June 7, 1995

Doris:

Please enter the attached document into NUDOCS, including PUBLIC. It is an original fax from Indiana Michigan Power Company.providing additional information on an earlier letter on a fire alarm system reflash commitment (TAC NOS. M90757 AND M90758)

Date:	May 4, 1995
Facility:	DONALD C. COOK NUCLEAR PLANT, UNIT NOS. 1 AND 2
Docket Nos.:	50-315 and 50-316
Recipient:	John B. Hickman/NRC/NRR/DRPW/PD3-1
Author:	John Girgis, American Electric Power
Original Incoming:	August 24, 1994

cc: J. Hickman
Cook File

C Jamieson

DF01
1/1

REGULATORY INFORMATION DISTRIBUTION SYSTEM
(RIDS)

Office of Nuclear Reactor Regulation (NRR)
Contact: Doris J. Hoover, DLO
415-1869, OWFN 12 H 13, Mail Stop O-12 H-5

DC: 95-156
DATE: June 7, 1995
CODE NO.:

ACTION REQUESTED

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	DELETE
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Enter into NUDOCS, CENTRAL FILE, and PUBLIC the attached document received 8/24/95. This document is a copy of a FAX and some pages may reproduce faulty. (See attached note from C. Jamerson, Licensing Assistant.)

DONALD C. COOK NUCLEAR PLANT, 1 & 2
50-315 & 316
TAC Nos. M90757 & M90758

Attachments: As stated

CC: C. Jamerson
J. Hickman

160011

Doris J. Hoover
NRR Document Liaison Officer

American Electric Power
Service Corporation
1 Riverside Plaza
Columbus, Ohio 43215
(614) 223-1000
Fax (614) 223-4000

AMERICAN
ELECTRIC
POWER

DATE:

TIME:

TO: JOHN HICKMAN

COMPANY:

FAX NUMBER:

FROM: JOHN GIRGIS

COMPANY:

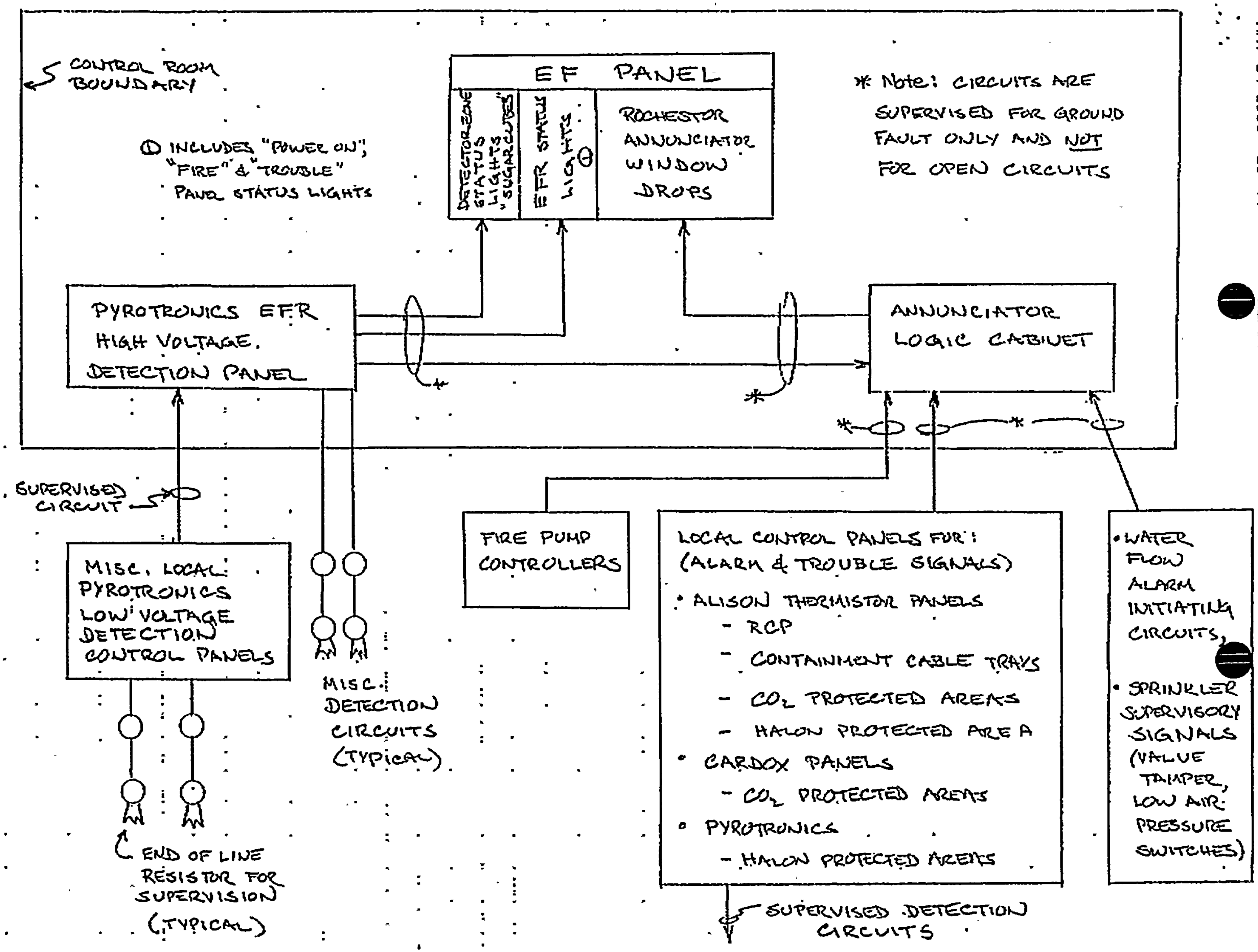
TELEPHONE NUMBER:

FAX NUMBER:

IF YOU HAVE ANY PROBLEMS WITH THIS FAX MESSAGE CONTACT THE PERSON NAMED ABOVE.

~~20~~ 23 PAGES, INCLUDING COVER SHEET

COOK NUCLEAR PLANT UNIT 1 & 2



Response to item #3

300-190

IND. & MICH. POWER CO.
RECEIVED
AUG 22 1977
DONALD C. COOK PLANT
MANAGERIAL

INDIANA & MICHIGAN POWER COMPANY
P. O. BOX 18
BOWLING GREEN STATION
NEW YORK, N. Y. 10004

August 19, 1977

Donald C. Cook Nuclear Plant Unit Nos. 1 and 2
Docket Nos. 50-315 and 50-316
DPR No. 58 and CPPR No. 61

Mr. Edson G. Case, Acting Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Case:

This letter is in response to Mr. Karl Kniel's letter, dated July 11, 1977, which transmitted to us 53 questions/positions concerning fire protection at the Donald C. Cook Nuclear Plant. Enclosed with this letter are five (5) sets of responses to all your fire protection questions except nos. 1,3,11,18,24,30,37, 38,40,46,49, and 52. The responses to these will be provided by September 30, 1977. By our letter dated July 20, 1977, we resubmitted proposed Technical Specifications for fire protection systems for both Units 1 and 2 of the Cook Nuclear Plant.

Due to the large amount of work required to respond to the fire protection questions, we do not have a schedule available for the implementation of the improvements to our fire protection program which are proposed in our submittals of January 31, 1977 and March 31, 1977, and our responses to some of the NRC positions that were included in the fire protection questions. Requests for design changes are being prepared to implement all of these proposed improvements. Subsequent to approval of the requests for design changes, a schedule for implementation will be established and forwarded to the Commission. A description of facility modifications required to implement the positions will accompany the schedule. It should be noted that most of these

Question 16:

a. Provide the results of system tests or analyses which substantiates that the sensitivity of fire detection devices, and that the number and placement of detectors are sufficient to provide a prompt alarm and/or actuation of the automatic fire protection systems.

b. Show that the complete fire alarm system, including waterflow and valve supervision, conforms to applicable guidance in NFPA 72D.

c. Describe the detector system circuitry (from the detectors to the main control room fire panel). Supplement this description with selected elementary wiring drawings and typical cable routing diagrams. Also, provide an electrical single line diagram which shows the main source and if applicable the alternate source of power for these systems.

d. Identify any significant differences between the Unit 1 fire detection system and the Unit 2 fire detection system.

Response to Question 16a:

Each ionization detector in Unit 1 was checked for proper sensitivity, following installation, by I&M relay engineers and a technical representative of the supplier. This latter check also included cleaning and verification of operation of each detector. This will be done on Unit 2 once the installation is complete.

Following the check by the supplier, ionization detectors are cleaned twice yearly and checked for sensitivity and operation yearly by I&M personnel who have attended Pyralarm service courses and are qualified by Pyralarm to service such systems. Manufacturer technicians may be called in for assistance at any time, if required.

Thermistor detection systems in Unit 1 were checked for proper sensitivity and operation, following installation, by I&M relay engineers. This will also be done on Unit 2 once installation is complete. Following the above initial check, yearly operational checks are performed by I&M personnel who are thoroughly familiar with the equipment. Manufacturer technicians may be called in for assistance at any time, if required.

Ionization and thermistor detectors have been located by the supplier's engineers, in quantities and spacing to agree as a minimum with NFPA 72E and the UL listing for these devices. We rely, as do other utilities and industries, on the results of UL and/or FM testing to determine the effectiveness of a device or system, the parameters affecting its use, and the quantities to be used.

Response to Question 16b:

We feel that NFPA 72D is an extremely poor guide to be used for nuclear power plants since it is much too general in nature. However, we recognize that it is, at this time, the only guidance available.

We also note that this question has apparently expanded in scope to include waterflow and valve supervision, whereas Appendix A to B.T.P. APCSB 9.5-1 only referred to NFPA 72D in Item E.1.(a) for fire detection. In responding to Appendix A to B.T.P. APCSB 9.5-1 we compared the requirements of NFPA 72D to the fire detection/suppression system control at the Cook Nuclear Plant. As stated therein we are in agreement with all the applicable portions of NFPA 72D except for the testing frequency.

Response to Question 16c:

The detector system circuitry is described below for the two types of fire detection in use at the Cook Nuclear Plant.

(i) Ionization (product of combustion) Fire Detection:

The ionization detector utilizes the principle wherein air is made electrically conductive (ionized) by exposure to a minute source of alpha radiation emitting material, Americium 241. The ionizing material is located in the outer or detecting chamber of the detector which is open to the atmosphere, and in an inner or compensating chamber of the detector which, except for a small vent to compensate for temperature and pressure changes, is essentially closed to prevent entrance of combustion products. The outer and inner chambers are connected in parallel with the anode and cathode of a special gas discharge (cold cathode) tube. The junction between the outer and inner chambers is connected to a starter electrode of the cold cathode tube.

A voltage is applied across the outer and inner ionization chambers causing a minute electrical current flow. When products of combustion enter the exposed outer chamber, the resistance to current flow increases and the voltage between the cold cathode tube starter electrode and the cathode increases and fires the tube. The current which then passes between the anode and cathode of the tube is sufficient to energize a zone relay and a corresponding alarm relay in the main ionization control unit.

The zone relay is a special 3-position relay incorporated in the detector circuit to give an alarm in case of fire and to supervise the system against defective detector heads, broken wires, or a similar failure that would make the system inoperative. Such a failure will de-energize the relays and close

Question 53:

You state that an ionization fire protection system alarming at the fire system control panel is installed below the control room suspended ceiling in the area behind the control panels. Appendix A to Branch Technical Position 9.5-1 requires that detectors be placed in each control room cabinet. Explain how the operator will know the location of the fire if detectors are not placed in each cabinet.

Response to Question 53:

The control room cabinets at the Cook Nuclear Plant consists of open and closed cabinets. Should a fire occure in any of the open cabinets in the control room, the products of combustion will readily escape and be sensed by the early warning ionization detection system. These detectors will alarm audibly and visually at the emergency fire panel in the Control Room. The closed cabinets in the Control Rooms are not air tight and in most cases are louvered to allow internally generated heat to dissipate into the Control Room. Products of combustion and smoke from a fire in the cabinet will also escape and be sensed by the ionization detection system. These detectors, operating as a zone, will alarm audibly and visually at the Control Room emergency fire panel.

On receipt of this alarm, due to a fire in either an open or closed cabinet, the operator must investigate behind the panels to observe for the pulsing neon lamp on each detector itself until he finds the operating detector. At this point he can use hand portable fire extinguishers already available in the Control Room and behind the control panels to attack the fire. In this manner, a fire in a control room cabinet will be detected in its early stages and be extinguished before it could spread further. Should additional fire fighting apparatus be required, water hose standpipes, CO_2 hose reels and breathing apparatus are available just outside the control room entrance for operator use.

Response to item #4

NFPA 72D (1967 Edition) Code Section 2154

Deviation: Documentation was not available to confirm that the alarm initiating and signaling circuits and cables installed for the systems reviewed, have met the criteria required by this code section for limited energy cable.

Justification: The review of the Record of Conversation memos dated 6/8/88 and 6/9/88 in addition to the drawings referenced below, confirms that the alarm initiating and signaling circuits and cables installed for the Chemetron CO2, Pyrotronics system 3 and FIU systems and the Rochester "EF" annunciator panels, meet the requirements of this code section with the exception of the requirement that the cables be approved for the application of a limited energy cable.

A review of the cable description telex dated 3/16/88 forwarded to Impell from AEPSC, indicates the type, size and quantity of conductors for selected cables. The description of the type of insulation is also provided. The cables reviewed meet or exceed the requirements of Code Section 2155 which provides the requirements cable characteristics.

Based on the review of this documentation, an equivalency can be made that the cables reviewed, will meet the requirements of Code Section 2155 due to the attributes of the construction features of these cables.

Since the circuit characteristics for the alarm system meets the requirements of Code Section 2154 and an equivalency has been made to confirm compliance with the requirement for an "approved " cable as verified under Code Section 2155, these cables are considered to be acceptable for use in the alarm system as installed.

Reference: -Record of Conversations
a. D.E. Kipley (Impell) and S. Dimetravich (Chemetron), dated 6/8/88.
b. D.E. Kipley (Impell) and D. Deipalmer (Rochester), dated 6/9/88.

-Telex 6142232004 page 1-5, cable descriptions and circuit characteristics, dated 3/16/88.

-AEPSC Drawings:

1-2010-58, 5/23/86	1-95936-16, 4/15/88
1-2011-49, 5/18/87	1-95937-18, 4/24/86
1-2012-38, 5/21/87	1-95939-15, 11/20/87
1-98612-14, 3/1/88	1-95928-4, 10/15/86
1-98990-3, 10/16/86	1-95981-18, 3/17/87
1-98991-13, 2/16/88	1-98992-0, 11/15/72

IMPELL CORPORATION

LOCATION AEPSC

TELECOPIER # (614) 223-2004

DATE MARCH 16, 1988

TO LIZ TAYLOR (AEP)

FROM DAVID KIRBY (IMPELL)

NUMBER OF FOLLOWING PAGES 4

LIZ:
SORRY FOR THE DELAY, BUT
I AM STILL TRYING TO GET
CIRCUIT CURRENT REQUIREMENTS
FOR THE CO_2 SYSTEM CIRCUITS.

300 TRI STATE INTERNATIONAL, SUITE 400 • LINCOLNSHIRE, IL 60015 • (312) 940-2000

TRANSMISSION REPORT

THIS DOCUMENT (REDUCED SAMPLE ABOVE)
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NO	REMOTE STATION I. D.	START TIME	DURATION	#PAGES	COMMENT
1	91-6142232004	3-16-88 4:16PM	8'35"	5	
		TOTAL	0:08'35"	5	

XEROX TELECOPIER 7020

Information Requested by Dave Kipley

	Item #	DWG #	CIRCUIT VOLT & CURRENT	Description
T. PRESS SW., AMPER SW., & PKLR. PRES. SW.	314	1-2011 1-98612	125 VDC 1MA	4 Conductor #7/18 (7 wires of 18 gauge, which is approximately equal to a #10 gauge), 600V insulation SISJ or PE/PVC
DMK CAB. #C PRES SPKLR PRES. SW.	315	1-2011 1-98612	125 VDC 1MA	7 Conductor #7/18 control cable, 600V insulation PE/PVC
	324	N/A		3 Conductor Twisted #12 Stranded copper, 600V insulation EPR/Neoprene,Okoprene,Hypalon, or CSPE
	325	N/A		3 Conductor Twisted #10 Stranded copper, 600V insulation EPR/Neoprene,Okonite/Okoprene, or EPR/Hypalon
	348	N/A		3 Conductor Twisted #2 Stranded aluminum, 600V insulation EPR/Neoprene or Okonite/Okoprene
	871	N/A		1 Conductor #12, 7 Stranded copper, 600V insulation XLP or EPR
TB → DET OR CIRC.	3007	1-2011 1-98992	250 VDC 20MA	1 Conductor #12 Stranded copper, 600V insulation XLPE
RFC 12-2078 SYS 3 DET. TO TB	3044	1-2010 1-95981 1-95928	24 VDC 20MA	2 Conductor #16 Stranded copper, 600V Shielded PE/PVC (copper shield with a PVC jacket)
RFC 12-2078 SYSTEM 3 DET. BELL CKT.	3064	1-2010 1-95928	24 VDC 1.5A	2 Conductor #16 Tinned copper, 600V insulation XLPE/Hypalon or EPR/Hypalon or XLPE/CSPE
RFC 12-2094 FPR TO 45 3 DET.	3077	1-2010 1-98991 1-98990	250 VDC 22MA	4 Conductor #16 Twisted copper, 600V insulation XLPE/Hypalon, XLPE/CSPE,or CSPE/CSPE
	3110	N/A	40MA	1 Conductor 2000MCM Stranded aluminum, 5kV insulation Okoguard/Okoprene
RFC 121543 O_2 RELAY AB TO HAZ #1-6 TB.	3119	1-2012 1-95936, 37, 39	250 VDC	2 Conductor #12 7-Stranded copper, 600V insulation XLPE/Asbestos Braid,Vulkene/Asbestos Braid or EPR/CSPE
RFC 12-2625 FPR TO 45,3 DET.	3120	1-2010 1-98991	250 VDC 22MA	4 Conductor #12 7-Stranded copper, 600V insulation XLPE/Asbestos Braid, Vulkene/Asbestos Braid, or EPR/CSPE

page 2 (cont'd list from page 1)

Item #	ROL #		Description
DBIL CAB to SPECIAL TEST 3121	1-2011 1-98612	125 VDC 1MA.	7 Conductor #12 7-Stranded copper, 600V insulation XLPE/Asbestos Braid, Vulkene/Asbestos Braid, XLPO/Hypalon, or EPR/CSPE
ARE TO EFR 3122	1-2011 1-98991 1-98992	250 VDC 22MA	12 Conductor #12 7-Stranded copper, 600V insulation XLPE/Asbestos Braid, Vulkene/Asbestos Braid, EPR/CSPE, or CSPE/CSPE
3123	NPX		15 Conductor #12 7-Stranded copper, 600V insulation XLPE/Asbestos Braid, Vulkene/Asbestos Braid, XLPO/Hypalon, or EPR/CSPE

Cable Number 17753-1 is Item #3120 already listed above.

Notes: There are various insulation types listed for certain cables. This is because there were various purchases of the cables made and depending on who we ordered the cable from usually determined the type of insulation. I can not find what these insulation descriptions are but I can give you who the purchasers were:

SISJ ....Plastic Wire Co, Collyer Co., General Cable Co., Essex Int.
PE/PVC ....Paige Electric, Collyer Co, Essex Int., General Cable Co.
EPR/Hypalon ....Anaconda, Continental
Okonite/Okoprene ......Okonite
EPR/Neoprene ....Cyprus, Essex Int.
EPR/CSPE ....Anaconda, Continental
XLP ....American Insulated Wire
EPR ....American Insulated Wire
XLPE ....Continental Wire
copper tape shield & PVC jacket ......Samuel Moore, Triangle, & G.E.
XLPE/CSPE ....BIW, Continental
XLPE/Hypalon ....Samuel Moore (Eaton), CERRO
CSPE/CSPE ....BIW, Anaconda
XLPO/Hypalon ....Rockbestos, Samuel Moore (Eaton)
Okoguard/Okoprene .....Okonite
XLPE/Asbestos Braid ...Continental
Vulkene/Asbestos Braid.....G.E.

Hopefully the manufacturers catalogues/representatives can give you some further information on the materials if you need them. If you have trouble, give me a call.

for Class 1 Signal Systems except as otherwise permitted in this Article, or other Articles, of this Standard. Flexible cords of the types described in Article 400 of the National Electrical Code shall not be used.

2150. Special Cables.

2151. Special cable approved for the purpose may be used as detailed in Paragraphs 2152, 2153, 2154, 2155, 2156.

2152. Low Voltage Applications. Cable for operation at 150 volts or less, shall be constructed as follows:

a. Conductors shall be of solid copper, not less than No. 14 AWG for single- and two-conductor cables, not less than No. 18 AWG for three- and four-conductor cables, and not less than No. 22 AWG for cables having more than four conductors.

b. The individual conductors shall have approved insulation having a nominal thickness of not less than 1/32 inch.

c. The cable conductors shall have a solid metallic sheath or a moisture-resistant and flame-retardant jacket providing equivalent protection against mechanical injury to that obtained with nonmetallic sheathed cable described in the National Electrical Code.

2153. The special cables may be installed exposed on a ceiling and on a side wall if not less than 7 feet from the floor and if adequately protected against injury. Concealed cable and cable passed through a floor or located on a side wall within 7 feet of the floor shall be installed in conduit or other approved raceway, unless solid metallic sheath is provided. Cable shall be adequately supported and terminated in approved fittings.

2154. Limited Energy Applications.

Approved cable meeting the requirements of Paragraphs 2155 and 2156 may be used in circuits having energy limiting characteristics as follows:

a. Circuit voltages not to exceed those shown in Column 1 of Table 1.

b. Maximum fault currents designed into the circuit not to exceed those shown in Column 2 of Table 1.

c. Noninterchangeable overcurrent protection not to exceed that shown in Column 3 of Table 1.

d. Energy limitations not to exceed those shown in Column 4 of Table 1.

Table 1

1	2	3	4	
Voltage Range	Maximum fault current AC or DC	Noninterchangeable overcurrent protection	Energy Limitation AC	DC
200-250	0.1 a	—	—	—
151-199	0.15 a	—	—	—
61-150	1.00 a	1.00 a	—	—
31-60	—	1.6 a	100 va (See Note)	
0-30	—	3.2 a	100 va (See Note)	

NOTE: Where batteries are used a resistor shall be in the circuit to limit the fault current to that obtained from a 100 va approved transformer of the same voltage output. Rectifiers and generators shall have built-in energy limiting characteristics equivalent to those of a 100 va approved signaling transformer.

2155. Conductors of cable for use with limited energy circuits shall be:

a. Solid copper, bunched-tinned (bonded) stranded copper, or copper alloys of equivalent tensile strength

b. Not smaller than

1. 16 gauge single conductor copper
2. 19 gauge multi-conductor copper

c. Covered by approved insulation having a 0.012 inch nominal 0.010 inch minimum thickness for both the outside jacket and the conductors. A single conductor cable shall have a jacket not less than 0.035 inch nominal 0.030 inch minimum thickness. Two or more conductors may be in flat parallel construction with 0.023 inch nominal integral insulation jacket, minimum 0.020 inch and with 0.031 inch minimum web.

d. The insulating compound shall have a temperature rating not less than 105°C and the jacket compound shall have a high degree of abrasion resistance.

2156. Limited energy cable described in Paragraphs 2154 and 2155 may be installed as follows:

a. Exposed on surface of ceiling and sidewalls or "fished" in concealed spaces. Cable shall be adequately sup-

Date: 6/9/88

Time: 1:25 PM EST

TELEPHONE CONVERSATION RECORD

Subject: Power Supply Data for Rochester Power Supply Model AN-159

From: David E. Kipley (Impell) DEK

To: Dino Deipalmer (Rochester)
(716) 238-4917

Summary of Conversation:

I requested data information on the power supply data for power supply Model AN-159. Mr. Deipalmer indicated the following:

The AN-159 power supply outputs are:

Volts DC	Min. Current	Max. Current
-28	1 amp	5.6 amp
+12	50 MA	500 MA
+12	50 MA	500 MA
+125	-	200 MA

In addition, I requested power data for the "EF" panel detection cards (Model AN-080). Mr. Deipalmer indicated that the detection circuits operate on 125 VDC at 1 MA.

DEK/ems

cc: B. J. Gerwe

Date: 6/8/88

Time: 3:00 PM EST

TELEPHONE CONVERSATION RECORD

Subject: Data required to confirm compliance with NFPA 12 for EMPC cabinet manual actuator, selector valves, and typical circuit current output from CO_2 system relay cabinets.

From: David E. Kipley (Impell) DEK

To: Steve Dimetravich (Chemetron)
(312) 534-1000

Summary of Conversation:

I requested data on the following equipment:

a. Maximum circuit current output from the CO_2 system relay cabinets

b. The hydrostatic pressures and equivalent lengths for the CO_2 selector valves

c. Maximum pull pressure and travel distance of EMPC cabinet manual actuator

Mr. Dimetravich indicated the following:

a. The largest power consuming component connected to the relay cabinets are the EMPC solenoids. These devices are all 10 watt solenoids.

Note: The current consumption is the following: $\text{Amp} = \frac{\text{Watts}}{\text{Volts}}$

$.040 = 10/250$ VDC
Amps

b. Selector valve data

1. All valves are hydrostatically tested at 1800 psi

2. Equivalent lengths of selector valves are the following:

Valve Pipe (Inches) Size	Equivalent Length (Feet)
1 1/2	72
2	67
3	99
4	61
6	185

c. Data is not available for this request for the manual actuators of the EMPC cabinets.

DEK/ems

cc: B. J. Gerwe

NFPA 72D (1967 Edition) Code Section 2223

Deviation: Documentation reviewed indicated that the power cables connected to the Alison Control panels A924 from power panels 1&2-DAB, circuit 5, are under sized for the 35 AMP breakers provided.

Justification: Based on the review of the letter from E.A. Taylor to B.J. Gerwe, indicates that these cables are adequate for the currents involved and are equivalent to the No. 10 AWG. wire required. Therefore, these cables are considered acceptable.

Reference: -Letter discussing the results of the evaluation performed for NFPA 72D Code Section 2223 from E.A. Taylor (AEPSC) to B.J. Gerwe (AEPSC), dated 4/26/88.

AEP
AMERICAN ELECTRIC POWER

Date April 26, 1988

Subject NFPA Code Compliance
Impell Corp. Recommendations

PIPING, HVAC

APR 27 1988

FIRE PROTECTION

From E. A. Taylor

To B. J. Gerwe

This memo is in response to your request for information dated 2/25/88. We have reviewed the recommendation on Code Section 2223 dealing with the comparison of a #7/18 AWG cable vs. a #10 AWG cable. The recommendation was to replace the #7/18 AWG with a #10 AWG.

An engineering evaluation was performed comparing a #7/18 to a #10 cable. A #7/18 AWG wire is larger than a #10 AWG and therefore the recommendation for upgrade to a #10 AWG is illogical.

The other item requiring investigation, Code Section 2154 on energy limitations, is awaiting further clarification from Impell.

Elizabeth Taylor

Elizabeth Taylor

EAT/jj/84.53

Approved R C Carruth

R. C. Carruth

cc: T. O. Argenta/S. H. Horowitz
L. F. Caso/J. V. Ruparel
D. N. Turnberg/J. R. Anderson
S. Z. Parsons/J. J. Kutys, Jr.
FILE: Cables

ANSI/ISA-S18.1-1979
(R1985)
Approved March 29, 1985

American National Standard

Annunciator Sequences and Specifications

Instrument Society of America

annunciator operation, not the disconnected position of the devices. Types of field contact include:

normally open (NO) — a field contact that is open for a normal *process condition* and closed when the *process condition* is abnormal.

normally closed (NC) — A field contact that is closed for a normal *process condition* and open when the *process condition* is abnormal.

field contact follower — see *auxiliary output.*

field contact voltage (trouble or signal contact voltage) — the voltage applied to *field contacts.*

first alert — see *first out.*

first out (first alert) — a *sequence* feature that indicates which of a group of *alarm points* operated first.

first out reset — see *reset.*

flasher — a device that causes *visual displays* to turn on and off repeatedly. Types of flashing include fast flashing, flashing, slow flashing, and intermittent flashing.

functional test — see *test.*

future alarm point — see *alarm point.*

horn relay contact — see *auxiliary output.*

integral logic annunciator — an *annunciator* that includes *visual displays* and sequence logic circuits in one assembly.

lamp cabinet — a cabinet containing *visual displays* only.

lamp follower — see *auxiliary output.*

lamp test — see *test.*

lock-in — a *sequence* feature that retains the alarm state until acknowledged when the abnormal *process condition* is *momentary.*

logic cabinet — a cabinet containing logic circuits and no *visual displays.*

maintained alarm — see *alarm.*

manual reset — see *reset.*

momentary alarm — see *alarm.*

multiple input — see *reflash.*

nameplate — see *window.*

normally closed (NC) — see *field contact.*

normally open (NO) — see *field contact.*

operational test — see *test.*

point module — see *alarm module.*

process condition — the condition of the monitored variable. The process condition is either normal or abnormal (*alarm*, alert, or off-normal).

pushbutton — A momentary manual switch that causes a change from one *sequence state* to another. Pushbutton actions include *silence*, *acknowledge*, *reset*, *first out reset*, and *test.*

reflash (multiple input) — 1. an auxiliary logic circuit that allows two or more abnormal *process conditions* to initiate or reinitiate the *alarm* state of one *alarm point* at any time. The *alarm point* cannot return to normal until all related *process conditions* return to normal. 2. one type of *auxiliary output.*

remote logic annunciator — an *annunciator* that locates *visual displays* and sequence logic circuits in separate assemblies.

reset — the *sequence action* that returns the *sequence* to the normal state. Types of reset include:

automatic — reset occurs after *acknowledge* when the *process condition* returns to normal.

manual — reset occurs after *acknowledge* when the *process condition* has returned to normal and the reset *pushbutton* is operated.

first out — reset of the *first out* indication occurs when the *acknowledge* or *first out reset pushbutton* is operated, whether the *process condition* has returned to normal or not, depending on the sequence.

response time — the time period between the *process condition* becoming abnormal and initiation of the *alarm* state. The minimum *momentary alarm* duration required for *annunciator* operation.

return alert — see *ringback.*

ringback (return alert) — a *sequence* feature that provides a distinct visual or audible indication or both when the *process condition* returns to normal.

sequence — the chronological series of actions and states of an *annunciator* after an abnormal *process condition* or manual *test* initiation occurs.

sequence action — a signal that causes the *sequence* to change from one *sequence state* to another. Sequence actions include *process condition* changes and manual operation of *pushbuttons.*

sequence diagram — a graphic presentation that describes *sequence actions* and *sequence states.*

sequence module — see *alarm module.*

sequence state — the condition of the *visual display* and *audible device* provided by an *annunciator* to indicate the *process condition* or *pushbutton* actions or both. Sequence states include normal, *alarm* (alert), silenced, acknowledged, and *ringback.*

sequence table — a presentation that describes *sequence actions* and *sequence states* by lines of statements arranged in columns.