

PACIFIC GAS AND ELECTRIC COMPANY

PG&E +

DIABLO CANYON POWER PLANT
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R.C. THORNBERRY
PLANT MANAGER

July 16, 1986

Mr. Kenneth R. Jones, Executive Officer
California Regional Water Quality Control Board
Central Coast Region
1102-A Laurel Lane
San Luis Obispo, CA 93401

Dear Mr. Jones:

Discharge 003 Heat Treatment Monitoring Report

Enclosed is the Diablo Canyon Power Plant (DCPP) Discharge 003 Monitoring Report. On November 5, 1985, PGandE requested permission to release heated water through discharge 003 while heat treating the screen wash system for biofouling control. As a result of this operation PGandE is submitting the enclosed report for your review.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Sincerely,

R C Thornberry
R. C. Thornberry

RCT:jhr

Enclosure

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PDR ADOCK 05000275
S PDR

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Distribution Sheet

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Enclosure

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DIABLO CANYON POWER PLANT

DISCHARGE 003 MONITORING REPORT

June 5, 1986

Introduction

Periodic heat treatment of the Diablo Canyon Power Plant cooling water system is necessary to remove fouling organisms which routinely settle and colonize the conduit surface. Since some fouling species prefer to settle in the smaller bore piping due to the flow velocities and turbulence present, additional auxiliary piping systems are also heat treated during demusseling. The screen wash system is particularly prone to this type of fouling, and it is demusselled during heat treatment by taking suction from the intake bay which is at the demusseling temperature. The traveling screens and spray system are run continuously during the demusseling procedure. The wash water, having removed debris from the screens, passes down a sluiceway to the debris sump, and is pumped through a pipe to its point of discharge at the base of the west breakwater (Figure 1). The wash water exits through a three foot diameter pipe in the concrete cap on the breakwater at a point ten to twelve feet above sea level, and cascades down the poured concrete and tri-bars of the breakwater entering the Pacific Ocean on an exposed headland (NPDES permit Discharge 003) which is subject to substantial wave energy and turbulence.

Since the discharge of elevated temperature seawater out Discharge 003 represents a rerouting of the main cooling water flow, concurrence of the staff of the Regional Board was obtained prior to the demusseling of November 11, 1985. Permission was granted provided that the discharge be monitored, and that a report of the findings be prepared for the Board's review. This report details observations conducted during demusseling operations on November 11, 1985, and on March 8, 1986.

Methodology

During demusseling, temperature was measured continuously in both of the Unit 1 intake conduits and at the terminus of the 003 Discharge pipe. Periodic measurements at other points in the system were taken with a hand held probe.

Biological observations were recorded prior to and following each demusseling. A list of invertebrate and plant species present at the point of discharge was compiled. Size measurements of dominant invertebrate species were recorded. Changes in species composition following demusseling were noted.

Results and Discussion

Temperature Monitoring

Temperatures monitored in the intake conduits and at the point of the 003 Discharge during the November 1985 demusseling are presented in Figure 2. Figure 3 presents the same information obtained during the March 1986 demusseling. The maximum internal temperature achieved during either demusseling was 105 degrees F, measured in Conduit 1-2 on November 11, 1985. Demusseling temperatures were typically 103 degrees F or less. The discharge temperatures at 003 associated with these internal temperatures ranged from 90 to 93 degrees F. This observed ten degree drop in temperature is due to a "cooling tower" effect which occurs in the traveling screen wash. The high pressure heads induce convective cooling as the wash water is exposed to the lower air temperature. There is also some additional cooling of the wash water as it travels the distance of

the discharge pipe. The temperature at the point of the 003 Discharge also lags behind the demusselled conduit temperature by fifteen to thirty minutes due to the temperature difference between the wash water and the discharge pipe.

Although the maximum temperature recorded at Discharge 003 was 93 degrees F, the thermal dose to marine organisms there is reduced substantially by the influence of mixing induced by breaking waves. This phenomenon is illustrated in Figure 4 which is a photocopy of a portion of a thermograph recording chart recorded during the March 1986 demusseling. This figure demonstrates that mixing with ambient temperature water is a significant factor, since the temperature probe was fixed at the terminus of the 003 Discharge pipe.

Biological Observations

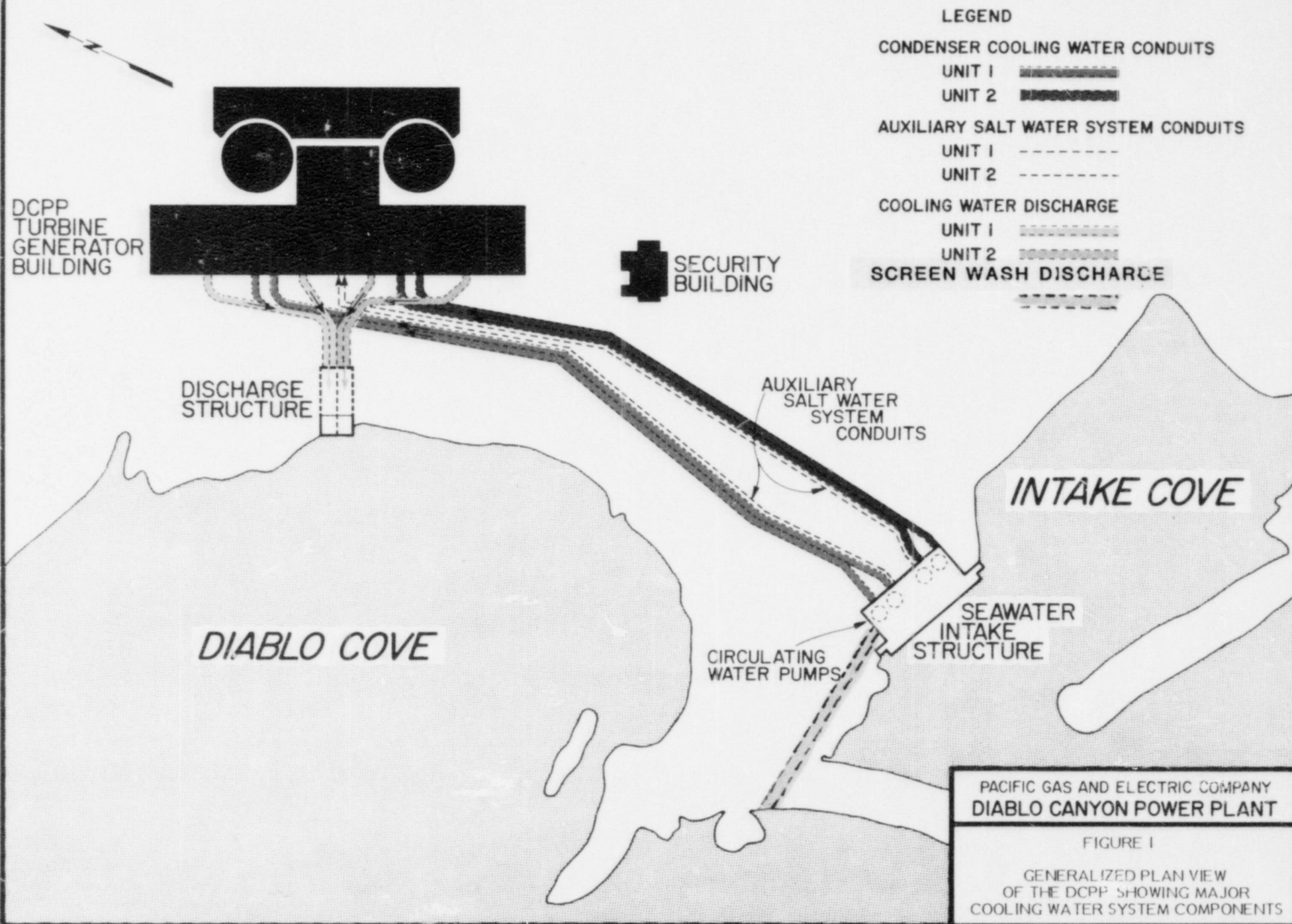
The marine community at the point of the 003 Discharge is comprised mainly of intertidal invertebrates and algae. These organisms have been able to extend their vertical distribution very high into the intertidal zone because of the intermittent operation of the screen wash discharge.

Invertebrates present include several species of limpets, including Collisella scabra, C. digitalis, and C. limatula. There is a dense aggregation of the barnacle Tetraclita squamosa, and other barnacles of the genus Balanus are present. A single very large anemone, Anthopleura elegantissima, is attached approximately three feet from the discharge. The crabs Pachygrapsus crassipes and Hemigrapsus nudus are present near the discharge, as is a population of the bay mussel Mytilus edulis.

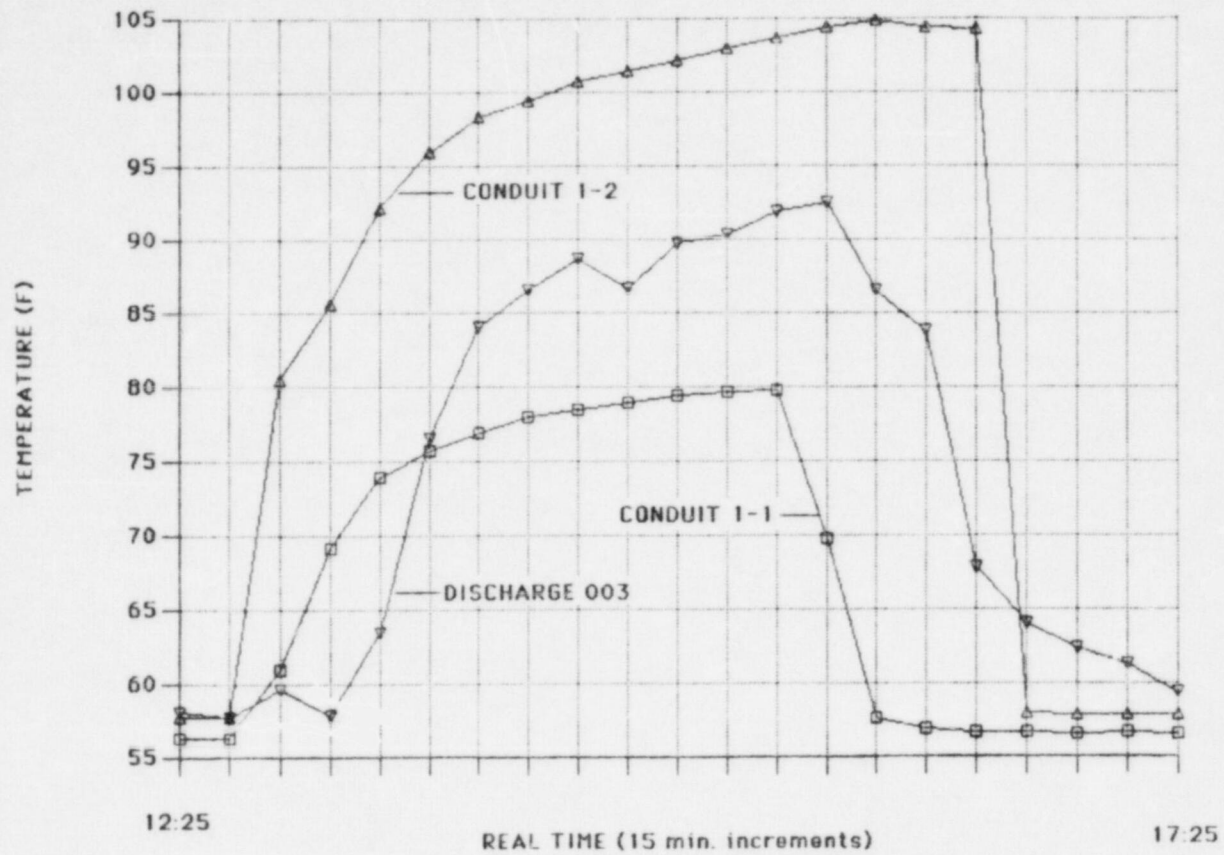
Algal species at the point of discharge include Endocladia muricata, Gigartina papillata, and Iridaea flaccida. At the base of the breakwater where the discharge enters the ocean is a mixed stand of young Laminaria dentigera and Pterygophora californica sporophytes.

The marine community at the discharge was observed just prior to and within two weeks of each heat treatment. No observable effects of either demusseling were noted. The same species were present in the same relative proportions following demusseling. The persistence of the species present is demonstrated by the size and assumed age of each. The large Anthopleura elegantissima at the point of discharge is in excess of 90 mm in basal diameter. The average size of the mussels present is approximately 25 mm with a range of 10 to 40 mm. Based on growth rates reported in the literature, the larger mussels are nearly one year old. They have, therefore, survived all of the heat treatments of Unit 1. Further evidence that the temperatures discharged from 003 pose no risk to the marine community can be inferred from the results of Phase I studies conducted during the DCPH Heat Treatment Optimization Program. This work indicated that, at a temperature of 90 degrees F continuous exposure in excess of 17 hours was necessary to result in 50 percent mortality of mussels.

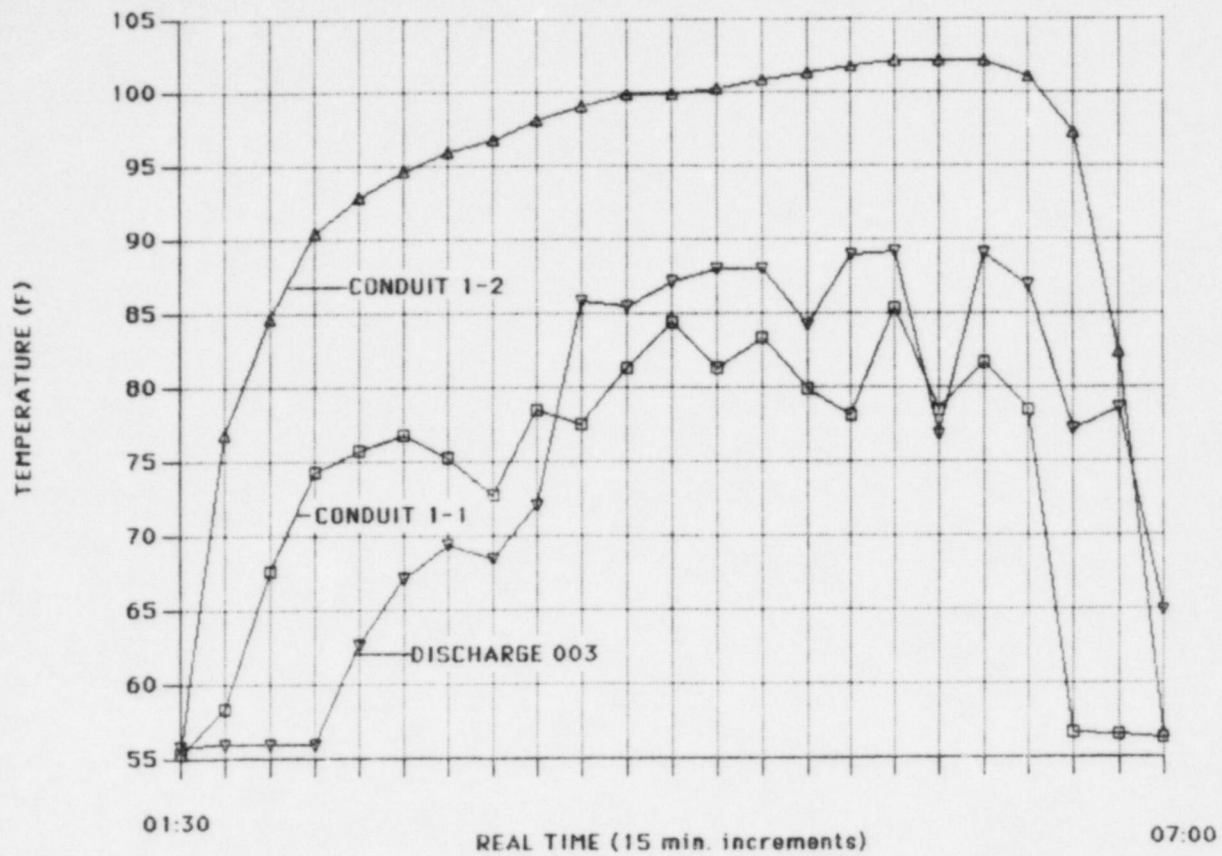
Based on observations conducted during two demusseling operations, it appears that the discharge of heated seawater from Discharge 003 does not pose a risk to the marine community. In order to further validate these observations, PGandE will continue to monitor Discharge 003 during heat treatments conducted during the remainder of 1986.



CONDUIT 1-2 DERUSSLING 11/11/88



CONDUIT 1-2 DEMUSSELING 3/8/86



CONDUIT 1-1 DEMUSSELING 3/8/86

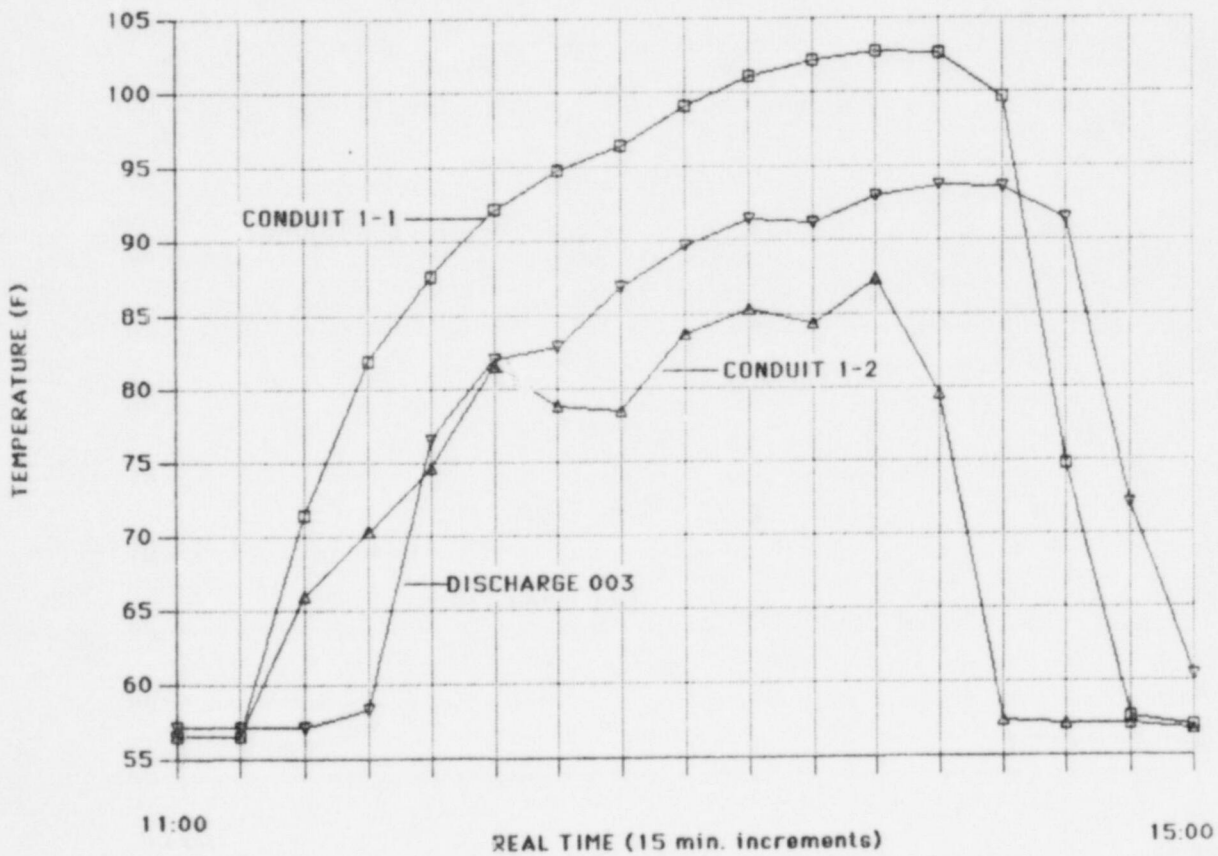


FIGURE 3

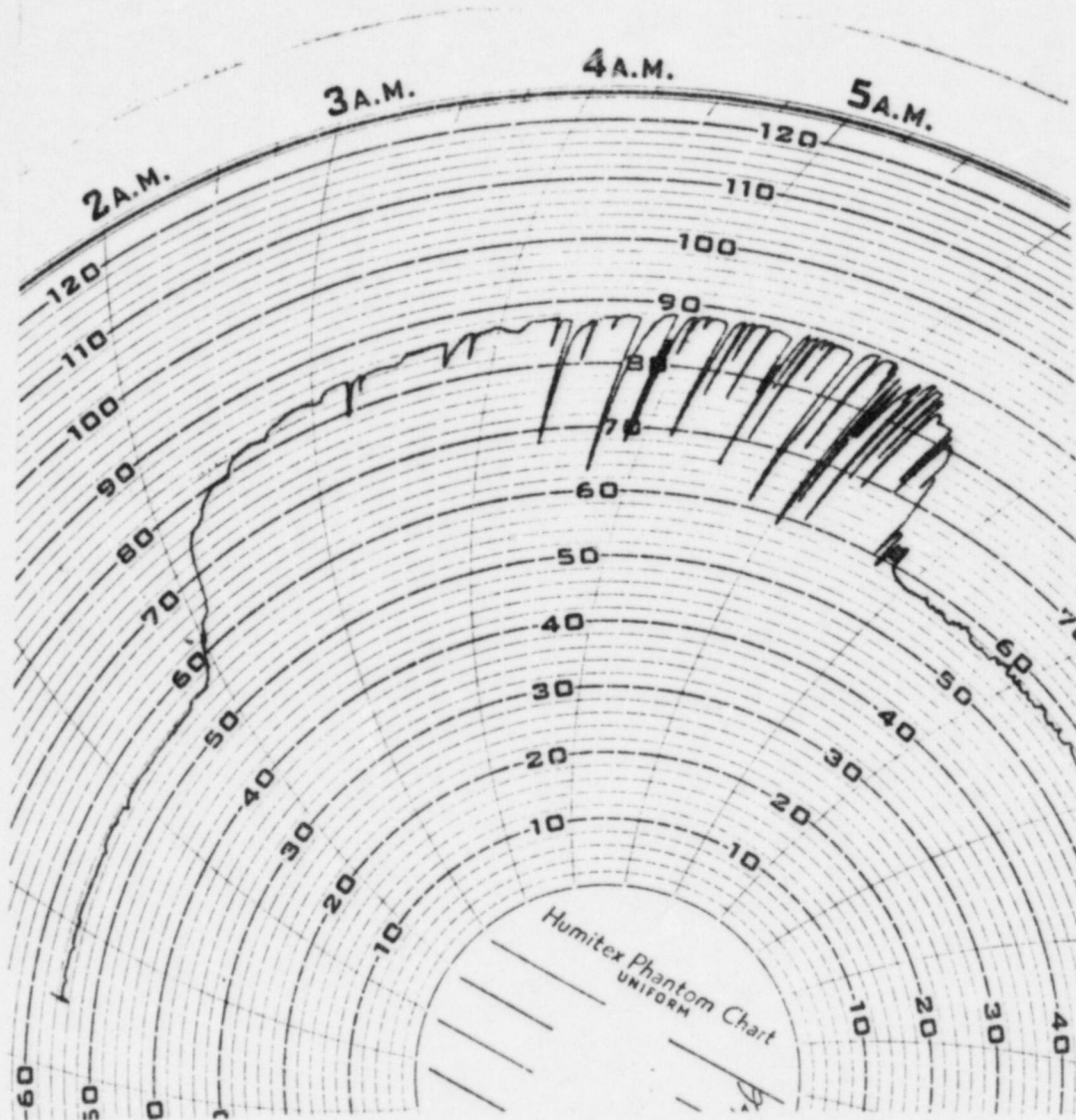


FIGURE 4

Temperature (°F) of discharge 003