

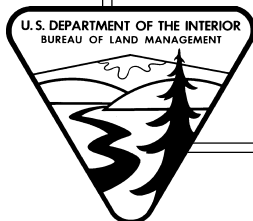
Serious Accident Investigation Report

North Stansbury Fire

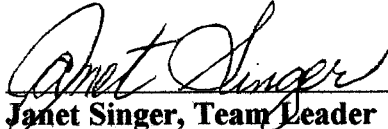
Two Lightning Strike Fatalities

August 23, 2000

Bureau of Land Management
Salt Lake Field Office
Salt Lake City, Utah



Serious Accident Investigation Team



Janet Singer, Team Leader
Deputy State Director
Montana State Office

9/21/00
Date



Bill Huntington, Chief Investigator
State Safety Manager
BLM, Arizona State Office

9/21/00
Date



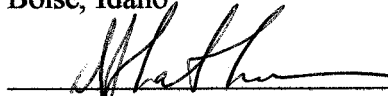
Stan Palmer, Safety and Health Advisor
National Interagency Fire Center
Boise, Idaho

9/21/00
Date



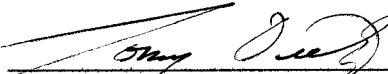
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9/21/00
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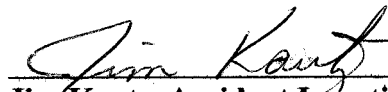
Don Latham, Lightning Technical Expert
Missoula Fire Laboratory
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9/21/00
Date



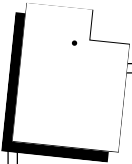
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Photo 1. Aerial view of North Stansbury Fire.

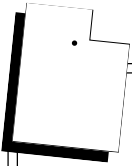
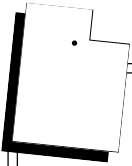
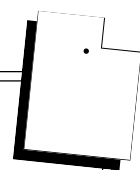




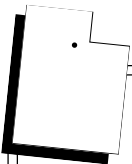
Photo 2. Aerial view of accident site.

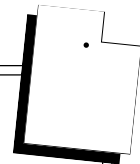




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Preface

Firefighters, by virtue of their occupation, routinely engage in one of the most dangerous activities within the Bureau of Land Management (BLM). Their occupation requires them to respond to managed wildland fires under various weather and environmental conditions and in various types of fuels and terrain. Pre-season efforts in the form of training and published guidelines have been established to anticipate occupational risks and hazards with the objective to safely guide the firefighter while working in these dangerous conditions. These guidelines may be found in the H-9213-1 *Standards for Fire and Aviation Operations 2000*, 1112-2 *Manual Safety and Health for Field Operations*, and PMS 410-1 *Fireline Handbook*. This accident was the result of exposure to one of the environmental hazards stated in the *Fireline Handbook*. This report will give guidance to the firefighters to perform their jobs more safely during thunderstorm activity.

The team acknowledges the cooperation of the employees at the Salt Lake Field Office of the Utah State Office of the BLM; the Utah Division of Forestry, Fire and State Lands; the Utah National Guard; the Utah Department of Corrections; and the Lone Peak Conservation Center Fire Suppression Resource, for assistance received during the investigation. The investigation could not have been accomplished in a timely manner without this assistance, and findings could not have been determined.

Memorial to the Crew

This report is dedicated to the Flame-in-go's Program of the Utah Division of Forestry, Fire and State Lands, in cooperation with the Utah Department of Corrections. The program, throughout its 22 years of service, has significantly contributed to wildland fire suppression throughout the country. Its exemplary performance has resulted in the saving of life, property, and resources on hundreds of wildland fires. The individual firefighters are commended for their efforts.



Executive Summary

A Utah Division of Forestry, Fire and State Lands Type 2 crew, Flame-in-go's, was struck by lightning at about 12:15 p.m. on August 23, 2000, while on the North Stansbury fire, fatally injuring two crew members, Rodgie Braithwaite and Michael Bishop. Four other crew members sustained serious injuries and were transported to the hospital for examination and released the same evening.

Initial attack on the North Stansbury fire began on Saturday, August 19. The fire was located in the Stansbury Mountains, about 40 miles west of Salt Lake City, Utah, south of Interstate 80.

The Flame-in-go's Type 2 hand crew was assigned to the fire on August 21.

The 20-person Flame-in-go's crew was transported via helicopter on August 23 from the Muskrat Field Station to a helispot near the fire line. Jerran Flinders, Flame-in-go's crew boss, and Tracy Dunford, an employee of the Utah Department of Forestry, Fire and State Lands, assembled the crew members at about 11:25 a.m. for their assignments and a weather safety briefing.

A Flame-in-go's short-squad, six firefighters, then proceeded toward its assigned work area. A storm cell with lightning, heavy rain, and marble-sized hail moved into the area at about 12:05 p.m.. The squad stopped walking to seek shelter, as instructed during the earlier briefing.

Initial visits to the site by members of the Serious Accident Investigation Team (SAIT) indicate the squad members were located on a relatively flat area at the edge of the fire line. All members had apparently covered themselves with tarps. One firefighter moved under a large juniper tree, two firefighters shared the same tarp near another nearby juniper tree, and the remaining three firefighters moved lower, below a rock outcropping. Lightning struck trees near where the squad had taken shelter.

Ben Taliulu, one of the squad members, radioed that the squad had been hit by lightning at about 12:30 p.m., and said two squad members were not breathing. Emergency procedures were started, and all the affected squad members were transported to the University of Utah Hospital by helicopter.

The Salt Lake Field Office manager was notified of the accident at 12:52 p.m.. The SAIT arrived in Salt Lake City on August 24 and the in-briefing occurred at about 2:00 p.m. The North Stansbury Fire was contained at 8:00 p.m. on August 23, at 250 acres.



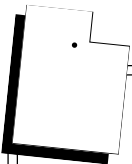
Investigative Process

A Serious Accident Investigation Team (SAIT) was mobilized on August 23. In accordance with 485 Department Manual, Chapter 7, a “Serious Accident Investigation Team” is convened when “. . . an accident where one or more fatalities and/or three or more personnel are in-patient hospitalized as a direct result, or in support of, wildland fire suppression or prescribed fire operation . . .” The team members were:

- Janet Singer, Team Leader, BLM, Billings Montana
- Bill Huntington, Chief Investigator, BLM, Phoenix, Arizona
- Tony Dietz, State of Utah Liaison, Salt Lake City, Utah
- Eric Reynolds, Operations Specialist, BLM, Boise, Idaho
- Dr. Don Latham, Lightning Technical Expert, Forest Service Research, Missoula, Montana
- Stan Palmer, Safety & Health Representative, BLM, Boise, Idaho
- Jim Kautz, Accident Investigation Photographer, Missoula Technology Development Center (MTDC), Missoula, Montana
- Kathy Hull, BLM State Office Liaison, Salt Lake City, Utah

The team received its Delegation of Authority (Appendix 1) from Lynn Findley, acting director, Office of Fire and Aviation, before proceeding to Salt Lake City. The team members received an in-briefing at the Salt Lake Field Office by Salt Lake Field Office Manager, Glen Carpenter, and proceeded to the accident site for familiarization and to photograph the site.

An Investigative Action Plan was developed to guide the team’s activities, interviews were conducted, and reference documents were obtained and reviewed. The team received assistance from BLM Salt Lake Field Office employees and the Utah Division of Forestry, Fire and State Lands staff. Close cooperation was provided by the Lone Peak Conservation Center Fire Suppression Resources staff and the Utah Department of Corrections in conducting interviews with the involved Flame-in-go’s crew. Personal protective equipment of the deceased were collected and sent to the MTDC for identification and analysis.



The following is a list of those directly involved and their positions on the North Stansbury Fire Incident:

Glen Carpenter.....Salt Lake Field Office Manager
Mike Turner.....Type III Incident Commander
Jerran Flinders.....Crew Boss, Flame-in-go's Type 2 Hand
Crew
Tracy Dunford.....Utah National Guard Liaison Officer
John Talbot.....Crew Boss, Utah National Guard Type 2
Hand Crew
Mark Terry.....Correctional Officer with Flame-in-go's
Steve Jackson.....Salt Lake Field Office Dispatch Duty Officer
Doug Gibbs, Melanie Frakes..Helitack Crew Members
Personnel.....Flame-in-go's Type 2 Crew
Injured: Michael Lindsay, Squad Leader
Ernest Chacon
Anthony Duran
Ben Taliulu
Fatalities: Rodgie Braithwaite
Michael Bishop

The Wildland Entrapment/Fatality Initial Report, Publications Management System (PMS) 0869, was completed on August 24. (Appendix 4)

A critical incident stress debriefing was conducted with all involved personnel by an outside consultant on August 24 at the BLM Salt Lake Field Office and at Muskrat Field Station. Utah Department of Corrections psychologists conducted a debriefing at the Utah State Prison for the involved crew members.

The 72-hour North Stansbury Fire Fatalities Report was prepared and submitted to Findley on August 26.

A close-out briefing of involved agencies and personnel was conducted on August 27, at the BLM Salt Lake Field Office.

A final Serious Accident Investigation Report was completed on October 6, 2000.



Incident Overview

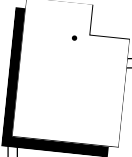
In August 2000, the fire season in the West appeared to be the worst in 50 years. The national planning level was at the most extreme, level five, due to the number of fires and the scarcity of resources. The situation in the Eastern Great Basin was the same with numerous starts and a scarcity of fire fighting resources. The Salt Lake BLM Field Office is located within the Eastern Great Basin. The Salt Lake Interagency Fire Center on August 18 responded to 10 new starts and was working several other extended-attack fires.

Two fires caused by lightning strikes were reported on Saturday, August 19, at 12:03 p.m., north of Muskrat Station by a single engine air tanker (SEAT), T-451. Air attack was dispatched to the area, and at 12:20 p.m., located a single tree fire with a ground fire burning in sage, grass, and juniper with some potential for spread. Initial attack efforts included the dispatch of Steve Griffiths, Tooele County fire warden, who assumed the role of initial attack incident commander (IC), with a state engine and a volunteer fire department (VFD) engine. Four Modular Airborne Fire Fighting System (MAFFS) C-130 aircraft also responded and dropped a total of eight loads of retardant. Mike Turner arrived on the scene at 10:00 p.m. and took command of the incident. The state and VFD engines with Griffiths were released from the fire at 11:30 p.m. Turner monitored the east side of the incident, and BLM engine 433 monitored the west side through the night.

A load of eight smokejumpers was ordered along with a Type 2 helicopter on Sunday, August 20. Mark Koontz, jumper-in-charge, had jumped the valley bottom east of the fire by 12:00 p.m. The smokejumpers were transported by helicopter to the fire. The smokejumpers worked the east flank until midday and were supported by helicopter bucket drops. The Flame-in-go's crew was ordered at 5:00 p.m. to arrive the following morning under an agreement with the Utah Division of Forestry, Fire and State Lands, and the BLM through the Statewide Annual Operating Plan 2000, reference; Authority, Cooperative Fire Protection Agreement, April 17, 1995. John Hawkins, a Boise smokejumper in transit, was asked to function as the IC for the night shift and Monday.

Suppression efforts continued on August 21 and at about 12:15 p.m., the Flame-in-go's crew, with Jerran Flinders, crew boss, arrived on the incident. The crew was briefed and transported to the incident by helicopter. The crew worked through the day with line construction, air-tanker drops, and helicopter bucket drops. The eight smokejumpers were demobilized at about 6:00 p.m.

Turner conducted a formal transition with Hawkins on Tuesday, August 22, at about 8:00 a.m. and resumed the role of Type 3 IC. Significant progress toward



fire containment was made throughout the day with helicopter support, line construction and other suppression activities. The Flame-in-go's were transported off the fire at the end of shift by helicopter on August 22.

A significant weather event was forecast for the central and northwest areas of Utah on August 23 (Appendix 5). Forecasts called for numerous thunderstorms, lightning, and large hail possible with a lightning activity level (LAL) of five, the highest rating given by National Oceanic and Atmospheric Administration other than for dry lightning events. Turner gave the crew leaders a morning briefing at Muskrat Station with assignments and current weather forecasts. Thunderstorm safety response guidelines were discussed.

The Flame-in-go's crew was transported by helicopter the morning of August 23, from Muskrat Station to a helispot near the fire line. At about 11:25 a.m., Flinders assembled the crew members for their assignments and a weather briefing. He discussed the procedures to take in the event of lightning activity. The crew was informed that if lightning began, it should move off the ridge to a safer location, abandon its tools, establish proper spacing, and turn off its radios.

A 21-person National Guard crew, with John Talbot as crew boss, and Tracy Dunford as liaison, was also assigned to the incident and transported to the helispot by helicopter that morning.

A Flame-in-go's short squad of six firefighters proceeded toward its assigned work area. A storm cell with lightning, heavy rain, and large hail moved over the area at about 12:05 p.m. These squad members stopped where they were at the time and sought shelter as instructed during the earlier briefing.

Flinders instructed the crew members to turn off their radios at 12:05, and said that he would check-in with them after the storm cell had passed by. Michael Lindsay, squad leader, had already turned off his radio and did not respond to the order. The strike that possibly caused the fatalities and resulting injuries occurred at about 12:12 p.m. as the storm cell was passing. The storm cell with lightning activity was noted in the immediate area for about 30 minutes (Appendices 3 and 5).

Initial visits by SAIT members indicated that the crew members were located on a relatively flat area at the edge of the fire line. All had apparently covered themselves with tarps. One squad member, Braithwaite, took shelter under a juniper tree (Tree A, photograph 3). Two other squad members, Chacon and Bishop, shared a tarp near another juniper tree about 14 feet to the south. The remaining three squad members, Lindsay, Duran, and Taliulu, moved about 30 feet lower on the slope to the east below a rock outcropping (Photographs 4, 5, and 6, and Diagram 1).



Photo 3. Locations of lightning strike trees.



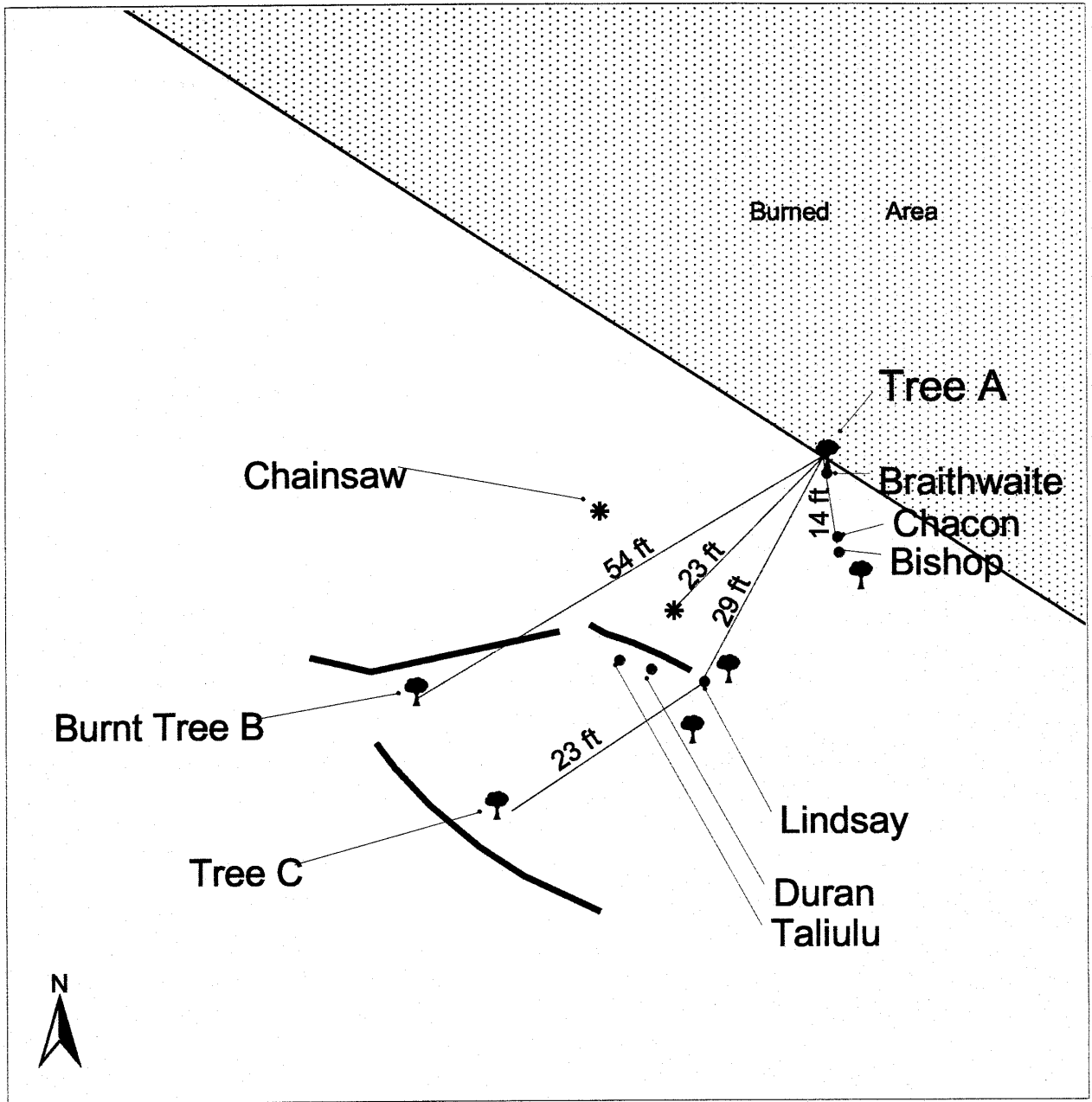
Photo 4. Aerial view of accident site and landing zone.



Photo 5. Fatality site.



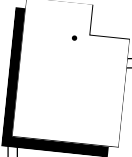
Photo 6. Locations of personnel.



SKETCH OF FATALITY SITE
NORTH STANSBURY INCIDENT
 August 23, 2000
 1200 hours

- * equipment
- rock ledge

Diagram 1. Sketch of the fatality site.



Mark Terry, correctional officer, saw one of the squad members come out of the trees yelling for help at about 12:30 p.m. Flinders turned on his radio at that time and heard Taliulu, one of the squad members, say the squad had been hit by lightning and that two squad members were not breathing.

Flinders was about one-eighth of a mile away from the accident site at the helispot. He instructed the squad to initiate cardiopulmonary resuscitation (CPR) and then ran to the accident site. Flinders requested the helicopter upon arrival and directed it to a landing zone near the accident site. CPR continued on the two firefighters while they were loaded on the helicopter along with a third injured firefighter, Chacon. CPR was continued by helitack crew members, Doug Gibbs and Melanie Frakes, while in flight to the University of Utah hospital arriving at about 1:00 p.m. The remainder of the injured squad members were flown to the hospital by another fire incident helicopter and a hospital medivac helicopter. All six firefighters were at the hospital by 2:25 p.m.

Two Flame-in-go's firefighters, Braithwaite and Bishop, were pronounced dead by the medical staff at the University of Utah Hospital at 1:21 p.m., August 23. The other four firefighters, Chacon, Lindsay, Duran, and Taliulu, were treated and released later that evening.

The fire was contained at 250 acres at 8:00 p.m., August 23 (Map 1). Periodic monitoring occurred during the following three days.

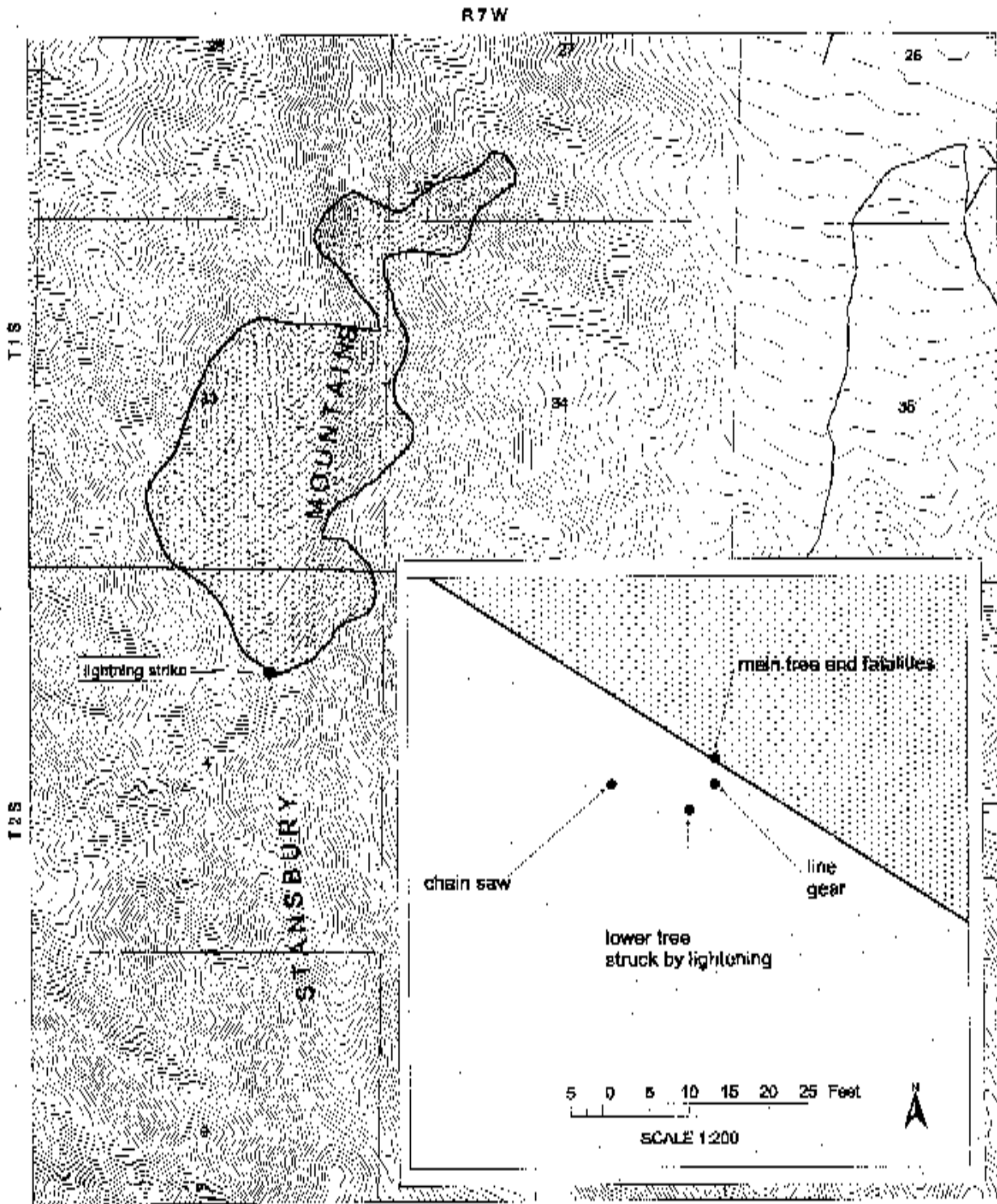
The remainder of the Flame-in-go's crew and the National Guard crew walked off the incident to the Muskrat Station, and all were accounted for by 3:40 p.m.

The SAIT was requested and it received a Delegation of Authority at 7:00 a.m. on August 24 in Boise. The team traveled to Salt Lake Field Office where it received an in-briefing conducted by the BLM Salt Lake Field Office manager at 2:00. The investigation was conducted in accordance with 485DM, Chapter 7, Serious Accident Investigation.





Factors

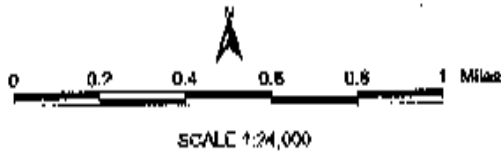
Human

Training, Qualifications, and Experience of the incident managers and the crew were examined. Records indicated Turner, IC, had more than eight years of fireline experience and was rated as a Type 3 and Type 4 Tactical Incident Commander. The Flame-in-go's Crew Boss, Flinders, and



NORTH STANSBURY Q106

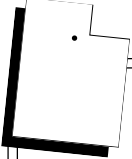
-  Burn Area
-  Public Land
-  Private Land
-  State Land



Bureau of Land Management
Salt Lake Field Office
August 26, 2000

This product may not meet BLM standards for accuracy and content. Different data sources and input scales may cause misalignment of data layers.

Map 1. Map of the North Stansbury incident.



the crew members were trained in accordance with National Wildfire Coordinating Group (NWCG) standards as stated in the NWCG 310-1, and were experienced. They had completed 18 previous fire assignments during the 2000 fire season.

Physical Fitness and Health records for crew members indicated they met the arduous standards for physical fitness. The crew was well rested, and prepared for its respective fire assignment.

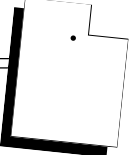
Leadership/Decision-Making of those in charge of the incident were deemed to be well thought-out, decisive. During the critical period before and after the lightning strike, the decisions made by the leadership indicated that it was well-trained with experienced managers/supervisors. All those directly involved, and those in supporting roles, performed admirably.

Medical Reports were received from the Utah Office of the Medical Examiner. Both reports indicate that the immediate cause of death was electrocution due to the lightning strike. Historical medical records from the Utah Department of Corrections indicated no immediate medical problems that would have contributed to the fatalities.

Communication between the crew and the incident command post (ICP) were good during the entire incident with the exception of the period when the storm cell went over and the crew members were instructed to shut off their radios until the storm had passed. They shut off their radios because of their understanding of the “thunderstorm safety” section found in the *Fireline Handbook*, PMS 410-1. The Flame-in-go crew followed these procedures.

Compliance with Established Standards and Guidance were found to have been followed by all involved with the incident. The “10 Standard Fire Orders,” the “18 Situations That Shout Watch Out,” and the Lookouts, Communication, Escape Routes, and Safety Zones (LCES) principles were not found to have been compromised, nor did they play a role in the accident. In fact, this was an example of a “textbook” fire response and the SAIT could not find any compromises nor failures in following proper procedures.

Management Oversight. Upon detection of the North Stansbury Fire, suppression began immediately with the limited resources available for initial attack.



After escape from initial attack, a Wildfire Escape Situation Analysis (WESA) was conducted. Options were considered, and a suppression alternative was chosen with more resources assigned to the fire.

The organizational structure was adequate throughout the duration of the incident providing proper oversight and control. In fact, for an incident of this size and complexity, it was extremely well-organized. Transitions between incident commanders were noted in dispatch and unit logs.

All fire suppression decisions were sound and within established policy as noted in the *Standards For Fire Operations 2000*, Chapter 2 and Chapter 10. No violations of safety protocol were noted. All actions were conducted following the 10 Standard Fire Orders, the 18 Situations That Shout Watch Out, and the LCES principles.

Equipment

Personal protective clothing of Michael Bishop and Rodgie Braithwaite were collected and sent to the Missoula Technology Development Center (MTDC) for identification and analysis. Fire Equipment Specialists Leslie Anderson and George Jackson, and photographer Jim Kautz, USDA Forest Service, MTDC, inspected the personal protective clothing on September 13, 2000. The inspection and analysis report is on file and was not made a part of this investigation report. The analysis indicated that the equipment performed as intended. Other fire equipment did not play any instrumental role in the lightning strike and the resulting fatalities.

The NWCG *Fireline Handbook* (1998), PMS 410-1, requires that firefighters wear a hardhat, 8" laced leather boots with slip-resistant soles, leather gloves, fire shelter, and flame-resistant clothing while on the fireline. Undergarments (T-shirt, underwear, and socks) worn under fire-resistant clothing should be of natural, or mostly natural, fibers.

Clothing worn by Rodgie Braithwaite was inspected at the MTDC and met both Forest Service and NWCG standards for wildland firefighting. Gloves, hardhat, and undergarments were not sent to the MTDC for analysis.

Clothing worn by Michael Bishop was inspected at the MTDC and met both Forest Service and NWCG standards for wildland firefighting. Hard hat and under garments were not sent to the MTDC for analysis.



Environmental

Weather forecasts indicated as early as August 19 that a change of weather was moving over the forecast region and that thunderstorms with lightning, rain, and hail were to be expected (Appendix 5). The daily forecasts, up to the incident on August 23, were progressively worse with a level five LAL forecasted for August 23. This was the fifth day of the North Stansbury fire and containment was expected at 6:00 p.m. on August 23. Fire behavior experienced was as predicted, with no deviations. Area fuels consisted of juniper, sagebrush, and grass. The intensity of the thunderstorm, with numerous cloud-to-ground lightning bolts, heavy rain, and marble-sized hail, was the only unusual event. Lightning records (Appendix 3 and 5) indicate that a small storm cell began active cloud-to-ground lightning at about 12:00 p.m. The storm cell generated lightning bolts to the ground between 12:00 and 12:30 p.m. The strikes were within about one kilometer of the accident site, most of them on the western side of the main north-south ridge. One of these ground strikes, most probably strike seven (Appendix 3 and 5), caused the fatalities.

Findings and Recommendations

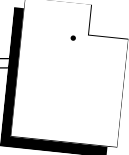
A **Root Cause Analysis Technique** was used to identify findings that had an influence on this lightning strike event. The investigation team identified the causal factors and since no significant stand-alone cause was found, the team members made the following recommendations. See Appendix 7 for Determination of Causal Factors Model.

Finding 1

Instructions in the Fireline Handbook, PMS 410-1, for Thunderstorm Safety, Chapter 5, Page 54, need to be reviewed. The following guidelines are unclear:

- ◆ “Do not use radios or telephones.”

Communication between supervisors and crews during fire suppression activities is critical. Although the event during which the radios were turned off was covered by the thunderstorm guidelines of *Fireline Handbook*, PMS 410-1, as developed by the



NWCG, the team recommends that this practice be reviewed. There is strong evidence that the act of leaving the radios on during thunderstorm events, has no effect on the safety of the radio users.

- ◆ “Sit or lie down if in open country.”

It was noted during the investigation that most short squad members were sitting on their day packs. Braithwaite was laying on the ground up against his day pack which was leaning on Tree A. Lightning research indicates crew members should not lie down during thunderstorm activity and suggests that firefighters sit on their day packs with their feet together in an open area. This would minimize the area of the body in contact with the ground, thus reducing the potential to carry ground current.

Recommendation:

The Director of Fire and Aviation will designate a task group to update the Thunderstorm Safety section of the *Fireline Handbook*, Chapter 5, based on current lightning and thunderstorm research and data. The task group will forward their revision to the NWCG Safety and Health Working Team to update the *Fireline Handbook*.

Finding 2

The Flame-in-go’s crew was trained in accordance with the standards and qualifications in NWCG, PMS 310-1 “Wildland and Prescribed Fire Qualifications System Guide.” In the event of separating the squads, when on fire assignments all supervisory personnel should be trained in basic emergency fire aid as recommended in NWCG, PMS 410-1 “Fireline Handbook #3,” which is a nationally recognized fireline reference guide.

Recommendation

BLM Director of Fire and Aviation will recommend that seasonal firefighter training, including contractor and cooperator training, will include basic emergency first aid as stated in the PMS 410-1 *Fireline Handbook*, Chapter 5, page 65.



Finding 3

BLM *Standards for Fire and Aviation Operations 2000*, H-9213-1, does not have safety precautions for firefighters during lightning and thunderstorm activity.

Recommendation:

The BLM Director of Fire and Aviation will recommend BLM fire program management consider adding thunderstorm safety precautions to the next *BLM Standards for Fire and Aviation Operation 2000* update.

Finding 4

Emergency preparedness procedures and notification processes were in place at the field office and enhanced the emergency response.

Recommendation:

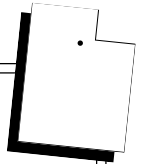
Director of Fire and Aviation will recommend all BLM fire organizations have Emergency Guidelines and Reporting procedures in place. These will be reviewed in unit, state, and national preseason preparedness reviews.

Finding 5

All firefighting standards and operations for initial and extended attack fire were followed. The thunderstorm safety guidelines as written in the *Fireline Handbook* were followed.

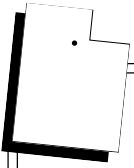
Recommendation:

The Utah fire organization will continue to use the guidelines and checklists for initial attack and extended attack outlined in the *Fireline Handbook*, Chapter 2, and *Standards for Fire Operation*, Chapter 10, Extended Attack. They will continue to train initial attack incident commanders Type 4 to the Type 3 level and above. This will meet the need for more ICs due to the increased number of complex incidents to which the Utah BLM firefighting resources respond.



Appendix

1. Delegation of Authority.....	A1-1
2. Chronology of Events.....	A2-1
3. Lightning Report and Photographs.....	A3-1
4. Wildland Fire Entrapment/Fatality Initial Report.....	A4-1
5. Weather Reports.....	A5-1
6. Map, and Diagrams.....	A6-1
7. Determination of Causal Factors Model.....	A7-1



Appendix 1

**UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT**

Office of Fire and Aviation
3833 S. Development Ave
Boise, Idaho 83705-5354

In Reply Refer To:
9210 (FA-100)

August 23, 2000

Memorandum

To: Janet Singer, Team Leader
From: Director, Office of Fire and Aviation
Subject: Delegation of Authority - Serious Accident Investigation

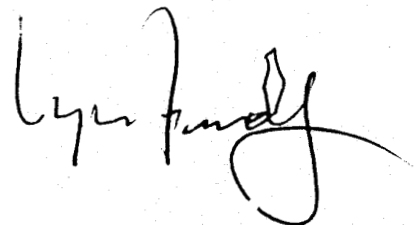
This memo provides official delegation of authority for the conduct of serious accident investigation for:

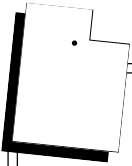
Fire name: North Stansbury
Location: Grantsville, Utah
Date of occurrence: August 23, 2000

As Team Leader, you are responsible for ongoing (daily) briefings to me. The information you provide will be shared with the Bureau Designated Agency Safety and Health Official and the Bureau Safety Manager. You are also responsible for the following formal briefings/reports in accordance with Departmental Manual 485, Chapter 7.

Preliminary brief (24 hours)
Expanded brief (72 hours)
Final report (45 days)

This investigation shall be conducted objectively to gather facts and evidence related to the accident, in accordance with the guidelines set in Departmental Manual 485, Chapter 7.





Appendix 2

CHRONOLOGY OF EVENTS

August 18
Friday

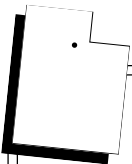
Severe thunderstorms in the area throughout the day.

August 19
Saturday

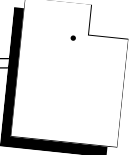
- 12:03 p.m - Tanker 451, single engine air tanker (SEAT), reported two fires three miles North of Muskrat. Air attack dispatched to the area.
- 12:20 p.m - Air attack 70K reported a fire with some potential at 40 40.78 X 112 38.00. Recommended the use of a SEAT to immediately suppress due to spread potential. Single tree with some ground fire, named North Stansbury Fire.
- 3:34 p.m. - Fire backed toward Timpie Valley. Steve Griffiths (Incident Commander (IAIC)) with one VFD engine and one state engine and four MAFFS units work the fire through the day.
- 10:00 p.m. - Mike Turner on scene and assumes command of the incident.
- 11:30 p.m. - State and VFD engines sent to station. Mike Turner monitors the east flank and E-433 monitors the west flank of the fire throughout the night.

August 20
Sunday

- 8:00 a.m. - Miscellaneous suppression work throughout the day. Ordered numerous resources to include a Type 2 helicopter and smokejumpers (load of eight out of Vernal; Mark Koontz is jumper-in-charge).
- 12:00 p.m. - Smokejumpers jumped on flat east of fire and then shuttled in by helicopter. Helicopter bucket drops were made throughout the day.
- 5:00 p.m. - Flame-in-go's Type 2 crew ordered to arrive on fire the following morning.

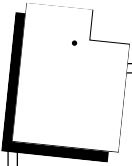


-
- 8:53 p.m. - Hawkins (Boise smokejumper) took over the fire. Hawkins to run fire that night and Monday.
- August 21
Monday
- 12:17 p.m. - Flame-in-go's Type 2 crew (Jerran Flinders - crew boss) arrived on fire.
- 6:00 p.m. - Eight smokejumpers demobed.
- August 22
Tuesday
- 8:09 a.m. - Turner transitioned with Hawkins and resumed as Type 3 IC. Currently one helicopter, one water tender, Flame-in-go's crew, two Forest Service engines assigned to fire (E-71 and E-41). Continued suppression efforts throughout the day. The Flame-in go's worked the east side of the fire. Helicoptered to the fire in the morning and off about 1800.
- August 23
Wednesday
- 8:00 a.m. - Turner at Incident Command Post (ICP) at Muskrat station. A 21-person National Guard crew is assigned to the fire (Talbot, Crew Boss) along with Flame-in-go's and helicopter AHP.
- 9:45 a.m. - Crew shuttle began for National Guard and Flame-in-go's. Helispot in saddle on east side of fire.
- 11:25 a.m. - Crew shuttle complete. Crew briefed which included lightning precautions and walked to their assigned work areas.
- 12:05 p.m. - Lindsay's squad with Flame-in-go's crew sought shelter at the south end of the fire perimeter due to thunderstorm activity with heavy rain and hail.
- 12:10 p.m. - Flinders instructed crew to turn off radios and seek shelter.
- 12:30 p.m. - Flinders turned radio back on and received call from Tailulu that squad had been hit by lightning, two people with no pulse and not breathing. Tracy Dunford asked to call for medivac and inform Turner. CPR started immediately on Braithwaite



and Bishop. Helicopter AHP flies to fire and instructed by Flinders to land at new helispot within forty feet of injured parties. Braithwaite, Bishop, and Chacon loaded.

- 12:49 p.m. - Helicopter AHP off North Stansbury fire to Salt Lake City hospital. Helitack crew members of AHP Doug Gibbs and Melanie Frakes administered CPR en route.
- 12:55 p.m. - Turner requested another medivac. Two individuals unable to walk, plus two who can walk. Dispatch called Air Med (University of Utah) and 9AH (Bell 206 in Tooele).
- 1:40 p.m. - National Guard medics assisted Flame-in-go's crew and Air Med arrives and picks-up Lindsay and Tailulu for transport to Salt Lake medical facility.
- 1:56 p.m. - 9AH inbound to fire for last two individuals.
- 2:10 p.m. - 9AH off fire en route to Salt Lake medical facility.
- 2;15 p.m. - AHP picked-up last squad member and Crew Boss Flinders at the helispot.
- 2:20 p.m. - Remainder of Flame-in-go's and National Guard crews walked off the mountain, about one hour walk to pick-up point.
- 3:40 p.m. - All individuals accounted for and standing down at Muskrat.



Appendix 3

LIGHTNING REPORT

Background:

Because the effects of lightning are generally not well known, some background information is included. Lightning is an electrical discharge between a cloud and the ground (ground flash) or between portions of a cloud or clouds (cloud flash). Here, we will use flash to mean ground flash. A flash is composed of one or more discrete events, called strokes, averaging 3 strokes per flash. Each stroke actually consists of two events, a leader and a return stroke. In normal negative flashes, such as those causing this accident, a leader proceeds from the cloud toward the ground. At a distance of about 10 m (30 ft) from the ground, an electrical breakdown occurs, accompanied by a current flow in the terminus, and the return stroke, the bright part of the lightning that the eye sees, proceeds back toward the cloud. The duration of the return stroke is about 40/1,000,000 of a second (40 microseconds). Because of the very short duration of the stroke discharge, the electric currents associated with the discharge travel on the surface of objects associated with the ground terminus of the stroke. Thus, usually, scars are found on the surface of trees, in the cambium, wet, layer just under the bark, or on the surface of trees wetted by rain. The electric currents that flow to the terminus of strokes also flow on or near the surface of the ground. Since the current can be as much as 100,000 Amperes, significant currents flow in the ground to the location of the terminus. A stroke can also have more than one terminus on the ground. Strokes very often stop following a tree and “flashover” to the ground or a nearby object.

Investigation of the site:

Three recent lightning scars were found at the site of the accident. One scar was on the tree nearest Braithwaite, Tree A, the other two 23 feet and 54 feet away (Trees B and C, sketch of site, appendix 6). Tree A had a light coating of recent retardant. The lightning strike to Tree A removed retardant coated material, thus was subsequent to the retardant drop three days before (20 August). The terminus of the strike to Tree A was in a crevice within 2 feet of Braithwaite’s pack at the base of the tree on the West side near the pen on photo 3-1. The scars are shown on photos 3-2 and 3-3, including the last scar on the tree near the base to the right of the pen on photo 3-3. Tree B had burned in the fire, and the scar on that tree was clearly after the burn (photo 3-4). The terminus of the strike to Tree B was on a rock at the base of the tree, five to seven inches from the tree (photo 3-5). The terminus of the strike to Tree C was not found, but fresh scars were found all the way down the tree as in photo 3-6. No fresh scars were found on other trees within 100 m of the site, although old scars were evident.

GAI lightning location system lightning locations closest to the site are plotted on the DEM terrain map in Fig. 3-7, and their characteristics in the accompanying table. According to the witness timing (chronology of events), the most likely lightning flash causing the accident was the flash marked #7 on the figure and in the table. Although this flash is not apparently as close to the site as other flashes, it is within the error of the lightning location system. We feel that the timing is far better than the locations as an indication of the causal flash. Witnesses do not report flashes very close to their location except for the flash causing the accident.

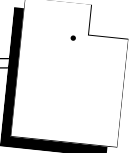
Flash #	Time,MDT	latitude	longitude	current	# strokes	remarks
1	12:00:30	40.664	-112.626	-80	3	
2	12:01:25	40.673	-112.636	-80	4	Likely by location, out by timing
3	12:02:18	40.685	-112.650	-100	2	
4	12:03:11	40.685	-112.627	-60	1	
5	12:04:39	40.692	-112.635	-50	1	
6	12:06:33	40.684	-112.647	-60	1	
7	12:12:57	40.683	-112.691	-70	1	Most likely by timing, location error large
8	12:25:35	40.674	-112.634	-140	1	Likely by location, out by timing
9	12:25:35	40.685	-112.634	-80	1	

Lightning table. Flashes between 12:00:00 and 12:30:00 on August 23, 2000, North Stansbury Fire Incident, in the vicinity of the accident.

Inferences:

The accident was caused by a single lightning flash, #7. Both fatalities apparently resulted from one path to ground, that of tree A, from this flash. The three paths to ground, based on tree scars, were either from multiple strokes in this flash, or multiple paths to ground from one or more strokes in the flash. The most likely case is a three-stroke flash. Lightning location multiplicities, that is, the number of strokes in a given flash, from lightning location data, can be in error, as can the location. In any case, the lightning causing the accident would probably have been over within about one-half second.

The Medical report and the Personal Protective Equipment Analysis report are in the file. Due to the contents they are not made a part of this investigation report.



These two reports, together with witness statements, lead to the conclusion that the lightning ground path from tree A included both Braithwaite and Bishop. Braithwaite was probably struck directly from a flashover from the tree striking him in the neck, the current flowing to ground through his back and buttocks. Bishop was reported to have been “soaking wet” and was lying on wet ground 14 feet from Braithwaite. Another member of the group, Chacon, lying next to Bishop, and closer to the terminus on tree A, was temporarily paralyzed. He was drier than Bishop, and had his rain gear on. Bishop’s clothing also shows multiple burn spots on buttocks and back. Ground currents flowing to the terminus on tree A no doubt caused the injury to Chacon and the death of Bishop.

The three other members of the group, Lindsay, Duran, and Tailulu were injured and dazed, probably by the discharge to tree C, possibly also from tree B, and could also have received current from tree A. The whole group of six probably intercepted currents of varying strength from all three terminus trees, but again, it was undoubtedly the current from tree A that caused the fatalities.

Recommendations:

This investigation prompts some recommendations for alteration to the Fireline Handbook to increase safety under thunderstorm conditions.

- 1) DO NOT LIE DOWN. As the fatalities investigated here show, intimate contact with the ground over extensive body surface can provide deadly current flow. The best position is sitting on the pack or crouching, with feet close together. Avoid sitting directly on the ground if possible, but if necessary, keep feet and butt close together. Crouching for extended periods is not easily done, so sit on the pack. Covering up with a ground cloth or space blanket is OK. Sitting on a ground cloth is OK too.
- 2) Removing caulk boots will not provide safety if stocking covered or bare feet are then in contact with the ground. Don’t bother.
- 3) “Stay out of dry creek beds” is correct for flash floods, but has nothing to do with lightning.
- 4) One of the problems in this accident was lack of communications. HT RADIOS (rubber ducky antennas) OR CELL PHONES ARE SAFE TO USE! Don’t use land line phones or radios with long whip antennas.
- 5) Wide-open spaces are better than trees or clumps of trees in the vicinity. Ridge tops etc. should be avoided.
- 6) If you feel the hair on your arms or head “stand up,” there is a high probability of a strike in the vicinity. Get crouched or sit on pack.

Dr. Don Latham
Project Leader, RMRS-4401



Photo 3-1

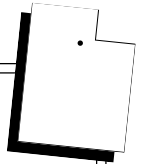


Photo 3-2



Photo 3-3

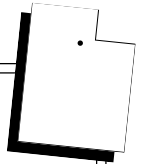


Photo 3-4



Photo 3-5

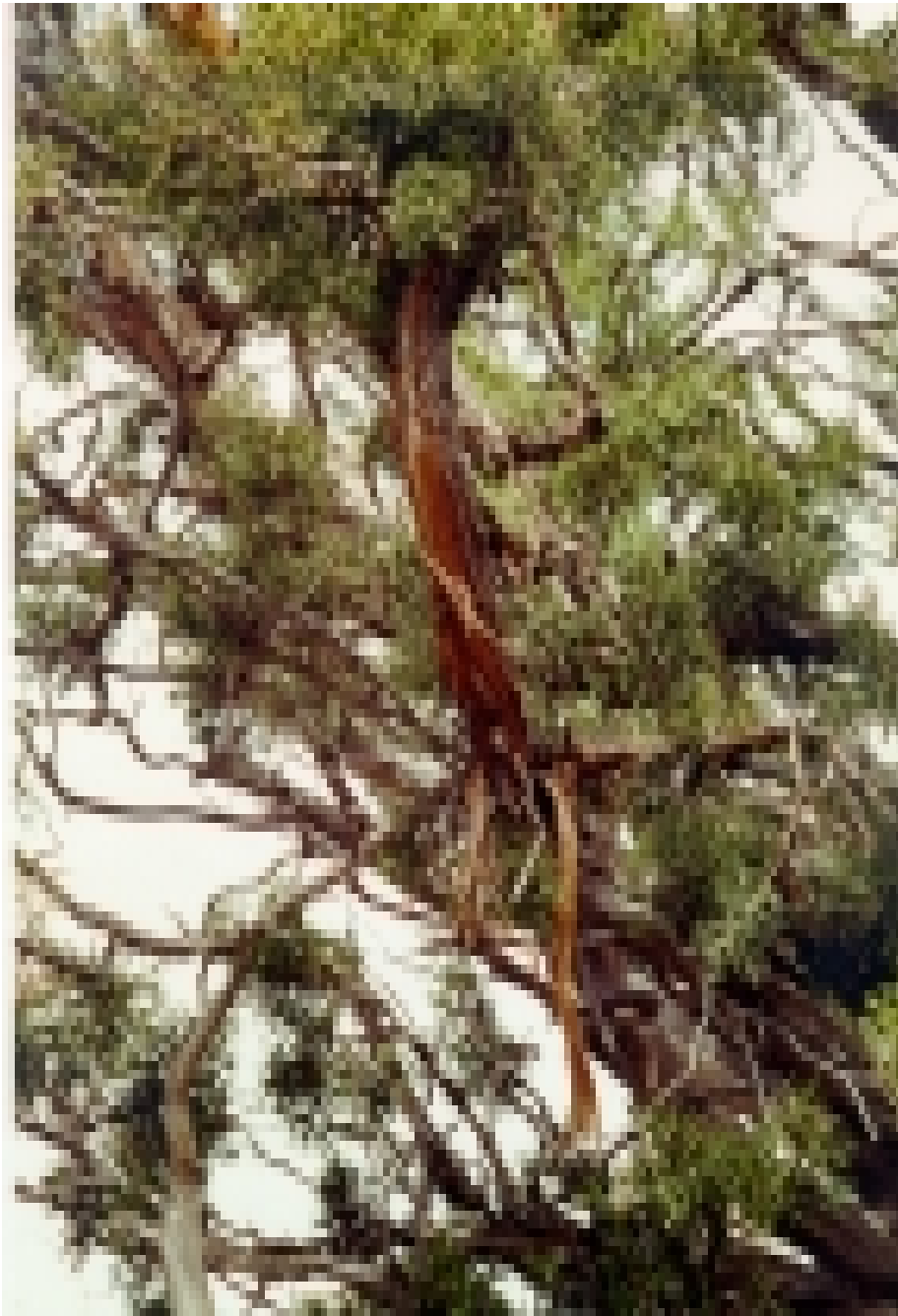
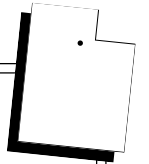
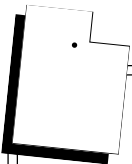
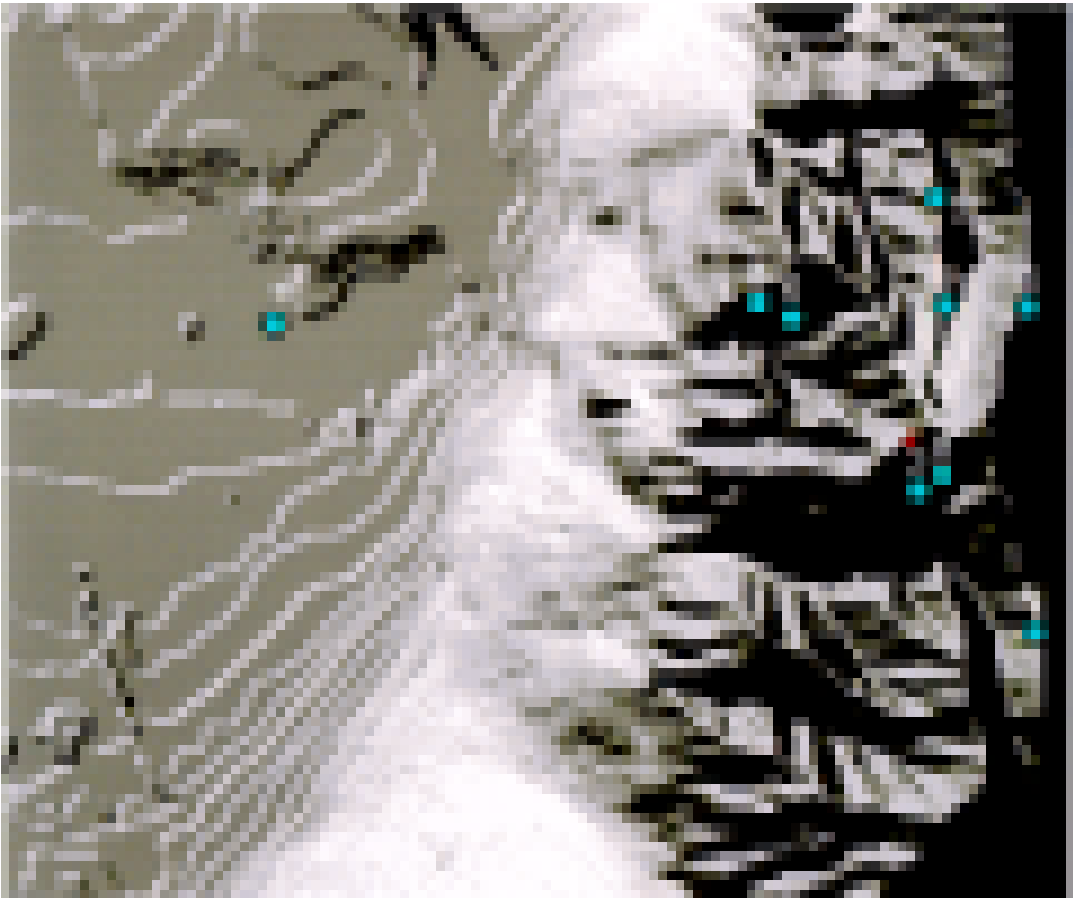


Photo 3-6



Utah Lightning Fatality



- Lightning Strikes
- Fatality Location

Figure 3-7

**WILDLAND FIRE ENTRAPMENT/FATALITY
INITIAL REPORT**

Timely reporting of entrapments or fatalities is necessary for the rapid dissemination of accurate information to the fire management community. It will also allow fire safety and equipment specialists to quickly respond to these events as appropriate. This initial report does not replace agency reporting or investigative responsibilities, policies or procedures. Complete this report for fire-related entrapment and /or fatalities. Immediately notify the National Interagency Coordination Center (NICC) attn: Intelligence Section. Submit this written report to the address given below within 24 hours. Submit even if some data are missing.

NICC- National Interagency Fire Center
3833 S. Development Avenue
Boise, Idaho 83705-5354

Phone -(208)-387-5400
FAX-(208)-387-5414

NICC Intelligence Section
IBM:idnic/wo,nifc

I. General Information

- A. Date August 23, 2000
- B. Fire Name and location North Stansbury Mountain Fire, 40 Miles west of Salt Lake City, Utah
- C. Number of personnel involved Six
- D. Number of injuries Six
- E. Number of fatalities Two

II. Fire Related Information

- A. Fuel Model Timber with grass under story
- B. Temperature 70s RH _____ Wind _____ (Mph)
- C. Topography Ridge Top Slope 76 %
- D. Fire size at time of incident/accident 250 Acres
- E. Urban/Wildland intermix Yes No
- F. Cause of Fire Natural Incendiary Accidental Unknown

III. Entrapment

A situation where personnel are unexpectedly caught in a fire-behavior related, life threatening position where escape routes or safety zones are absent, inadequate or have been compromised. An entrapment may or may not include deployment of a fire shelter.

A. Entrapment information

- | | | |
|--|--|---|
| 1. Firefighter trapped | <input type="checkbox"/> with fire shelter | <input type="checkbox"/> without fire shelter |
| 2. Burns/smoke injuries incurred while escaping entrapment | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 3. Burns/smoke injuries incurred while escaping entrapment | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 4. Burns/smoke injuries incurred while fighting fire | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 5. Fire shelter performed satisfactorily | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 6. Fire shelter was available, but not used | <input type="checkbox"/> Yes | <input type="checkbox"/> No |

B. Personal Protective Equipment Used

Entrapment information

- | | | | |
|-------------------------|--|---------------------|--|
| 1. Fire Shelter | <input type="checkbox"/> Yes <input type="checkbox"/> No | 5. Protective Shirt | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| 2. Protective Pants | <input type="checkbox"/> Yes <input type="checkbox"/> No | 6. Hard hat | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| 3. Gloves | <input type="checkbox"/> Yes <input type="checkbox"/> No | 7. Boots | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| 4. Face/Neck Protection | <input type="checkbox"/> Yes <input type="checkbox"/> No | 8. Goggles | <input type="checkbox"/> Yes <input type="checkbox"/> No |

IV. Fatalities

A. Type of accident

- | | |
|--|--|
| <input type="checkbox"/> 1. Aircraft | <input type="checkbox"/> 5. Vehicle |
| <input checked="" type="checkbox"/> 2. Natural (lightning, drowning, etc.) | <input type="checkbox"/> 6. Smoke |
| <input type="checkbox"/> 3. Medical (heart, stroke, heat, etc.) | <input type="checkbox"/> 7. Entrapment |
| <input type="checkbox"/> 4. Stuck by Falling Object | <input type="checkbox"/> 8. Other |

B. Where Fatalities(s) occurred

- | | |
|--|--|
| <input checked="" type="checkbox"/> 1. Fire Site | <input type="checkbox"/> 3. In transit |
| <input type="checkbox"/> 2. Incident Base | <input type="checkbox"/> 4. Other |

C. Fatalities

- | | | | |
|--|---------------------------------|-----------------------------------|---|
| 1. <u>Michael Bishop</u> DOB <u>1973</u> | | | |
| Employment status | <input type="checkbox"/> Career | <input type="checkbox"/> Seasonal | <input type="checkbox"/> Casual <input checked="" type="checkbox"/> Other |
| 2. <u>Rodgie Braithwaite</u> DOB <u>1974</u> | | | |
| Employment status | <input type="checkbox"/> Career | <input type="checkbox"/> Seasonal | <input type="checkbox"/> Casual <input checked="" type="checkbox"/> Other |

Note: In the event of fatality(s), do not release name(s) until next of kin are notified.

D. Employing agency Utah State Department of Corrections-

E. Unit name and address Utah State Prison, Draper, Utah

F. Firefighting part of employee's job description Yes No

G. Person to contact for additional information David Dalrymple Phone 801-538-5501

Home unit address Utah State Prison, Draper, Utah

H. Brief description of accident Inmates Michael Bishop and Rodgie Braithwaite were mopping up the North Stansbury Mountain Fire when they were hit with an intense flurry of lightning strikes in the area. They were accompanied by Jarin Flinders, who was uninjured. Inmates Ernest Chacon, Benjamin Taliulu and Anthony Duran were treated and released. Inmate Michael Lindsay is expected to be released to day.

Appendix 5

STANSBURY INCIDENT/LIGHTNING STRIKE

8/23/00

Prepared by William J. Alder
Meteorologist in Charge
Salt Lake Forecast Office

WEATHER SYNOPSIS: A typical summer-time monsoonal pattern with tropical moisture had encompassed the majority of northern Utah on August 17th-18th. This moisture is conducive to mainly afternoon and evening showers and thunderstorms. The late afternoon and evening of August 18th was very active with numerous showers and thunderstorms with frequent lightning.

The lightning detection system the National Weather Service uses is from Global Atmospheric Incorporated in Tucson, Arizona. The lightning data showed 3800 cloud-to-ground lightning strikes in an area from Weber to Utah counties, Tooele Valley to Kamas from 4:00 PM MDT-midnight on August 18th. Only minimal amounts of rain accompanied the thunderstorms in the Tooele valley with Tooele reporting .26 inches of rain, Stansbury Park .19 and Grantsville .05.

Even though the Stansbury wildfire was not reported until August 19th, it most likely started in the evening hours of August 18th.

August 20th-22nd were mostly dry with some spotty showers and thunderstorms in southern and eastern Utah on the 22nd.

The monsoonal flow of tropical moisture returned to northern Utah on August 23rd.

SALT LAKE DOPPLER RADAR: The Salt Lake Doppler Radar located on Promontory Point provides weather surveillance over northern Utah. The weather chronology from about noon-1:22 PM on August 23rd was as follows...

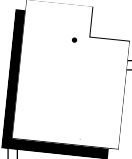
At 11:30 AM MDT a weak (30 dBz) shower developed over the northern portion of the Stansbury Mountains, about 9 miles west-southwest of Grantsville. This was the first convective development of the day in northwest Utah.

By 11:45 AM MDT this shower had strengthened to moderate reflectivity (45 dBz) as it drifted slowly northward.

At 12:01 PM MDT the original shower had increased to 53 dBz as it drifted across I-80. At this time a new shower began developing at about the same location as the original shower developed.

By 12:06 PM MDT the second shower reached 54 dBz and was located about 8 miles west of Grantsville. It then weakened slowly as it drifted north to cross I-80 at 12:30 PM MDT.

At 12:35 PM MDT rapid redevelopment of showers began along the path that the two earlier showers had followed, extending from about 8 miles west of Grantsville to near I-80.



Rapid development continued in that area for about 20 minutes with the storm reaching it's peak intensity (61 dBz) at 12:53 PM MDT. The core of the storm was located 8 miles west-northwest of Grantsville at that time.

The storm maintained about the same intensity until 1:10 PM MDT as it drifted slowly northward. At that time it was located 10 miles northwest of Grantsville.

The storm then weakened as it continued north with the core moving across I-80 at 1:22 PM MDT.

LIGHTNING DETECTION CHARTS: 15-minute lightning data indicated about 5 cloud-to-ground lightning strikes from 12:15-12:30 PM MDT over the north end of the Stansbury mountains and an additional 5 more cloud-to-ground lightning strikes from 12:30-12:45 PM MDT. The 30-minute lightning data indicated lightning was more active just north of I-80 and over the extreme portion of the Great Salt Lake.

WEATHER FORECASTS: The first spot weather forecast request on the fire was in the afternoon of the 19th. Several additional spot forecasts were issued on August 20th-21st. At 1:30 PM MDT on August 22nd, and a last spot forecast was requested. This forecast indicated that the weather for Wednesday, August 23rd would be "mostly cloudy with showers and thunderstorms likely...a 60 percent probability". The LAL was forecast to be 5 and the Haines Index was 4."

The 9:00 AM MDT August 23rd Fire Weather Forecast for Utah Fire Weather zones 423/424 (which straddle the Stansbury range) indicated; "Mostly cloudy with numerous showers and wet thunderstorms developing by midday in the mountains. Numerous showers and wet thunderstorms developing during the afternoon in the valleys and deserts. Locally heavy rain possible." The LAL was 5 and the Haines Index 4-5.

At 12:10 MDT a Short Term Forecast was issued for Utah zones 3-5 that indicated showers and thunderstorms where located over south Utah county . The verbiage stated; "Additional thunderstorms are also developing over the Stansbury Mountains in eastern Tooele county. Etc."

At 1:00 PM MDT a Special Weather Statement was prepared that indicated that the showers and thunderstorms were developing rapidly over Utah, some of which will produce locally heavy rain, gusty winds, and frequent lightning.

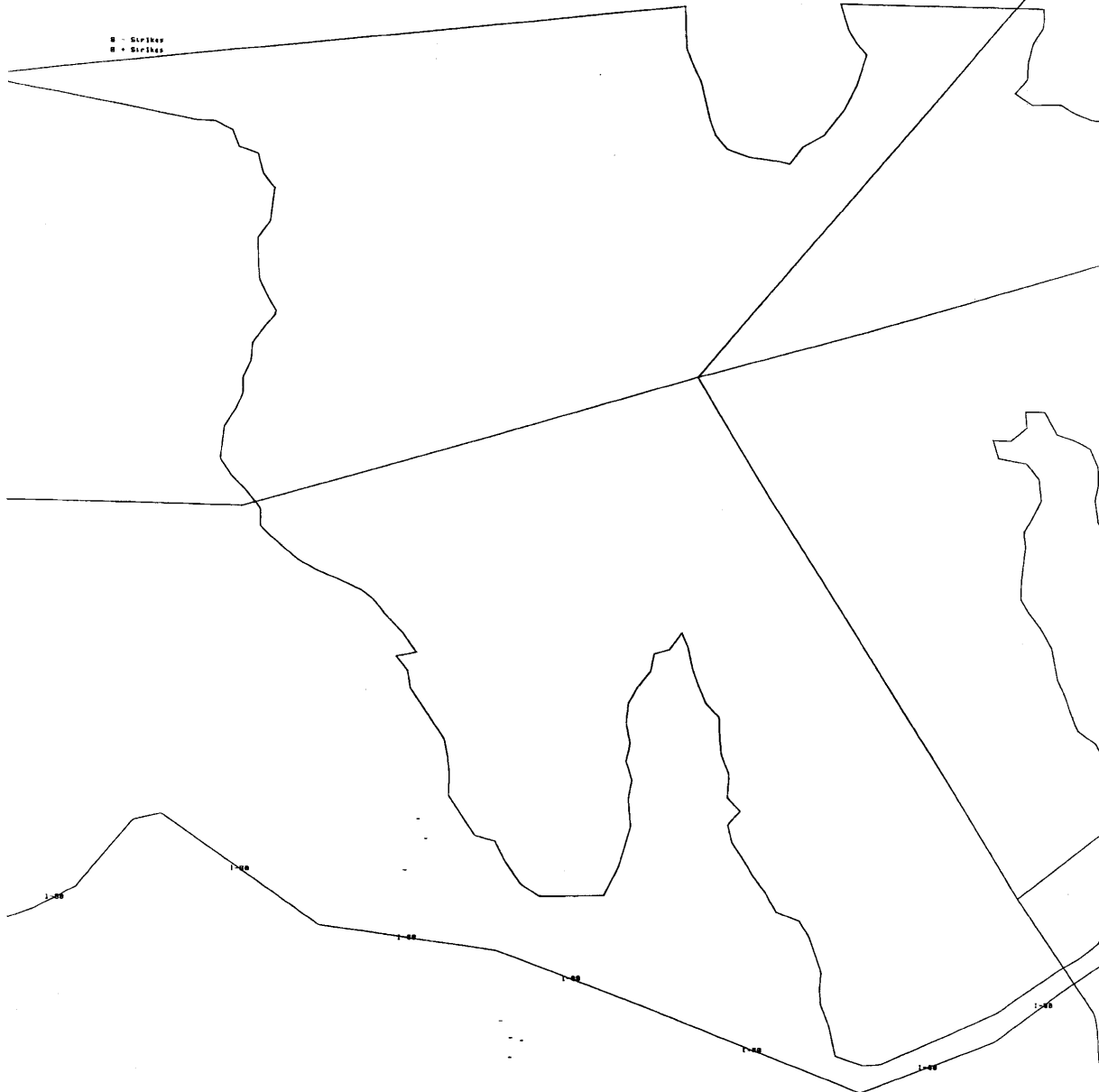
Another Short Term Forecast was issued at 1:20 PM MDT that indicated; "A thunderstorm producing very heavy rains was located along the north end of the Stansbury Mountains in eastern Tooele county."

A Significant Severe Local Storms "For the Record" report was prepared.

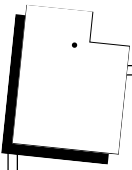
10- 2-00; 2:55PM;

;6024179588

11 / 19



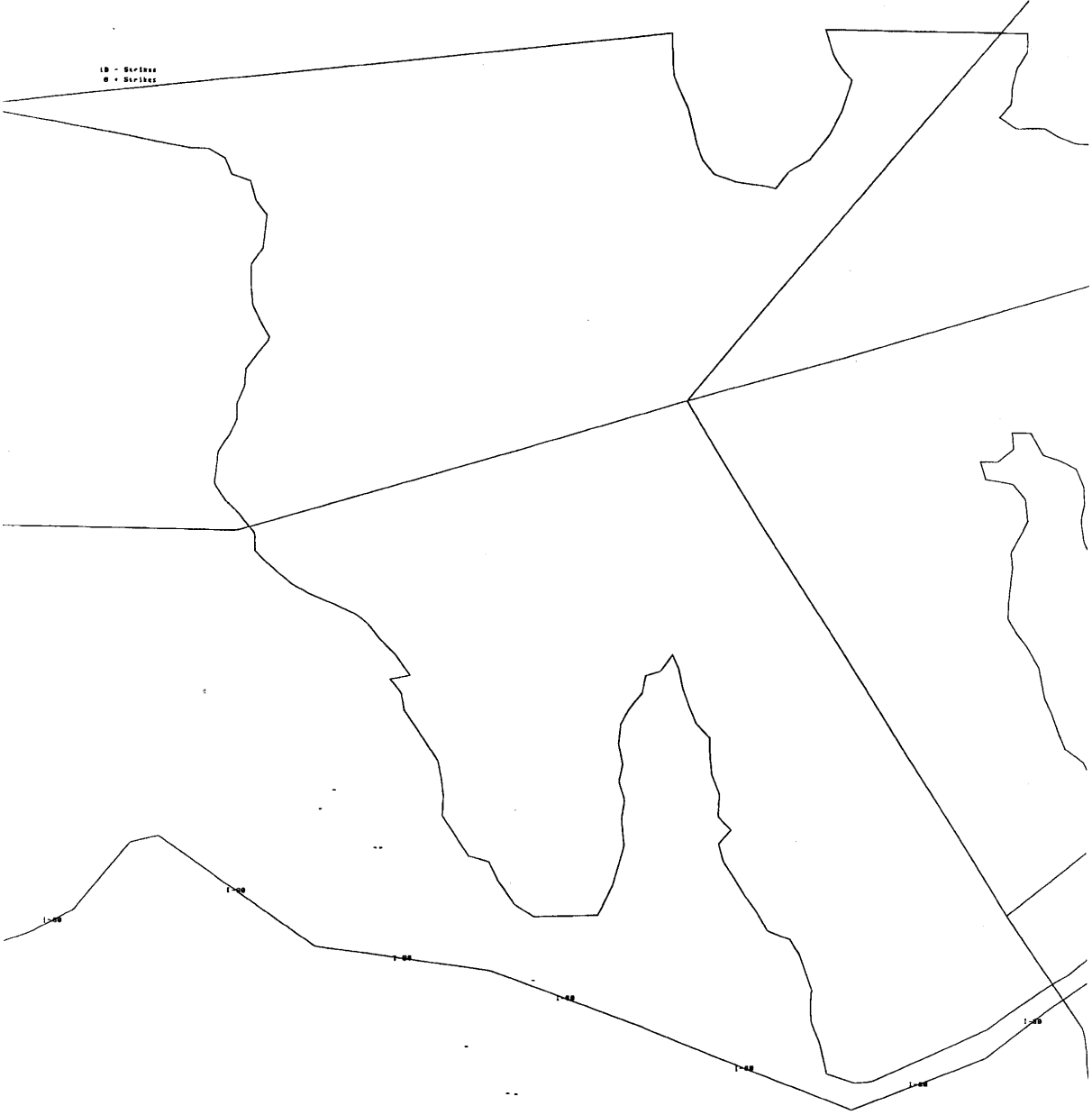
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.10- 2-00; 2:55PM;

;6024179588

12/ 19

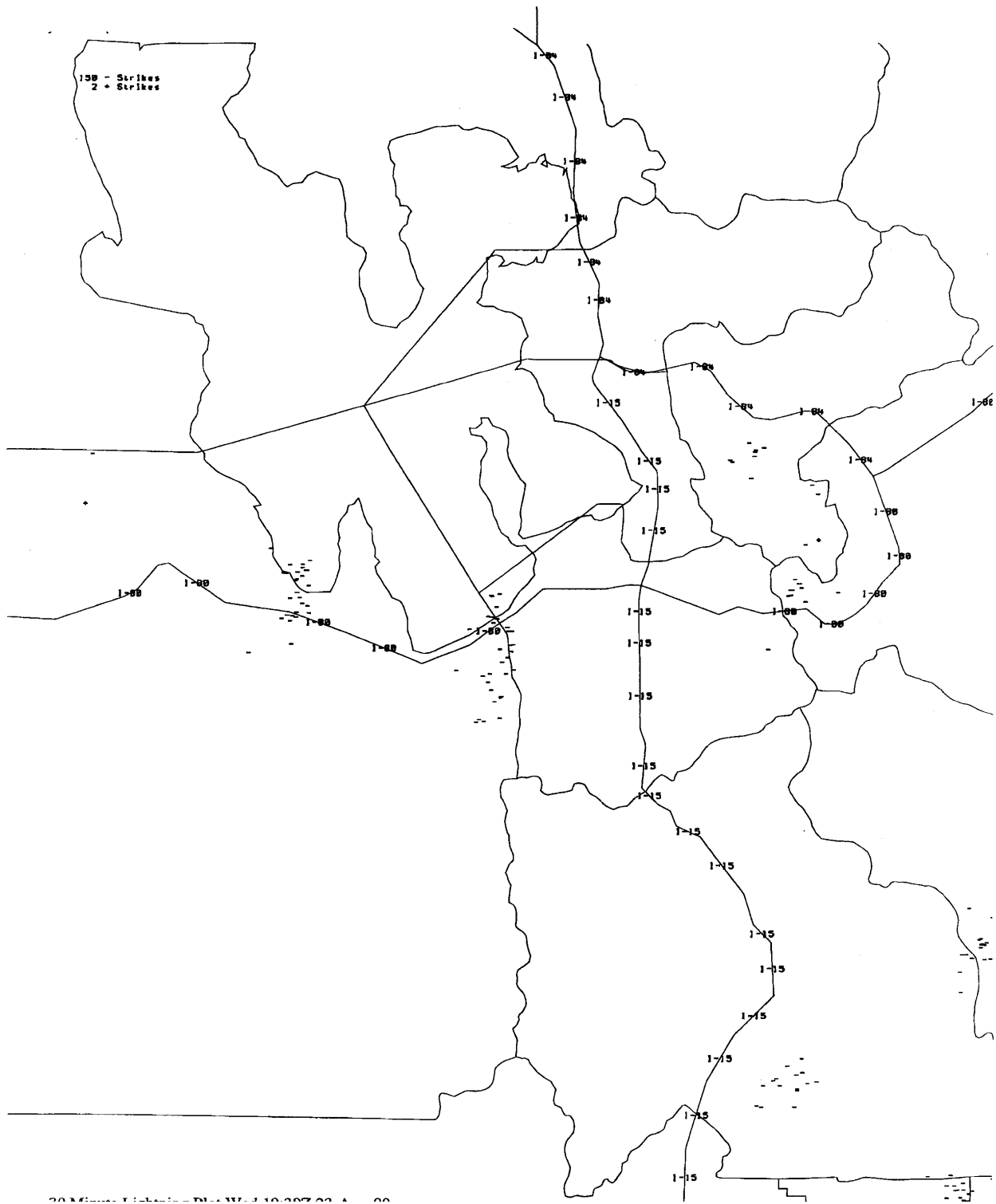


15 MAY 1967 11 19 47 00 A 00

10- 2-00; 2:56PM;

;6024179588

13/ 19



20 Miles East of New York 10-20-20 A 00

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 124 NM 54 NM RES
 08/23/00 18:30
 RDA:KMTX 41/15/46N
 6574 FT 112/26/49W

MODE A / 21
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 MAX= 50 DBZ

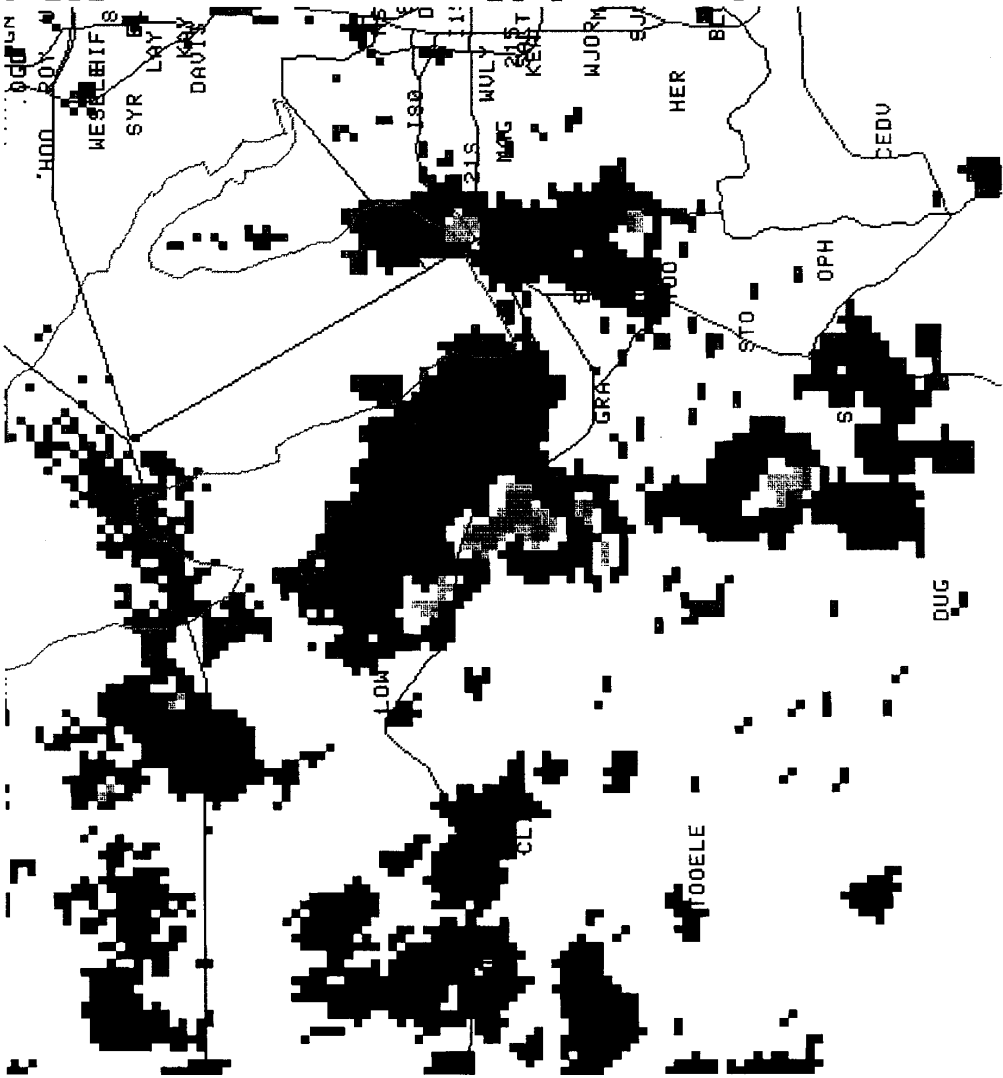
ND DBZ



MAG=4X FL= 1 COM=1
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 OUL U/A:HI

Q15 OHP 1408 R

24/1435 NO LINE TO
 SND PUP MSG TO RPG
 HARDCOPY
 MAP SELECTED



FNUS55 KSLC 231456
FWFSLC

SALT LAKE FIRE WEATHER OFFICE...MORNING FORECAST
NATIONAL WEATHER SERVICE SALT LAKE CITY UTAH
ISSUED 0900 MDT WED AUG 23 2000.....BRENCHLEY

* MONSOONAL PATTERN OVER OUR DISTRICT *

BROADCAST DISCUSSION...A MOIST SOUTHERLY FLOW IS MOVING ACROSS THE ENTIRE FIRE WEATHER DISTRICT TODAY. NUMEROUS SHOWERS AND WET THUNDERSTORMS WILL DEVELOP ACROSS SOUTHERN AND CENTRAL UTAH THIS MORNING. NUMEROUS SHOWERS AND WET THUNDERSTORMS WILL ALSO DEVELOP ACROSS NORTHERN UTAH DURING THE MIDDAY HOURS. GUSTY AND ERRATIC WINDS ARE POSSIBLE NEAR ANY STORMS TODAY. OTHERWISE BREEZY SOUTH-SOUTHWEST WINDS WILL BLOW ACROSS THE WESTERN DESERTS AND VALLEYS OF UTAH TODAY. SOME SHOWERS AND THUNDERSTORMS ARE EXPECTED TO CONTINUE DURING THE NIGHT TONIGHT.

DISCUSSION...A VERY STRONG MONSOONAL PUSH IS AIMED AT THE DISTRICT TODAY. SHOWERS AND THUNDERSTORMS HAVE ALREADY DEVELOPED OVER SOUTHERN NEVADA AND EXTREME SOUTHERN UTAH EARLY THIS MORNING AND CONTINUE TO PUSH NORTH. HEATING FROM THE SUN DURING THE DAY WILL ALSO CAUSE ADDITIONAL SHOWERS AND THUNDERSTORMS TO FORM OVER NORTHERN UTAH TODAY. WETTING RAINS ARE EXPECTED WITH MOST STORMS TODAY WITH SOME LOCALLY HEAVY RAIN POSSIBLE. STRONG AND ERRATIC WINDS ARE POSSIBLE WITH ANY THUNDERSTORMS ESPECIALLY OVER NORTHERN UTAH. BREEZY SOUTH-SOUTHWEST WINDS WILL BLOW OVER THE WESTERN VALLEYS OF UTAH DURING THE DAY TODAY WITH SPEEDS 10-20 MPH. AS THERE WILL BE PLENTY OF MOISTURE AND SOME DISTURBANCES MOVING THROUGH THE AIRMASS...SCATTERED SHOWERS AND A FEW THUNDERSTORMS WILL CONTINUE THROUGH THE NIGHT TONIGHT.

...FORECAST AREA 1...NORTHERN UTAH...
...ZONE 420-GREAT SALT LK DESERT AND MOUNTAINS...ZONE 421-CACHE VALLEY...ZONE 422-NORTHERN WASATCH FRONT...ZONE 423-SALT LAKE AND TOOELE VALLEYS...ZONE 424-SOUTHERN WASATCH FRONT...ZONE 425-WASATCH MOUNTAIN VALLEYS...ZONE 426-WASATCH MOUNTAINS NORTH OF I-80...ZONE 427-WASATCH MOUNTAINS SOUTH OF I-80...ZONE 428-WESTERN UINTA MOUNTAINS...ZONE 429-WEST TAVAPUTS PLATEAU AND SURROUNDING RANGES...ZONE 430-WESTERN UINTA BASIN...

TODAY...

SKY/WEATHER.... MOSTLY CLOUDY (4-8 TENTHS) WITH NUMEROUS SHOWERS AND WET THUNDERSTORMS DEVELOPING BY MIDDAY IN THE MOUNTAINS. NUMEROUS SHOWERS AND WET THUNDERSTORMS DEVELOPING DURING THE AFTERNOON IN THE VALLEYS AND DESERTS. LOCALLY HEAVY RAIN POSSIBLE.

LAL..... BECOMING 5
TEMPERATURES... MAX DESERTS.....86-94
NEAR 5000 FT...83-91
NEAR 8000 FT...70-78

HUMIDITY..... MIN DESERTS.....18-28%
NEAR 5000 FT...20-30%
NEAR 8000 FT...30-40%

WIND....20 FT.. SOUTH-SOUTHWEST 10-20 MPH IN THE WESTERN VALLEYS. OTHERWISE UPSLOPE AT 5-10 MPH. GUSTY ERRATIC WINDS TO 40 MPH POSSIBLE NEAR THUNDERSTORMS.

HAINES INDEX... 4-5

...FORECAST AREA 2...CENTRAL UTAH...
...ZONE 431-CASTLE VALLEY...ZONE 432-SAN RAFAEL SWELL AND DESERT...
ZONE 433-SAN PETE AND SEVIER VALLEYS...ZONE 434-WEST CENTRAL DESERTS AND MOUNTAINS...ZONE 436-CENTRAL UTAH MOUNTAINS...

TODAY...

SKY/WEATHER.... MOSTLY CLOUDY (5-9 TENTHS) WITH NUMEROUS SHOWERS AND WET THUNDERSTORMS DEVELOPING BY LATE MORNING. LOCALLY HEAVY RAIN POSSIBLE.

LAL..... 5
TEMPERATURES... MAX DESERTS.....84-92
NEAR 5000 FT...83-91
NEAR 8000 FT...70-78

HUMIDITY..... MIN DESERTS.....20-30%
NEAR 5000 FT...25-35%

AUG 23 2000 15:49

TEXT 1-4-NOWSLC

Page 1

FPUS75 KSLC 231811
NOWSLC

SHORT TERM FORECAST
NATIONAL WEATHER SERVICE SALT LAKE CITY UT
1210 PM MDT WED AUG 23 2000

UTZ003>005-008-231900-
GREAT SALT LAKE DESERT AND MOUNTAINS-SALT LAKE AND TOOELE VALLEYS-
SOUTHERN WASATCH FRONT-WASATCH MOUNTAINS SOUTH OF I-80-
1210 PM MDT WED AUG 23 2000

.NOW...
AT 1210 PM...SHOWERS AND THUNDERSTORMS ARE LOCATED OVER SOUTHERN UTAH
COUNTY. A SPOTTER REPORTED LOCALLY HEAVY RAIN IN SANTAQUIN.
ADDITIONAL THUNDERSTORMS ARE ALSO DEVELOPING OVER THE STANSBURY
MOUNTAINS IN EASTERN TOOELE COUNTY. SHOWERS ARE MOVING TO THE
NORTH AT 15 MPH...AND SHOULD MOVE ACROSS PAYSON BETWEEN 12 PM AND
1230 PM AND INTO THE PROVO AREA BY 1 PM. SHOWERS AND THUNDERSTORMS
WILL CONTINUE TO DEVELOP RAPIDLY OVER MUCH OF NORTHWEST UTAH EARLY
THIS AFTERNOON.

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AUG 23 2000 15:29

TEXT 1-2-SPSSLC

Page 1

WWUS35 KSLC 231902
SPSSLC
IDC000-UTC000-WYC000-240000-

SPECIAL WEATHER STATEMENT
NATIONAL WEATHER SERVICE SALT LAKE CITY UT
100 PM MDT WED AUG 23 2000

...WIDESPREAD SHOWERS AND THUNDERSTORMS THIS AFTERNOON AND EVENING...

DEEP MONSOONAL MOISTURE IS NOW WELL IN PLACE OVER THE GREAT BASIN.
SHOWERS AND THUNDERSTORMS ARE DEVELOPING RAPIDLY OVER UTAH AND
SURROUNDING AREAS THIS AFTERNOON. SOME OF THESE STORMS WILL PRODUCE
LOCALLY HEAVY RAIN...GUSTY WINDS AND FREQUENT LIGHTNING WELL INTO THE
EVENING HOURS. SOME LOCALIZED FLOODING IS ALSO POSSIBLE...ESPECIALLY
IN THE URBAN AREAS OF THE WASATCH FRONT AND BELOW RECENTLY BURNED
HILLSIDES.

PERSONS TRAVELING OR PLANNING OUTDOOR ACTIVITIES SHOULD BE ALERT FOR
RAPIDLY DETERIORATING WEATHER CONDITIONS INCLUDING HEAVY RAIN AND
GUSTY...ERRATIC WINDS.

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WCJIN-WYSW

AUG 23 2000 15:49

TEXT 1-3-NOWSLC

Page 1

FPUS75 KSLC 231921
NOWSLC

SHORT TERM FORECAST
NATIONAL WEATHER SERVICE SALT LAKE CITY UT
120 PM MDT WED AUG 23 2000

UTZ003-005-232000-
GREAT SALT LAKE DESERT AND MOUNTAINS-SALT LAKE AND TOOELE VALLEYS-
120 PM MDT WED AUG 23 2000

.NOW...
A THUNDERSTORM PRODUCING VERY HEAVY RAIN IS LOCATED ALONG THE NORTH
END OF THE STANSBURY MOUNTAINS IN EASTERN TOOELE COUNTY. LOCALLY
HEAVY RAIN HAS SPREAD ONTO INTERSTATE 80 ABOUT 10 MILES EAST OF
DELLE. THIS THUNDERSTORM WILL DRIFT SLOWLY NORTHWARD INTO STANSBURY
BAY BY 2 PM. ADDITIONAL THUNDERSTORMS WILL DEVELOP RAPIDLY ACROSS
THE AREA THROUGH THIS AFTERNOON.

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/O...SLIFC...ATTENTION KIM
 SPOT FORECAST FOR...STANSBURY
 NATIONAL WEATHER SERVICE SALT LAKE CITY UTAH
 ISSUED 1440 MDT TUE AUG 22 2000.....BURCH

DISCUSSION...MONSOONAL MOISTURE WILL MOVE INTO THE FIRE AREA BEGINNING
 TOMORROW AND CONTINUE THROUGH THE WEEK. BUT FOR THIS AFTERNOON AND
 TONIGHT CONDITIONS WILL BE DRY. THE AIRMASS IS UNSTABLE THUS LATE
 AFTERNOON AND EVENING ISOLATED THUNDERSTORMS ARE POSSIBLE. WETTING RAINS
 CAN BE EXPECTED WEDNESDAY AND THURSDAY.

FOR...THIS AFTERNOON

LAL.....2
 HAINES INDEX.....5
 CLEARING INDEX...1000+
 SKY/WEATHER.....MOSTLY CLOUDY (5-7 TENTHS CLOUD COVER) WITH ISOLATED
 LATE AFTERNOON THUNDERSTORMS POSSIBLE.
 THUNDERSTORMS COULD BE DRY.
 TEMPERATURE.....MAX = 80-90
 HUMIDITY.....MIN = 15-25%
 WIND - EYE LEVEL...RIDGETOP WINDS SOUTHWEST 15-25 MPH. OTHERWISE
 UPSLOPE 5-10 MPH. GUSTY ERRATIC WINDS TO 35 MPH
 NEAR ANY THUNDERSTORMS.

FOR...TONIGHT

LAL.....2
 HAINES INDEX.....5
 SKY/WEATHER.....PARTLY CLOUDY (3-5 TENTHS CLOUD COVER).
 ISOLATED EVENING (MAINLY DRY) THUNDERSTORMS
 POSSIBLE.
 TEMPERATURE.....MIN = 50-60
 HUMIDITY.....MAX = 50-60%
 WIND - EYE LEVEL...RIDGETOP WINDS SOUTHWEST 15-25 MPH. OTHERWISE
 DOWNSLOPE 5-10 MPH AFTER SUNSET. GUSTY ERRATIC
 WINDS TO 35 MPH NEAR THUNDERSTORMS.

FOR...WEDNESDAY

LAL.....5
 HAINES INDEX.....4
 SKY/WEATHER.....MOSTLY CLOUDY (6-9 TENTHS CLOUD COVER) WITH SHOWERS
 AND THUNDERSTORMS LIKELY...A 60 PERCENT
 PROBABILITY.
 TEMPERATURE.....MAX = 80-90.
 HUMIDITY.....MIN = 20-30%
 WIND - EYE LEVEL...RIDGETOP WINDS SOUTH 10-15 MPH. OTHERWISE UPSLOPE
 4-8 MPH. GUSTY WINDS TO 25 MPH WITH SHOWERS AND
 THUNDERSTORMS.

\END/

AUG-22-00 TUE 02:15 PM

FAX:

PAGE 1

A.A.W. K.M

Spot Weather Observation and Forecast Request (See reverse for instructions)

Requesting Agency will Furnish Information for Blocks 1 - 13

1. Name of Incident or Project: stangbury Q106; 2. Control Agency: UT SLD-BLM; 3. Request Made Time: 1330; Date: 8/22/00; 4. Location: TIS R 7W 528; 5. Drainage Name: Timpire Valley; 6. Exposure/Aspect: Ridge Top/West; 7. Size of Incident or Project (acres): 250; 8. Elevation Top: 6925; Bottom: 4500; 9. Fuel Type: Rt. Sage Grass; 10. Project On: [X] Ground [] Crawling

Table with 10 columns: Place, Elevation, Observation Time, Wind Direction / Velocity (20 Foot, Eye-Level), Temperature (Dry Bulb, Wet Bulb, RH, DP), Humidity, and Remarks. Includes observations at 1130 and 1230.

12. Send Request To (Person): Mike Turner; 13. Send Request To (Location): Muskkrat; 14. Send Forecast via: Fax; 15. Send Copy To:

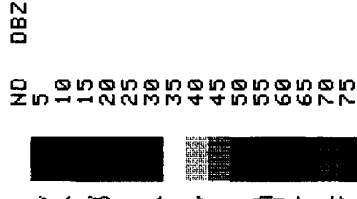
13. Discussion and Outlook: NSTANS 4. SPT

Forecast table with columns: Best Period, Sky Cover, Temperature, Humidity, Wind (Eye-Level, 20 Foot), and Index. Includes checkboxes for Today, This Afternoon, This Evening, and Tonight.

16. Forecast Received by (Name):; Date:; Time:; Forecast Received at (Location) via:

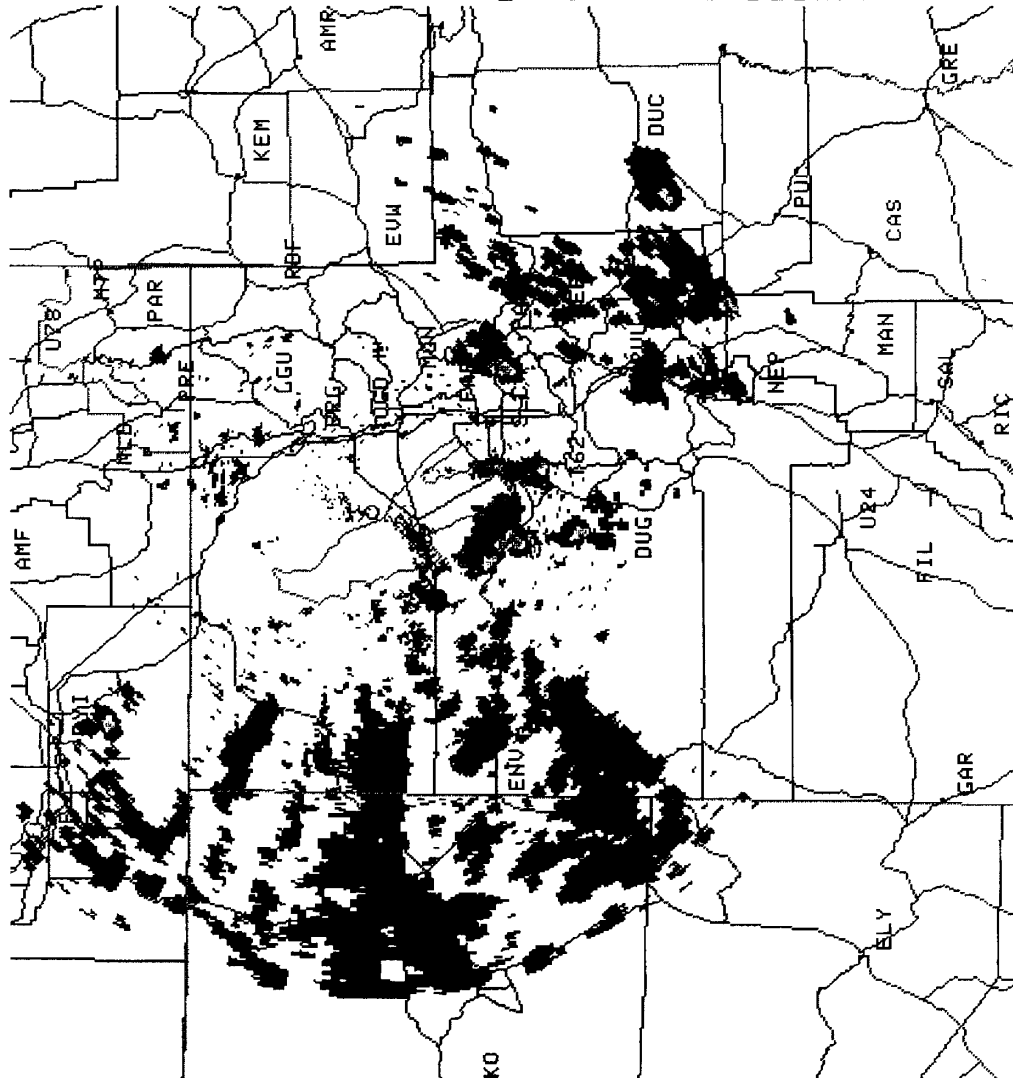
08/24/00 15:16
CMP REF 37 CR
124 NM 54 NM RES
08/23/00 18:30
ROA:KMTX 41/15/46N
6574 FT 112/26/49W

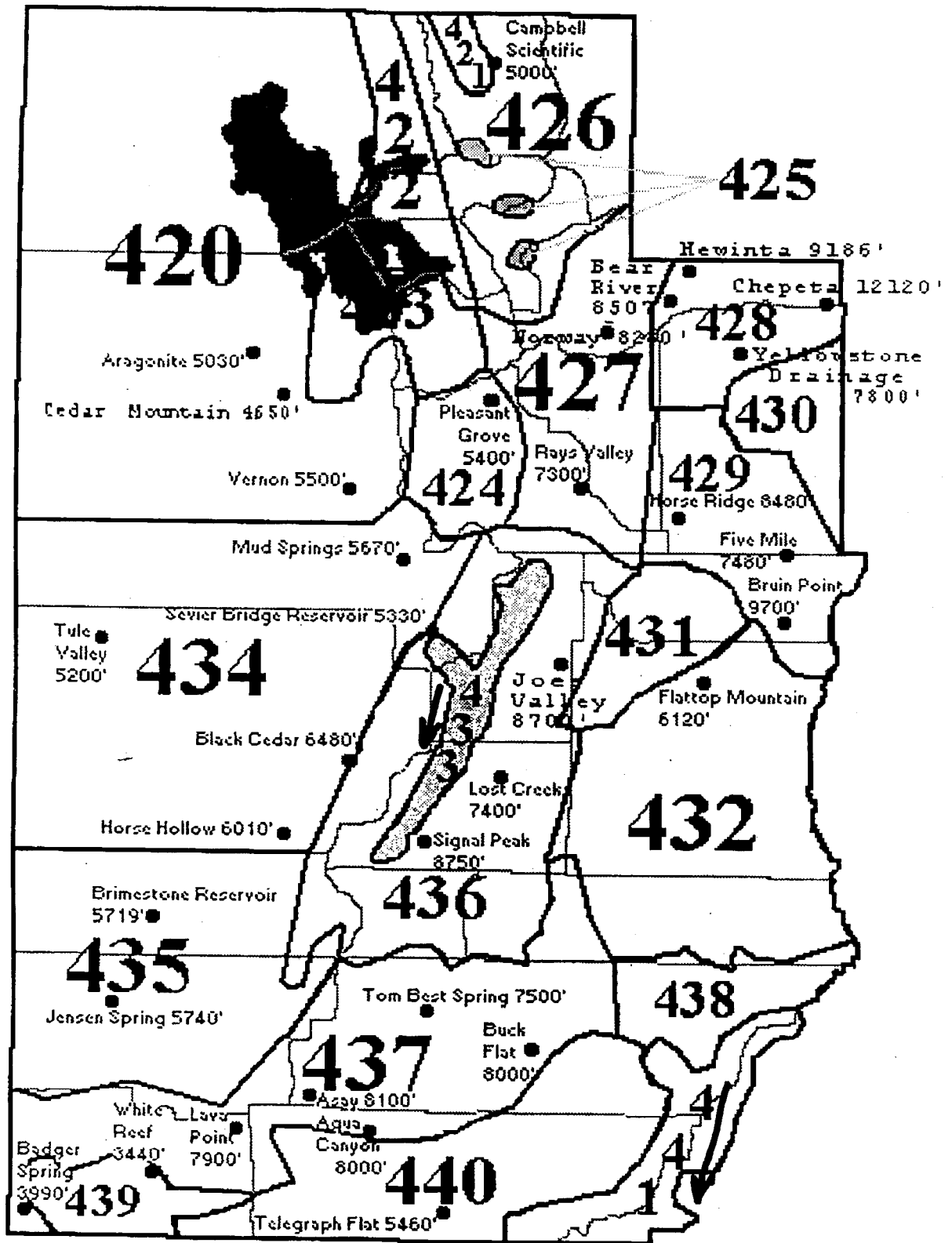
MODE A / 21
CNTR 194DEG 35NM
MAX= 50 DBZ

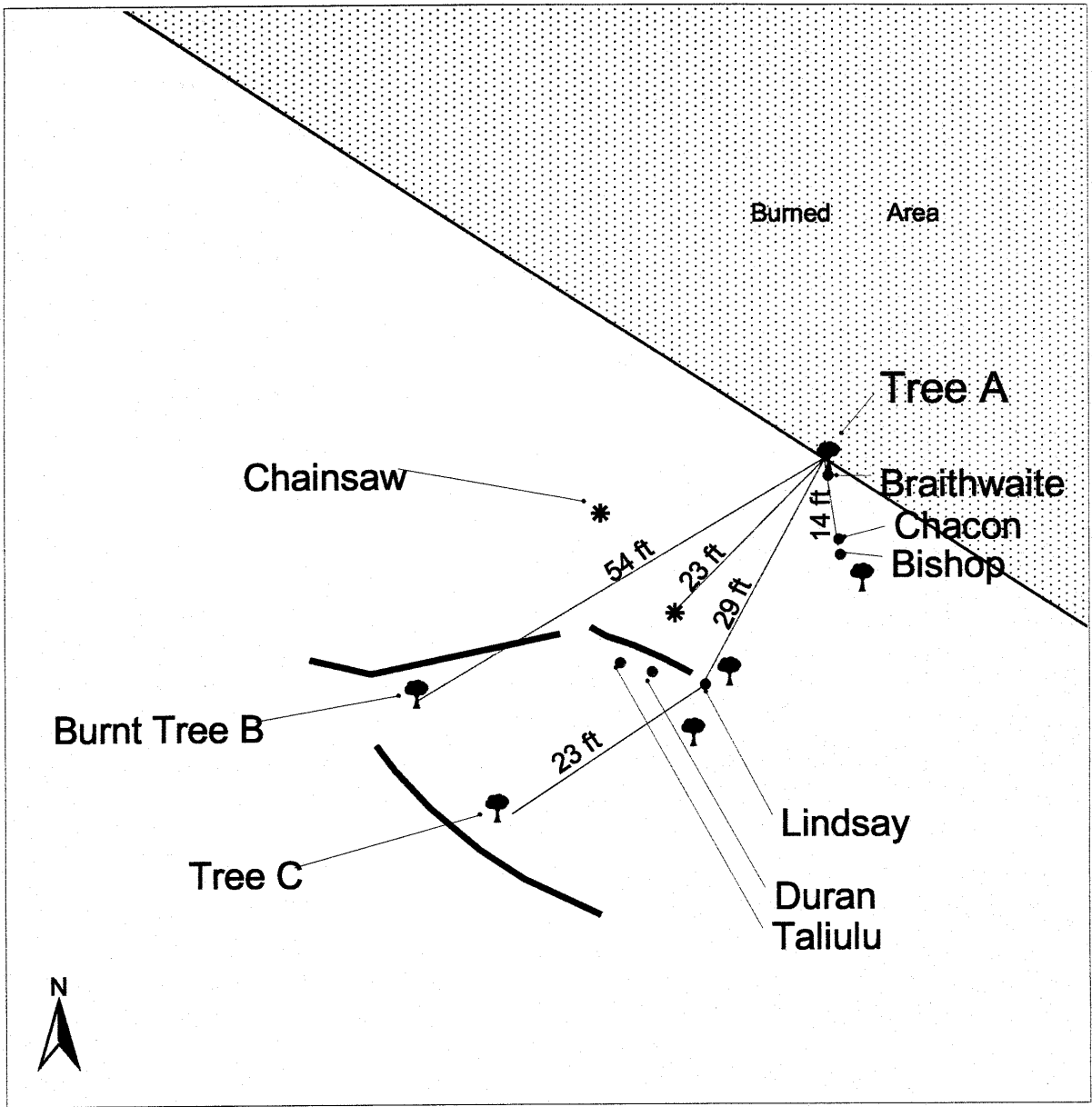


MAG=1X FL= 1 COM=1
OUL:ST M TU AT
OUL U/A:HI

A/R (ROA)
Q15 OHP 1408 R
NO COMLINE TO SEND
ALERT DEF: TO RPG
24/1435 NO LINE TO
SND PUP MSG TO RPG
HARDCOPY



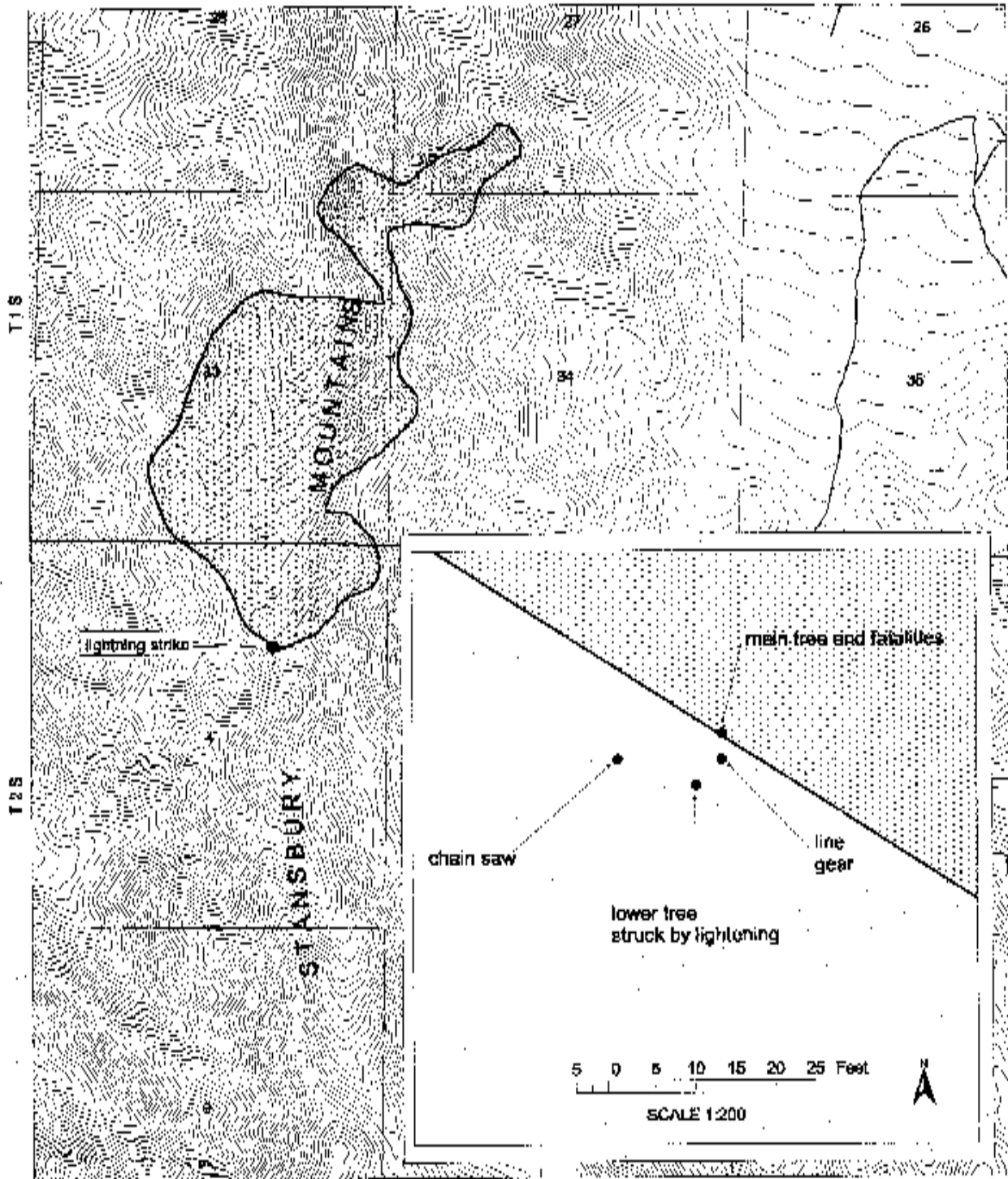




**SKETCH OF FATALITY SITE
NORTH STANSBURY INCIDENT
August 23, 2000
1200 hours**

* equipment
— rock ledge

R7W



NORTH STANSBURY Q106

- Burn Area
- Public Land
- Private Land
- State Land



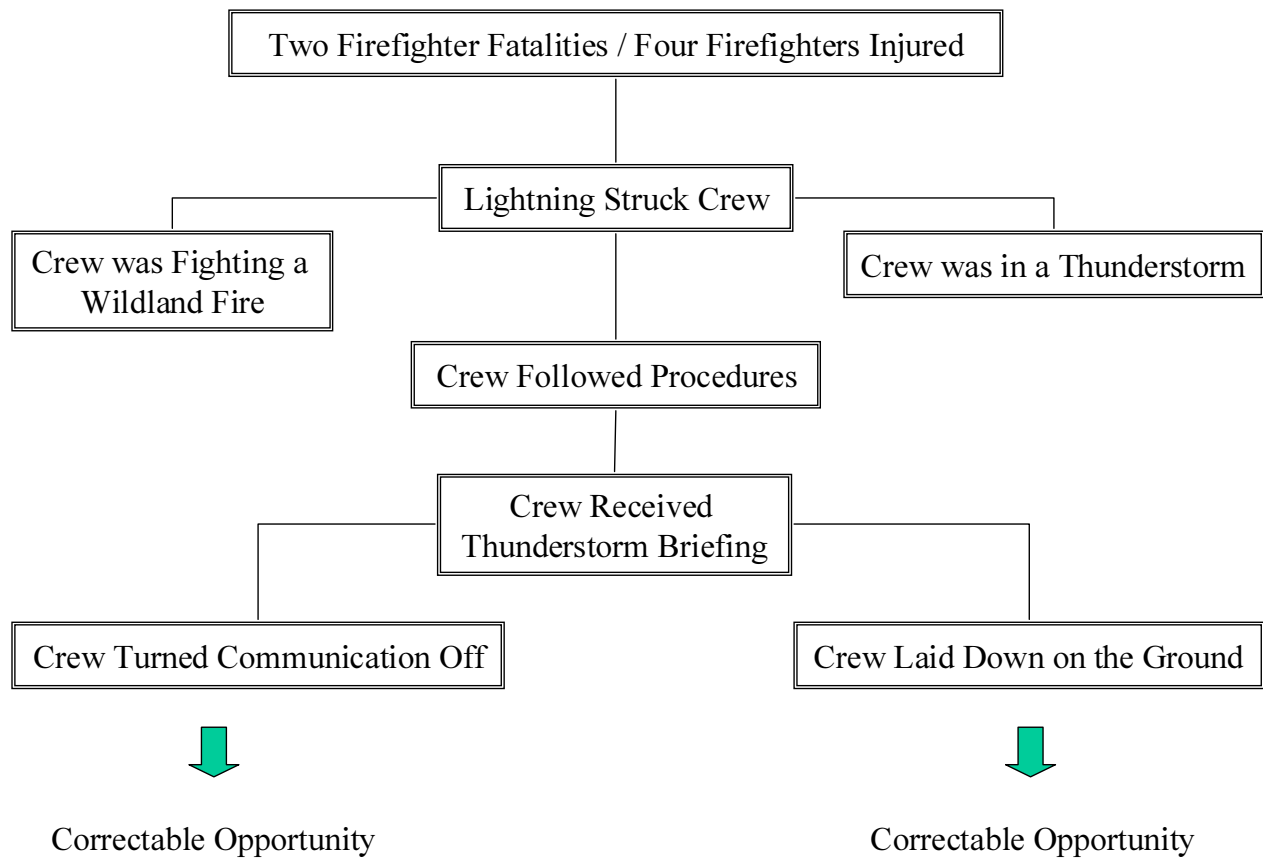
SCALE 1:24,000

Bureau of Land Management
Salt Lake Field Office
August 26, 2000

This product may not meet BLM standards for accuracy and content. Different data sources and input scales may cause misalignment of data layers.

In order to determine what causal factors were instrumental in causing the deaths of Rodgie Braithwaite and Michael Bishop, and also, causing injuries to four other crew members of the Flame-in-go Type 2 Hand Crew, a Causal Relationship Model was developed. All effected were members of the Flame-in-go Crew assigned to the fire on August 23, 2000.

Causal Relationship Modeling helps in determining the causes related to the incident, and what areas need to be addressed to keep this from happening again. These opportunities to make corrections, “Correctable Opportunities”, to our operations guidelines will recognize technological advances made through years of research in the understanding of thunderstorm/lightning events and precautions to take during these events.



Having identified the Causal Factors that went into the Event, we can only determine that the lightning strike and the resulting fatalities/injuries to the firefighters was a random event and could not have been preventable under the guidelines which are in use when fighting Wildland Fires. As all procedures were followed and the crew took the proper posture during the thunderstorm, it can only be determined that no correctable action short of staying off the mountain could have prevented this tragedy. We can only control internal happenings.