Consumers Power Company

General Offices: 212 West Michigan Avenue, Jackson, Michigan 49201 • Area Code 517 788-0550

March 23, 1976

Director of Nuclear Reactor Regulation
Att: Mr Robert A. Purple, Chief
Operating Reactor Branch No 1
US Nuclear Regulatory Commission
Washington, DC 20555

DOCKET 50-255, LICENSE DPR-20
PALISADES PLANT, CORRECTION TO XN-76-4 AND
ANSWER TO NRC QUESTION ON POSTULATED BROKEN
LOOP ACCUMULATOR FLOW BEHAVIOR FOR 1.0 DEG/PD CASE

In a telephone conversation March 1, 1976, the NRC staff requested an explanation for the sudden decrease in calculated core flooding tank flow rate for the accumulator connected to the broken loop for the DEG/PD case with C_D = 1.0 as shown in Figure 2.48 of XN-76-4. The cause of the sudden decrease was determined to be a pressurization of the break volume due to an inadvertent trip signal which opened the valve between the guillotine break volumes on a restart at 14.2 seconds.

Additional calculations have been made to determine the effects of the valve trip on the LOCA ECCS analysis for the 1.0 DEG/PD case. The RELAP4-EM blowdown case was restarted and run out to end-of-bypass. End-of-bypass temperatures were estimated from the blowdown results and the power distribution. An additional TODEE2 heatup calculation was run conservatively using the time to refill and reflood rates from the initial RELAP4-EM/FLOOD calculation. The use of previous refill and reflood results is conservative since the earlier end-of-bypass will result in higher injection rates and a longer duration of accumulator flow.

Results of the blowdown calculation compared to the base case originally submitted are attached and results from the TOODEE2 calculation are also given (Figures 1 through 6.) The calculated change from the base case is shown to be minor except for the broken loop accumulator flow rate which is calculated to go out the break anyway. End-of-bypass was calculated at 27.77 seconds or 0.46 seconds earlier than the base case. A PCT of 2065°F was calculated at 171.7 seconds with a local metal-water reaction of less than 10%. Rupture was calculated at 45.7 seconds. The hot spot temperature is estimated to be

11.3°F higher than the base case at end-of-bypass and 23°F higher at PCT. Location of rupture was 7.70 feet, and PCT was 8.20 from the bottom of the core.*

In conclusion, the questioned decrease in accumulator flow was caused by an unintentional opening of the valve between the breaks on restart for the DEG/PD C_D = 1.0 case. Additional calculations to determine the effect of this inadvertent trip were performed, and the results are attached (Figures 1 through 6). The trip had only a minor effect on the overall LOCA ECCS Analysis. End-of-bypass was calculated 0.46 seconds earlier and PCT was estimated to increase by 23°F.

The 1.0 DEG/PD case remains the limiting case and even with a 23°F increase in the DEG/PD C_D = 1.0 case the guillotine break spectrum results are consistent and remain within the ECCS criteria.

*Locations given in Table 2.4 of XN-76-4 should be corrected to read 8.20 feet in place of 8.32 and 7.70 instead of 7.78. A revised table showing the corrections is attached.

Roger B. Linford
for

David A. Bixel
Assistant Nuclear Licensing Administrator

CC: JGKeppler, USNRC

TABLE 2.4

PALISADES

LARGE BREAK RESULTS

	DEG/PD (C_D = 1.0)	DEG/PD (C_D = 0.8)	DEG/PD (C_D = 0.6)	1.0 DES/PD (9.818ft^2)	0.8 DES/PD (7.854ft^2)	0.6 DES/PD (5.891ft^2)
Peak Cladding Temperature, °F	2042.	2036.	1966.	2100.	1994.	1977.
Peak Temperature Location, ft	8.20	8.20	8.20	8.20	8.20	8.20
Local Zr/H_2O Reaction (Max.),	< 9%	< 8%	< 7%	< 10%	< 8%	< 6%
Local Zr/H_2O Location, ft	7.70	7.70	7.70	7.70	7.70	7.70
Total Zr/H_2O	<< 1.0%	<< 1.0%	<< 1.0%	<< 1.0%	<< 1.0%	<< 1.0%
Hot Rod Burst Time, sec	47.8	45.9	49.9	49.9	54.1	60.1
Hot Rod Burst Location, ft	7.70	7.70	7.70	7.70	7.70	7.70

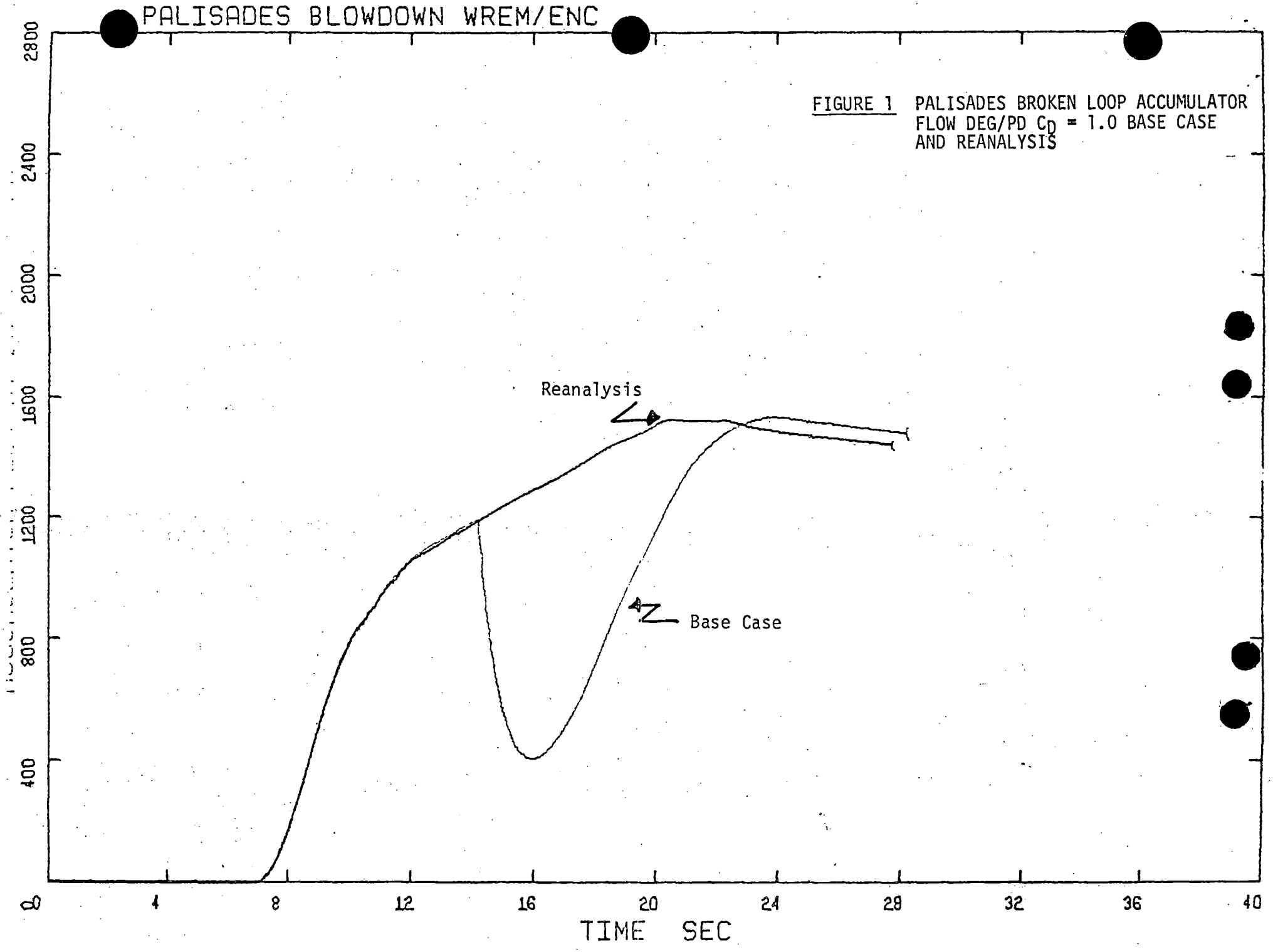

FIGURE 1 PALISADES BROKEN LOOP ACCUMULATOR FLOW DEG/PD C_D = 1.0 BASE CASE AND REANALYSIS

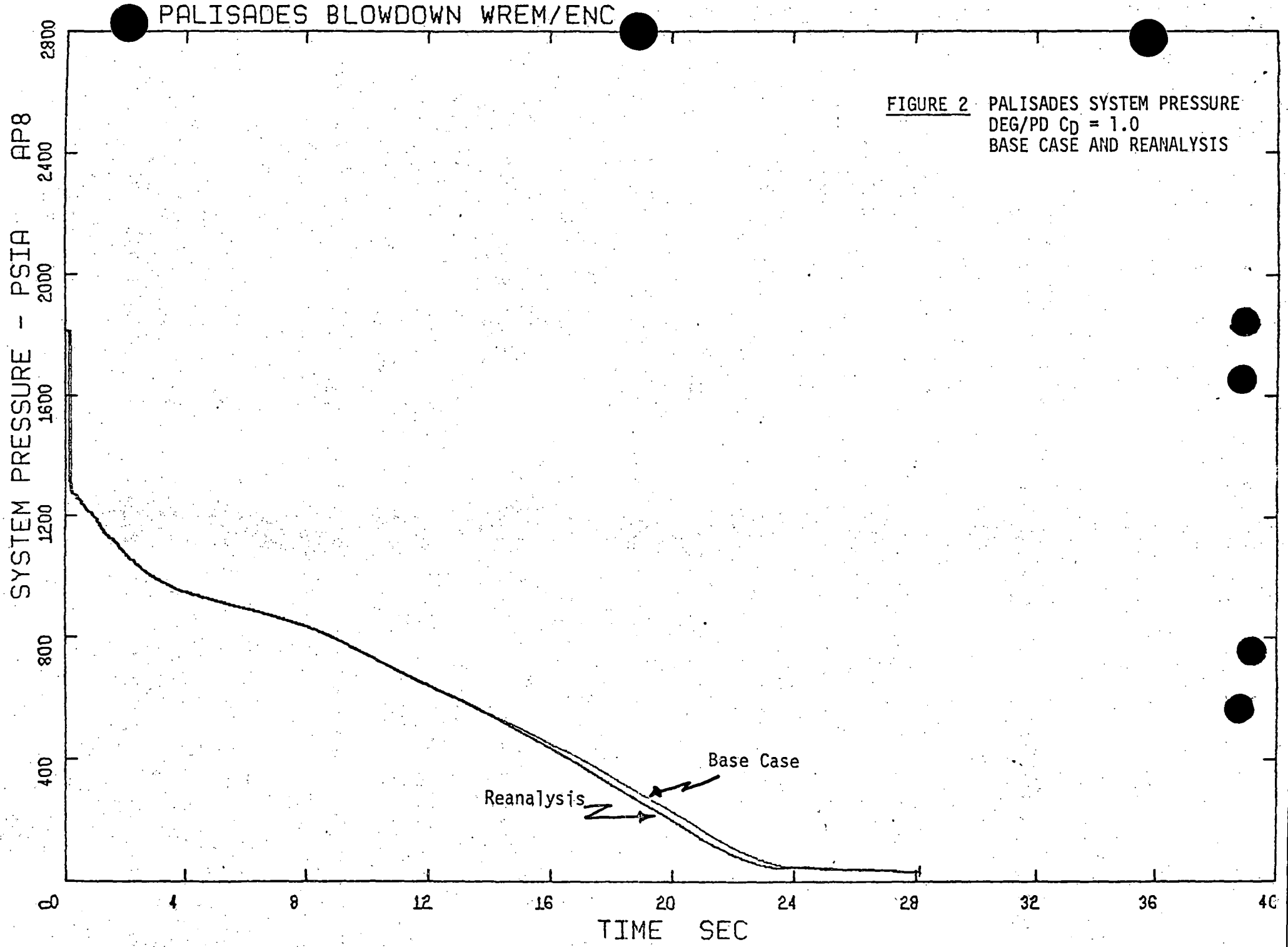

FIGURE 2 PALISADES SYSTEM PRESSURE
DEG/PD C_D = 1.0
BASE CASE AND REANALYSIS

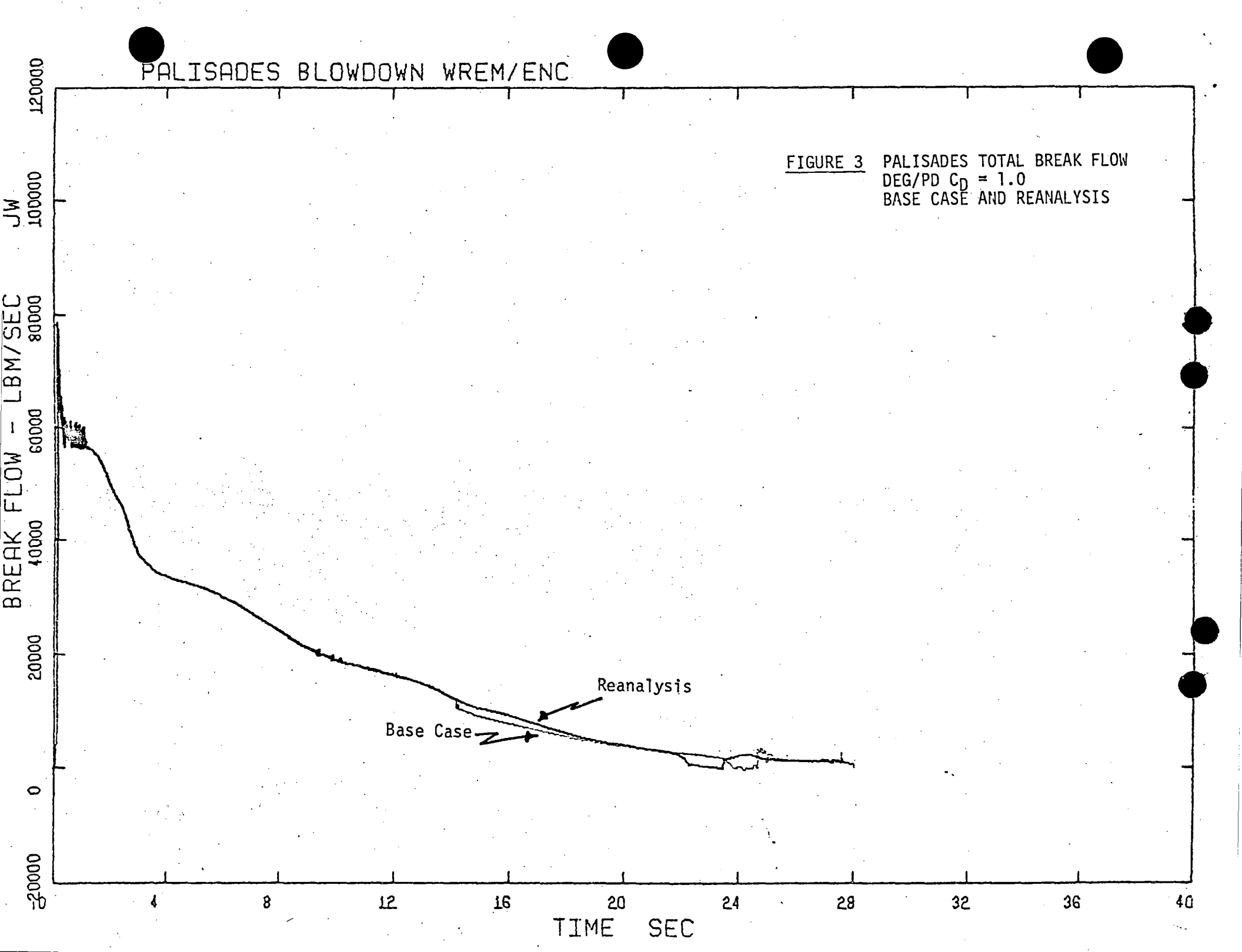

FIGURE 3 PALISADES TOTAL BREAK FLOW
DEG/PD C_D = 1.0
BASE CASE AND REANALYSIS

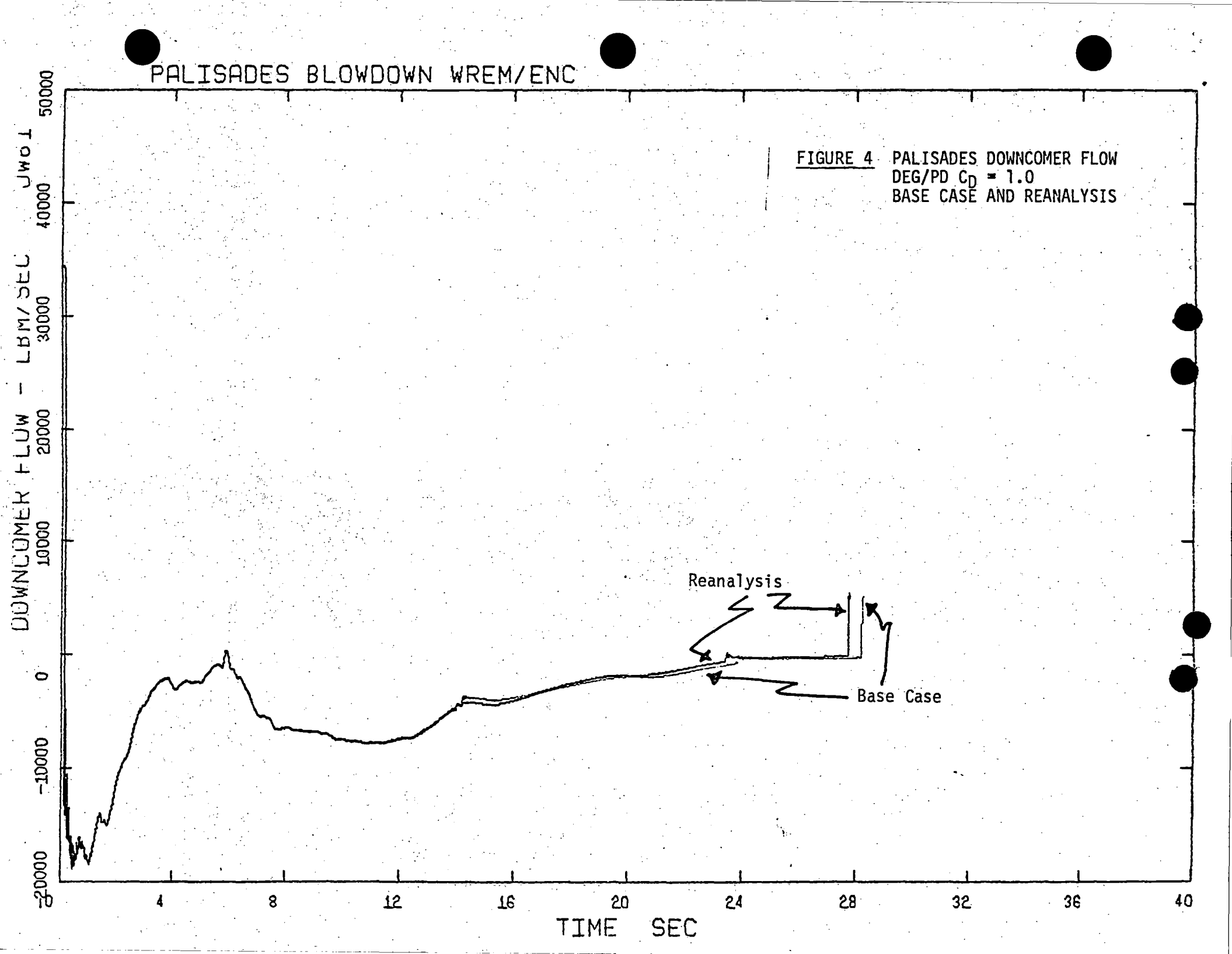

FIGURE 4 PALISADES DOWNCOMER FLOW
DEG/PD C_D = 1.0
BASE CASE AND REANALYSIS

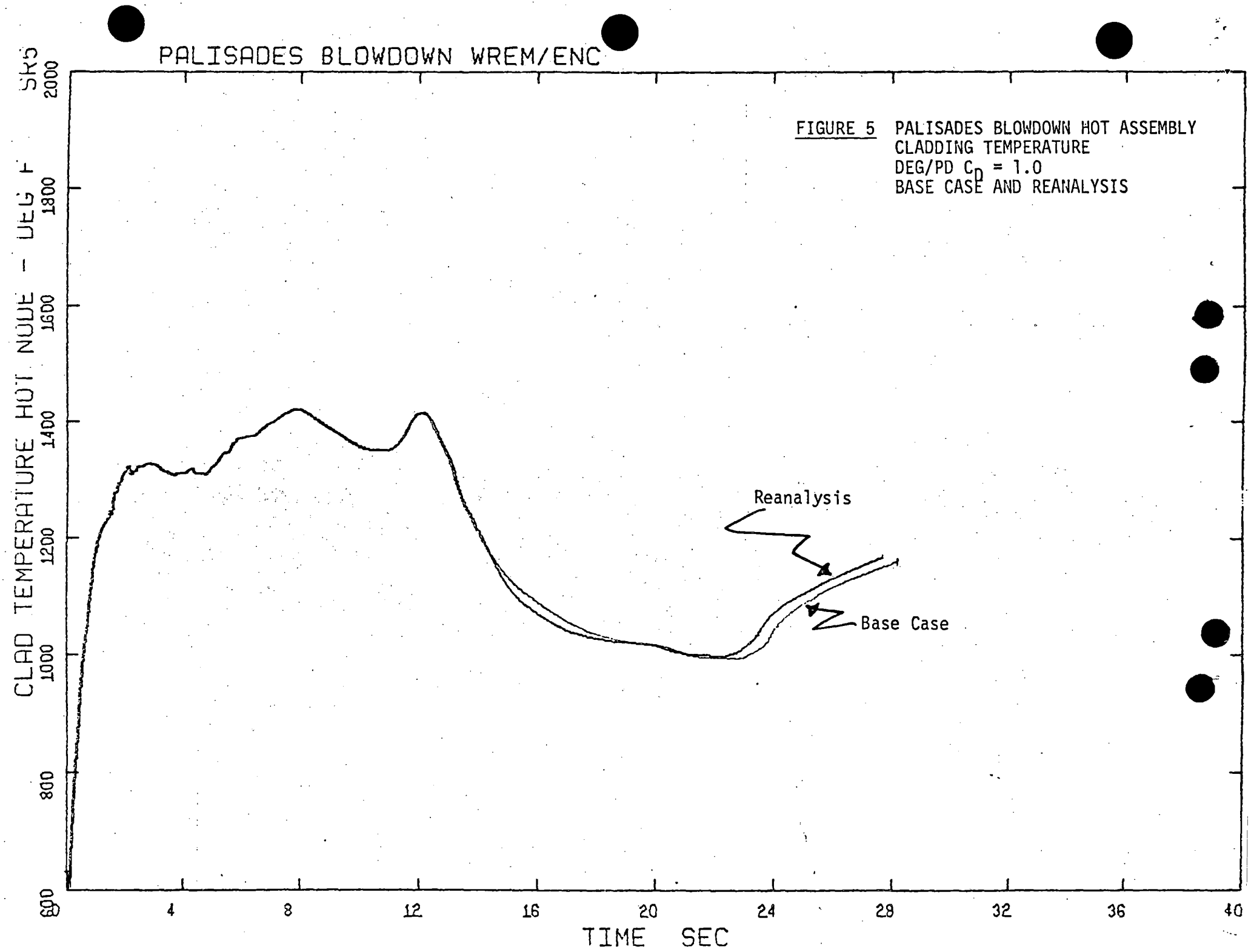

FIGURE 5 PALISADES BLOWDOWN HOT ASSEMBLY CLADDING TEMPERATURE DEG/PD C_D = 1.0 BASE CASE AND REANALYSIS

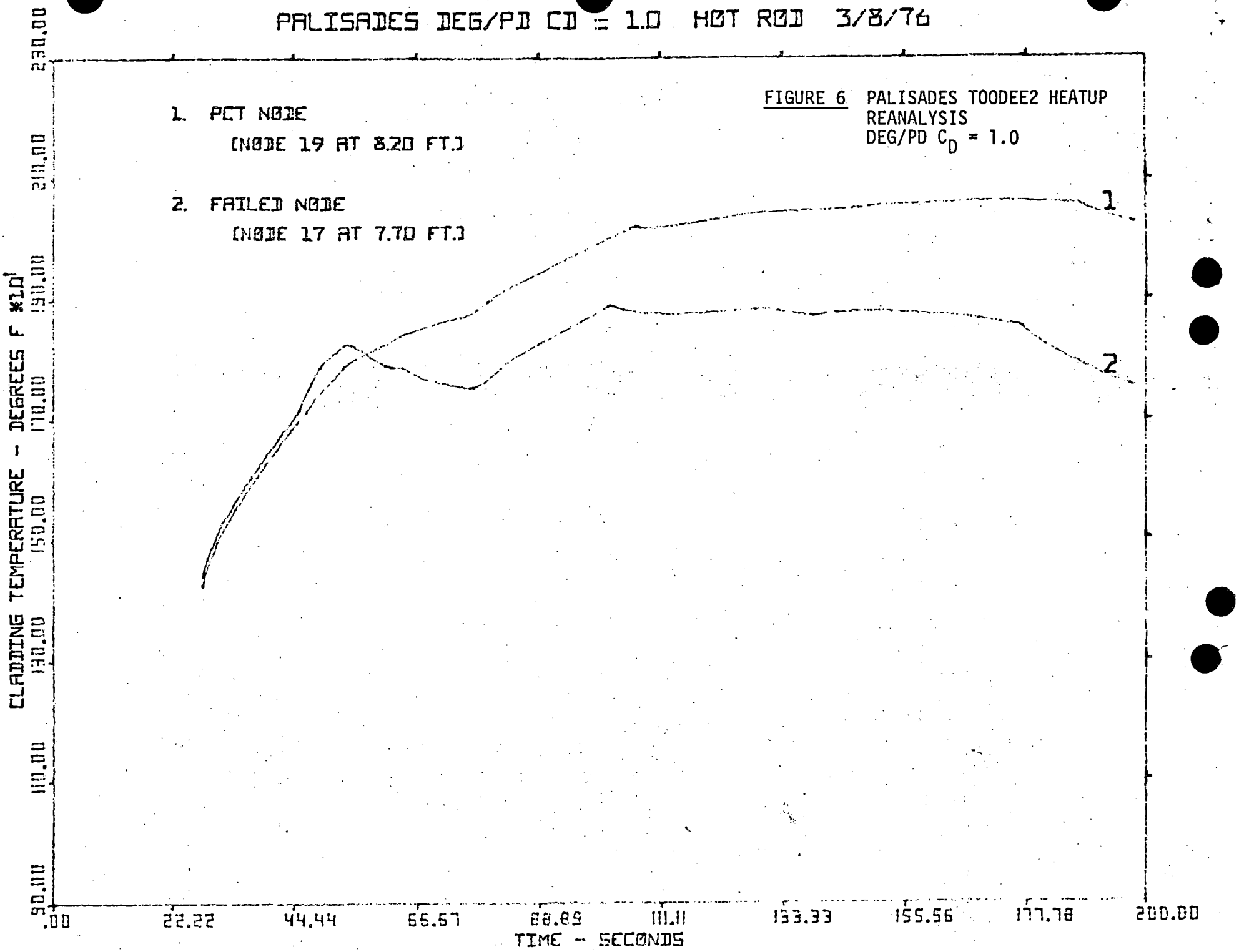

FIGURE 6 PALISADES TOODEE2 HEATUP REANALYSIS DEG/PD C_D = 1.0