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**Accelerator Division Headquarters**

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To: AD Department Heads, AD Project Leaders

From: Paul C. Czarapata

Subject: Maintenance Activities and Remediation

Those of you who attended the recent department heads meeting heard of a shock incident that occurred in MI-30. This incident had the possibility to be much more severe. One of our colleagues was working in the service building while troubleshooting a machine system. He leaned towards a relay rack and placed his hands against the rack while he looked at a monitor. His hand came in contact with the shell of a Heliax® connector and he received an electrical shock that was strong enough to clench his hand to the rack and cable. He jerked his hand free and simultaneously the Main Injector tripped on a ground fault. This serious safety event was reported to the Secretary of Energy and required an in-depth review and subsequent remediation. In this case the cause was deteriorated insulation on the Heliax® caused by radiation and the shield coming in contact with the Main Injector magnet bus. A secondary cause was poor housekeeping. This was a cable abandoned in place.

As a part of the Division’s response to this incident, the Operations Department conducted and extensive search of all AD tunnels to look for similar problems. What they uncovered shows a much greater problem. There are many cables in the tunnels that are abandoned in place. Even cables that are in use can be seen draped across the bus, coiled and dropped on the floor or just hanging from the cable trays.

This degeneration of workmanship has crept into our everyday work, whether due to rushing to finish a project, repurposing cables, or just sloppiness. Not all machines are in this condition. Some have taken a professional approach and pride in their area and have taken care to dress cables properly and insulate and tag those that are not in use.

With this memo Sergei and I are asking you to pass on to your people the expectation of quality work. When you or your personnel are installing, removing, or modifying equipment; we are asking you take the time to address any cables in the area that belong to your department. I also ask that you report other cables in the area to the appropriate owner. We know that we cannot fix everything at once. If we address this problem at each access opportunity, we will clean up the problem and turn our areas back into professional looking and operating machines.

One of the lessons learned from this event is that cable ties do not survive in radiation areas. The following will list some actions that should be taken as we clean up unwanted or abandoned cables.

Actions to be taken for cables in use:

1. If you know the source and end-point of the cable and it is not labeled, enter it in the cable data base. The link is on the **AD home page, under databases** and label the cable at both ends.
2. Use a Bridle Ring or Spring Steel Fastener or equivalent (see last page.) installed in the nearest Unistrut© channel then coil and secure the excess cable so it cannot come in contact with any nearby bus. If the cable is not flexible enough to coil, dress the cable away from the bus and secure it in place with appropriate clamps.

For spare cables or cables reserved for future use:

1. Same actions as above plus, insulate the cable on both ends so there is no exposed conductor, connector or shield. Again, enter the information in the cable database and label the cable.

For cables that are abandoned or damaged.

1. If possible, remove the cable back to the cable penetration. Cut the cable and insulate it.
2. Label the cable as abandoned and enter that information in the cable database.
3. At the source end of the cable, remove it back to the penetration. Again cut the cable, insulate the end and apply the label.
4. If a cable cannot be removed back to the penetration, cut it at the cable tray, insulate it and apply the label as in number 2.

In high radiation area’s the normal cable ties will not survive. It is recommended to use either PEEK cable ties or an equivalent method that will survive in that environment. Ultraviolet light (like that from florescent bulbs) will deteriorate normal white cable ties as well. Many black cable ties are UV resistant.

You are all intelligent people. I cannot define every situation so use your best professional judgment. You know what we are trying to accomplish. Also, please make this part of your summer shut-down plans. There is no single code to be used and no extra money available. We have a lot of work but we can and will get it done.