

Monitoring Emergency Circuits for Integrity

Source: ISO's Public Protection Classification (PPCTM) Program, Fire Chiefs Online

If your community has a public safety communication center, you can improve your Public Protection Classification (PPCTM) by monitoring the integrity of your primary dispatch circuit. The [Fire Suppression Rating Schedule (FSRS)](https://firechief.iso.com/FCWWeb/mitigation/ppc/2000/ppc2001.jsp) awards up to 1.5 credit points for Item 430.B, Monitoring for Integrity.

Monitoring for integrity involves installing automatic systems that detect faults and failures and send visual and audible indications to appropriate personnel. To receive the credit, you must follow NFPA 1221 — Standard for the Installation, Maintenance and Use of Emergency Communications Systems. The standard defines monitoring for integrity as the "automatic monitoring of circuits and other system components for the existence of defects or faults that interfere with receiving or transmitting an alarm."

The best way to be sure that your primary dispatch circuit meets national standards is to consider the requirements of NFPA 1221 when you are designing the system and/or issuing a Request for Proposals (RFP). The standard is available from the National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101.

**What you need to monitor**

To get credit for monitoring the primary dispatch circuit, you need an automated system that continuously looks at all components of the circuit, including its power supply. Visual and audible alarm (trouble) signals must alert communication center personnel whenever any component fails. The audible signal should sound again if an additional fault occurs. The visual signal should be on a dedicated display not used for routine dispatching. Appropriate personnel must be on duty and ready to respond whenever the trouble alarm signals go off. Duplicate transmitters must take over in case a radio circuit fails.

ISO has developed a [worksheet](https://firechief.iso.com/FCWWeb/mitigation/downloads/ppc3002.pdf) for determining your community's credit for monitoring for integrity. Your ISO field representative will work with an authorized representative of your dispatch center to fill in the worksheet. The field rep will review system diagrams and technical data provided by the manufacturer and software provider to determine the credits your community will receive for monitoring.

Three of the items on the worksheet are designed to see if you meet the minimum criteria for recognition of monitoring for integrity:

Item 1 – *"All portions of circuit and all components identified for integrity status/fault condition and all circuit components monitored for power supply and emergency power integrity/failure with visual and audible trouble signals?"*

Item 6 – *"Trouble signals displayed at a location where personnel in constant attendance and responsible to respond to signal as specified in NFPA 1221 8.1.2.3?"*

Item 7 – *For radio circuits, are there duplicate transmitters for the primary dispatch circuit as specified in the Standard?"*

The answers to worksheet Items 1, 6, and 7 must be "yes" to receive any credit for monitoring for integrity.

If your community gets full credit for all items in the worksheet, you'll receive the maximum 1.5 points for FSRS Item 430.B.

**Let's look at an example**
One community of 75,000 population recently undertook a $7 million renovation of its emergency operation center, including procurement of several technology systems. In addition to improving the local effectiveness and interoperability of the radio system, the city wanted to maximize its ISO credit for receiving and handling of fire alarms.

The city covers more than 98 square miles and is roughly 8 miles from north to south and 16 miles from east to west. Signal-propagation studies showed that the coverage area would need two separate sites. Motorola designed and installed an 800 MHz trunked-radio system. It includes, at a primary site, a System Watch Site Lens and MOSCAD Fault Management monitoring and alarm components, designed to maintain constant vigilance over two radio towers, running simulcast for uninterrupted reliability.

If the primary transmitter fails at either tower site, the system senses the failure and transfers to a hot-standby transmitter at the same site. In the event of controller failure, additional redundant site controllers installed at the primary site automatically transfer radio system control. Should all of the 800 MHz dispatching circuits fail, the telecommunication center can roll over to National Public Safety Planning Advisory Committee (NPSPAC) conventional frequencies or use VHF and UHF bands for dispatching.

T-1 telephone lines (in duplicate) connect the communication center to each tower through redundant, completely segregated routing and entry points into various buildings or equipment rooms. No single-line failure will cause the system to loose connectivity, and the communication system monitors each T-1 line for integrity and service quality.

For emergency power, the system includes an automatic-starting emergency generator at the communication center, as well as back-up generators at each tower site. Each site also has a 15 kw UPS unit.

The system monitors 14 primary circuit components, with 60 different trouble signal possibilities. In the event of a failure, both audible and visual alarms (trouble signals) notify personnel at the community's 24-hour facility. Those staff members can page off-duty personnel when necessary.

The city also has direct ring-down telephone lines to each fire station, two methods of wireless communication through a commercial wireless vendor, paging through a commercial vendor, mobile data communications by laptop computer, standard telephone circuits and lines, and fiber optics for additional communications redundancy and functionality.

As part of its planning for the project, the city obtained a copy of NFPA Standard 1221 and hired a consultant familiar with monitoring issues. The RFP for design and construction required that the finished system comply with the standard.

The example community did receive full credit for monitoring for integrity and therefore got the maximum 1.5 credit points for Item 430.B of the FSRS. There are many ways to earn that credit — or to get partial credit for monitoring. Your ISO representative will be happy to work with you on the requirements and your alternatives for meeting them.