Electronics Memo No. 240

An Audit of the Wye Monitor System
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Introduction:

Two major events that caused major losses of observing time had involved the Wye Monitor System. Due to those major losses, an audit has been undertaken in order to:

1. Repair or correct those factors that caused or obscured those problems.
2. To take a critical look at this system in order to eliminate future problems.
3. To improve communications with the major groups involved (Operations, DCS, and E&S) for a more complete understanding of the Wye Monitor System.
4. To establish improved system tests in order provide confidence in the Wye Monitor System's operation. As a byproduct this will aid in training people as to its operating characteristics.
5. To look forward to Expanded VLA and this system.

Incidents:

At the time this audit was undertaken, there were only two incidents that this audit was going to deal with. However during this period another incident occurred, which gave us further information to evaluate. Taken in order:

1. This incident was the loss of the chiller unit. It was noted by Operations that there never was an alarm for the correlator room, in particular "Loss of Airflow or Hi Temp". A similar notation occurs for the Computer Room as well. So we had a warm correlator room, but no alarm. While this problem didn't cause the loss of observing, it certainly confused people. The problem was that the Hi Temp indication was planned for, it was never installed. So the alarm is based only on loss of airflow. Which, while no longer chilled, was still occurring.

The planned action for this problem will be for DCS to locate a suitable device which will measure Air Temperature somewhere in the correlator room. Upon crossing a set temperature point, it will then alarm as was initially specified.

1a. In the course of this audit, it was decided that the Computer "Loss of Airflow or Hi Temp" would be looked at also. It was then discovered that this had been disconnected for false alarms. We connected it, tested it, and then per request, disconnected it again.

The planned action for this problem, is a improved airflow sensor to be selected and installed by E&S in order to eliminate those false indications. It was also decided that a Hi Temp indication was unnecessary, so DCS will eliminate that message portion from the screen, provided no objections occur.

2. This incident was data not being written to tape. If the routine in the Modcomps that carries out that duty stops, it also stops sending periodic signals to the Wye Monitor System. After a short period of time, the Wye Monitor System will report that Dump has stopped. So when this program died, the tape no was being written too. There wasn't an alarm, and the physical event of the data tape no longer turning wasn't noticed by Operations. The problem was that the communications line between the Modcomp and the Wye Monitor Module had reversed connections. This made the logic think it was always getting the proper signals. This problem was first reported shortly after the Operation's room re-arraignment. At that time, DCS had thought we had fixed this problem. It was reported again verbally, but then accidentally forgotten.

The action for this problem was first to repair it, and then cause the program to stop in the Modcomp in order to make certain it was completely operational. A request was made that if any problems were noted with any aspect of the Wye Monitor System, that it be reported via Mainsaver, instead of relying just on verbal communications. This incident is also a powerful lesson in not relying on a single means in order to determine proper operation. If that single method fails for some reason, and other methods are not checked, then this situation could be duplicated again.

3. This incident was loss of power to the Control Building. In this incidence the Wye Monitor System carried out all functions properly. Operations was able to Emergency Stop all the Antennas after they stowed and to monitor the antennas for about 4 hours, when the Wye Monitor UPS couldn't support the system anymore. The problem was that this outage lasted for about 16 hours. For the rest of that time Operations couldn't release the antennas from the Emergency Stop condition, nor did they have any current status on them. In fact, in one antenna, a cryo pump produced oil fumes, that triggered the fire alarm, which shut down the antenna. However Operations could never know that had happened. If it had been a real fire, then our response would have been hampered even more then usual.

The action for this item would be to re-specify the length of time that the Wye Monitor System would have to remain up during an extended power outage. It would cost ~$2200 to extend the Control Building time to 24 hours. The cost to extend the antennas to a similar amount is unknown.

Improvements:

What follows are improvements to this system:

1. Clearer documentation for Operations. Much of what is reported by the Wye Monitor System is hardware specific, and known only by the people who maintain that equipment. The DCS group will get with the relevant people for each aspect of items reported or controlled by the Wye Monitor System, and produce documentation for Operations. Operations in turn will be expected to provide feedback on the documentation. The documentation would include alarms reported, possible causes, and Operations response.

2. Clearer UPS information on Wye Monitor screen. This will be studied by E&S to evaluate possible enhancements. Most of what is reported was established by the manufacturer, and E&S has little control over that. The documentation improvement may aid in this also.

3. Clearer Generator information on Wye Monitor screen. The status of site power isn't reported to the system in a clear fashion. Also, the control of bringing generator manually on-line isn't a simple process. This will be dealt with a new generator control system to be installed by E&S. Also DCS is slated to aid in that effort. Between the two groups, it should be possible to do both items. The documentation improvement may aid in this also. Desired features are: On Commercial Power, On Generator Power, Generator Status's, and Commercial Power Status.

4. Antenna Fire Status latched. The current fire alarm reflects the exact state of the alarm. Because the Wye Monitor System is a centrally polled information system, and works at 300 baud, it is possible to miss a fire alarm that has a duration of less then 6 seconds. E&S is studying this to determine possible effects of having this signal latched.

5. B-Rack Airflow loss. If airflow is lost to the B-Rack, it will shut down in order to protect equipment from over-heating. It was proposed that a signal that would indicate that status be sent via the Wye Monitor System. The DCS group will install this as funds become available.

Testing:

The DCS group is in the process of testing the Wye Monitor System. These tests go beyond the early modules tests. Instead we are attempting to do a full system test for each antenna or system. The DCS group will coordinate with other groups these activities in order to do these tests in parallel with other tests, or to make certain that the tests we conduct will not harm equipment. Procedures and checklists are being developed for this. During these tests, all groups especially Operations are encouraged to be a part in order to learn how the Wye Monitor System both responds to and reports the system under test.

Expanded VLA:

The current Wye Monitor System probably will disappear with Expanded VLA. Instead, it will most likely become part of the new monitor and control system. Much like the VLBA, all facility and Antenna status's will be gathered and reported via one system. This will ease training, make these status's available to all groups besides Operations, and provide remote viewing over the network for troubleshooting critical facility and antenna equipment problems. However this is still under development and may evolve.

Conclusion:

While the large amount of data loss in all three incidents is extremely regrettable, it has lead to an re-examination of the Wye Monitor System which this audit reflects. Many corrective actions have been completed, and others will be planned, and if it yields better results, will be carried out.

If anyone has ideas on how to improve the Wye Monitor System, they are encouraged to contact the DCS group. If anyone has anything that needs corrective action, they are welcome to contact the DCS group. But in this case, it should also be reported through the Mainsaver system, in order to make certain that all corrective actions receive the proper priority and attention.