Consumers Power Company

General Offices: 212 West Michigan Avenue, Jackson, Michigan 49201 • Area Code 517 788-0550

COPY

January 17, 1979

Director, Nuclear Reactor Regulation
Att Mr Dennis L Ziemann, Chief
Operating Reactors Branch No 2
US Nuclear Regulatory Commission
Washington, DC 20555

DOCKET 50-155 - LICENSE DPR-6
BIG ROCK POINT PLANT - FIRE
PROTECTION MODIFICATIONS

By letter dated December 8, 1978, Consumers Power Company committed to providing an implementation schedule for proposed fire protection modifications at the Big Rock Point Plant by mid-January 1979.

The following provides a best estimate schedule and updated responses to the December 8, 1978 letter. The individual schedule dates provided below are subject to change with the exception of the commitment to complete all modifications discussed in P26 below.

Item 32

At the present time, approved fire doors have been installed in all but three door openings through the fire barriers.

These three openings are equipped with good substantial doors that are equivalent to approved fire doors. These doors, due to their substantial construction and their equivalency to fire doors, will remain in place without modification.

The doors that will not be modified are located between (1) Room 124 (track alley) and Room 125 (condensate pump room), (2) Room 104 (shop) and Room 104A, (3) Room 105 (air compressor and electric room) and Room 101 (lobby).

The combination of two fire doors between Room 326 (turbine floor) and Room 308 (viewing area) have been accepted by the NRC inspection team of October 10-13, 1978 as being equivalent to the three-hour barrier. These doors will not be upgraded and will remain in place without modification.

Other miscellaneous penetrations will be sealed by the end of the 1980 refueling outage.

7901230144

Item 33

This item will be addressed by a separate letter before February 1979.

Item 34

Self-contained battery powered lighting units will be installed by November 1979.

Item 35

Final design not yet complete.

Item 36

Our December 8, 1978 letter completed this item.

Item 37

Our December 8, 1978 letter completed this item.

Item 38

Results of an analysis of the potential for damage to safe shutdown equipment by a hydrogen explosion in the off-gas system is provided as Attachment I.

Item 39

Fire doors equipped with fusible link closure devices will be completed by April 1979.

Item 40

Our December 8, 1978 letter completed this item.

Item 41

Our December 8, 1978 letter completed this item.

Item 42

Our December 8, 1978 letter completed this item.

P5

Independent safe shutdown capability will be provided as identified in our December 8, 1978 letter. The schedule for this item is dependent on final design and interfaces with the SEP program.

P6

Preliminary results of an evaluation for protective measure to preclude the potential for a fire causing inadvertent actuation of the RDS indicate that insulation of control/power cables with Kaowool will provide adequate protection. The modification will be complete by January 1980.

P7

This modification will be complete by March 1980. Special insulation will not be required as identifed - Attachment II.

P8

This modification will be completed by September 1979.

P9

Our letter of December 8, 1978 completed this item.

P10

A portable water "Loaded Stream" extinguisher has been provided at the bailer house.

P11

This item will be completed during the 1980 refueling outage currently scheduled for February and March 1980.

P12

Same as Item P11.

P13

Installation of all fire detection and alarm systems will be completed during the 1980 refueling outage, currently scheduled for February and March 1980.

P14

This item is complete.

P15

Our letter of December 8, 1978 completed this item.

P16

Equipment will be ordered and placed in service by August 1, 1979.

P17

Equipment will be ordered and placed in service by August 1, 1979.

P18

One 5000 cfm smoke ejector will be ordered and placed in service by August 1, 1979.

P19

Equipment will be ordered and installed by December 31, 1979.

P20

Equipment will be ordered and placed in service by August 1, 1979.

P21

Procedures will be written by February 15, 1979 to document the required test. Post winter testing will be completed by June 1, 1979.

P22

Was completed December 8, 1978.

P23

Was completed December 15, 1978.

P24

One fire depot has been established and a second assigned. The second depot will not be functional until the security modification is completed. Expected date for the second depot is June 1, 1979.

P25

This item is part of Consumers Power planned fuel pool rack modifications and will be submitted by June 1979.

P26

This item was addressed completely in our December 8, 1978 letter with the exception of an overall commitment for completion schedule for all fire protection related modifications. Consumers Power intends to complete all fire protection modifications before the end of 1980 with the possit exception of the independent safe shutdown capability which is still being evaluated.

David P Hoffman (Signed)

David P Hoffman
Assistant Nuclear Licensing Administrator

CC JGKeppler, USNRC

ATTACHMENT I

BIG ROCK POINT PLANT

ANALYSIS OF HYPOTHESIZED HYDROGEN EXPLOSION EFFECTS FROM THE OFF-GAS SYSTEM AS RELATED TO SAFE SHUTDOWN

The following analysis is provided as a response to Request #38 from Enclosure 1 of the NRC letter to D A Bixel dated 12/20/78.

Request #38

Provide the results of an analysis of the potential for damage to safe shutdown equipment by a hydrogen explosion in the Off-Gas System.

Conclusion

Based on our letter of April 11, 1978 and the system design as summarized in the FHSR and the analysis below, there appears to be no off-gas explosion potential that could completely cripple safe shutdown capability at Big Rock Point.

Discussion:

1. CPCO submittal to NRC of April 11, 1978 in response to I E Bulletin 78-03 indicates the very low probability of external accumulation of hydrogen from postulated Off-Gas System leakage with ventilation equipment in service (attachment).

2. FHSR Section 9.1.7 indicates that the Off-Gas System is designed to withstand the calculated pressures for an internal explosion (attachment).

3. Notwithstanding the low probability of hydrogen accumulation or explosion potential as outlined in Response 1 above; a review of interior areas where off-gas leakage could accumulate with ventilation systems disabled has been conducted with reference to the Success Tree for Safe Shutdown, VII-9 and System List VII-10 from the 3/29/77 submittal to the NRC (attachment).

    a. Stack base area and radwaste area - only off-gas and stack gas monitoring components are located here and loss of both systems would not preclude safe shutdown via the Poison System/Clean-up Isolation/Emergency Condenser path or the Scram/Containment Isolation/Emergency Condenser/Shutdown Cooling System path.

    b. Lower turbine hall and condensate pump room - elements of the Condensate System, Demineralized Water System and Feedwater System are located here but complete loss of these systems would not prevent safe shutdown via the Emergency Condenser/Poison System/Clean-Up System Isolation/Shutdown Cooling System path or the Scram/Containment Isolation/Emergency Condenser/Shutdown Cooling System path.

    c. Turbine pipe tunnel - elements of the Fire System, Demineralized Water System, Service Water System, Instrument Air, Condensate System, Air Ejector System, Containment Isolation System and Feedwater System are located here.

        1) The safe shutdown path utilizing the Poison System/Clean-Up System Isolation/Emergency Condenser System would not be affected.

        2) The pipe tunnel has blowout panel protection for high energy pipe rupture that would limit pressure rise to preclude pipe tunnel structure damage per the submittal to the NRC of June 29, 1973.

        3) Assuming that missiles generated by an explosion disabled the Fire System, such failure could be isolated by manual valving and the

alternate supply path through MO-7072 could replenish the emergency condenser.

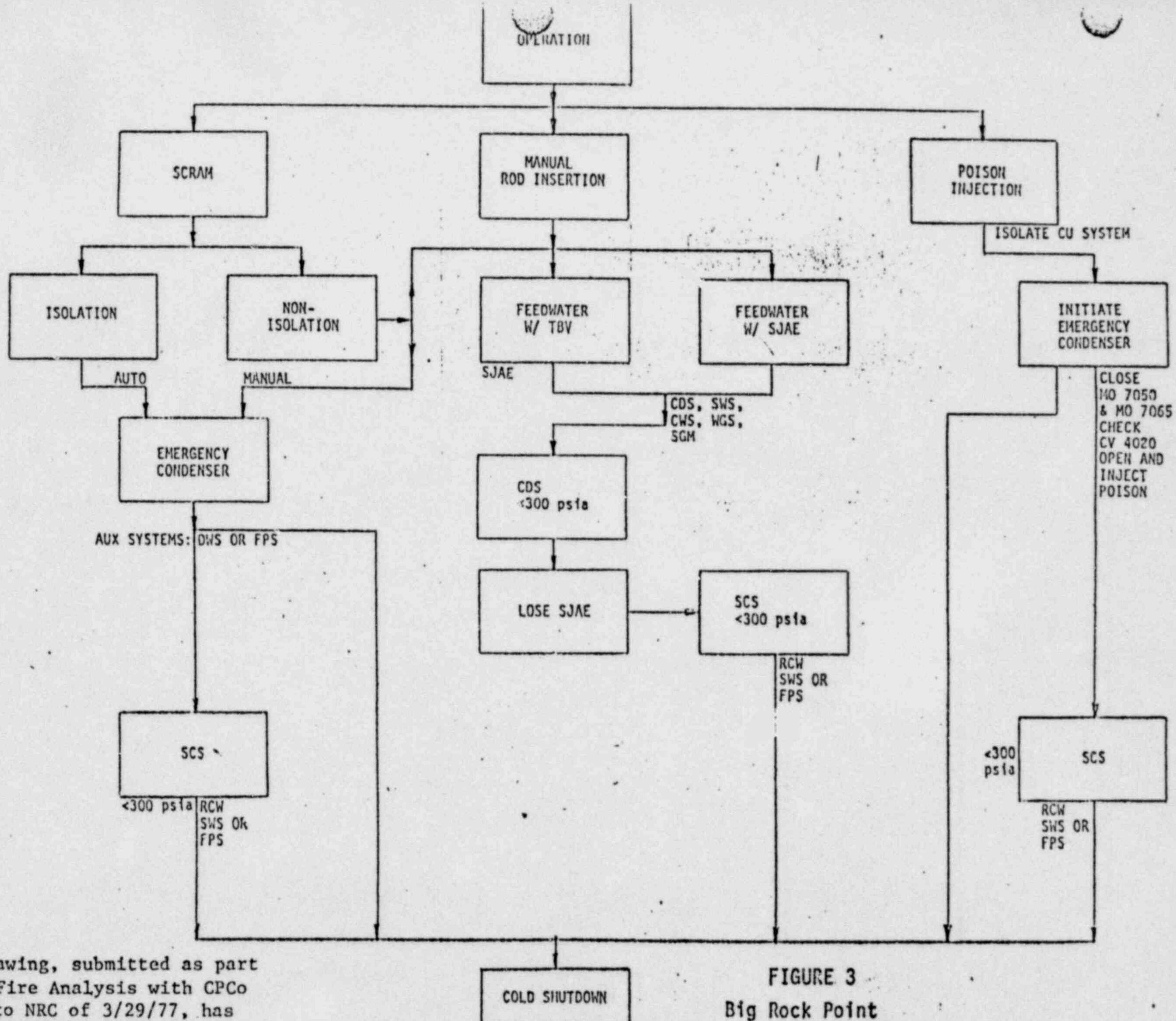
4) Assuming that missiles generated by an explosion disabled the service water supply to containment, the Fire System tie to the Service Water System in containment could be utilized for the Shutdown Cooling System.

5) If the service water discharge from containment were ruptured by explosion effects, the Shutdown Cooling System would not be considered operable; however, the Poison System/Clean-Up Isolation/Emergency Condenser System path would still be intact as well as the Scram/Containment Isolation/Emergency Condenser path for safe shutdown.

6) If any of the external containment isolation valves or associated piping were disabled in the open condition by explosion effects, the redundant isolation valves inside containment could still provide containment integrity if needed for safe shutdown.

7) If the Demineralized Water System were disabled, makeup to the emergency condenser could still be provided by the normal Fire System or, if it were disabled also, the fire water path through MO-7072 could be used.

8) Loss of instrument air would not prevent use of the Emergency Condenser System, the Poison System, Scram System, Containment Isolation or Shutdown Cooling System. The Clean-Up System could also be isolated by manual valving. Thus, at least two safe shutdown paths could be used, namely - Poison/Clean-Up Isolation/Emergency Condenser/Shutdown Cooling System path or the Scram/Containment Isolation/Emergency Condenser/Shutdown Cooling System path.



NOTE: This drawing, submitted as part of the Fire Analysis with CPCo letter to NRC of 3/29/77, has been modified to show deletion of core spray system per CPCo letter to NRC of 7/14/78.

FIGURE 3
Big Rock Point
Success Tree for Safe Shutdown

FIGURE 3 (Cont.)

BIG ROCK POINT

SUCCESS TREE FOR SAFE SHUTDOWN

CODE	SYSTEM
E.C.S.	Emergency Condenser System
D.W.S.	Demineralizer Water System
F.P.S.	Fire Protection System
R.C.P.	Reactor Recirculation Pump
R.C.W.	Reactor Cooling Water
S.W.S.	Service Water System
F.W.S.	Feedwater System
T.B.V.	Turbine Bypass Valve
C.D.S.	Condensate System
W.G.S.	Waste Gas System (Including Off-Gas)
S.J.A.E.	Steam Jet Air Ejector
C.W.S.	Circulating Water System
R.C.S.	Reactor Clean Up System
C.R.D.	Control Rod Drive
R.D.S.	Reactor Depressurization System
S.G.M.	Stack Gas Monitoring
S.C.S.	Shutdown Cooling System | *

* added 12-20-78 - R.E.B.

Consumers Power Company

COPY

General Offices: 212 West Michigan Avenue, Jackson, Michigan 49201 • Area Code 517 788-0550

April 11, 1978

Mr James G Keppler
Office of Inspection and Enforcement
Region III
US Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, IL 60137

DOCKET 50-155 - LICENSE DPR-6 -
BIG ROCK POINT PLANT - RESPONSE
TO IE BULLETIN 78-03

IE Bulletin 78-03 discusses the potential for accumulation of explosive gas mixtures in Boiling Water Reactor Off-Gas System Operations and requests that Consumers Power Company review and respond to specific areas of concern relating to this system. The purpose of this letter is to provide the requested response.

ITEM

Review the operations and maintenance procedures related to the off-gas system to assure proper operation in accordance with all design parameters. Include in this review measures you have taken or will take to prevent inadvertent actions (such as arc strikes) which might cause ignition of the mixture of gases contained in the off-gas piping.

RESPONSE

Big Rock Point Operating, Maintenance and Administrative procedures relating to the off-gas system have been reviewed and, where necessary, appropriate precuations were added to preclude inadvertent ignition of potentially explosive gases.

ITEM

Review the adequacy of the ventilation of spaces and areas through which off-gas system piping containing explosive mixtures of gases pass. The review should consider ventilation losses and off-normal off-gas system operation, such as lack of dilution steam, lost loop seals, blown rupture disks, bypassing recombiners and leakage of off-gas into isolated portions of systems.

RESPONSE

A review of the design of the off-gas system at Big Rock Point indicates that there are two potential areas that could possibly be affected by off-gas release. These areas are the pipe tunnel and the radwaste area. Both areas are well ventilated; the pipe tunnel having a flow of 5,000 cfm to 14,100 cfm (design) and the radwaste area from 1,500 cfm to 4,[illegible] cfm (design). In order to reach an explosive concentration in these areas, the hydrogen concentration would have to exceed 4% and, based on the ventilation flow rates, this would correspond to a hydrogen escape rate of 60 cfm and 200 cfm for the radwaste area and pipe tunnel, respectively. Since these are significantly higher flow rates than nominally exist in the off-gas holdup line (10 cfm), it is highly unlikely that the limit(s) can be exceeded.

Note: The analysis deriving these flow rates assumes minimum design ventilation flow and uniform mixing.

ITEM

For those spaces and areas identified, describe what action you have taken or plan to take to assure that explosive mixtures cannot accumulate, that monitoring equipment will warn of such an accumulation and that disposal of such mixtures will be controlled without resulting in a damaging explosion.

RESPONSE

There are no plans to alter off-gas system or ventilation system design at Big Rock Point. There are no hydrogen detectors in either the radwaste area or pipe tunnel and the only ventilation flow indication available in the control room is ventilation supply and exhaust fan alarms. However, because of the extremely low potential for explosion based on both the analysis performed in the previous response and Big Rock Point's long operating history with no significant off-gas problems, it is concluded that current procedures, design and operation are adequate to preclude a damaging explosion.

ITEM

Loop seals are potential off-gas leakage paths following a pressure transient in the off-gas system piping. Describe your design features to minimize and detect the loss of liquid from loop seals and describe operating procedures which assure prompt detection and reseal of the blown loop seals.

RESPONSE

There is no method available to verify whether an off-gas loop seal is full. Analysis has shown that off-gas pressure is nominally one to two ounces per square inch, necessitating a four-inch loop seal to ensure sealing integrity. Since all off-gas loop seals at Big Rock Point are approximately two feet or longer, the possibility of seal failure is remote. If a loop seal should fail however, it would automatically refill via moisture collection from within the system and without any procedural action required.

2q

ITEM

Review operating and emergency procedures to assure that your operating staff has adequate guidance to respond properly to off-gas system explosions.

RESPONSE

There are no Big Rock Point Plant procedures that deal specifically with off-gas system explosions. However, both the Operating Procedures and the Site Emergency Plan address and adequately cover plant fires. Further, the Plant Operating Procedures also address abnormal off-gas and stack gas releases as well as off-normal procedures for other systems. Based on this, it is concluded that the required response to a postulated off-gas explosion is adequately addressed.

In summary, the operation and design of the off-gas system at Big Rock Point has been reviewed for the potential of maintaining accumulations of explosive gases. The review has produced no evidence that system design or operation should be altered based upon safety deficiency. Since further, and more detailed, review in this area will be conducted during the Systematic Evaluation Program (SEP), it is requested that any other required evaluation be coordinated with this effort.

William S Skibitsky (Signed)

William S Skibitsky
Senior Licensing Engineer

CC: Director, Office of Nuclear Reactor Regulation
Director, Office of Inspection and Enforcement

2 of 3

9.1.6 Monitoring and Control

9.1.6.1 Protection against excessive radioactive gas release rates is afforded by ~~several~~ two continuous radiation monitors on the process off-gas system (as indicated in Section 7.12. In the event that radiation release rates exceed the continuous safe discharge limit of 0.4 curies per second, a valve in the off-gas line may be manually closed to retain the gases. At the higher level of ~~10~~ curies per second, this valve is closed automatically by a monitor signal. Valve closure requires plant shutdown and correction of the cause of high release. After suitable decay, the retained gases, which have been held in the off-gas piping, are released and plant operation resumed.

9.1.6.2 Continuous monitors on the stack provide a record of both total activity and ~~nitrogen-13~~ Xe 135 activity of all air and gases released from the stack. A particulate sampler is also provided on the stack to detect any significant release of radioactive particles. These monitors serve to indicate any changes or trends in release rates of radioactive gases or particles, as well as total amounts released. Means are also provided for periodically measuring the concentrations of individual radioisotopes so that they may be related to appropriate limits. (See Section 7.12.2)

9.1.7 Explosion Hazard

A potential hazard in the off-gas system may exist due to the presence of a stoichiometric mixture of hydrogen and oxygen. Actually, the probability of a hydrogen-oxygen reaction occurring is very low, since the off-gas system is closed and no source of ignition or spark is present, and the gas is saturated with water vapor so no static spark should result. However, the system is designed to withstand the calculated pressures encountered due to such a reaction.

9.2 LIQUID WASTES

9.2.1 Sources and Quantities

9.2.1.1 The radioactivity of the liquid wastes is due to activation of corrosion products formed in the nuclear steam supply system and the possible escape of fission products from fuel element cladding defects. The corrosion products result from the materials of construction of the system and consist of compounds of iron, chronium, nickel, cobalt, zirconium, aluminum, manganese, copper, etc. Radioactivity results from neutron irradiation of these elements. Fission products, on the other hand, consist of a very wide range of elements. The total mixture of radioisotopes which can be present in the nuclear steam supply system at any particular time is therefore quite complex. It can be characterized only in general by saying that most of the chemical elements can be present. The total

ATTACHMENT II

ANALYSIS REQUIRED BY P7

Insulation to protect conduits and valve operators against a fire resulting from an oil leak at a Big Rock reactor recirculation pump is not needed.

Results of an analysis show that the temperature rise in the pump room and the duration of the abnormal temperatures are negligible. The temperature rise and duration are both directly related to how hot the conduit and valve operators get.

In addition, every item in the room absorbs heat. This further limits how hot the conduit and valve operators get.

Distance from a heat source also determines how much heat is absorbed by an item. The farther away from a heat source, the less heat that is absorbed. The conduits and valve operators are approximately 50 feet from the recirculation pumps.

Ventilation through the room changes the air about once every 3-1/2 minutes. This ventilation constantly takes heat away. Thus, any temperature rise in the room is quickly dissipated.

PVC cable has an ignition temperature of over 500°F. Steel valves, while noncombustible, weaken at 1200°F.

Analysis indicates that a 50-square foot oil spill that is burning will raise the temperature 219°F above the ambient temperature. The temperature of uninsulated PVC cable will rise and may approach the room temperature. The cable may reach this temperature but cooling begins immediately due to ventilation.

A 3 gpm oil spray being burned raises the temperature in the room 222°F above the ambient temperature. Again, the cable temperature will rise and may approach the room temperature.

Both of these situations assume an inoperative sprinkler system. However, when the sprinkler system operates the fire will be controlled and temperature rises will be drastically reduced.

Both situations produce temperatures well below the ignition temperature of PVC and the weakening temperature of steel.

In conclusion, insulation of conduits and valve operatros is not needed.