PUBLIC SERVICE COMPANY OF COLORADO
P. O. BOX 840 • DENVER, COLORADO 80201

R.F. WALKER
PRESIDENT

January 15, 1986
Fort St. Vrain
Unit No. 1
P-86016

Director of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attn: Mr. H.N. Berkow, Project Director
Standardization and Special
Projects Directorate

Docket No. 50-267

SUBJECT: Additional Information to
Support 35% Power -
Building Access

REFERENCE: 1) PSC Letter Dated
December 10, 1985,
Walker to Berkow
(P-85460)

Dear Mr. Berkow:

This letter submits additional information to support PSC's intention to use the ice vests described in reference 1 to allow personnel access with elevated building temperatures. As stated in Reference 1, PSC may rely on the ice vests to perform various desirable actions following a steam line break with the Fort St. Vrain (FSV) Plant at 35% power or less. However, it should be re-emphasized that use of the ice vests would not be mandatory following a steam line break at 35% power because adequate time exists (29.4 hours) prior to the time that PCRV liner cooling must be established.

In response to recent NRC staff requests, Attachment 1 to this letter documents the professional opinion of Dr. Thomas Bernard who has worked for two years on the development of a Heat Stress Management Program for EPRI. Attachment 2 to this letter provides details of a FSV Operations Department walkdown of the manual actions which would be performed following a steam line break. It is concluded that an adequate supply of ice vests and Scott Air-Paks exist to perform the required manual actions to establish liner cooling in elevated building temperatures. Additional ice vests are being ordered to provide further margin.

Change: RAX, EG&G, LPDR; PDR, NSIC } Ltr Only due to Content of Copyright Material

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Again, PSC would like to stress that we have a proven safety program and will do the utmost to protect the safety of all workers. The work would be done by teams and in stages, with stay times being short (less than 30 minutes).

If you have any questions on this subject, please call Mr. M. H. Holmes at (303) 480-6960.

Very truly yours,

R.F. Walker

R.F. Walker
President

RFW/FWT:pa

Attachments

Attachment 1

to P-86016

Westinghouse
Electric Corporation

Research and Development Center

1310 Beulah Road
Pittsburgh Pennsylvania 15235
(412) 256 1000

January 13, 1986

Michael Niehoff
Public Service Company of Colorado
2420 W. 26th Avenue - Suite 100D
Denver, CO 80211

Dear Mr. Niehoff:

My opinion was sought concerning an emergency entry procedure at Fort St. Vrain in response to an NRC inquiry. A basic concern for entering the reactor building when the ambient air temperature is as high as 82 C (180 F) and is saturated with water vapor is the heat stress that the worker will experience. I have prepared a research report for EPRI titled "Heat Stress Management Program for the Nuclear Power Industry," which will be available as EPRI NP4453 in March. A prepublication copy is enclosed. This letter discusses your situation in the light of the EPRI research project.

Based on the report, ice cooling garments, which are a type of personal protection, are the only practical means of protection. These are described in Section 8.2 (pp 8-9ff). The principle of personal protection is to provide the user with a hospitable microenvironment when hazards exist in the ambient environment. Under conditions of high heat stress and moderate metabolism with a need for mobility, an ice cooling garment can provide the personal protection the workers require. The ice garment controls heat stress by limiting the external heat load on the worker and providing a heat sink for internal heat generation. First, the insulating jacket on the garment and the coveralls worn by the individual will establish a barrier to external heat gain from convection and radiation (infrared). This means that internal heat generation is the primary source of heat stress. Internal heat generation is metabolism that results from the work demands placed on the individual. Because the clothing insulation and environmental conditions preclude sweating as an effective means of cooling the individual, the ice acts as a heat sink for internal heat generation to keep the body temperature within safe limits. Thus the ice garment sets up a microenvironment in which the external sources of heat are reduced and the internal heat is balanced by a heat sink.

The ice garments have been demonstrated as effective by both laboratory and field experience. The highest ambient temperature in a laboratory that the ice garments have been tested was reported in EPRI NP2868. At 55 C (131 F), the ice cooling garment (SFWG in the report) permitted an average time of 103 minutes and at least 67 min for 95% of the tests. Because the use of personal protection for heat stress is based on the

principle of isolating the individual from the environment, increasing the ambient temperature should have little effect on the work time.

Most field experience is at lower ambient temperatures, but two routine uses of ice garments were reported to me at higher temperatures. In one, work is performed at 60 C (140 F) for one hour before the exposure is terminated by the procedure. In this case, the workers have not felt that they were limited by heat stress. In the second case, work is performed for 15 to 25 minutes at 71 C (160 F). The work in this case requires only that amount of time, and the workers also report that they are not limited by heat stress.

Based on laboratory and field experience, the service time for ice cooling garments was conservatively estimated and reported in NP4453 (see Table 8-2, pg 8-13). For a garment with 3.8 kg (8.4 lb) of ice, a service of 45 minutes can be expected for a moderate metabolism. Most experience has shown that longer times can be expected (e.g., the 60 minutes at 60 C mentioned above).

The following are recommendations for the emergency entry work.

o Ice cooling garment with at least 3.8 kg of ice at -6 C (20 F)

o SCBA (Note; the service time may be different than that for the ice garment, and the shorter time would apply for planning purposes)

o One set of heavy cotton coveralls (an outer cover of plastics would enhance the insulating effects)

o Buddy system for mutual observation

o Physically fit workers

o Instructions to terminate the work at the earliest signs of heat illness

o Heat resistant gloves

Two other considerations might include an antifogging agent on the exterior lens of the SCBA mask and a communications device between the two workers and to the outside.

The above information is an interpretation of the material contained in the EPRI report and is provided with the understanding that it is covered by the legal notice contained in the report.

Sincerly,

T. E. Bernard

Thomas E. Bernard
Human Sciences