DOUGLAS COUNTY PUD

ACCIDENT

JULY 23, 2011

E. WENATCHEE, WA

INVESTIGATED AND REPORTED BY IBEW LOCAL 77's ACCIDENT INVESTIGATION COMMITTEE

PREPARED BY: DARYN KLINGINSMITH

8/16 copy to Shaunie for Exec Bd + Copy to Kellie

On Saturday, July 23, 2011 at approximately 22:33 an accident occurred involving a Douglas County Public Utility District line crew. A journeyman lineman was injured after making contact with an energized primary cable, receiving burns to both hands. He was rendered unconscious for approximately 2-3 minutes, then recovered unaided and was transported to Central Washington Hospital by ambulance, was treated, and released the next day at approximately 17:00.

At approximately 18:45, Saturday July 23rd, multiple customer outage calls were received by the Douglas PUD System Operations center, reporting having heard a 'loud bang'. Knowing it was an underground primary system in the area, two linemen were dispatched to investigate the outages. They looked at the maps at the service center before they left, and determined the outage customers were on C phase, based upon the information they had available. Upon arrival at the 3 phase riser pole (147403) feeding the known outage area, only the B phase cutout fuse was blown. All of the customer addresses known to be out of power were listed as C phase customers on the current maps (at this point they doubted the accuracy of the maps). Lineman A & Lineman B went to the first 3 phase termination cabinet (147481) and isolated the only outgoing 4/0 B phase cable, they also went to transformer vault (148583) and parked the incoming cable which was listed as C phase on the maps (actually was B phase). In communications with the System Operator, they refused and closed the B phase cutout with a 30A fuse, it held. Believing they had a bad UG cable, they called System Operations and requested a line foreman and wireman to assist w/ testing.

At this point they went back to transformer vault (148583) and closed the incoming cable, it held and restored the customers on Woodridge Drive.

They then went to the next 3 phase term cabinet(148481) and parked the incoming 4/0 B phase feed cable, then went back to source cabinet(147481) and energized the outgoing 4/0 B phase cable, it held.

At this point they returned to the service center to acquire the UG test equipment/materials, and join the other 2 crew members. The line foreman and two linemen got all the equipment and materials and returned to the jobsite. The wireman hadn't arrived at the service center yet, so they arranged to have him meet them at the jobsite.

Upon arrival at the jobsite, the crew went to the 3 phase term cabinet (148481) and isolated the outgoing cable on B phase, assuming it went to the 4x4 concrete vault (148580) across 4th St SE, because that is where the customers out of power were believed to be calling from. They then installed the parked incoming 4/0 cable in vault (148481), and the fuse did not blow. They had no fault indicators to help identify which cable was faulted. In the 4x4 vault (148580) they

planned to isolate the single road crossing cable feeding from the 3 phase term cabinet (148481). The outgoing cable from the 3 phase term cabinet (148481) that they had parked, was bare concentric non jacketed #2AL cable. They parked all 3 of the #2AL non-jacketed cables in the 4x4 vault (148580) because of this fact (these cables were C phase however, not B phase).

At this point they erroneously believed they had the road crossing cable isolated, however the isolated cable didn't cross the road to the 4x4 vault, it was a radial cable, feeding East on 4th St SE, which was indeed faulted. They tested the actual faulted cable and grounded it, then applied the Von testing machine to it. They continued to test the cable but couldn't hear the thumping of the fault, due to the noise from the generator, the busy street, and the fact that they were unknowingly listening in the wrong area. Finally they decided to move the testing equipment to where they believed the other end of the cable was across the street in the 4x4 vault (148580) and "thump" from the other end. As Lineman A & Lineman B were moving the equipment to the other location, with assistance from the wireman who had arrived, the foreman was at the crew truck, looking at the map books for ways to back feed the outage if necessary.

*{note: at no time were any of the A or C phase cables switched in the 3 phase cabinets.}

As Lineman A & Lineman B prepared to install the testing equipment to the feed cable #2AL non-jacketed cable (the only cable tag in this vault was on this cable and said, "to dip pole source"), the wireman was setting up the generator as far away as possible, within view. Lineman A pulled the believed to be dead B phase source cable, really energized C phase cable with an approved hot line tool (shotgun) and laid it down on the top of the vault, he then inserted the tester bushing into the elbow termination of the cable and pushed it on as far as he could with leather gloves on his hands. Lineman B picked up the "shotgun" tool (still attached to the elbow connector) and Lineman A positioned the elbow on the vault lid so that Lineman B could fully insert the test connector by pushing the elbow with the shotgun. Upon the elbow fully seating with the test bushing, the exposed test conductor made contact w/ the vault and resulted in a direct phase to ground condition. Lineman A was holding the test bushing and primary cable elbow at the time of the fault condition, resulting in 7620V contact. A flash occurred, and the C phase riser fuse blew instantly. Lineman A fell forward onto the vault and was unconscious. Lineman B used the shotgun to move the cable and clear Lineman A from any danger, then proceeded to render first aid. The line foreman was notified, and called for EMS and for a supervisor to respond. Lineman B and the wireman monitored Lineman A for 2-3 mins while he was unconscious but had a pulse and was trying to breath. He regained consciousness, but was in shock. By the time EMS arrived (approximately 15-20 mins) Lineman A was able to talk and walk. He walked to the ambulance where he was taken to

Central Washington Hospital for observation. He was treated for 2nd & 3rd degree burns to both hands and tested for internal injuries.

He was released the next afternoon, July 24th, and reported to Harborview on Wednesday July 27th for follow up burn exams to both hands.

Accident Causes:

- Testing and grounding procedures were not followed in accordance with Washington State Laws.
- Crew assumed which customers were out based upon memory, and did not verify current system configuration accurately.
- Mapping of equipment was inaccurate/or out of date.
- Lineman was 'hands on' without a clearance.
- Lack of cable identifiers.

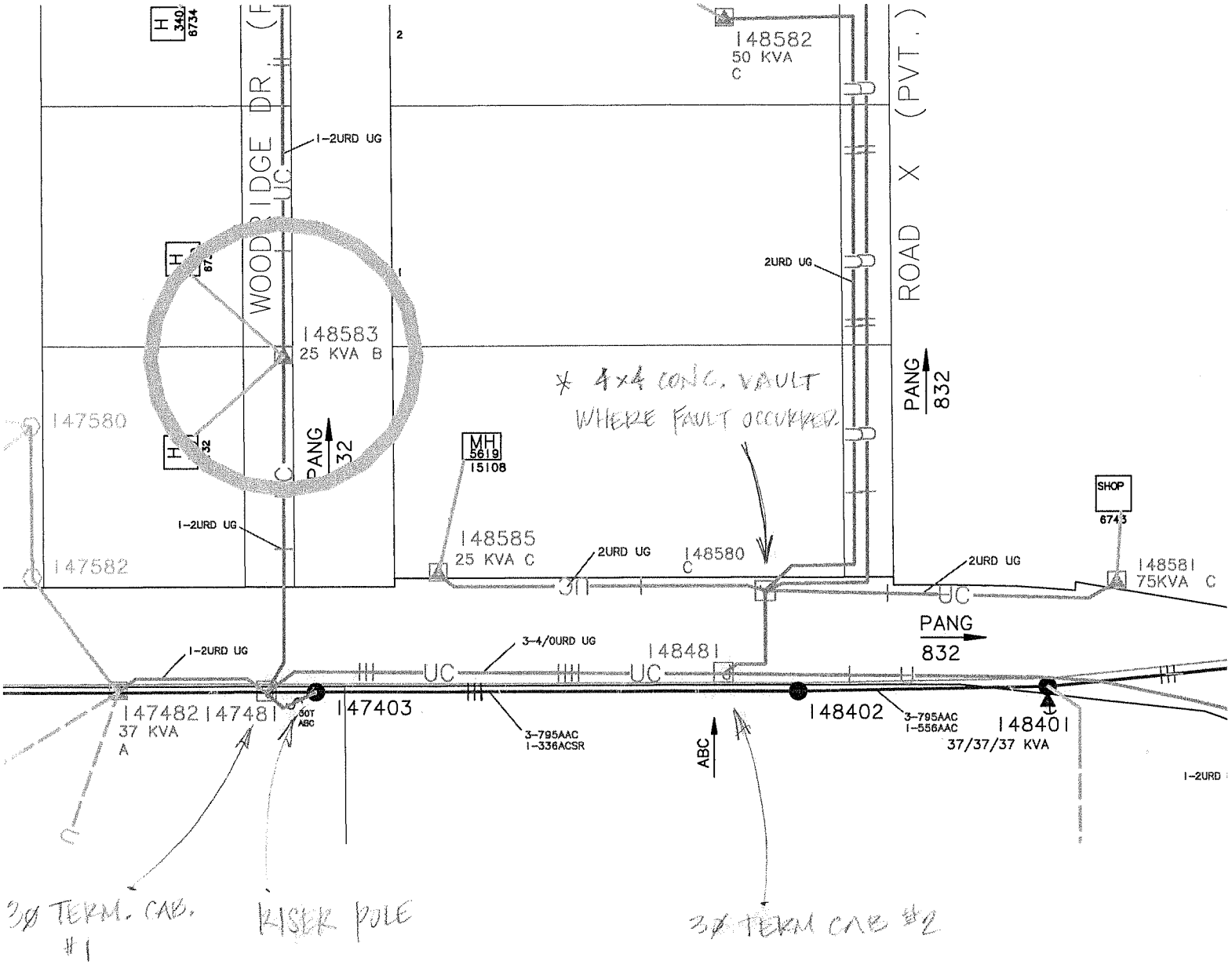
Recommendations:

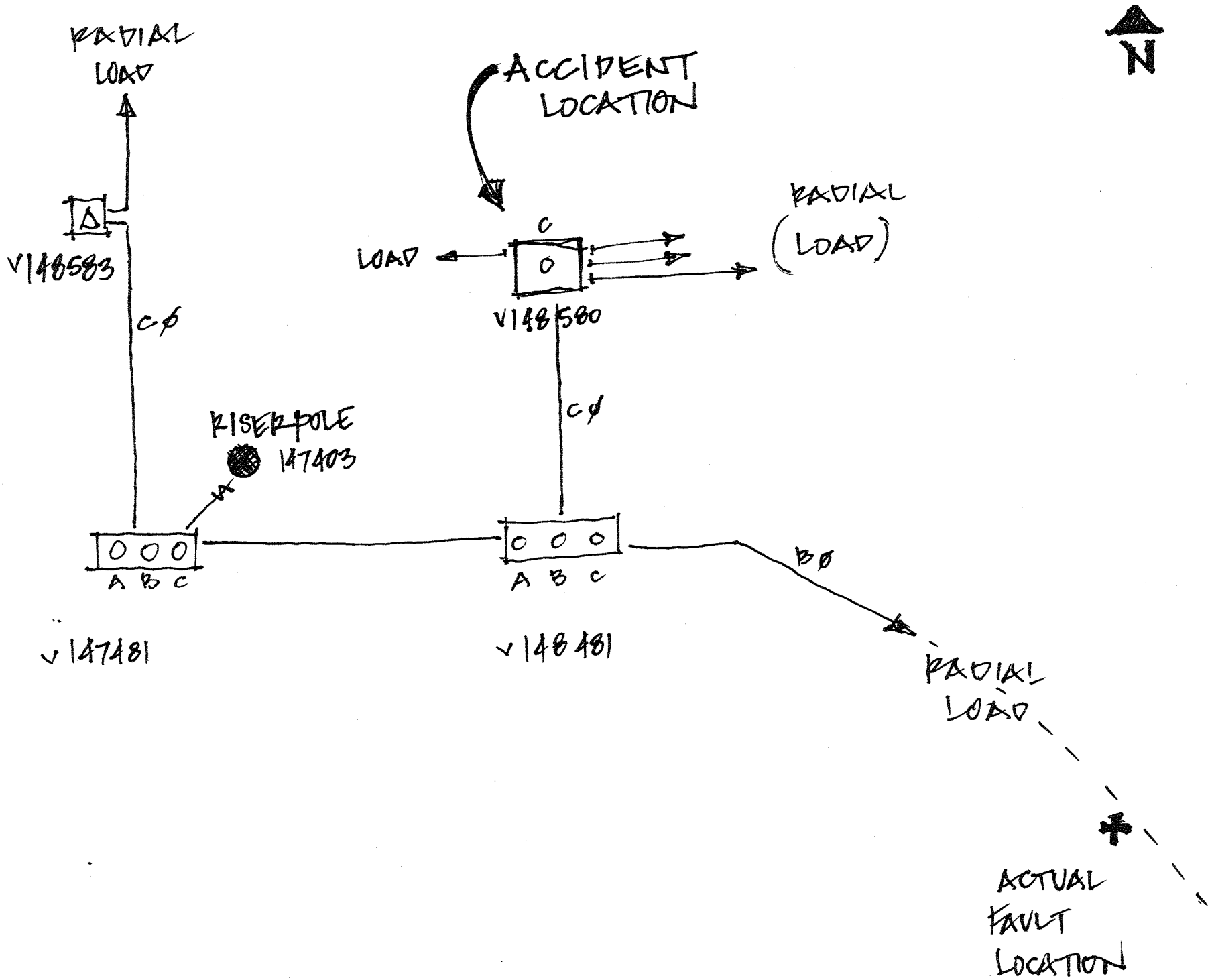
- The employer provides additional training on clearances, testing and grounding for all affected employees in accordance with Washington State laws.
- Develop a procedure and/or provide training to verify that cable identification is correct on old and new cables.
- Develop a procedure and/or provide training that all equipment that is required to be energized is verified.
- Develop a procedure with employer and/or utility to ensure the Foreman is fully aware of the condition of the system to be worked.
- Improve/develop cable marking procedures, and use of fault indicators.

Date	Time	System	Crew Ref #	Event
Dispatcher			Event Details / Crew Feedback	
7/23/2011	1041	Doug		**F/B Control Spill**
Bellinger		30 KCFS		
7/23/2011	1144	Doug		**F/B Control Spill**
Bellinger		20 KCFS		
7/23/2011	1153	Okan	OK-11-7-23-11-5	
Bellinger		POWER OUT TO CIRCLE IRRIGATION>>>>>POWER OUT IN CRAWFISH LK AREA 320,338 THOMPSON RD, 6 MERRIT CABIN RD		
7/23/2011	1342	Doug		**Frequency Deviation**
Bellinger		59.75		
7/23/2011	1501	Doug		**F/B Control Spill**
Bellinger		30 KCFS		
7/23/2011	1518	Doug		**Non-Firm Settlement**
Bellinger		SOLD DOUG(JEREMY PUGET DECLINED) =LISA (SHELL) 10 MW FOR HRS 17-2000@ 27 MILS NDT-40 PGE=DON-1175 PCW=JEAN398 WWP=JARED-199		
7/23/2011	1633	Doug		**F/B Control Spill**
Bellinger		40 KCFS		
7/23/2011	1715	Doug		**Security Check**
Bellinger		DOORS AND PHONES CHECKED		
7/23/2011	1821	Doug	DE-11-7-23-18-21	
Bellinger		LOUD BANG THEN POWER WENT OUT		

Date	Time	System	Crew Ref #	Event
Dispatcher			Event Details / Crew Feedback	
7/23/2011	1900	Doug		**NIGHTSHIFT**
Erb		1900-0000		
7/23/2011	2008	Doug		**Okanogan Slice**
Erb		SYSTEM RESOURCE FOR 7/24 SYS GEN ID # 1210153		
7/23/2011	2219	Doug		**Okanogan Slice**
Erb		SYTEM RESOURCE SYS GEN ID # 1210248		
7/23/2011	2234	Doug		**Misc Note:**
Erb		TOWNE CALLED "MAYDAY" "MAYDAY" OVER RADIO AND REQUESTED EMERGENCY SERVICES BE SENT FOR A MAN DOWN, CALLED 911, HE ALSO REQUESTED A SUPERVISOR BE CALLED, CONTACTED BURT HE WILL BE IN.		
7/23/2011	2237	Doug		**Frequency Deviation**
Erb		FREQUENCY DEVIATION TO 60.085 Hz		
7/23/2011	2250	Doug		**Gen Drop**
Erb		60 KCFS TOTAL SPILL PER GRANT (JEFF)		
7/23/2011	2306	Doug		**Misc Note:**
Erb		WELLS (DEBBIE) CALLED, HYDRO LOGGER ALARM CAME IN, WE WILL WAIT TO INCREASE SPILL MORE BECAUSE WE JUST INCREASED IT		
7/23/2011	2314	Doug		**F/B Control Spill**
Erb		70 KCFS TOTAL SPILL PER GRANT (JEFF)		
7/23/2011	2349	Doug		**F/B Control Spill**
Erb		60 KCFS TOTAL SPILL PER GRANT (JEFF)		

SYSTEM MAP - THIS VERSION WAS FROM THE CORRECTED VERSION DONE AFTER THE ACCIDENT. NO COPIES OF INCORRECT MAPS ARE AVAILABLE.

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