VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

W. L. STEWART
VICE PRESIDENT
NUCLEAR OPERATIONS

April 30, 1986

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
Attn: Mr. Lester S. Rubenstein, Director
PWR Project Directorate No. 2
Division of PWR Licensing-A
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Serial No. 86-203
NO/DAS:vlh
Docket Nos. 50-280
50-281
50-338
50-339
License Nos. DPR-32
DPR-37
NPF-4
NPF-7

Gentlemen:

VIRGINIA ELECTRIC AND POWER COMPANY
SURRY POWER STATION
NORTH ANNA POWER STATION
RESPIRATORY PROTECTION PROGRAM

In your letter of March 27, 1986, you requested that we provide a discussion on how our current practices with respect to the use of 35% enriched oxygen with open-circuit Self-Contained Breathing Apparatus (SCBA) meets the requirements of 10CFR20.103. Your letter also requested a schedule for submitting test protocol in support of a 10CFR20.103(e) authorization request for a modified SCBA unit and a schedule for submitting additional information supporting the interim use of existing SCBAs.

Attachment 1 provides a discussion of our current respiratory protection program practices including information supporting continued use of our existing SCBAs. Previous correspondence we have had with the National Institute for Occupational Safety and Health (NIOSH) indicated that NIOSH certification of the SCBA was not voided by use of 35% oxygen enriched breathing air. However, since there is question whether this represents the current position of NIOSH, Attachment 2 is transmitted as a 10CFR20.103(e) authorization request to formally resolve the issue of acceptability of using 35% oxygen enriched breathing air with the existing SCBAs. Finally, the test protocol to support future use of 35% oxygen with a different SCBA unit will be forwarded to you under separate cover by May 16, 1986. A separate 10CFR20.103(e) authorization request for this device will be processed independently following successful test completion.

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Rec'd w/check $150.00

We have evaluated our specific authorization request of Attachment 2 in accordance with the criteria in 10CFR170.12. A check in the amount of $150 is enclosed as an application fee. If you have any questions regarding the enclosed information or authorization request, please contact us.

Very truly yours,

W. L. Stewart

Attachments

cc: Dr. J. Nelson Grace
Regional Administrator
NRC Region II

NRC Senior Resident Inspector
North Anna Power Station

NRC Senior Resident Inspector
Surry Power Station

Mr. Chandu P. Patel
NRC Surry Project Manager
PWR Project Directorate No. 2
Division of PWR Licensing-A

Mr. Leon B. Engle
NRC North Anna Project Manager
PWR Project Directorate No. 2
Division of PWR Licensing-A

ATTACHMENT 1

Discussion of Current Respiratory Protection Practices and Information Supporting Continued Use of Existing Self-Contained Breathing Apparatus

Discussion of Current Respiratory

Protection Program Practices

Background:

During a May 6, 1985, meeting with the NRC on respiratory protection for subatmospheric containments, Virginia Electric and Power Company, Duquesne Light Company, and Northeast Utilities discussed obtaining an all-purpose respirator for subatmospheric applications. Specifically, a long-term solution using an oxygen enriched open-circuit self-contained breathing apparatus (SCBA) was discussed. The specific SCBA discussed for such future applications, following appropriate oxygen compatibility testing, was the Mine Safety Appliances (MSA) Custom 4500 Dual-Purpose Breathing Apparatus. This device was considered to "envelope" the lower pressure MSA Ultralite SCBA and the MSA Model 401 Ultralite upgrade in terms of any testing results. For future applications, we were asked to submit generic test protocol which would not be vendor specific.

Unlike the other two utilities, we own and use MSA Model 401 SCBAs. Our need to pursue SCBA testing and NRC authorization per 10CFR20.103(e) was based on the fact that the existing MSA Model 401 is no longer in production, including original spare parts. Although MSA can provide compatible replacement parts for our devices, most replacement parts are of aluminum construction instead of original brass construction. As a consequence, our supply of original material components is limited and we must eventually convert the existing units to MSA Ultralite equivalents. As stated during the May 6, 1985, meeting, we believe that our safe operating experience with the MSA Model 401 SCBA in enriched oxygen application provides substantial assurance of continued satisfactory performance with open-circuit SCBA devices. Only oxygen compatibility testing of the modified aluminum component device appears to be needed to confirm acceptability.

With respect to our existing MSA Model 401 SCBA, we stated during the meeting that our substantial operating experience proved that those units could be and were being operated safely with the enriched oxygen application. Furthermore, although we had requested the topic of interim relief as an agenda item, we stated at the end of the May 6, 1985, meeting that we believed it would be unnecessary to pursue such interim relief as we had recently recovered documentation from our files in which NIOSH reviewed and indicated that our enriched oxygen application did not void certification. We stated that we had provided this documentation to NRC Region II and therefore intended to proceed only with efforts to support future submission of a 10CFR20.103(e) authorization request on the Ultralite upgrade SCBA. We subsequently closed our self-initiated deviation report and initiated efforts in support of test protocol for the Ultralite upgrade SCBA.

Current Respiratory Protection Practices:

The current MSA Model 401 SCBA has been certified by NIOSH for compressed air applications. We use 35% oxygen enriched breathing air in the Model 401 SCBA to compensate for the oxygen deficient atmosphere in our subatmospheric containment. Use of 35% oxygen does not affect protection factors which have been established in the NIOSH certification process for compressed air applications.

We have used the MSA Model 401 SCBA with 35% oxygen since 1976. A review of our correspondence with NIOSH and OSHA prior and subsequent to our use of 35% oxygen establishes that we had previously addressed the issue of enriched oxygen application. On July 8, 1977, we received a letter from Mr. Robert H. Schutz, Chief of NIOSH's Testing and Certification Branch stating his opinion that regarding our subatmospheric enriched oxygen application, "the (certification) approval will not be voided". Based on that concurrence, we viewed the unit to be wholly acceptable with respect to NIOSH certification.

This position can be seen in our letter, Serial #558, of December 4, 1977, which notified the NRC of our implementation date for respiratory protective equipment usage. In this letter, we specifically requested permission to continue using a non-certified air hood with its demonstrated protection factor as part of the program. This air hood was the only device which we believed to require an exemption request at the time of formal program implementation.

Additional Information:

Based on recent concerns regarding oxygen compatibility of aluminum components and associated vendor correspondence, we reviewed our records and removed appropriate aluminum replacement parts from service and spare inventory and replaced these parts with parts of original brass construction. We additionally reviewed the maintenance records of fifty complete SCBAs for repairs/parts replacement over a period of one year. No indication of oxygen induced failure or degradation was documented in this records review nor are we aware of any other previous part replacement due to oxygen induced damage. Most of these parts were replaced as part of routine preventive maintenance.

Summary:

With respect to 10CFR20.103, we have continued to use our MSA Model 401 SCBAs with 35% oxygen enriched breathing air with the position that we are in compliance with 10CFR20.103(c), based on the NIOSH letter of July 8, 1977, and consistent with our licensing position since 1978. Specifically, routine subatmospheric containment entries are made using oxygen enriched breathing air. Outside of containment,SCBA requirements are met with a separately maintained inventory of NIOSH certified MSA SCBAs with compressed air.

ATTACHMENT 2

10CFR20.103(e)

Authorization Request

10CFR20.103(e) Authorization Request

Purpose:

10CFR20.103(c) specifies that respiratory protection equipment be certified or have certification extended by the National Institute for Occupatonal Safety and Health/Mine Safety and Health Administration (NIOSH/MSHA) to make allowance for protection factors. 10CFR20.103(e) permits a licensee to request specific authorization by the Commission to assign protection factors for equipment which has not been tested and certified by NIOSH/MSHA. A prerequisite for such authorization is demonstration by testing or reliable test information that the "material and performance characteristics of the equipment are capable of providing the proposed degree of protection under anticipated conditions of use." This attachment transmits for your approval a request for specific authorization to make allowance for protection factors when using 35% oxygen enriched breathing air with the Mine Safety Appliances Model 401 open-circuit Self-Contained Breathing Apparatus (SCBA).

Background:

The containments at both North Anna and Surry nuclear power stations are designed to be maintained at subatmospheric pressure during power operations. Actual containment environment varies depending on the unit load as well as the time of year. However, the range of pressure is nine to eleven pounds per square inch absolute. This pressure is roughly equivalent to the atmospheric condition found at 13,000 feet altitude. Likewise, containment temperature and relative humidity vary depending on the time of year and may locally exceed 120°F and 90% relative humidity. (Containment average air temperature is required to be less than or equal to 120°F by Technical Specification at Surry and 105°F at North Anna.)

It is necessary for station personnel to periodically enter containment while the units are operating in order to perform routine inspections or maintenance as required. The impact of the above-mentioned containment environment on personnel safety was assessed in the mid 1970's due to minor physiological effects observed in some personnel during containment entries (e.g. dizziness, stomach cramps and breathing difficulties). Nomograms identifying acceptable containment stay times were developed and are currently used to mitigate heat stress effects. These nomograms are based on containment temperature and humidity.

Methods to compensate for the physiological effects due to the oxygen deficient atmosphere of containment were explored and it was determined that supplying the workers with oxygen enriched breathing air was necessary. A review of available literature at that time indicated no adverse physiological effects would be expected in workers using oxygen

enriched breathing air.* We have found that enriching the breathing air supply to 35% oxygen eliminates the previously observed physiological effects due to oxygen deficiency.

To provide protection for personnel entering containment, the Company initially purchased approximately sixty-five MSA Model 401 SCBA's (open-circuit, pressure-demand type) and established procedures to utilize these devices with a 35% oxygen/65% nitrogen breathing air mixture. This respirator has been used for over ten years with no incidence of oxygen induced failure or adverse performance noted.

Respiratory Protection Program - SCBA's:

SCBA Equipment:

The MSA Model 401 SCBA's purchased by the Company are supplied for use with compressed air. Following the recommendations of the Compressed Gas Association, Inc. in Pamphlet C-10, those Model 401 cylinders at Surry Power Station presently designated for use with 35% oxygen have been cleaned and tested in order to satisfy the requirements for Class 1, Oxidizing Gas Service. At North Anna Power Station cylinders designated for 35% oxygen service are in the process of being reinspected and tested to provide documentation of transfer to Class 1 service.

SCBA's are maintained by station personnel certified under MSA's Air Mask Service Center Certification Program and in accordance with the manufacturer's preventive maintenance and repair procedures. Only MSA supplied repair/replacement parts are utilized during maintenance.

Equipment, designated for use with the 35% oxygen/65% nitrogen gas mixture, is segregated and controlled to ensure no inadvertent exchange with compressed air units may occur.

Breathing Air Quality:

The 35% oxygen/65% nitrogen breathing air mixture, used in SCBA equipment at the stations, is purchased in 300 cubic-foot gas cylinders. Strict controls are employed by the vendor during manufacture of the mixture which involves reconstitution of medical grade liquid oxygen and liquid nitrogen. The vendor is required to test and certify that the mixture is suitable for human respiration (Grade D purity or better) and that the oxygen and nitrogen constituents are within 2% of the specified volume percentages.

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* Refer to articles by Alfred P. Morgan, M.D., entitled the "Pulmonary Toxicity of Oxygen" (dealing with 70 percent enrichment), and Patty, F.A., "Industrial Hygiene and Toxicology," Vol. 2, 2nd Edition, pp. 912-913, 1963 (Inner Science Publishers, 605 Third Avenue, New York, New York).

Vendor supplied bulk gas mixtures are transfered to SCBA cylinders using a MSA cascade charging system. The charging system is specifically designed for transfer of respirable gases (i.e., contaminant free) and is operated by trained personnel in accordance with approved station procedures.

Training:

Personnel who use SCBA equipment (oxygen enriched or compressed air) are provided specific training to assure personnel safety. SCBA user training is a separate course of instruction administered to potential users following Respiratory Protection Training. This instruction includes review of appropriate actions in the event of an emergency or an equipment malfunction. Appropriate testing is employed, including practical demonstrations to ensure training effectiveness. Annual retraining is required to maintain SCBA user qualification.

Available Alternatives Compared:

Alternative types of breathing apparatus have been evaluated and rejected as unacceptable or inferior to the presently used open-circuit SCBA. Only two applicable types of breathing apparatus are currently identified in ANSI Z88.2-1980, "Practices For Respiratory Protection" as acceptable for our subatmospheric containment application. A discussion of the advantages and disadvantages of these two types are presented below:

1. Positive Pressure Closed-Circuit - In the closed-circuit design (rebreathers), the nitrogen component of the breathing air is continually rebreathed with pure oxygen added either from a compressed liquid or gaseous source or from a chemically generated source. The carbon dioxide generated during use is chemically removed from the recirculating breathing air. Due to recirculation, the oxygen enrichment of the breathing air steadily increases until reaching upwards of 80% oxygen. The NRC has assigned a protection factor of 5000 for this device type in 10CFR20, Appendix A.

   The advantages of the closed-circuit type breathing apparatus are: lighter weight and longer service time (i.e., in rebreathing you do not carry as large an inventory of breathing gas). The disadvantages are: contaminant recirculation; any system leakage can quickly exhaust the small breathing gas supply; more and complex maintenance; and an increased fire hazard since 100% oxygen is used. Additionally for our application, the exothermic reaction associated with carbon dioxide scrubbing in rebreathers can compound physiological effects due to heat stress. In fact, during the mid 1970's, we purchased several rebreathers and used them in containment. This experience proved unsatisfactory and use of these units was discontinued.

2. Positive Pressure Open-Circuit - The MSA Model 401 is a positive pressure open-circuit device. For the open-circuit type device, the wearer carries the full inventory of breathing gases. The compressed

breathing gas is supplied to the wearer and then vented to the atmosphere after each breath.

The advantages of the open-circuit type breathing apparatus to our application are: it provides the user with the highest degree of respiratory protection (i.e., the NRC has assigned a protection factor of 10,000 for this device type in 10CFR20, Appendix A.); the breathing air is supplied at ambient temperature, thereby not adding to the heat stress load on the user; the equipment is highly reliable, easily maintained and "user friendly"; and the lower percentage oxygen enrichment makes the device less of a fire hazard than the closed-circuit devices. Additionally for our specific application, maintaining the same respiratory equipment type inside and outside of containment simplifies basic respiratory training of personnel. Conversely, introducing a second and different type of breathing apparatus would make respiratory training more complex for personnel. The one disadvantage of the positive pressure open-circuit device is the issue of NIOSH certification for enriched oxygen applications.

As a result of our evaluation including an assessment of the advantages and disadvantages enumerated above, we determined in 1976 and reconfirm today that the open-circuit SCBA is the best alternative available for our specific work environment.

Summary of Request for Specific Authorization:

Specific NRC authorization per 10CFR20.103(e) requires a demonstration by testing or reliable test information that the "material and performance characteristics of the equipment are capable of providing the proposed degree of protection under anticipated conditions of use." In lieu of formal testing, we submit approximately ten years of actual safe operation to substantiate that the existing equipment is capable of providing adequate protection under anticipated conditions of use. This ten years of experience represents over 3,000 SCBA usage hours at Surry Power Station alone. As noted in Attachment 1, we have reviewed records relating to maintenance of fifty SCBAs for a period of one year operation. No indication of oxygen induced degradation or failure of parts was noted in this record review. Furthermore, we are unaware of any oxygen related degradation or failure of a SCBA during our ten years of safe operational experience. We believe that this safe operational experience provides sufficient "reliable test information" as to the acceptability of the present MSA Model 401 SCBA with 35% oxygen enriched breathing air.

We, therefore, request your consideration and approval of this request for specific authorization to continue to make allowance for protection factors using our existing MSA Model 401 SCBA equipment with 35% oxygen enriched breathing air.