Consumers Power Company

James W Cook
Vice President - Projects, Engineering and Construction

General Offices: 1945 West Parnall Road, Jackson, MI 49201 • (517) 788-0453

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Harold R Denton, Director
Office of Nuclear Reactor Regulation
Division of Licensing
US Nuclear Regulatory Commission
Washington, DC 20555

MIDLAND NUCLEAR COGENERATION PLANT
MIDLAND DOCKET NOS 50-329, 50-330
NATURAL GAS ISSUE
FILE: 0971 SERIAL: 19379

On August 23, 1982, the NRC Staff met with representatives of Consumers Power Company to discuss issues associated with the natural gas pipeline at the Midland Plant Site. This letter provides information requested by the Staff in the meeting.

Background

A 6-inch natural gas pipeline passes around outside the northern perimeter of the site as shown in Figure 1. A tap from this line enters the site from the north and supplies a regulator station located by the north side of the evaporator building. Gas is used as a fuel for the auxiliary boilers which are located in the northeast corner of the evaporator building and for the test boilers which are located in the southwest corner of the combination shop. The eastern branch of this line northeast of the plant will be valved out of service prior to fuel load.

Analysis

A comprehensive evaluation is being performed by NUS Corp for Consumers Power Company, patterned after the study done by Mechanics Research Incorporated for the Tennessee Valley Authority's Hartsville Nuclear Plant. The natural gas pipeline near the Hartsville plant is much larger than the pipeline at the Midland Plant and was shown to be acceptable. Further, it should be emphasized that the analyses presented here, while conservative, have been based on conditions specific to the Midland Plant. They cannot be generically applied to other pipeline-plant configurations.

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As part of the evaluation being done for the Midland Plant, a probabilistic assessment was used to assess the frequency of occurrence of potential pipeline ruptures and their possible consequences. In addition, deterministic studies are being used to evaluate other possible failure mechanisms. These include confirming that potential air shock, missile generation, and heat do not exceed the specific safety design criteria of the plant. The present location of the regulator station on site and possible ignition of gas from leaks in piping internal to the evaporator building and combination shop also are being analyzed to confirm that this configuration is acceptable.

The probabilistic assessment has been completed and shows that a flammable concentration of natural gas will not reach the air intakes of any safety related structure with a frequency of greater than 1×10^{-7}. A detailed report of this assessment is provided as Appendix A.

Also, the assessment assumed that the temporary test boilers would be operational. This was done so as not to preclude the option of subsequently utilizing these boilers for plant operation. Appendix B is a statement of why Consumers Power Company feels this option should be kept open. Since the simultaneous operation of all five boilers does not require the volume of gas which the pipeline is capable of delivering, flow will be limited to 20 lb/sec by the use of an orifice plate.

To further enhance the safety of the natural gas pipeline, we are in the process of procuring a leak detection system. This system is based on a mass flow inventory calculation and uses a dedicated computer for control and calculations. This type of leak detection has been successfully used on a 100 mile oil pipeline and is presently being installed on another liquid pipeline. Pressure and flow measurements will be taken at various points along the pipeline and compared to predicted values of flow to determine if a gas leak is present. Preliminary results indicate that a leak of approximately 1% would be detected within two minutes. This system will be designed such that in the event of a leak, a valve in the pipeline feeding the plant will be closed automatically. A report explaining how this system fuctions is attached in Appendix C.

Conclusion

When the results of the probabilistic assessment are combined with the added reliability of the gas leak detection system (98% availability) the probability of a gas leak reaching any structure in flammable concentrations is acceptably low.

The outstanding analyses will confirm that the ignition of a drifting cloud of gas or gas trapped within a building will not affect the ability of any safety related item to perform its necessary safety function.

We believe that the analysis provided in this submittal, including hardware changes proposed to provide a further margin of safety, when coupled with the confirmatory analysis to be provided in November, demonstrate the acceptability of natural gas as a fuel for the boilers at the Midland Plant Site.

James W. Cook

JWC/MAF/fms

CC RJCook, Midland Resident Inspector
RHernan, US NRC
DBMiller, Midland Construction (3)
RWHuston, Washington

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CONSUMERS POWER COMPANY
Midland Units 1 and 2
Docket No 50-329, 50-330

Letter Serial 19379 Dated October 19, 1982

At the request of the Commission and pursuant to the Atomic Energy Act of 1954, and the Energy Reorganization Act of 1974, as amended and the Commission's Rules and Regulations thereunder, Consumers Power Company submits information requested by the Staff regarding a natural gas pipeline at the Midland Site.

CONSUMERS POWER COMPANY

By J W Cook
J W Cook, Vice President
Projects, Engineering and Construction

Sworn and subscribed before me this 19 day of October, 1982

Barbara R Townsend
Notary Public
Jackson County, Michigan

My Commission Expires September 8, 1984

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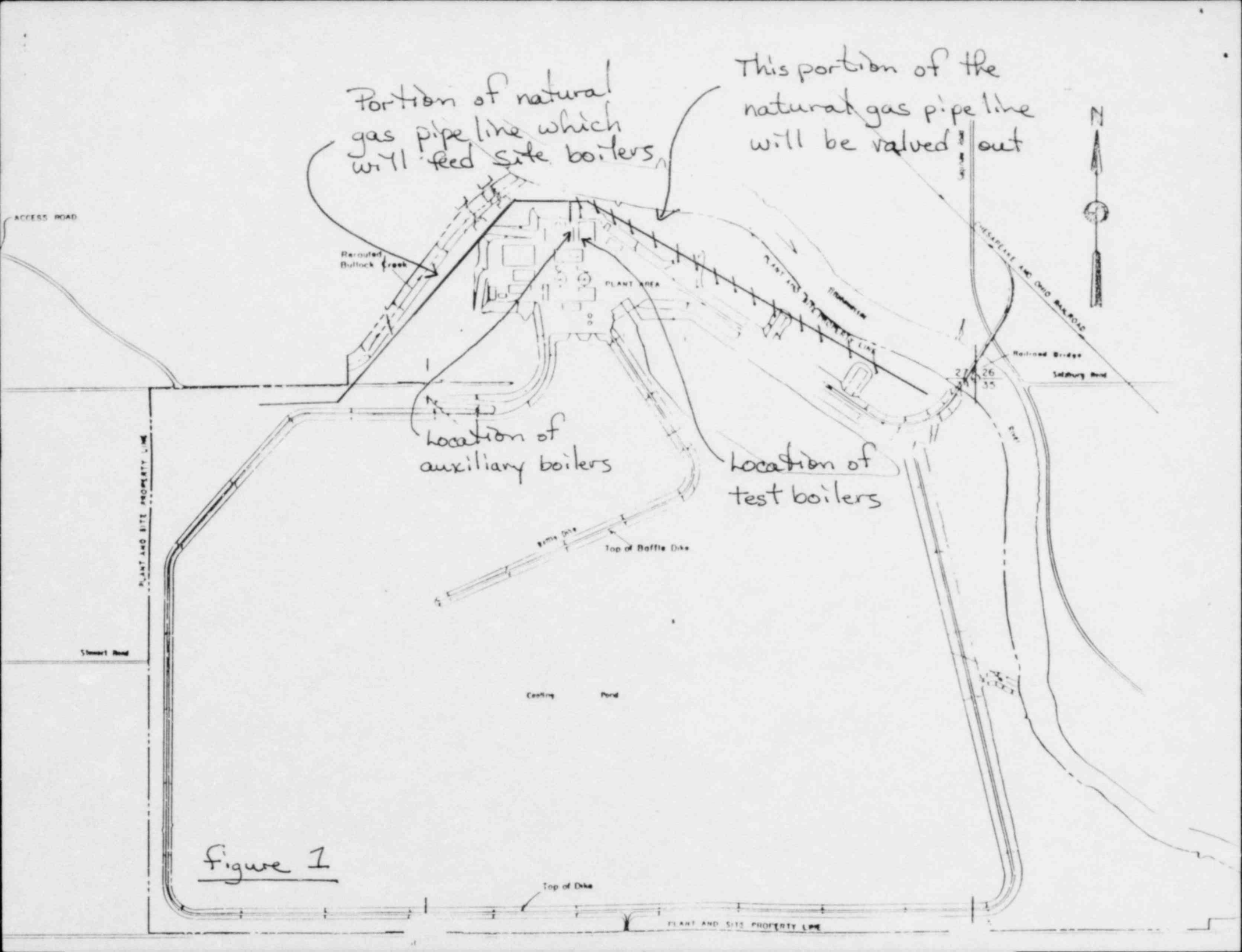
Portion of natural gas pipeline which will feed site boilers
This portion of the natural gas pipeline will be valved out
location of auxiliary boilers
location of test boilers
ACCESS ROAD
Rerouted Bullock Creek
PLANT AREA
Top of Baffle Dike
Top of Dike
PLANT AND SITE PROPERTY LINE
Stewart Road
Cooling Pond
Railroad Bridge
Salisbury Road
N

figure 1

APPENDIX A

PROBABILISTIC ASSESSMENT OF THE NATURAL GAS PIPELINE AT THE MIDLAND NUCLEAR COGENERATION PLANT

APPENDIX B

RATIONALE FOR USING HIGH PRESSURE BOILERS DURING PLANT OPERATION

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RATIONALE FOR USING HIGH-PRESSURE BOILERS DURING PLANT OPERATION

Three high-pressure test boilers have been installed at the Midland Plant to supply heating steam to the process steam system during start-up, so as to expedite system checkout in 1983. These boilers, thus, have been considered temporary and not to be used during plant operation. However, the operational flexibility afforded by maintaining the high-pressure boilers could serve to: (a) minimize the time that the reactor must spend performing tests during a start-up; and (b) minimize stresses on the secondary and process steam systems due to thermal cycling. Maintaining the option for using the high-pressure boilers could considerably enhance the safety margin provided the plant.

During start-up, the high-pressure test boilers could be used as a source of steam that would normally be met using the reactor. For example, when an overhaul or other major work has been performed on the main turbine, it is necessary to balance the machine and/or to verify that the turbine-generator control systems are properly tuned. This may require repeatedly rolling and then tripping the turbine, thus potentially exposing the reactor to a transient at low power. Although this situation has been analyzed, found acceptable, and is no different than the situation at any other nuclear generating plant, Midland may be able to reduce the number of instances where the reactor is subjected to this type of cycling. If the high-pressure boilers were available as an additional steam source, the turbines could be tested with steam from this source. All testing and verification of proper operation could be completed without using nuclear generated steam, thereby enhancing overall safety.

In a similar fashion, the high-pressure boilers could be used in the future to verify proper operation of the process steam system after adjustments or modifications. Although it has been shown that transients in the process steam cycle do not create additional significant safety concerns for the Midland plant, the availability of the high-pressure boilers for this type of testing would offer the same benefits as gained from testing the secondary system without using nuclear generated steam.

The heat exchangers of the process steam system are designed to withstand frequent heat-ups and cool-downs by the use of an expansion joint in the shell which limits stresses to acceptable values. If the high-pressure boilers were available to supply steam, thermal cycling which would occur during plant shutdown or during a transfer of steam supply from one unit to the other could be moderated. Reductions in thermal cycling of the process steam heat exchangers would reduce the possibility of stress related tube leaks in the heat exchangers, thus further enhancing the quality of the boundary between the secondary and tertiary steam systems.

It must be recognized that before the high-pressure boilers can be considered as a permanent installation, an agreement must be reached with the Department of Natural Resources and the Michigan Air Pollution Control Commission regarding air pollution and other environmental concerns. These issues have not been addressed in the present analysis and they may pose problems which would render use of the high-pressure boilers as an infeasible option.