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STRAIN SEISMOMETER DATA
FROM THE CATHAY EVENT
(U)

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The CATHAY nuclear event was conducted at the USAEC's Nevada Test Site on 8 October 1971. Surface-ground-zero for CATHAY was 1699 m from the tie-point of the three component strain-seismometer stations on an azimuth of $S1.9^{\circ}E$. BRK and ERL both reported a body-wave magnitude of 4.7 for CATHAY. Surface collapse occurred about 63.8 minutes after detonation.

Dynamic strain data from the three components are shown in Figures 1-3. Figure 1 is the N-S component ($N00^{\circ}07'W$); Figure 2 is the E-W component ($S89^{\circ}58'E$); Figure 3 is the SW-NE component ($S45^{\circ}17'W$). The ordinates of all plots are in units of microstrain (10^{-6} strain) with tension positive and compression negative. The first arrival was at 1.02 sec and was compressive from the SSW.

Figures 4-6 show the long-term strain records from -5 min to +74 min, including collapse at +64 min. Figures 7-9 show the collapse data on an expanded scale. The records are unusual in several respects. First, the NS component, which is nearly radial to ground-zero, shows a tensile step after zero-time followed by "creep" into additional tension during the first half-hour. Second, the collapse, rather than relieving the original step, appears to add to it. Figure 10 shows the resolved strain data over the same time interval as Figures 4-6. As can be seen, the areal strain is essentially constant and compressive after the dynamic phase is over. There is a definite strain increase following the dynamic strain step, and an additional increase accompanying collapse. The cause of the transient at ~ 72 min is unknown.

Figure 11 shows the strain pattern in lemniscate form for times of +1 min, +60 min, and +65 min; collapse occurred between the latter two times. In all three cases, not only is the compression axis significantly away from the azimuth to the source, the strain along the azimuth to the source is actually tensile.

If the explosive source is considered compressive in all directions, the CATHAY data are apparently unusual. Data from several other events have shown the strain-step pattern to routinely have the compressive axis in the NW-SE direction regardless of the azimuth to the source. Areal strains are routinely compressional, as one might expect. These data will be presented in another report.

Regional stresses in the Yucca Flat area, based on surface fracture, appear to be tensile in the NW-SE direction, leading to NE-SW trending cracks. The strain-seismometer data indicate the effect of a detonation is to relieve the regional stress, thereby giving apparent compression along the regional tensile axis, rather independently of the azimuth from the source to the region in question.

This report is preliminary in nature, and is primarily to make the CATHAY data available. All data shown are available in digital form.

CWO:fl

8/29/74 CATHAY FILE 2 CHANNEL 1 8/29/74

BITS X-2.94E-02

FIGURE 1

8/29/74 CATHAY FILE 2 CHANNEL 3 8/29/74

20-3613-X SLIB

FIGURE 2

8/29/74 CATHAY FILE 2 CHANNEL 5 8/29/74

FIGURE 3

20-35E-02

SLIP

8/29/74 CATHAY FILE 5 CHANNEL 1 8/29/74

FIGURE 4

20-35E-02
SL1B X 2.95E-02

8/29/74 CATHAY FILE 5 CHANNEL 3 8/29/74

MICROSTRAIN

20-391.3 X SLIB
FIGURE 5

8/29/74 CATHAY FILE 5 CHANNEL 5 8/29/74

20-50E-02
FIGURE 6

3/29/74 CATHAY FILE 3 CHANNEL 1 8/29/74

MICROSTRAIN

20-346-2-X SLIB FIGURE 7

8/29/74 CATHAY FILE 3 CHANNEL 3 8/29/74

MICROSTRAIN

20-361-C-X SLIB FIGURE 8

8/29/74 CATHAY FILE 3 CHANNEL 5 8/29/74

FIGURE 9

FIGURE 11

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