



Commonwealth Edison

One First National Plaza, Chicago, Illinois
Address Reply to: Post Office Box 767
Chicago, Illinois 60690

July 15, 1983

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Subject: Braidwood Station Units 1 and 2
Additional FSAR Information
NRC Docket Nos. 50-456/457

Reference (a): B. J. Youngblood letter to D. L. Farrar
dated May 24, 1983

Dear Mr. Denton:

Reference (a) requested that the Commonwealth Edison Company provide, by July 15, 1983, certain additional information concerning the FSAR for our Braidwood Station Units 1 and 2.

The Attachment to this letter provides our response to Questions 330.3 and 330.4 as requested. Additionally, revised responses (page changes) to Questions 241.3, 241.8 and 362.1 are provided in the Attachment. Our FSAR will be amended to include the information contained in the Attachment to this letter as appropriate.

Please address any questions that you or your staff may have concerning this matter to this office.

One (1) signed original and fifteen (15) copies of this letter with Attachment are provided for your use.

Very truly yours,

E. Douglas Swartz
Nuclear Licensing Administrator

Attachment

cc: J. G. Keppler - RIII
RIII Inspector - Braidwood

6966N

13001
111

BRAIDWOOD-FSAR

QUESTION 330.3

"The location of pipelines shown in Figure 2.2-2 'Pipelines Within 5 Miles of the Site' does not agree with a 1983 pipeline map recently observed in the Will County Development Department. The latter map indicates that a 22" Texaco-Cities Service Pipeline passes through a section of the plant site cooling pond area. It appears that the pipelines shown in Figure 2.2-2 are based on two older maps (i.e., the January 1, 1977 map 'Gas Distribution Lines and Communities Served by Gas Public Utilities' of the State of Illinois Commerce Commission and the map 'Oil and Gas Industry in Illinois,' 1977, by the Illinois State Geological Survey). We request that the applicants review this discrepancy and revise Figure 2.2-2 accordingly. The revised figure should show the location of all major transmission pipelines greater than 8 inches which pass within a 5 mile radius of the Braidwood site. In the event the 22 inch pipeline actually passes through the Braidwood site, provide an analysis of a pipeline leak or rupture, releasing petroleum products, and the effects on the safe operation of the nuclear facility."

RESPONSE

The Pipeline Map of Will County prepared by the Will County Development Department has been reviewed. Apparently, this map shows incorrectly a 22-inch ARCO crude oil pipeline, which is located in Kankakee County, (Figure 2.2-2) to be the Texaco-Cities Service Pipeline Company's 22-inch pipeline. According to Texaco-Cities Service, it does not own a 22-inch line in or near the lake at Godley, Illinois (Reference 1).

REFERENCE:

1. Mr. J. A. Wilson, District Manager, Texaco-Cities Service Pipeline Company; letter to J. A. Wilson, Environmental Coordinator, Sargent & Lundy, June 13, 1983.

BRAIDWOOD-FSAR

QUESTION 330.4

"The data shown in Table 2.2-5 'Frequency of Shipments of Explosive Material to and from the Joliet Army Ammunition Plant on the Illinois Central Gulf Railroad' covers the time period 1974-1977. This data should be updated to indicate current munitions rail shipments, if any, past the Braidwood site."

RESPONSE

At present, the arsenal is inactive and there are no shipments of Class A, B, and C explosives, TNT, or lead azide over the Illinois Central Gulf Railroad. The only ammunition shipped over these tracks is small caliber and very few in number (Reference 1).

Subsection 2.2.2.2 will be revised to include this information. Tables 2.2-5 through 2.2-7 will be deleted.

REFERENCE:

1. Mr. Robert J. Surkein, Director, Transportation and Traffic Management Directorate, Department of the Army, Headquarters United States Army Armament Material Readiness Command, Rock Island, Illinois; telephone conversation with J. A. Wilson, Environmental Coordinator, Sargent & Lundy, June 9, 1983.

BRAIDWOOD-FSAR

QUESTION 241.3

"Provide information on the strength specified for the lean concrete, mudmat, and bash*used as backfill material beneath and surrounding Category I structures and buried pipes. Furnish plots presenting results of quality control tests performed to verify that the actual construction is in compliance with the specifications."

"*Lean Concrete"

RESPONSE

Results of the compressive strength tests performed for the lean concrete used beneath and surrounding Category I structures and buried piping indicate that the actual strength is higher than the design strength.

The average actual ultimate bearing pressure of the lean concrete used for Category I structures exceeds the ultimate bearing capacity of the founding strata.

The essential service water pipeline (ESWP) is the only Category I buried pipe. The average actual ultimate bearing pressure of the lean concrete placed under the ESWP exceeds the ultimate bearing capacity of the founding glacial till. The average actual ultimate bearing pressure of the lean concrete used as a backfill material exceeds the ultimate bearing pressure of the compacted granular fill.

Table Q241.3-1 provides a comparison of the actual strength of the lean concrete and the ultimate bearing pressure of the founding strata applicable to specified structures.

BRAIDWOOD-FSAR

TABLE Q241.3-1

ULTIMATE BEARING PRESSURES OF BACKFILL
FOR CATEGORY I STRUCTURES AND BURIED PIPE

<u>CATEGORY I STRUCTURE OR PIPELINE</u>	<u>AVERAGE ACTUAL ULTIMATE BEARING PRESSURE OF BACKFILL MATERIAL (ksf)</u>	<u>ULTIMATE BEARING PRESSURE OF THE FOUNDING STRATA (ksf)</u>
Containment Building Unit 1	165	150
Containment Building Unit 2	170	150
Auxiliary Building	211	150
Fuel Handling Building	175.6	150
Essential Service Water Pipeline Foundation	75	45
Essential Service Water Pipeline Encasement	75.5	20

BRAIDWOOD-FSAR

TABLE Q241.8-1

SUMMARY OF STATIC AND DYNAMIC

STABILITY ANALYSES FOR INTERIOR DIKE

<u>LOADING CONDITIONS</u>	<u>MINIMUM FACTOR OF SAFETY PROVIDED</u>	
a. Static Loading Conditions		
1. End of Construction - no water	2.2	
2. Full Reservoir - Water Elevation 595 feet	2.0	
3. Rapid Drawdown - Water Reduced from Elevation 595 feet to 592 feet	1.8	
b. Pseudostatic Loading Conditions with 0.12 Seismic Coefficient		
1. End of Construction - no water	1.5	
2. Full Reservoir - Water Elevation 595 feet	1.3	
3. Rapid Drawdown Water Reduced from Elevation 595 feet to 592 feet	1.2	

BRAIDWOOD-FSAR

Table Q362.1-1 is a summary of the maximum measured differential settlements for all construction and operational monuments. Table Q362.1-2 is a summary of projected maximum total and differential settlements for each Category I structure. These total and differential settlements have been calculated after reviewing the stabilized elevations. The stabilized elevations have been identified on the settlement plots. Some allowance has been made in the total settlement due to the small amount of building load that still remains to be placed. The new operational phase monuments, installed in September 1981, clearly show that their maximum differential settlement is less than or equal to -0.01 feet (-0.011 feet maximum). This settlement is considered negligible and indicates that settlement has stabilized.

The differential settlements given in Table Q362.1-2 are all less than or equal to -0.03 feet. This is significantly less than 1/2-inch or more which was assumed in the design of the auxiliary building and fuel handling building. The only safety-related pipe or conduit that is not suspended is the essential service water pipeline. This pipeline travels beneath the heater bay building and enters the turbine room mat. Beneath the heater bay, it is encased in reinforced concrete and supported on till or rock. The point of maximum differential settlement occurs as the encased pipeline enters the turbine room mat. The pipeline is designed to take with adequate margin the 1/2-inch estimated differential settlement in this area.

It is concluded that all Category I structures have been designed to account for the maximum total and differential settlement.

The lake screen house is founded within a very stiff to hard glacial till of the Wedron Formation. The till is overconsolidated and has an ultimate bearing capacity of approximately 45,000 psf (Subsection 2.5.4.10.1.2). The approximate static bearing pressure for the screen house is 3,000 psf resulting in a factor of safety of 15. The estimated settlement of the screen house is less than 1/4 inch total and 1/8 to 1/4 inch differential (Subsection 2.5.4.10.2.2). Construction phase settlement monitoring was not performed for the lake screen house but will be included in the operational phase settlement monitoring.

BRAIDWOOD-PSAR

TABLE Q362.1-1

TABULATED DIFFERENTIAL SETTLEMENTS FOR SURVEY MONUMENTS

<u>BUILDING</u>	<u>MONUMENT NUMBER</u>	<u>PERIOD OF MEASUREMENT</u>	<u>MAXIMUM MEASURED DIFFERENTIAL MOVEMENT (Feet)</u>	<u>DIFFERENTIAL MOVEMENT BASED ON STABILIZED ELEVATION (FT)</u>
Fuel	9	2/79 to 12/81	+0.002	
	10	2/79 to 8/80	-0.012	-0.015
	New 10	9/81 to 10/82	0.000	
	New 9	9/81 to 10/82	-0.002	
	51	9/81 to 10/82	+0.002	
	52	9/81 to 10/82	0.000	
Refueling Water Storage Tanks	40	2/79 to 8/80	-0.025	-0.010
	New 40	9/81 to 10/82	+0.003	
	55	9/81 to 10/82	0.000	
Auxiliary Building	KK	2/77 to 8/80	-0.059	-0.039
	LL	2/77 to 8/77	-0.013	
	JJ	1/77 to 5/77	-0.010	
	21	2/79 to 8/80	-0.020	-0.010
	22	2/79 to 8/80	-0.013	-0.010
	23	2/79 to 8/80	-0.015	-0.005
	24	2/79 to 8/80	-0.020	-0.015
	26	2/79 to 8/80	-0.021	-0.020
	27	2/79 to 8/80	-0.027	-0.020
	28	2/79 to 8/80	-0.025	
	New 21	9/81 to 10/82	+0.006	
	New 26	9/81 to 10/82	+0.013	
	New 27	9/81 to 10/82	0.000	
	New 29	9/81 to 10/82	+0.001	
	53	9/81 to 10/82	-0.002	
	54	9/81 to 10/82	-0.001	
Unit 1 Containment	U	2/77 to 8/80	-0.061	-0.070
	V	2/77 to 8/80	-0.052	-0.063
	N	2/77 to 8/80	-0.080	-0.067
	N ₂	3/77 to 6/77	-0.014	
	N ₂ ⁴	3/77 to 6/77	-0.014	
	P	2/77 to 8/77	-0.004	
	13	2/79 to 2/80	-0.012	-0.008
	14	2/79 to 8/80	-0.005	-0.007
	15	2/79 to 8/80	-0.010	-0.012
	36	2/79 to 8/80	-0.003	-0.012
	39	2/79 to 8/80	-0.018	-0.012
	New U	9/81 to 10/82	-0.002	
	New V	9/81 to 10/82	+0.018	
	New N	9/81 to 10/82	-0.001	
	New 3	9/81 to 10/82	-0.001	
	New 37	9/81 to 10/82	-0.004	
	New 39	9/81 to 10/82	+0.002	

TABLE Q362.1-1 (Cont'd)

<u>BUILDING</u>	<u>MONUMENT NUMBER</u>	<u>PERIOD OF MEASUREMENT</u>	<u>MAXIMUM MEASURED DIFFERENTIAL MOVEMENT (Feet)</u>	<u>DIFFERENTIAL MOVEMENT BASED ON STABILIZED ELEVATION (FT)</u>
Unit 1 Safety Valve Room	1 (Northeast Room)	2/79 to 8/80	-0.011	-0.015
	3 (Northwest Room)	2/79 to 8/80	-0.027	-0.025
Unit 2 Safety Valve Room	42	2/79 to 8/80	-0.024	-0.015
Unit 2 Containment	AA	2/77 to 6/77	+0.005	
	BB	2/77 to 6/77	+0.006	
	R	2/77 to 8/77	-0.001	
	R ₁	2/77 to 8/77	-0.014	
	R ₂	2/77 to 5/77	-0.020	
	R ₃	2/77 to 8/77	-0.013	
	R ₄	2/77 to 8/80	-0.078	-0.074
	Z	2/77 to 8/80	-0.064	-0.065
	18	2/79 to 8/80	-0.020	-0.015
	19	2/79 to 8/80	-0.034	-0.018
	20	2/79 to 8/80	-0.020	-0.012
	43	2/79 to 8/80	-0.017	-0.008
	44	2/79 to 5/80	-0.007	-0.010
	Z1	9/81 to 10/82	-0.001	
	New R4	9/81 to 10/82	-0.006	
	New 17	9/81 to 10/82	-0.009	
	New 18	9/81 to 10/82	-0.004	
	New 41	9/81 to 10/82	-0.011	
	New Z	9/81 to 10/82	+0.002	
Units 1&2 Turbine Room	CC	2/77 to 5/77	-0.001	
	HH	2/77 to 8/77	-0.033	
	T	2/77 to 8/77	-0.002	
	W	3/77 to 8/77	-0.013	
	X	2/77 to 8/77	+0.001	
	4	2/79 to 8/80	-0.010	-0.015
	5	2/79 to 8/80	-0.001	-0.005
	6	2/79 to 8/82	+0.003	0
	33	2/79 to 8/82	-0.005	0
	New 4	9/81 to 10/82	-0.006	
	New 33	9/81 to 10/82	-0.005	
	New 34	9/81 to 10/82	0.000	
	56	9/81 to 10/82	-0.010	
	58	9/81 to 10/82	-0.004	
	59	9/81 to 10/82	-0.007	
Heater Bay	57	9/81 to 10/82	-0.009	
Radwaste/Service Building	DD	2/77 to 8/77	-0.003	
	XX	2/77 to 8/80	-0.013	-0.023
	34	2/79 to 8/80	-0.008	0

BRAIDWOOD-FSAR

TABLE Q362.1-2

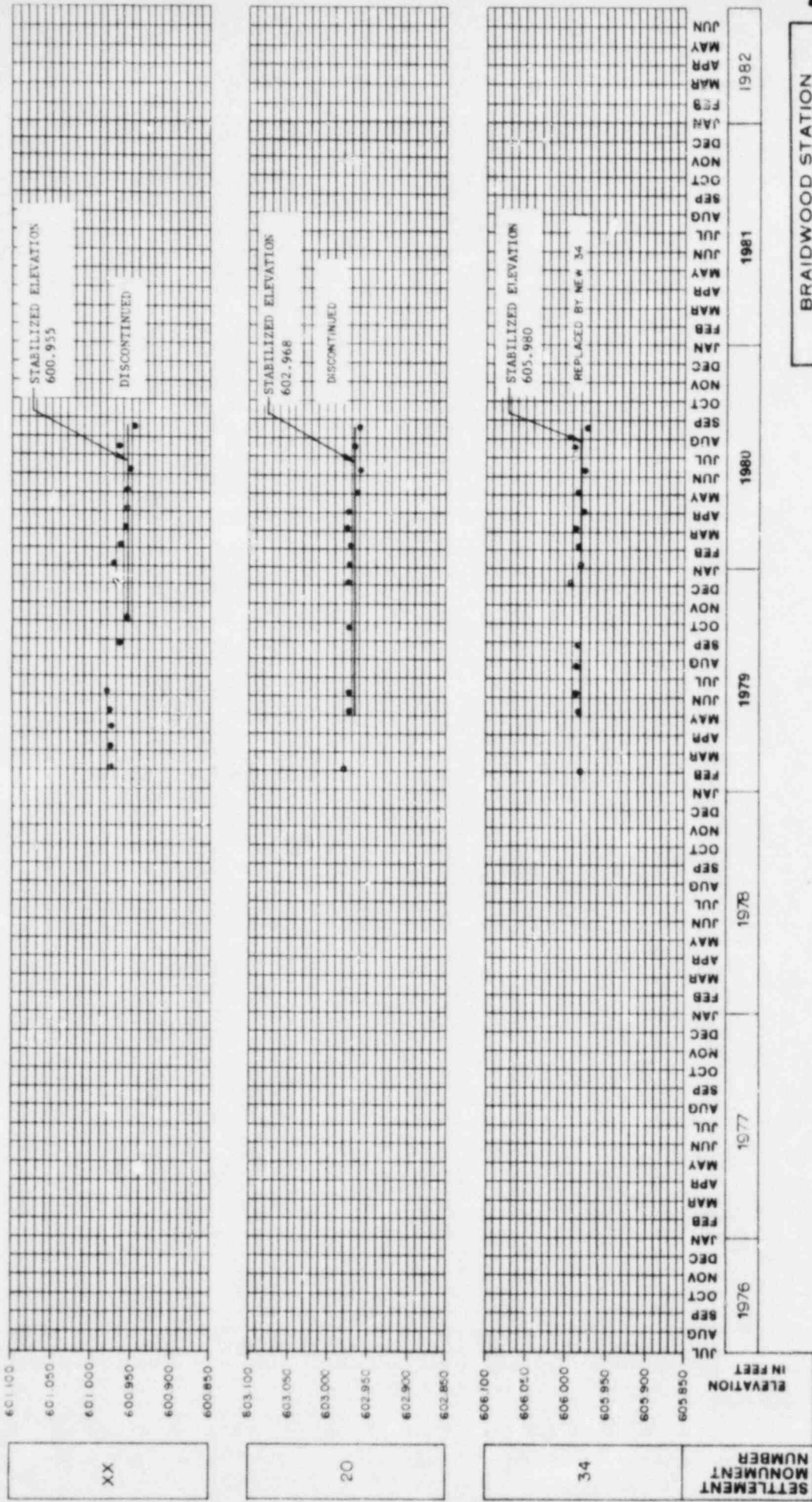
PROJECTED MAXIMUM TOTAL AND DIFFERENTIAL

SETTLEMENTS

<u>CATEGORY I STRUCTURE</u>	<u>PROJECTED MAXIMUM* TOTAL SETTLEMENT (Feet)</u>	<u>MAXIMUM DIFFERENTIAL SETTLEMENT (Feet)</u>
Unit 1 Containment	-0.074	-0.01
Unit 2 Containment	-0.078	-0.01
Auxiliary Building	-0.041	-0.03
Fuel Building	-0.04**	-0.02**
Refueling Water Tanks	-0.04**	-0.02**

* Projected maximum total settlement determined by increasing by 5% the difference between stabilized monument elevations and the monument initial elevations. Monuments U, V, Z, N, R₄, and KK were monitored from the beginning of construction to August 1980. These monuments were used to compute total settlement for the containments and auxiliary building areas.

**Settlement values given here are estimated conservatively because a significant amount of construction occurred before monuments were installed. Actual measurements indicate less than or equal to -0.025 feet total settlement.

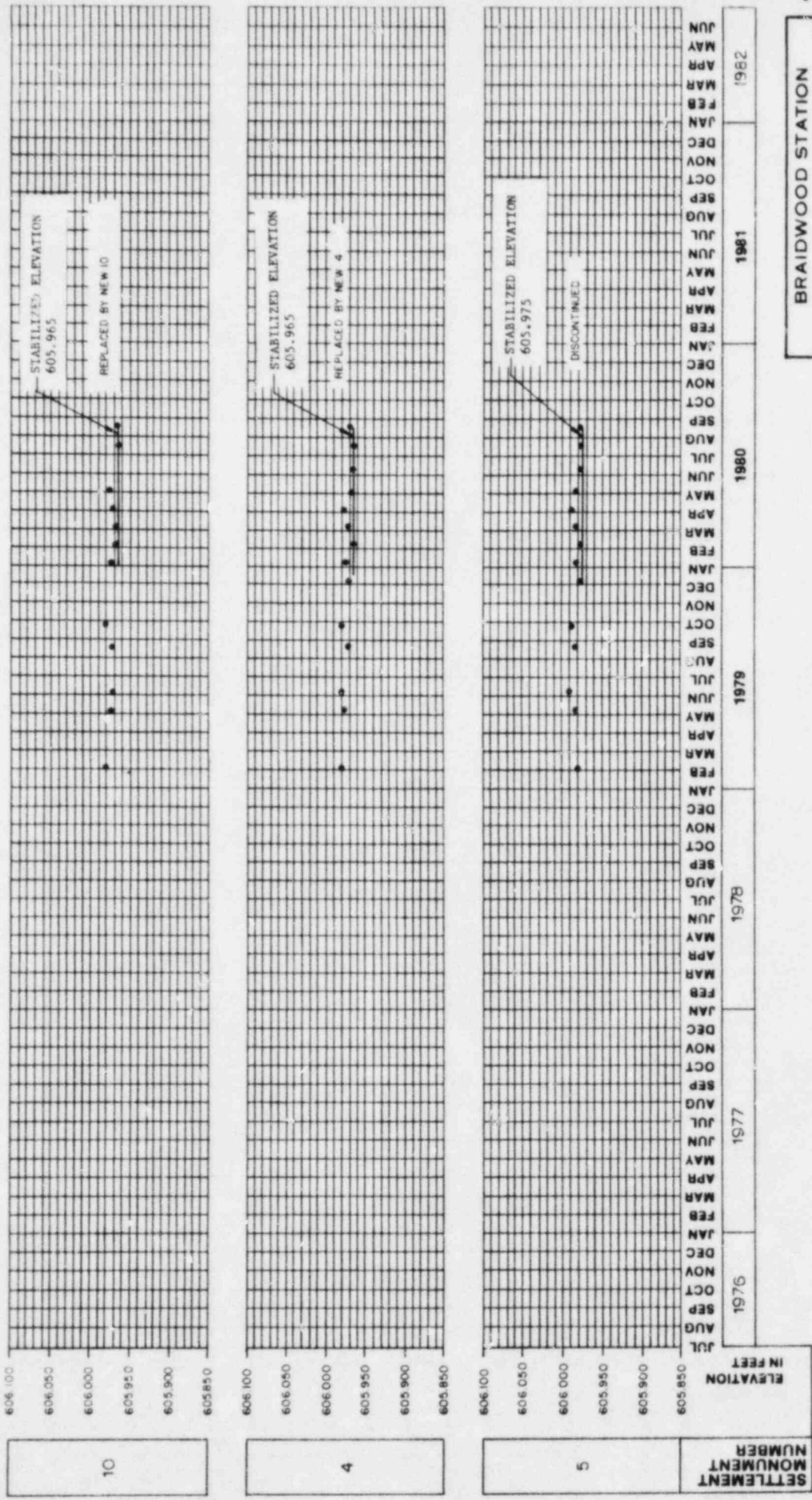


BRAIDWOOD STATION

FINAL SAFETY ANALYSIS REPORT

FIGURE Q362.1-10

SETTLEMENT PLOTS FOR
MONUMENTS XX, 20, 34



BRAIDWOOD STATION
FINAL SAFETY ANALYSIS REPORT

FIGURE Q362.1-11
SETTLEMENT PLOTS FOR
MONUMENTS 10, 4, 5

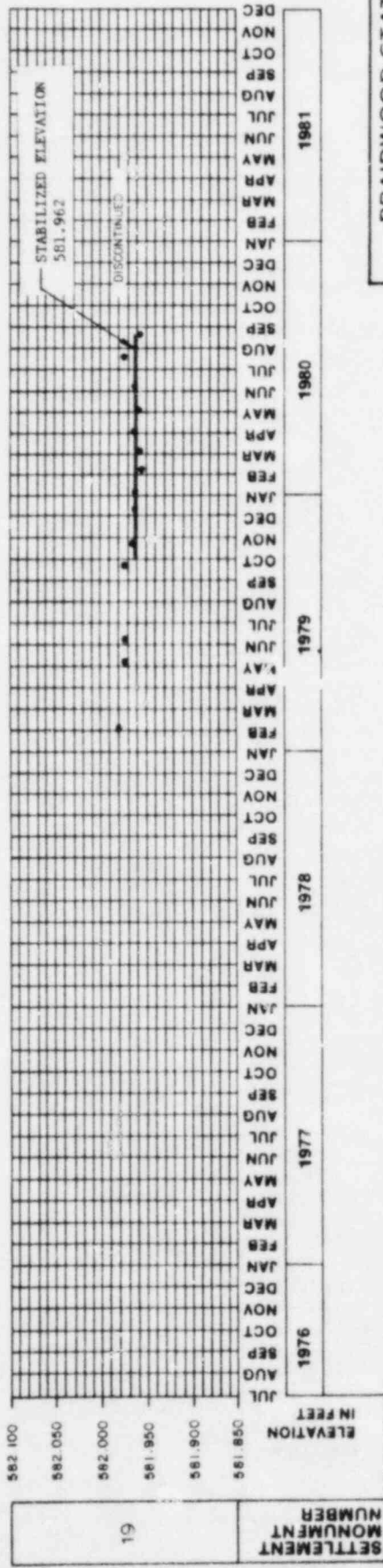
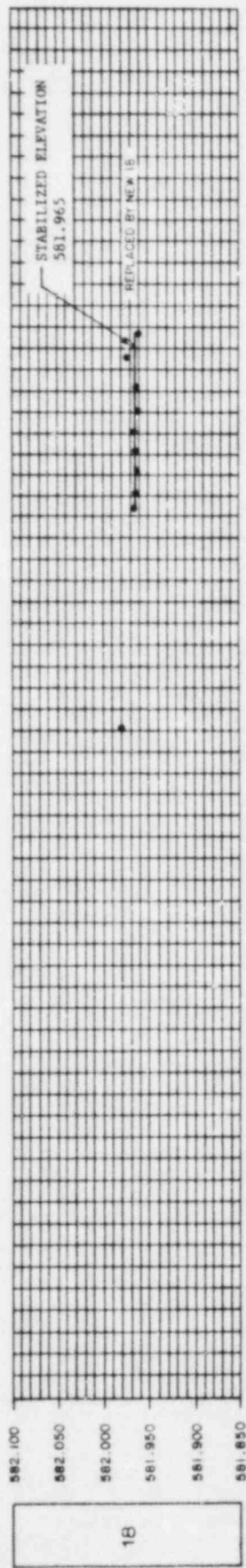
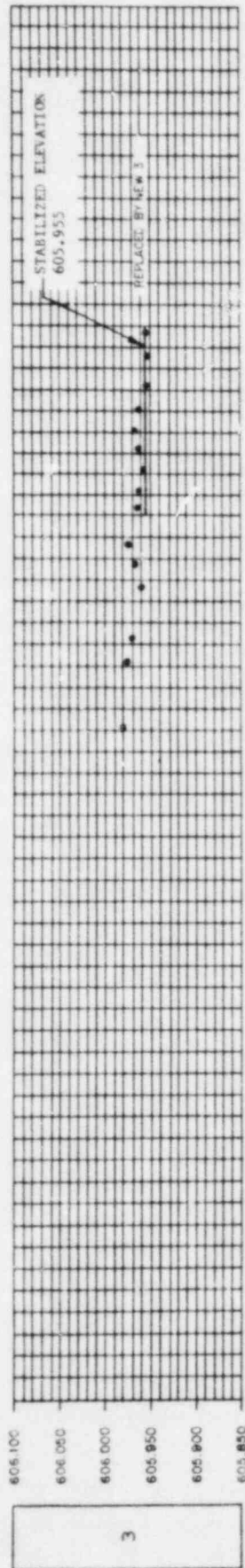
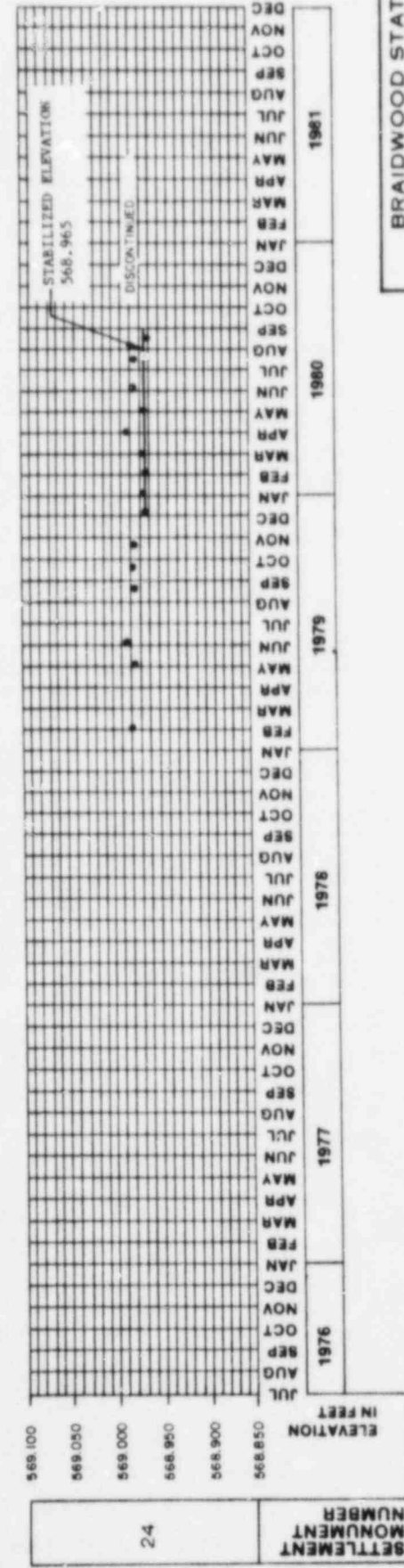
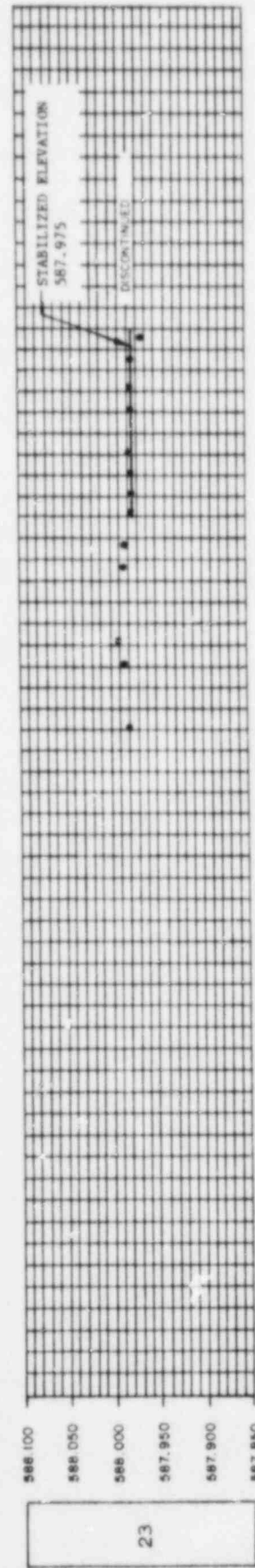
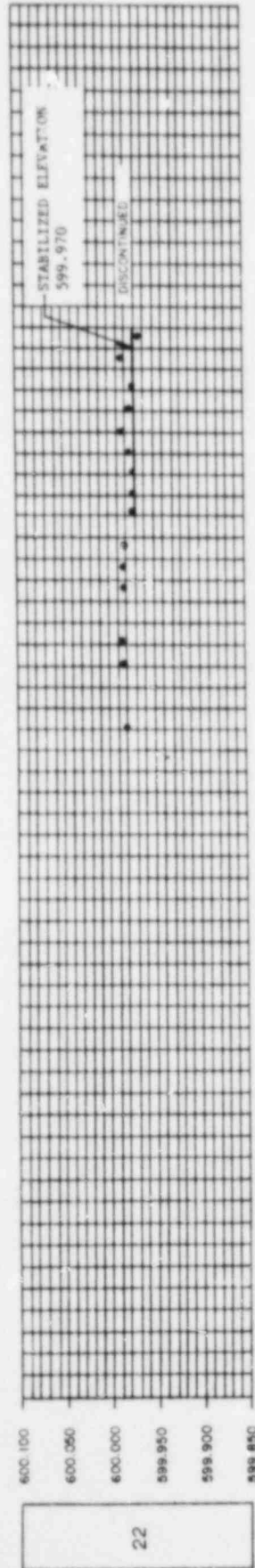
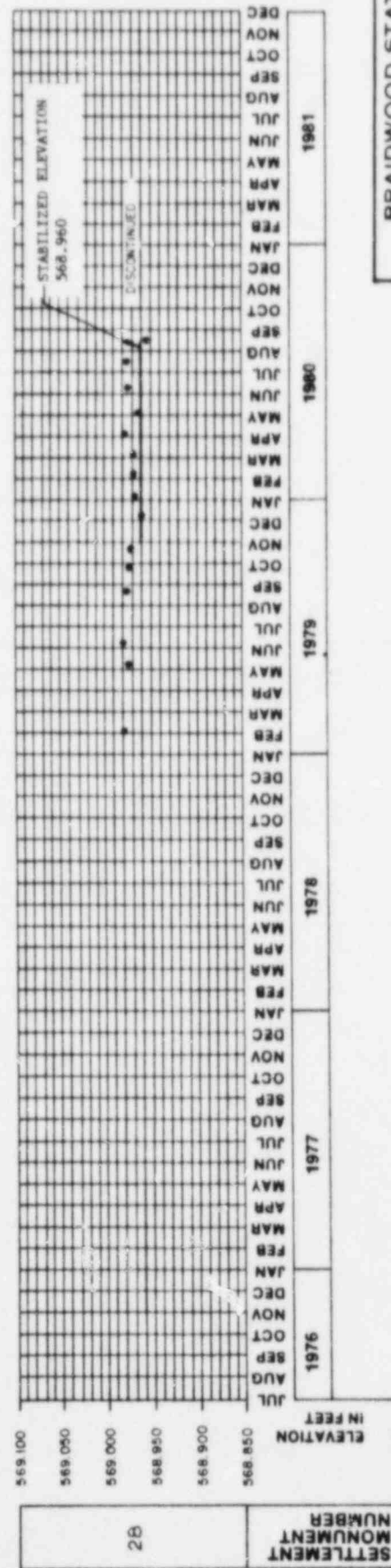
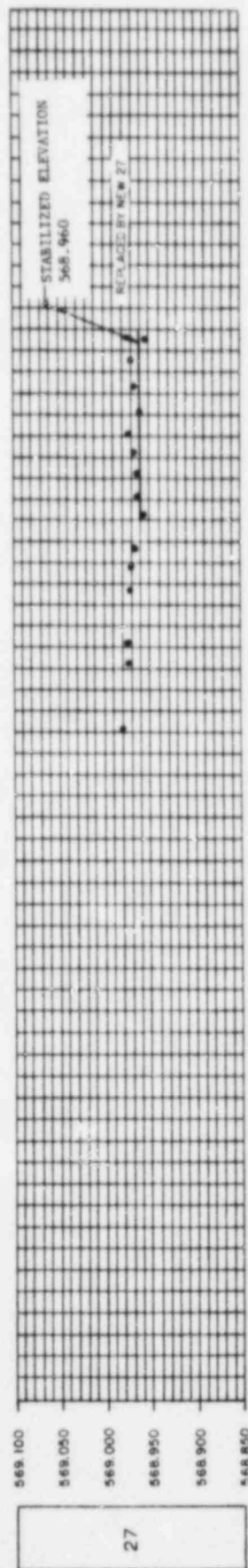
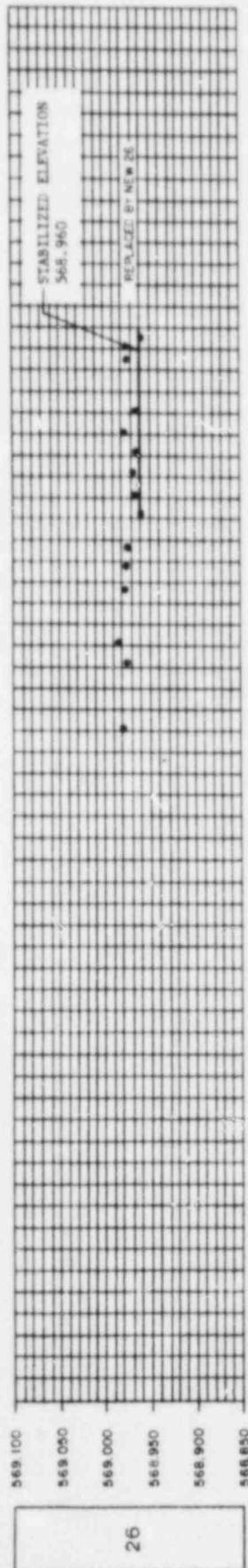


FIGURE Q362.1-12
SETTLEMENT PLOTS FOR
MONUMENTS 3, 18, 19



BRAIDWOOD STATION
 FINAL SAFETY ANALYSIS REPORT
 FIGURE Q362.1-14
 SETTLEMENT PLOTS FOR
 MONUMENTS 22, 23, 24

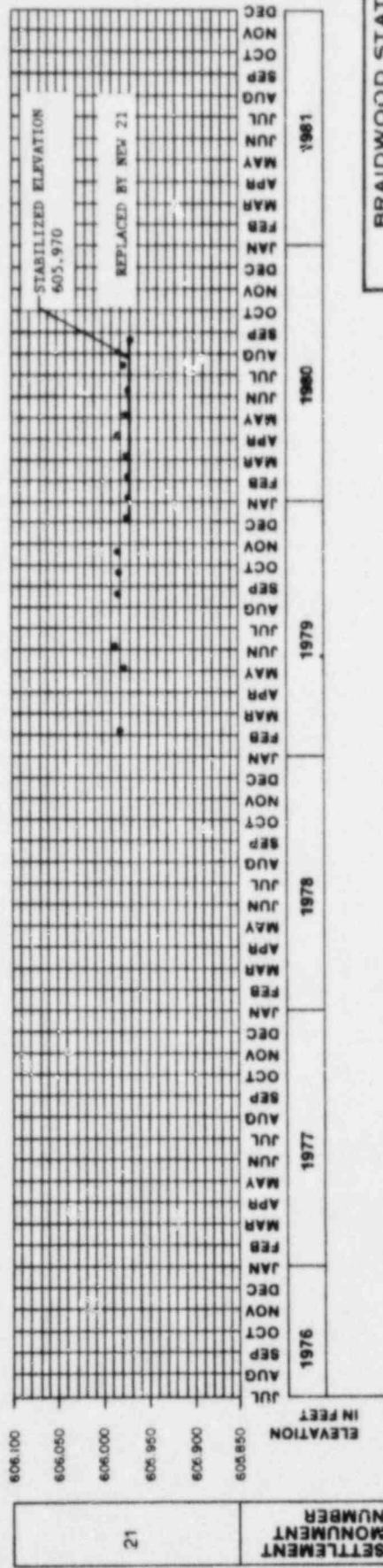
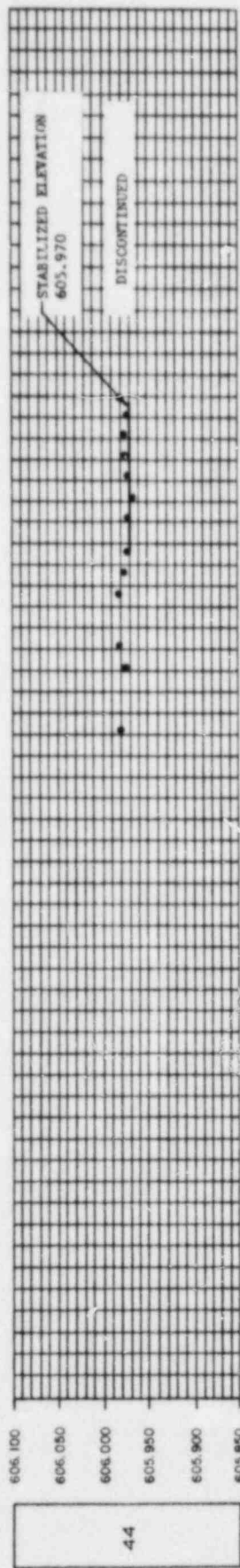
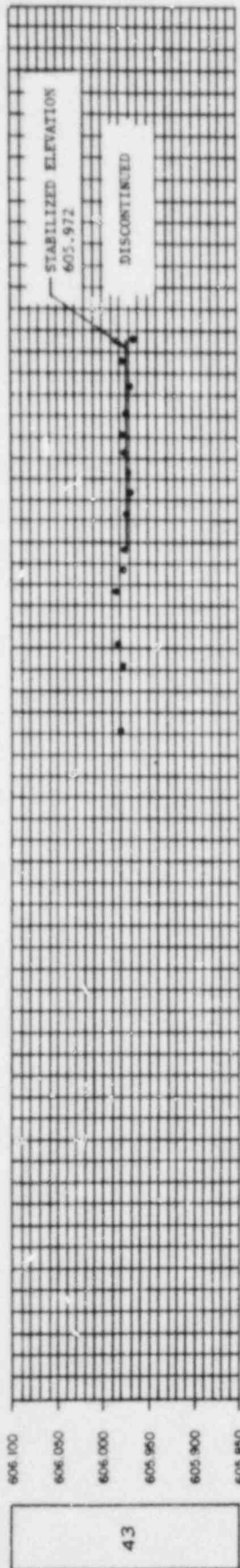
Q362.1-14



JUL 1976
AUG
SEP
OCT
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC

BRAIDWOOD STATION
FINAL SAFETY ANALYSIS REPORT

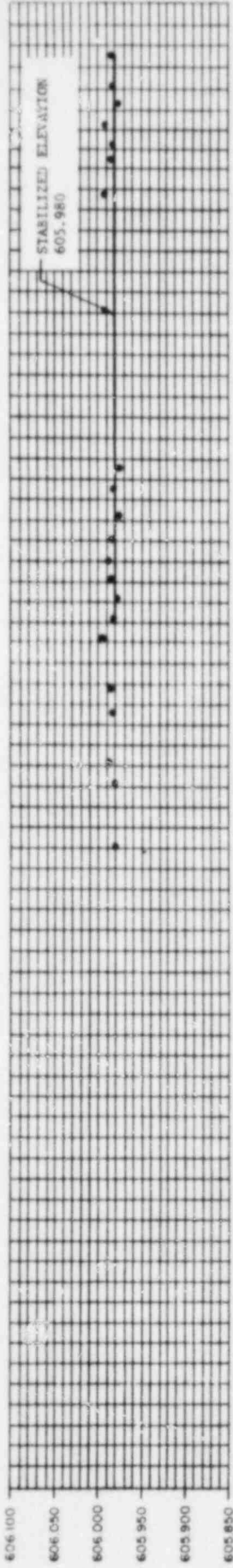
FIGURE Q362.1-15
SETTLEMENT PLOTS FOR
MONUMENTS 26, 27, 28



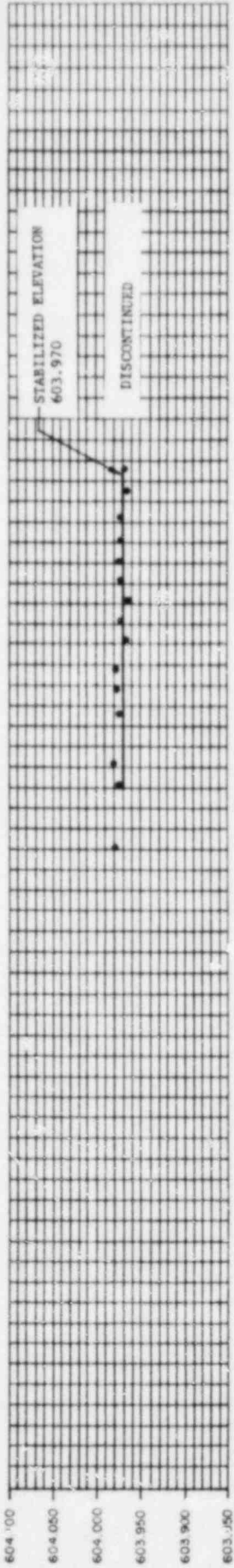
BRAIDWOOD STATION
FINAL SAFETY ANALYSIS REPORT

FIGURE Q362.1-17
SETTLEMENT PLOTS FOR
MONUMENTS 43, 44, 21

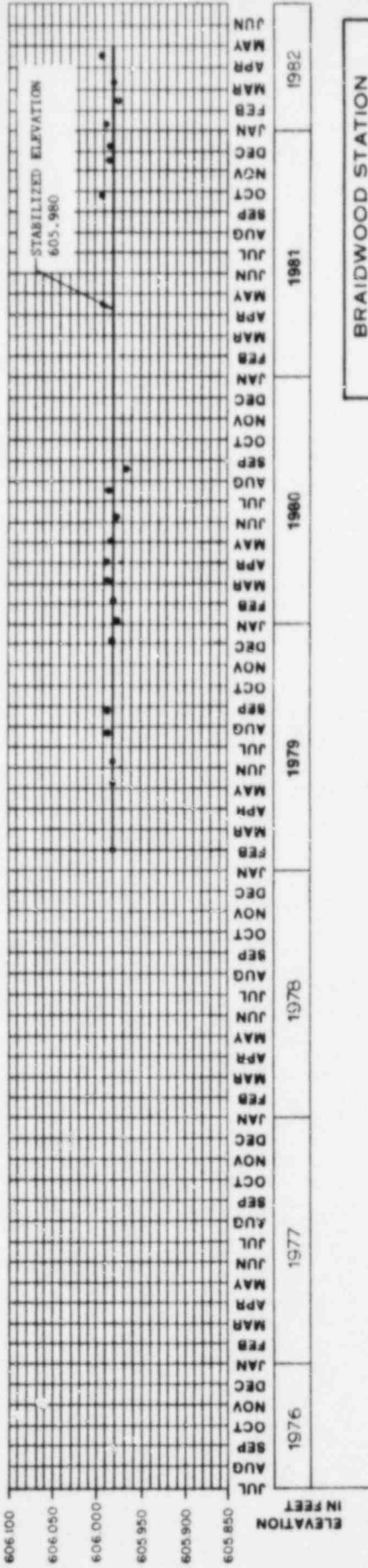
6



1



33



BRAIDWOOD STATION
FINAL SAFETY ANALYSIS REPORT
FIGURE Q362.1-16
SETTLEMENT PLOTS FOR
MONUMENTS 6, 1, 33
(SHEET 1 OF 2)