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Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Mail Station 0-P1-17
Washington, DC 20555-0001

Subject: Duane Arnold Energy Center
Docket No: 50-331
Op. License No: DPR-49
Response to NRC Request for Additional Information Related to the GL 96-06 Response for the Duane Arnold Energy Center

References: 1) Letter, J. Franz (IES) to F. Miraglia (NRC), dated January 28, 1997, NG-97-0106, 120 Day Response to Generic Letter 96-06, "Assurance of Equipment Operability and Containment Integrity During Design-Basis Accident Conditions"

2) Letter, R. Laufer (NRC) to L. Liu (IES), dated March 31, 1998, Request for Additional Information Related to the GL 96-06 Response for the Duane Arnold Energy Center

File: A-101b, A-107a

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Dear Sirs:

In Reference 1, IES Utilities submitted the Duane Arnold Energy Center's response to Generic Letter 96-06, "Assurance of Equipment Operability and Containment Integrity During Design-Basis Accident Conditions." In Reference 2, the Staff requested additional information concerning our response. The attachment to this letter provides our response to the Staff's request.

Should you have any questions regarding this submittal, please contact this office.

Sincerely,

Kenneth Peveler,
Manager, Regulatory Performance

Attachment

cc: R. Murrell
J. Franz
E. Protsch
R. Laufer (NRC-NRR)
C. Paperiello (Region III)
NRC Resident Office
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IES Utilities' Response to the NRC
Request for Additional Information Related to the GL 96-06
Response for the Duane Arnold Energy Center

NRC Request 1:

Confirm that all possible event scenarios have been considered in arriving at the worst case situation for both waterhammer and two-phase flow conditions. Provide a detailed description of the "worst case" scenarios for waterhammer and two-phase flow, taking into consideration the complete range of event possibilities, system configurations, and parameters. For example, loss of power with full and partial system drain-down should be considered, all waterhammer types and water slug scenarios should be considered, as well as temperatures, pressures, flow rates, load combinations, and potential component failures. Additional examples include:

- the consequences of steam formation, transport, and accumulation;
- cavitation, resonance, and fatigue effects; and
- erosion consideration.

Licensees may find NUREG/CR-6031, "Cavitation Guide for Control Valves," helpful in addressing some aspects of the two-phase flow analysis.

Alliant/IES Utilities Response:

Subsequent to our response to GL 96-06, as a result of a review of related industry operating experience, additional reviews were performed to further determine the affects on primary containment integrity as a result of operating the drywell cooling system post-accident. These reviews included a thorough review of the UFSAR to determine the most limiting accident scenario that could effect drywell cooling. This review determined that none of the UFSAR accident scenarios relied on the drywell cooling system to mitigate the effects of an accident, as originally concluded.

However, as a conservative decision, it was decided to establish a barrier to provide additional assurance that water hammer would not create a potential failure of primary containment following a design basis accident.

Therefore, UFSAR Chapter 15, "Accident Analysis," was reviewed to determine the most limiting accident conditions that could affect drywell cooling piping. A review of Section 15.6.6, which evaluated the design basis accident (DBA) loss of coolant accident (LOCA) due to a recirculation pipe break and Section 6.2.2.3.1, which evaluated temperature rise of containment in response to a DBA LOCA, determined that the

drywell can tolerate temperatures up to 340 °F with no significant compromise to the original design margins. This is the "worst case" scenario.

As a result of the above reviews, guidance has been provided to the operators to restrict restoration of drywell cooling during an accident if drywell temperature exceeds 280 °F, well below 340 °F. This temperature is below the saturation temperature, 396 °F, for the lowest drywell cooling relief valve setpoint of 220#. If drywell temperatures exceeded 280 °F during the accident, then the operators are directed to take actions to insure that the system is re-filled prior to returning to service, and thus eliminating any potential for a waterhammer event.

NRC Request 2 through 8:

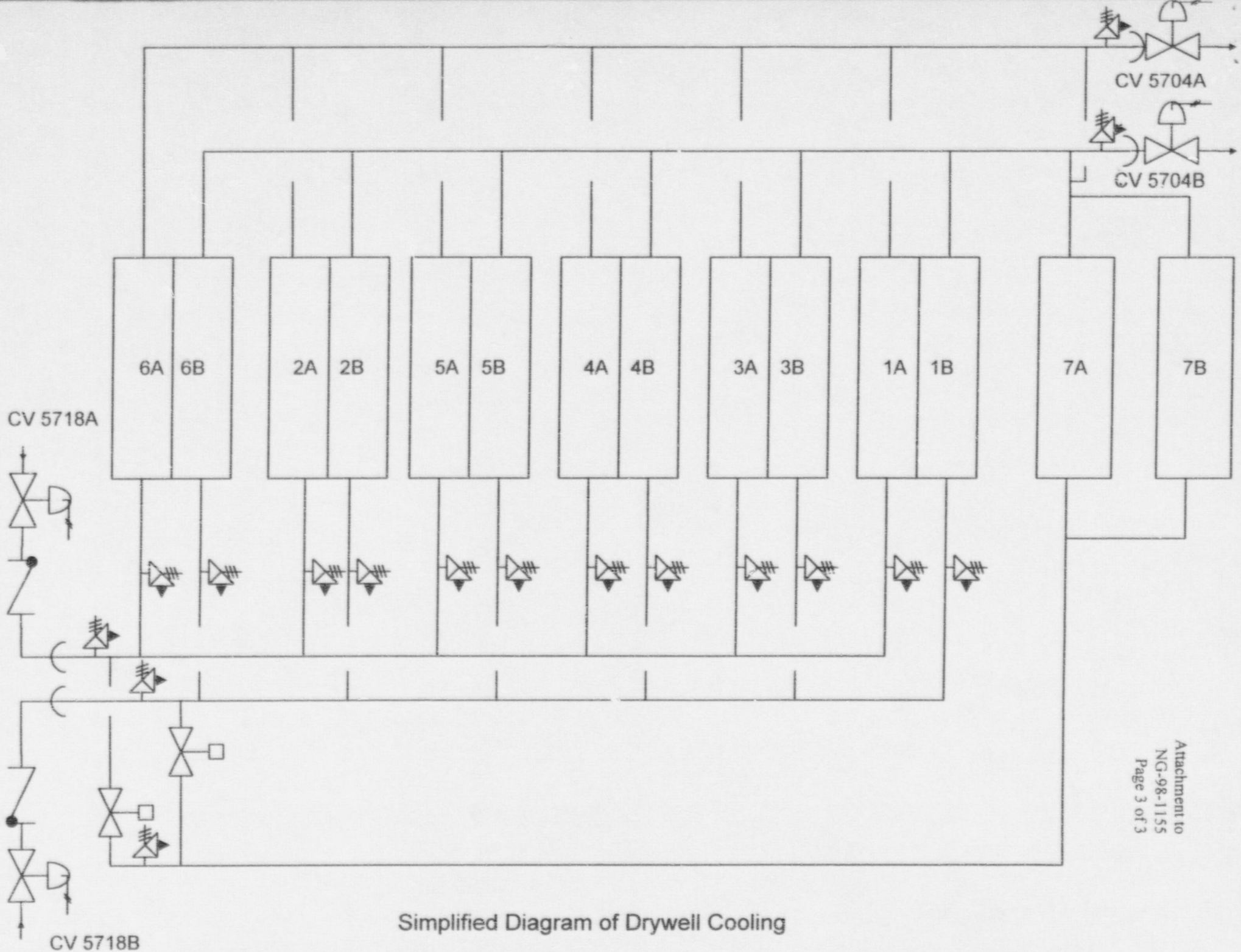
These requests were not applicable to DAEC due to the above actions regarding operator actions required to be taken prior to restoring drywell cooling after a design basis accident.

NRC Request 9:

Provide a simplified diagram of the system, showing major components, active components, relative elevations, lengths of piping runs, and the location of any orifices and flow restrictions.

Alliant/IES Utilities Response:

See attached drawing with list of active components.



Simplified Diagram of Drywell Cooling