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MEMORANDUM FOR: John T. Greeves, Chief
Engineering Branch

FROM: Naiem S. Tanious
Engineering Branch

SUBJECT: TRIP REPORT - THE SECOND U.S. MINE VENTILATION SYMPOSIUM: RENO, NEVADA, SEPTEMBER 23-25, 1985

I attended the 2nd U.S. Mine Ventilation Symposium held in Reno, Nevada during the period September 23-25, 1985. This symposium was organized a few years ago by SME/AIME to promote better communication among the Mine Ventilation Professional Community, and also to provide a forum (other than the regular SME meetings) for exchange of technical developments and research results. Judging from the level of attendance and number of papers given, the Ventilation Symposium fills a need, especially for areas that are not traditional to mining such as the ventilation of nuclear waste repositories.

The Symposium's 18 sessions covered the following areas:

1. Mine fires
2. Ventilation system analysis
3. Methane drainage
4. Dust
5. Fans and Shafts
6. Recirculation
7. Radon
8. Nuclear waste site ventilation
9. Methane control
10. Underground heat flow and climate
11. Micro-computers
12. Face ventilation
13. Air cooling and refrigeration
14. Diesel
15. Monitoring

A list of the papers presented under the above sessions are attached to this report. Much of the above titles are familiar topics to engineers involved in ventilation of coal and metal mines. However, three areas of investigation are new: 1) ventilation of nuclear waste repositories, 2) the use of microcomputers, and 3) the monitored usage of recirculated air.

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Five papers were presented in the nuclear waste repositories session. Because this topic is part of our work. I will give a brief description of the five papers in the following:

- The exploratory shaft and the design ventilation system by B. K. Schroeder

This paper describes Rockwell general design for the ventilation shafts/testing facilities at BWIP. Rockwell is planning the first shaft to total depth of 1034 meters (3400 feet) with breakout in the Cohassett basalt flow at 965m. A second shaft is included in the design for safety reasons (an alternate method of egress). A compressed air ventilation system will be used until the two shafts are connected. This system will have a chiller/drier to deliver the air at 50°F (10°C) (the rock temperature at this horizon is 51°C). The author gave a system analysis where he presented a loss-of-ventilation accident scenario with various assumptions of water inflow, etc., and showed a maximum evacuation time of 20 minutes for 12 men.

- The concept of designing two independent ventilation systems for the nuclear waste repository in basalt - by D. C. Miclea.

This paper presented calculation of two ventilation circuits; one for development of the entries and drilling the emplacement holes, and the other for actual emplacement of waste. The two circuits will be kept separate, with small leakages (which are almost inevitable) always from the development circuit to the emplacement circuit. The author also gave a ventilation network simulation using the computer program VNET. All the calculations are, of course, preliminary and the author stated that many problems remain that need to be solved. It is interesting to note that most of the ventilation system components is listed as problem areas. Among those are shaft sizes, shaft method of construction, possibility of locating some of the main fans underground, air cooling, etc. This is to be expected in this conceptual stage. However, the author emphasized the necessity of maintaining two separate and independent ventilation systems for the repository.

- Critical aspects of ventilating a civilian nuclear waste repository in salt by - F. Djahanguiri and J. Gozon.

No text was available for this paper. The paper is a general one and does not go into any detail for ventilation of a repository in salt where the host rock intrinsic thermal and mechanical properties (including clay seams, etc.), and continuous creep dictates the ventilation.

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° Effects of retrieval on ventilation and cooling requirements for a nuclear waste repository - by D. F. Hambley.

Again this is a general paper and mostly discusses local retrieval and full retrieval (Mr. Hambley is a co-author of Engineers International report to NRC on Assessment of Retrieval Alternatives - NUREG/CR-3489) in a generic repository. The author's main conclusion is that air flow requirements for the repository will depend on whether local or total retrieval is needed (on this point DOE stated in their recent position on retrievability and retrieval that additional ventilation requirement for retrieval will be designed at the same time as the repository; however, construction of these facilities that provide additional ventilation air need not be constructed at the time the repository is constructed).

° An experimental determination of mixed and forced convection heat transfer coefficients in a modeled nuclear waste repository by - R. L. Osborne and R. N. Christensen.

This paper describes a laboratory model for heat flow in a generic repository. The apparatus is a steel sheet formed like a rectangular flow channel (similar to a duct) simulating a repository room. Heaters were attached to the ceiling, floor, and side and airflow was induced in the channel by a variable speed fan. The authors' experimental results indicates that for the convective heat transfer coefficient (governs the transfer between the rock surface and the air) remain essentially the same for air flow with Reynolds number (Re) below 30,000 and down to Re = 6000. Thus, from the heat transfer point of view the low flow rates for the ventilation air can be just as effective as high ones, which means savings to DOE.

The session on ventilation of repositories had many interesting discussions - most centered on the need for better models for prediction of ventilation network for the hot repository environment.

I have a copy of the proceedings of the Symposium in my office (room 421) by the door, for your review. If you have any questions please call me.

Naiem S. Tanious
Engineering Branch
Division of Waste Management, NMSS

Enclosure:
As stated

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