

SEOUOYAH NUCLEAR PLANT
ERCW CONDUIT SETTLEMENT MONITORING

Updated Results - December 1980

The results of the settlement monitoring program to date (December 1980) are given below.

Diesel Generator Building

The previous settlement data are given in Table Q2.70-1 and Figure Q2.70-1. These data and the additional data are presented in Table Q2.86-2.

ERCW Pumping Station, Access Cells, and Dike

The settlement monitoring program for the ERCW system is discussed in our response to Question 2.78. Settlement data, current to March 1980, were presented in our original response to Question 2.86. The results of a NRC site visit (of October 27, 1980), additional data, requested additional discussion, and a summary of previous responses are presented here.

The ERCW system consists of a pumping station, access cells, access dike, electrical conduits, and pipelines. Settlement markers are located on all of these except the pipelines as follows:

Pumping Station - two survey markers are located on the pumping station, one each on the NE and NW corners.

Access Cells - one survey marker is located at the centerline of each cell and arch cell (#1CL to F13).

Access Dike - two survey markers (one on each side of the road) are located on each side of the ERCW electrical conduit bank supports. These are located at 30-foot intervals along the access dike (#14 N/S to 20 N/S). These were extended (#21N, 21S, 22N, 22S) to include 4 survey markers (two on each side) at the end of the support slab. These markers are located in the rockfill approximately 5 (#21 N/S) and 40 (#22 N/S) feet from the end of the slab on the shore side.

Electrical Conduit Bank - five survey markers (#23 to 27) are located along the ERCW electrical conduit route between the end of the slab and soil boring SS-69. These markers are located on manhole groups 54, 55, and 56 and midway between them.

Settlement data for these features, current to March 1980, were given in our original response to Question 2.86. The data were tabulated in Table Q2.86-1 and presented graphically in Figures Q2.86-1 to -5.

These data indicated movements of up to 0.1 inches. Table Q2.86-1 has been updated to include the latest readings.

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As discussed in our response to Q2.86, several settlement markers were hit during construction. This is documented in the survey notes. The surveyors reported markers as either "monument hit" or "monument possibly hit." These data are included in Table Q2.86-1. During the site visit October 27, 1980, the NRC representative, Raman Pichumani, viewed these markers. The distress to the markers, which are just rebars in a pipe sleeve, was visually very apparent. The procedure used to correct the actual survey data to account for marker disturbance is thus justified.

The apparent movement of the disturbed markers is not logically explained as just consolidation settlement. For example, the markers were reported as hit on the December 19, 1979, survey. No settlement trend existed based on the previous data. Variations are only a few thousandths of a foot on monthly reading for four months. In fact some of the readings show an upward not downward movement (19N & 20N). The markers were reported hit with the December 19, 1979, reading. "Movements" of up to - 0.079 feet (down) are reported. However, movement from December 19, 1979, to present show no settlement trend. Variations are again a few thousandths on monthly readings for four months. Such a sudden jump in settlement with no pre- or post- activity is not logically explained by any consolidation theory.

Also, the reported "movements" are not logical when viewed in plan. Markers are present on each side of the road (road width is 20 feet, approximate marker separation is 25 feet) and at 30-foot intervals along the road. Figure Q2.84-6 shows an enlargement of the area between markers 17 and 22, the area of interest. The data shown are for the December 19, 1979, the reported hit date. The largest "movement" is reported for #19N (-0.079 ft.). However, #18N (30 feet east) reports 0.0 ft., #19S (25 feet south) reports -0.004 feet, #20N (30 feet west) reports -0.034 (also reported as hit), and #21N (10 feet west) reports -0.033 (also reported as hit). The second largest "movement" is reported for #18S (-0.048 feet). Adjacent markers #17S (30 feet east) reports -0.009 feet, #19S (30 feet west) reports -0.004 feet, #18N (25 feet north) reports 0.0 feet. In addition, the road and curbing show no signs of distress in the vicinity of these markers. Such local pockets of settlement might be explained by consolidation. However, consolidation cannot explain that they appear in one month with no pre- or post- activity and cannot explain the lack of impact on the road.

Nevertheless, even if the 0.079 feet of settlement is valid and should be considered, it has no adverse effect on the pipes. The 36-inch diameter ERCW pipes are protected by a 60-foot long steel 42-inch diameter steel pipe sleeve as it crosses from the pile supported slab to insitu soil. The pipe sleeve extends from 20 feet back along the slab to 40 feet beyond the end of the slab. Details of the pipe sleeve are shown in figure Q2.71-5. The ERCW pipes as sleeved will withstand settlements of six inches and be within allowable limits. This is as discussed in our response to Question 2.72.

The latest readings (September 19, 1980) show some erratic data points. Of notable interest are 17S, 18S, 19N, and 20N where results of -0.161, -0.081, -0.047, and -0.007 feet are reported. Number 18S appears to have moved

down from -0.048 to -0.081 while 19N appears to have moved up from -0.081 to -0.047. Likewise, 17S moved down from -0.010 to -0.161 while 20N moved up from -0.047 to -0.007. In these data, no consistent pattern of movement is evident. The road and curbing show no signs of distress. The magnitude of the remaining data generally fall within the range of the previously reported data.

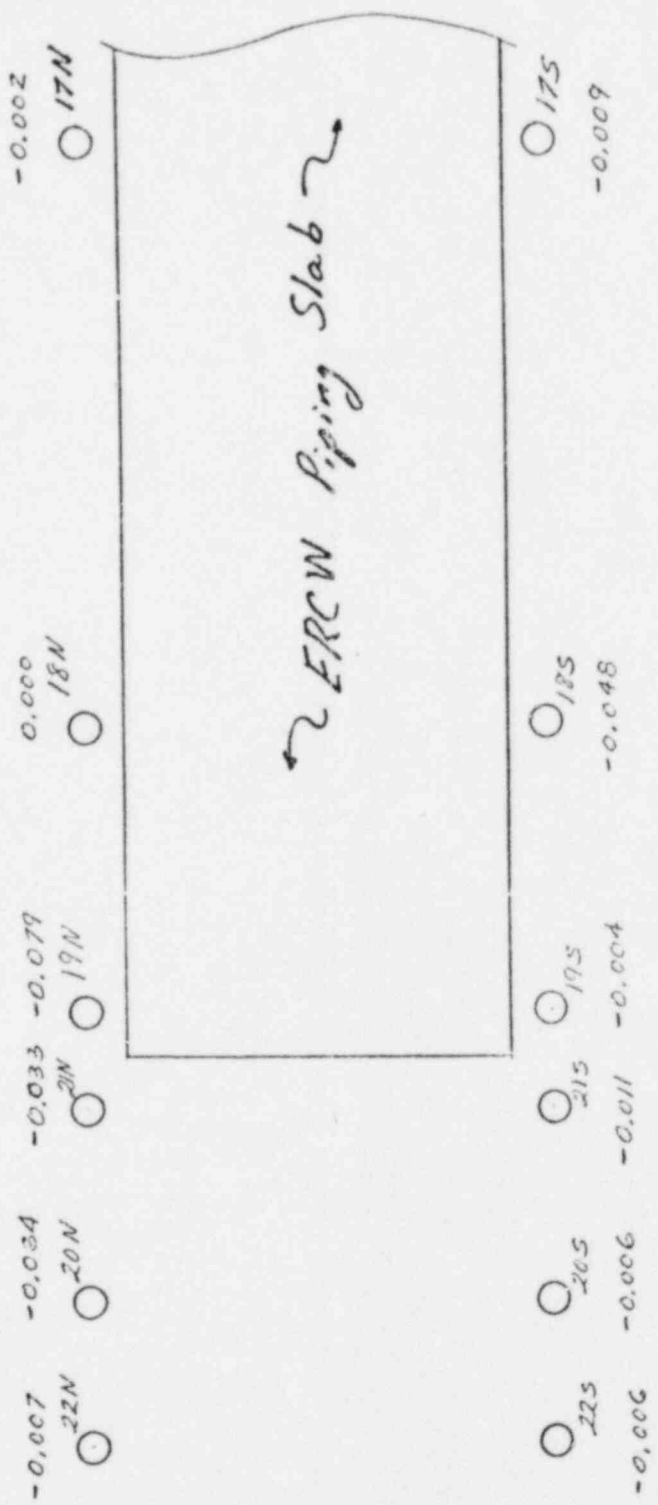
Based on our evaluation, the total and differential settlements are not significant; there are no trends being exhibited; and there has been no adverse structural performance.

TABLE Q2.86-2

SEQUOYAH NUCLEAR PLANT - DIESEL GENERATOR
BUILDING - SETTLEMENT MONITORING

DATE	SETTLEMENT POINTS							
	N.E. CORNER		S.E. CORNER		N.W. CORNER		S.W. CORNER	
	ELEV	DIFF	ELEV	DIFF	ELEV	DIFF	ELEV	DIFF
1-15-73	725.00		725.00		725.00		725.00	
2-15-73	724.99	-0.01	724.99	-0.01	725.00	0.00	725.00	0.00
3-23-73	724.99	-0.01	724.99	-0.01	725.01	0.01	725.00	0.00
4-16-73	725.00	0.00	724.99	-0.01	725.01	0.01	725.00	0.00
5-15-73	724.99	-0.01	724.98	-0.02	725.01	0.01	725.00	0.00
6-15-73	724.99	-0.01	724.98	-0.02	724.99	-0.01	724.98	-0.02
7-16-73	724.99	-0.01	724.98	-0.02	725.00	0.00	724.98	-0.02
8-17-73	724.98	-0.02	724.97	-0.03	725.01	0.01	724.99	-0.01
9-17-73	724.97	-0.03	724.97	-0.03	724.99	0.01	724.98	-0.02
10-15-73	724.98	-0.02	724.97	-0.03	724.99	-0.01	724.99	-0.01
11-16-73	724.97	-0.03	724.96	-0.04	724.99	-0.01	724.98	-0.02
12-14-73	724.96	-0.04	724.96	-0.04	724.99	-0.01	724.97	-0.03
1-14-74	724.97	-0.03	724.96	-0.04	724.99	-0.01	724.98	-0.02
4-16-74	724.96	-0.04	724.96	-0.04	724.98	-0.02	724.97	-0.03
7-19-74	724.96	-0.04	724.96	-0.04	724.97	-0.03	724.97	-0.03
10-11-74	724.96	-0.04	724.96	-0.04	724.97	-0.03	724.97	-0.03
1-14-75	724.96	-0.04	724.97	-0.03	724.98	-0.02	724.97	-0.03
4-7-79	724.936	-0.054	724.948	-0.052	724.933	-0.067	724.936	-0.064
7-21-80	724.977	-0.023	724.982	-0.018	724.973	-0.027	724.977	-0.023
7-23-80	724.972	-0.028	724.979	-0.021	724.965	-0.035	724.969	-0.031
9-2-80	724.982	-0.018	724.999	-0.001	724.988	-0.012	724.998	-0.002
9-22-80	724.987	-0.013	725.003	0.003	724.991	-0.009	724.992	-0.008
11-5-80	724.991	-0.009	725.001	0.001	724.994	-0.006	724.986	-0.004

POOR ORIGINAL



Enlargement of Area 17-22
 Showing "Movement" of Markers
 on Hit Date of 12-19-79



Units = Feet
 (-) = Down

Scale: 1" = 20'

Figure Q2.86-6

POOR ORIGINAL