TITLE: COMPARISON OF EXPERIMENTAL NIGHTS DURING THE ASCOT 1980 GEYSERS FIELD STUDY USING RADON-222

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SUBMITTED TO: FOR INCLUSION IN THE SUMMARY OF PRESENTATIONS GIVEN AT THE ASCOT MODELING MEETING, TUCSON, ARIZONA FEBRUARY 5-6, 1981

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UNITED STATES ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION CONTRACT W-7405-ENG. 36

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During the ASCOT 1980 Geysers field study, radon-222 concentrations in the air were measured continuously one meter above ground level at Diamond D Ranch by Dr. Marvin H. Wilkening and colleagues from New Mexico Tech. One of the purposes of this study was to help classify drainage flow nights by looking at the behavior of radon-222 at the outflow of the Anderson Creek/Putah Creek airshed. For this purpose, radon-222 can be considered to be uniformly and constantly exhaled from the earth's surface. As cool slope and drainage winds move along the terrain, they accumulate radon and advect it down valley until morning instabilities mix it to greater depths than these shallow flows. Hence, the measured diurnal trend of radon reflects the integrated behavior of nocturnal flows in the basin and their subsequent breakup in the morning. The use of this technique to classify drainage flows has been used by Wilkening and Rust (1972).

Figure 1 shows the diurnal trend of radon-222 at Diamond D Ranch for the five experimental periods during the 1980 study. The results show the following:

**Experiment 1 (September 11-12)** - A rapid buildup of radon beginning about 1800 PST and leveling off rather quickly at about 2100 PST.

**Experiment 2 (September 15-16)** - A gradual buildup of radon from about 1700 PST until morning transition at about 0700 PST.

**Experiment 3 (September 18-19)** - Radon attempted to increase at about 1800 PST but was interrupted at 2000 PST. Radon levels stayed low until about 0030 PST when a gradual increase continued until morning transition.

**Experiment 4 (September 19-20)** - Same behavior as Experiment 2 with slightly higher concentration during the night.
Experiment 5 (September 24-25) - Similar to Experiment 1 except for a much earlier onset of radon increase. Radon levels started to increase at about 1500 MST with an abrupt interruption at 2030 PST that recovered quickly by 2130 and remained constant throughout the night.

Preliminary analysis of the above radon behavior shows the following: Experimental nights 1 and 5 indicate the strongest basin outflow conditions with night 5 having conditions beginning several hours sooner than any of the other experimental nights. Nights 2 and 4 appear to have a more gradual development of outflow conditions indicating weaker drainage on the slopes. Experimental night 3 was a poor drainage case with drainage indications not beginning until after midnight.

In summary, the radon-222 measurements at Diamond D Ranch have proven to be useful in classifying the integrated drainage flow conditions out of the contributing airsheds. This data is available continuously from September 8 through 25 and will be analyzed in the above manner to aid in classifying nocturnal conditions. The data will also be used to investigate stability, mixing depth, and transition characteristics of the drainage flow out of the basin. Modelers are encouraged to try to model the radon behavior at Diamond D Ranch by using a suggested constant area source of 0.5 pCi m$^{-2}$s$^{-1}$ throughout the air sheds involved.

Reference

Fig. 1. Diurnal trends of radon-222 one meter above ground level at Diamond D Ranch for the five experimental nights of the 1980 Geysers experiment.