

Appendix S - Executive Summary of "Inspection of Sago Mine Voice Communication Equipment"  
U.S. Department of Labor

Mine Safety and Health Administration  
Industrial Park Road  
RR1, Box 251  
Triadelphia, West Virginia 26059



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December 21, 2006

MEMORANDUM FOR RICHARD A. GATES

Manager, Coal Mine Safety and Health, District 11

FROM:

JOHN P. FAINI   
Chief, Approval and Certification Center

SUBJECT:

Executive Summary of Inspection of Sago Mine Voice  
Communications Equipment

Coal Mine Safety and Health, through Robert L. Phillips, requested that (a) the mine phones at Wolf Run Mining Company's Sago Mine, I.D. No. 46-08791, be identified by model and (b) a brief description of how they were interconnected with each other be prepared. Table 1 describing the telephones is attached as is Table 2 showing unused pager connections, and a diagram of their locations.

Multiple communications systems were in place at Sago Mine at the time of inspection. These included:

- paging loudspeaking telephones located in various areas, both underground and on the surface;
- a distributed antenna radio system allowing for communications between the surface and mobile underground equipment (trolleyphones);
- a commercial telephone system on the surface; and
- portable two-way radios.

These systems were interconnected on the surface. Hardware used for connection of the paging system to an extension of the mine's telephone system were provided. An additional interface was used to connect the paging system to a radio transceiver, which allowed for two-way communication with portable VHF radios used on the surface. Portable two-way VHF radios were apparently used for point-to-point communications underground, but this was not observed during the post-accident investigation. Portions of the hardware associated with these systems were evaluated and inspected to determine operational status. It was determined that:

- When inspected between January 27, 2006, and February 4, 2006, the underground portion of the paging telephone system featured eighteen (18)

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individual telephones. Three (3) of these were not connected to the system; two of these were in the area of damage caused by the explosion and the third was found on top of a piece of mobile equipment. As detailed in attached Table 1, the functionality of the units varied from normal to non-functional. The two units found in the area of explosion damage were not tested.

The pager line was found to be intact except in the area of explosion damage. Leading from the surface, the most inby end of the undamaged line was located near the 1 Left Section track switch in the 2 North Main track entry. Additionally, the pager line was not damaged from a point near the #4 crosscut of the No. 6 belt on the 2 Left Section, and leading inby.

In the damaged areas, the cable was found to be cut or pulled apart, especially where it traversed crosscuts, exposing it to the apparent forces from the explosion. Repairs had been affected to these areas by splices or replacement of the cable with twisted-pair wiring.

Additionally, at least nine (9) unused facilities for connection to the underground pager line were found. It is not known, for specific locations, if telephones were present at the time of the explosion, if they were moved during the mine rescue, or if telephones were ever connected.

Not all of the paging telephones found connected to the system were permissible. The only devices found in areas where permissibility was required were assumed to have been installed during mine rescue.

- The underground trolleyphone system consisted of the signal line, the track as a return line, a repeater, terminating resistors, and trolleyphones carried on the track-mounted mobile equipment. The repeater did not function when inspected; laboratory testing of the unit is the subject of another report titled "Gai-Tronics Corporation Trolleyphone Carrier Repeater, Exhibit No. GH-91P."

The signal line was severely damaged in the area affected by the explosion. It had apparently been repaired to allow for communications before the inspection occurred. The repair consisted of termination of the line to the track approximately 20 feet inby spad 3854, at the 50 block of the No. 4 belt. This was the most outby undamaged area.

The trolleyphones found on the #6 and #8 mantrips were found with depleted batteries, and were not tested for function. They appeared to be complete, and with minimal damage. It should be noted that, if the signal cable had been damaged and the line was not terminated, the trolleyphones would most likely not have been able to provide communications with the surface.

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- None of the conductors associated with the trolleyphone system or the paging telephone systems showed any signs of burning or charring associated with excessive current. However, it should be noted that ignition-capable sparking can occur without leaving marks on conductive elements such as these.

Comprehensive test results can be obtained from the Chief of the A&CC, RR 1, Box 251, Industrial Park Road, Triadelphia, West Virginia 26059.

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**TABLE 1. SAGO MINE UNDERGROUND PAGING TELEPHONES INSPECTED, PAGE 1 of 3**

Location	Identifying Marking	Approval Marking	Receive Page?	Provide Page?	Talk to surface?	Listen to surface, handset?	Battery Voltage	Comments
#1 Belt, #1 Block	Case: None PCB: WBA1501A	None	Yes	Yes	Yes	Yes	Top: 12.93 Bottom: 9.95	Case is green and yellow
#1 Belt, 13 Block	Femco Telephone, PCB: WBA3422A	None	No	Yes	Yes	Yes	Top: 11.1 Bottom: 11.1	Stainless steel case
#2 Belt, 22 Block	Femco Telephone, Model 821301, P/N AM7021, S/N 307003	9B-155-1	Yes	Yes	Yes	Yes	Top: 10.4 Bottom: 10.45	
#3 Belt head	PCB: WBA1598	None	Yes	Yes	Yes	Yes	Inside: 10.47 Outside: 10.47	Stainless steel case
#3 Belt drive starter	Pyott-Boone Page Boss, Model 112 PCB: 005-0077-003	9B-102-2	Yes	Yes	Yes	Yes	9.47	
#3 Belt, 9 Break	Pyott-Boone PageBoss PCB: 005-0077-003 Rev Q		No	No	No	Yes	9.51	Audible hum from handset
#3 Belt, 17 Break	Pyott-Boone PageBoss, Model 112, S/N 12927, PCB: 005-0077-003 Rev Q	9B-102-2	Yes	Yes (muffled)	Yes (muffled)	Yes	8.82	
#4 Belt, 1 Block	PCB: WBA3422A		Yes	Yes	Yes	Yes	Top: 11.31 Bottom: 11.31	Yellow and black case
'Supply hole,' #4 Belt, 9 Block	Gulton Femco Division, Permissible Paging Telephone, Model 821301, p/n AM7011, S/N 045291	9B-155-0	Yes	Yes	Yes	Yes	11.61	
#4 Belt, 40 Block	'Spruce', AEI Paging Phone, P/N 755-1		No	No	No	Yes	Top: 7.88 Bottom: 10.17	Yellow and black case, Page Speaker missing

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**TABLE 1. SAGO MINE UNDERGROUND PAGING TELEPHONES INSPECTED, PAGE 2 of 3**

Location	Identifying Marking	Approval Marking	Receive Page?	Provide Page?	Talk to surface?	Listen to surface, handset?	Battery Voltage	Comments
#4 Belt, 49 Block, near spad 3845	'Sago', pcb WBA3422		No	No	No	No	11.84	Stainless steel case, dirty (earpiece and mic holes are filled with dirt)
#4 Belt, 49 Block, near spad 3845	"A687JK", pcb WBA3422		Yes	Yes	Yes	Yes	11.22	Yellow and black case, clean, installed in close proximity to unit detailed above
#4 Belt, 57 Break	Femco Model 741301/402 Pcb 3422	9B-34(illegible)5	N/A	N/A	N/A	N/A	11.12	Unit not tested for voice function because pager line was disconnected, but remnants of wiring presumed to be associated with pager line found in terminals; audible click heard when page switch operated.
Crosscut near #6 Belt drive	Calibration sticker "Date 10-5-05 by RH"; Pcb WBA3422A		N/A	N/A	N/A	N/A	12.27	Unit covered in soot and found in rubble; not connected to pager line; Handset was missing; handset cord was flexible and appeared to have been mechanically separated from handset; an audible click heard when page switch operated; interior of unit clean and apparently undamaged.
1 Left Section, at Power Center	Femco Model No (illegible); Serial No. 23(illegible); Two Battery Telephone Permissible: pcb WBA4097 Repair Job 35867 Date Rec'd 10-10-05; Date repaired 10-12-05; Hughes Supply Co.	Illegible	Yes	Yes	Yes	Yes	Top: 11.99 Bottom: 11.96	When first inspected, voice communications with this unit were not possible. After a break in the pager line at 21 Block of #5 belt was located and repaired, the unit worked.

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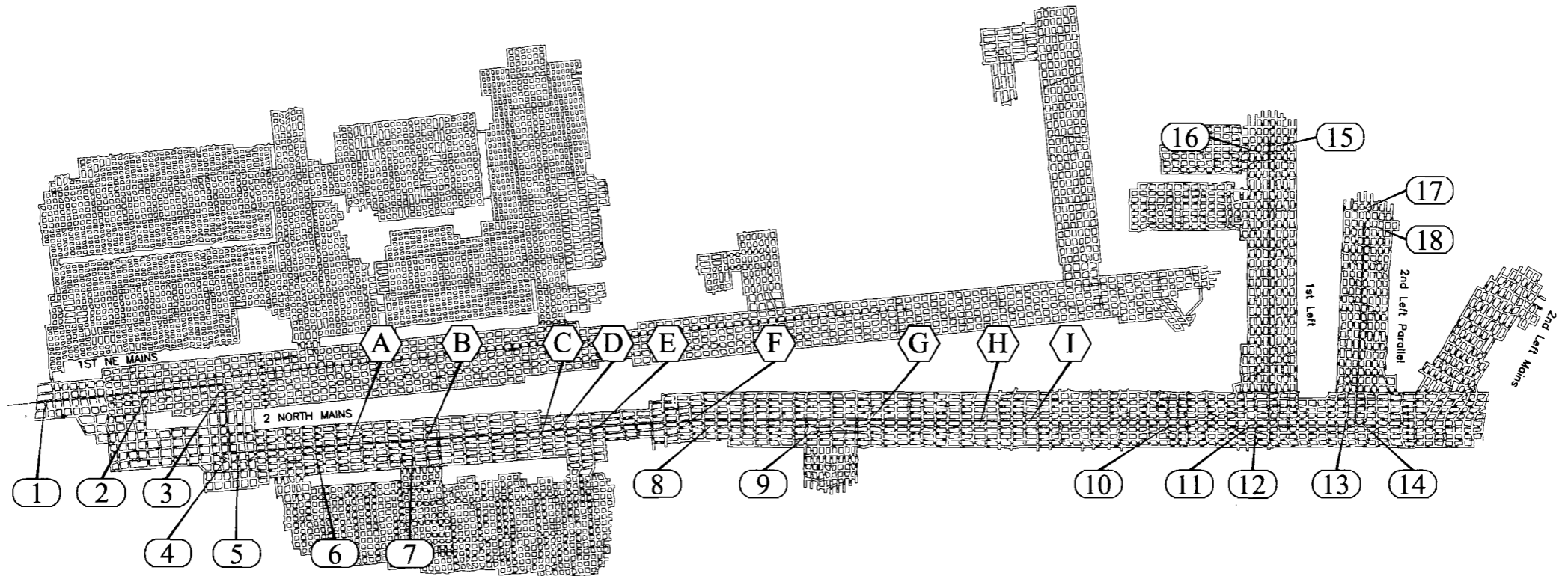
Location	Identifying Marking	Approval Marking	Receive Page?	Provide Page?	Talk to surface?	Listen to surface, handset?	Battery Voltage	Comments
1 Left Section, #3 entry, Near old #7 belt drive	Gulton, Femco Division, National Mine Service, Gulton Permissible Paging Telephone, Model 821301, P/N AM7020, S/N 028020, 2 battery permissible phone, PCB: WBA4097 Rev B	Illegible	No	Noisy	No	No	Top: 8.90 Bottom: 10.59	
2 Left Section, Entry #4, near spad 4276	PCB: WBA4097, 'Spruce'		Yes	Yes	Yes (low volume)	Yes	Top: 10.54 Bottom: 10.38	Phone was located at end of twisted pair cable that was apparently added by rescue teams from end of mine phone cable at power center
On top of shuttle car canopy near 2 Left power center	PCB: WBA 3422A, 'Sago'		Yes	Yes	Yes (low volume)	Yes	Top: 11.45 Bottom: 11.47	Phone was not connected, but was believed to have been the phone connected at the power center before the explosion and subsequent rescue. Phone was connected to line for testing

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TABLE 2. UNUSED PAGER CONNECTIONS, SAGO MINE, FEBRUARY 4, 2006

Location	Comments
#3 Belt, 12 Break, Belt entry	6 inches long
#3 Belt, 18 Break, Belt entry	
#3 Belt, 27 Break, Track entry	Branch line drop. Ends appeared to be cut out of the jacket.
#3 Belt, 28 Break, Track entry	Cable spliced into main cable. The ends of the cable had been stripped of insulation and covered with black tape.
#3 Belt, 31 Break, Track entry	Pigtail connector for branch line.
#3 Belt, 37 Break, Track entry	Pigtail connector for branch line, covered with black tape.
#4 Belt, 13 Break, Belt entry	Cable splice in track entry was clean, appearing to have been new. Bare ends of branch line in belt entry.
#4 Belt, Between 21 and 22 Break, Track entry	Wires covered by tape.
#4 Belt, 25 Break, Track entry	Branch line drop with bare ends. Mr. Denver Wilfong indicated that he thought he used phone at this location on morning of accident.

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⑩ Pager locations as defined in Table 1

Ⓘ Unused pager connections as defined in Table 2

Scale: 1" = 800'