

John -

11/14/03

The following list of potential design improvements is the first rough summary based on the responses to date to the Houston memo of Aug 1 (attached). Please look it over and suggest additions/changes by Wednesday noon to Brad Hardin (x28507) or Dave Yue (x28129). We plan to discuss the final list with GE in the near future.

thanks,

B. Hardin

POTENTIAL DESIGN IMPROVEMENTS FOR GESSAR-II

1. Increased Containment Capability Margins
 - a. increased volume
 - b. increased pressure capability (e.g., increase to 25 psi from 15)
 - c. pressure suppression features
 - d. increased temperature margin (penetration seals, etc.)

2. Containment Atmosphere Mass Removal
 - a. filtered vs. unfiltered vent systems
 - b. low flow vs. high flow vent systems

3. Augmented Decay Heat Removal
 - a. active vs. passive systems
 - b. isolation condenser
 - c. dedicated suppression pool heat removal

4. Augmented Containment Heat Removal
 - a. active vs. passive systems (i.e., suppression pool cooling vs. higher capacity heat sink- perhaps 30% full power for ATWS)

5. Combustible Gas Control Systems
 - a. inerting- pre vs. post and preconditioning
 - b. hydrogen igniters
 - c. fire suppression

6. BWR Containment Spray Systems
 - consideration for: capacity, initiation, water source, AC/DC dependencies

7. Core Retention Devices
 - consideration for: cavity geometry, cavity concrete type, cavity access ports, integral basemat

8. Missile Shields
 - consideration for: steam explosions and combustible gas explosions

9. Improved AC Power Supplies

- a. more and/or improved diesel generators and electrical divisions
- b. uninterruptible power supply providing backup power to equipment critical to safe shutdown
- c. bus crosstie advantages/disadvantages
- d. diverse motive sources

10. Improved DC Power Supplies

- a. higher capacity batteries
- b. additional batteries and electrical divisions
- c. diverse DC power systems (e.g., fuel cells)
- d. bus crosstie advantages/disadvantages

11. Specific Prevention Concepts

- a. improved valve or drain design
- b. improved control logic
- c. reduction of common cause dependencies:
 - pump cooling ventilation
 - service water dependencies
 - air supply dependencies
 - other support systems
 - relocation of equipment to improve separation
 - diversity of manufacturer of redundant equipment (LPCI pumps..)

12. Improved Capability for ATWS

- a. seismic scram
- b. diverse electric scram
- c. improved CRD hydraulic system
- d. additional standby liquid control system pumps

13. System Simplification

- a. consider elimination of unnecessary interlocks and possible unnecessary auto- initiation systems
- b. consider elimination of certain redundant valves and components installed for isolated needs which may affect overall safety

14. Modification or Alternate Equipment Selection Based on Operating Experience

- e.g., 3 stage Target Rock SRVs replaced with 2 stage or

15. Accident Management/ Human Factors Considerations

- a. use of advanced instrumentation important to accident management including improved transient indicators, control room data acquisition and display and alarm prioritization
- b. computer aided artificial intelligence including attention to risk issues in man- machine interfaces
- c. improvements in maintenance procedures and extension of emergency procedure guidelines to cover severe accidents and use of simulators for severe accident operator training

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

AUG 01 1983

MEMORANDUM FOR: Assistant Directors for DSI, DST, DE, & DHFS
FROM: R. Wayne Houston, Assistant Director for Reactor Safety, DSI
SUBJECT: REVIEW OF GESSAR-II DESIGN IMPROVEMENT

The CP/ML Rule, 10 CFR 50.34(f)(1) requires license applicants to perform certain studies and "...ensure that the results of such studies are factored into the final design of the facility." 10 CFR 50.34(f)(1)(i) states:

"Perform a plant/site specific probabilistic risk assessment, the aim of which is to seek such improvements in the reliability of core and containment heat removal systems as are significant and practical and do not impact excessively on the plant (II.B.8)."

In accordance with the CP/ML Rule, GE has submitted a PRA for the GESSAR-II standard plant FDA application which the staff is currently reviewing. In performing our review, we should ensure that an adequate effort has been made by GE to seek out and evaluate various potential improvements in plant design aimed at reducing overall plant risk.

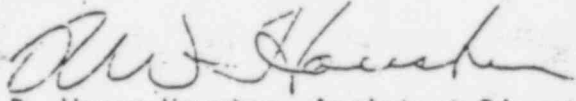
To allow us to assess the degree to which overall plant design improvements have been considered for GESSAR-II, we wish to compile the relevant documentation. We believe the compilation will prove useful in forthcoming licensing actions, including rulemaking. Accordingly, please provide me with a list of questions, issues, studies, and analyses pertaining to significant design improvements that have been pursued with GE during your respective staffs' review of GESSAR-II. You should examine, within reasonable bounds, substantive design alternatives. These questions will of their very nature go beyond the bounds of the traditional SRP review which is designed to show conformance with the regulations. If, in assembling your list, you are able to identify additional questions that GE has not yet been asked to address, please include these questions as a separate list. Include in this list any specific questions that derive from external event (seismic, etc.) considerations. Any such new questions will be considered in total to ascertain whether or not they should be included in the ongoing PRA review.

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Following are examples of the types of questions in which we are interested including two from the current set of Q-2s developed during the GESSAR-II PRA review, and three other general questions:

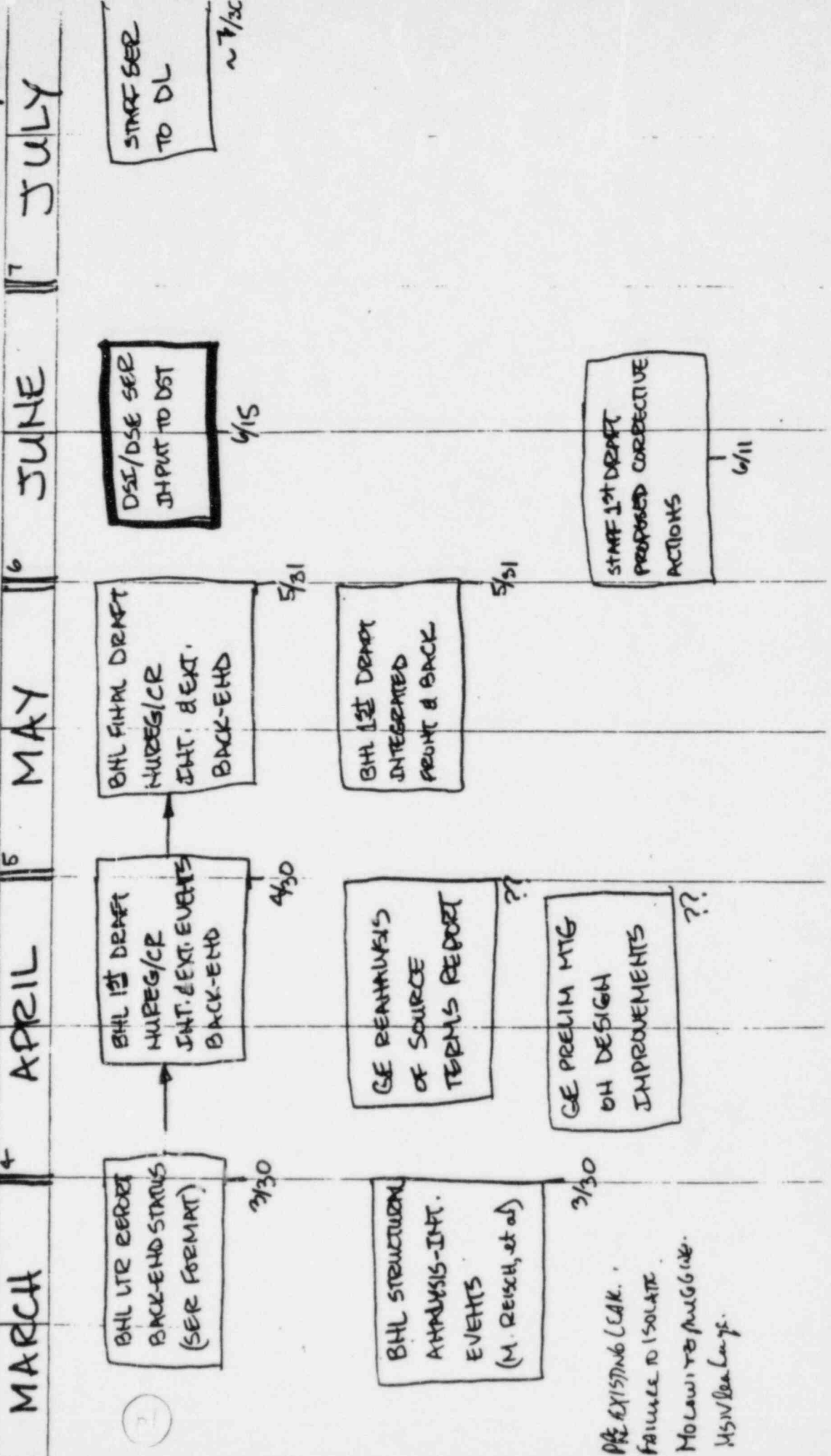
- (1) 720.113
Augmented decay heat removal may be helpful in reducing severe accidents risk. The Germans are considering separate dedicated suppression pool heat removal systems. Provide a discussion of the potential use of such systems in the GESSAR-II design including descriptions of the systems that have been considered by GE and the expected impact of these systems on plant risk. Also include a discussion of the potential that augmented heat removal systems may have for removing the limitations of core retention devices discussed in your response to Part 3 of Question 720.83. ✓
- (2) 720.144
In the conceptual design for the advanced BWR's developed by an advanced engineering team comprising General Electric (United States), Toshiba and Hitachi (Japan), Asea Atom (Sweden) and Ansaldo Meccanica Nucleare (Italy), an electrically (as opposed to hydraulically) operated high speed scram CRD has been recommended. This would provide higher scram reliability and better load following by allowing unrestricted control rod operation at high powers. Please provide an assessment of potential reduction in the core damage probability and overall plant risk by adopting the new CRD design as compared to the current CRD design in GESSAR-II plants. ✓
- (3) Discuss the advantages and disadvantages of the inclusion of an integral containment basemat in GESSAR-II and the effect on plant risk. ✓
- (4) Discuss any potential advantages in the relocation of plant equipment that could significantly alter the outcome of the dominant accident risk sequences and reduce risk. ✓
- (5) Discuss the utility of providing additional standby power sources and/or the use of diverse sources of motive power. Also discuss any potential advantages and disadvantages associated with the use of electrical crossties.

If you have questions, please call Jack Rosenthal (X29447).


R. Wayne Houston, Assistant Director
for Reactor Safety, DSI

cc: R. Mattson
RSB S/L's
J. Meyer
A. Thadani
D. Yue
D. Scaletti
C. Thomas

CESSAR PRA SCHEDULE - BACK-END 3/21



PRE EXISTING LEAK.
 FAILURE TO ISOLATE
 MOLWITZ SUGGESTION
 MSN/Dea Long.