Request for Additional Information for General Electric – Morris Operation License Renewal Application

General Electric Corporation
Morris Operation
Docket No. 72-1
SNM-2500

SECTION 1 -IDENTIFICATION OF SSCS SUBJECT TO AGING MANAGEMENT

1-1 Provide a list of SSCs that are subject to an AMR and a list of SSCs that are not subject to an AMR. Describe the process used to determine the SSCs that are subject to an AMR.

Response – SSCs subject to an AMR specified in Section 11.3 of the CSAR and part of the original licensing basis for Morris Operation and SSCs identified through process described below.

- **SSCs subject to an AMR**
- **Fuel Storage Basin concrete walls, floors and expansion gate**
- **Fuel Storage Basin stainless steel liner**
- **Fuel Storage System including baskets and supporting grid**
- **Unloading Pit doorway guard**
- **Filter Cell Structure**
- **Spent fuel cladding**
- **Basin building (above grade)**

SSCs not subject to an AMR as determined through the evaluation process below.

- **SSCs not subject to an AMR**
- **Air compressors**
- **Basin leak detection system**
- **Basin water chillers**
- **Basin water level monitor**
- **Basin filter system**
- **Demineralized water system**
- **Fuel handling cranes and associated fuel handling equipment**
- **Ground water monitoring well network**
- **Off-site power**
- **Standby diesel generator**
- **Ventilation system**
- **Water supply well**
- **Water tower**

The process used to determine the SSCs that are subject to an AMR is the following:

The proposed Part 72 license renewal process is summarized in the two principles of license renewal from the Part 54 Final Rule Statements of Consideration published in Federal Register Vol. 60, No. 88, May 8, 1995, pages 22464. *"The first principle of license renewal was that, with the exception of age-related degradation unique to license renewal and possible a few other issues related to safety only during the period of extended operation of nuclear power plants, the regulatory process is adequate to ensure that the licensing basis of all currently operating plants provides and maintains an acceptable level of safety so that operation will not be inimical to public health and safety or common defense and security. Moreover, consideration of the range of issues relevant only to extended operation led the Commission to conclude that the detrimental effects of aging is probably the only issue generally*

applicable to all plants. As a result, continuing this regulatory process in the future will ensure that this principle remains valid during any period of extended operation if the regulatory process is modified to address age-related degradation that is of unique relevance to license renewal.

The second and equally important principle of license renewal holds that the plant-specific licensing basis must be maintained during the renewal term in the same manner and to the same extent as during the original licensing term. This principle would be accomplished, in part, through a program of age-related degradation management for systems, structures, and components that are important to license renewal…"

Per the NRC issued RAI, "*The GE-MO ISFSI request for license renewal is unique in that it is the first ISFSI to request a license renewal and it is the only operating commercial water basin ISFSI not co-located at a nuclear power plant site in the United States. Storage of spent nuclear fuel in a water basin are held to the same 10 CFR Part 72 regulations as a dry cask ISFSI. The NRC has provided preliminary guidance for 10 CFR Part 72 license renewal to Virginia Electric and Power Company's (VEPCO) dry cask ISFSI (Ref. 2, 3, & 7) but has not issued any written guidance for wet storage ISFSIs. Since the design and operation of the GE-MO ISFSI is similar to a spent fuel storage pool at a nuclear power plant, the NRC has used applicable portions of NUREG1800, Standard Review Plan for*

Review of License Renewal Applications for Nuclear Power Plants (Ref. 9) and NUREG-1801, Generic Aging Lessons Learned (GALL) Report (Ref. 10) during the review of the GE-MO ISFSI. While both of the NUREGs contain guidance that is not applicable to the GE-MO ISFSI; the NRC staff believes that the general processes covering the spent fuel pool, its support systems, and historic information on age related degradation of nuclear power plant SSCs are appropriate for renewing the GE-MO ISFSI license. For these reasons, the staff has decided to apply the guidance developed for dry cask ISFSI license renewal and for those applicable sections of NUREG-1800 and 1801 to the license renewal of the GE-MO ISFSI in addition to the appropriate regulations of 10 CFR Part 72."

In broad, generic terms, the design and operation of the GE-MO spent fuel pool is similar to a spent fuel storage pool at a nuclear power plant and some aspects of the reference NUREGs may be applicable, however, significant differences between GE-MO basins and support systems and a nuclear power plants fuel storage basins and the fuel stored in both must also be taken into account. The GE-MO basins are below ground, in native bedrock, water level is maintained at or below grade level. All stored fuel is held in GE-MO unique stainless steel baskets (CSAR Section 5.0, ¶ 5.4.4.2) that that are a "can" style container minus a lid, providing individual support and additional containment and shielding for each fuel bundle. Fuel is not routinely shuffled nor is new fuel added unlike the spent fuel pool in a nuclear power plant, (last fuel moved was January 1989) and there are no plans to do so. The static state of the GE-MO fuel assures there are no mechanical or dynamic stresses placed on the fuel. The large basin water volume and low decay heat input (RAI Question 2-7 and 5-3) from the stored fuel provide an extended period of time to take corrective action in case of a malfunction of any of the basin support systems. In the event of an earthquake or other extreme natural phenomena, sufficient makeup water is available through either on-site or off-site means to maintain safe storage conditions.

Fuel stored at GE-MO has reactor discharge dates that range from April, 1970 through October 1986. The last fuel was received at GE-MO in January 1989. Burn up rates range from a high of 36.71 GWD/MTU to a low of 0.18 GWD/MTU, and an average burn up of 17.74 GWD/MTU. Due to the robust design of the pool (CSAR Section 5.0, ¶ 5.5) and the time interval from reactor discharge, there are no postulated events that would result in exposure to a member of the public in excess of the limits of 10CFR72.104, as stated in the CSAR, Section 8.0, ¶ 8.1.1. The condition of the fuel is monitored as part of routine activities conducted at GE-MO through basin water analysis (RAI Question 3-7 and 3-8) and air quality monitoring (RAI Question 2-18). The design of the pool, and operational requirements for the basin area assure a depth of water over the stored fuel, which provides for extended passive heat dissipation capability. This heat dissipation capability has been verified through testing (RAI

Question 5-3, J. D. Kesman Report of November 27, 2001 and Fuel Basin Water Evaluation: Conductivity Change and Evaporation Rate conducted 05/005/04 thru 06/24/04) demonstrated that a minimum of 54 days is available following a loss of basin cooling and make-up capability before the water level will approach the Technical Specification limit, 9 feet above the fuel, or a drop of 3.5 feet from normal pool level.

In general, safe storage of the spent fuel is achieved by maintaining the integrity of the fuel cladding through maintaining a high quality of basin water (CSAR Section 10.0, ¶ 10.4.5). Fuel cladding is designed to withstand a far more severe environment in a reactor than in static storage at GE-MO. The low temperature conditions, removal of both particulate and ionized impurities from the basin water, and absence of chemical materials provides high water clarity, limits corrosion and maintains radiation exposure rates in the vicinity of the basin as low as reasonably achievable. The cladding provides an effective primary barrier to the escape of fission or activation products from stored fuel. The basin water is an effective secondary barrier for the confinement of the small amounts of radioactive materials that may be released from the spent fuel.

The GE-MO radiation protection program is previously established in the current approved revision of the GE-MO Consolidated Safety Analysis Report (CSAR) Section 7.0, Radiation Protection. Subsection 7.7, Estimated Man-Rem Off Site Dose Assessment, specifies the current approved environmental monitoring program. Under normal operating conditions, Kr-85 provides essentially all the exposure from the GE-MO ventilation exhaust stack. The sum of the values for annual whole body exposure due to inhalation and skin dose out to a radius of 50 miles gives a total of less than 2×10^{-6} man-Rem/yr whole body and less than 0.12 man-Rem skin dose. Routine air samples continue to show that exhaust emissions are below detectable limit, as followings:

	Vent Supply	Stack Inlet
Alpha (µCi/ml)	4.79x10-13	MDA (~1x10-15)
Beta (µCi/ml)	1.07x10-12	MDA (~1x10-15)

The vent supply is air intake to the facility and stack inlet is air being released to the exhaust stack.

There are no planned or unplanned releases of liquid wastes from the site boundaries.

Analysis of postulated accidents including the causes of such events, consequences, and the ability of GE-MO to cope with each are previously established in the CSAR, Section 8.0, Accident Safety Analysis. The Structures, Systems, and Components (SSCs) Important to Safety are described in Section 11.0, Quality Assurance. Given the robust design of the Morris pool and the passive nature of the SSCs Important to Safety, no scenario involving a support system would result in an exposure to the public in excess of the criteria established in 10CRF72.104.

The current approved safety basis for the Morris facility as defined in the CSAR, designated items important to safety (CSAR Section 11.0, sub-section 11.3) demonstrates that no accident postulated (CSAR Section 8.0) will result in exceeding the limits of 10 CFR 72.104 and 10 CFR 100.20 to demonstrate protection of the public.

As shown in CSAR Sections 7.0 and 8.0, the low value of credible doses that could be received from normal operating and credible accident releases are many orders of magnitude below regulatory limits.

Unlike similar support systems at a nuclear power plant, the combination of the GE-MO radiation safety program, and accident analysis demonstrates that failure of a SSC supporting fuel storage basin operation will not cause an immediately reportable event. Ample time has been demonstrated for repair, temporary substitution, or permanent replacement of any SSC to prevent any Technical Specification violation and no exceedance of regulatory limits for radiation exposure is postulated.

The first step in the license renewal process involved the identification of the in-scope SSCs. This was done by evaluating the SSCs against the following scoping criteria. Consistent with the current licensing basis, the following SSC types are considered important to safety and consistent with the guidance in NEI-95-10, R3, Section 3.1 are considered in scope for the purpose of license renewal:

3.1 Systems, Structures, and Components Within the Scope of License Renewal

Part 54 Reference

54.4
(a) Plant systems, structures and components within the scope of this part are --

(1) Safety-related systems, structures and components which are those relied upon to remain functional during and following design-basis events (as defined as in 10 CFR 50.49 (b)(l)) to ensure the following functions --
  (i) The integrity of the reactor coolant pressure boundary;
  (ii) The capability to shut down the reactor and maintain it in a safe shutdown condition; or
  (iii) The capability to prevent or mitigate the consequences of accidents that could result in potential offsite exposure comparable to the guidelines in 4 50.34(a)(l), 50.67(b)(2), or 100.11 of this chapter, as applicable.

(2) All nonsafety-related systems, structures, and components whose failure prevent satisfactory accomplishment of any of the functions identified in paragraphs (a)(1)(i), (ii), or (iii) of this section.

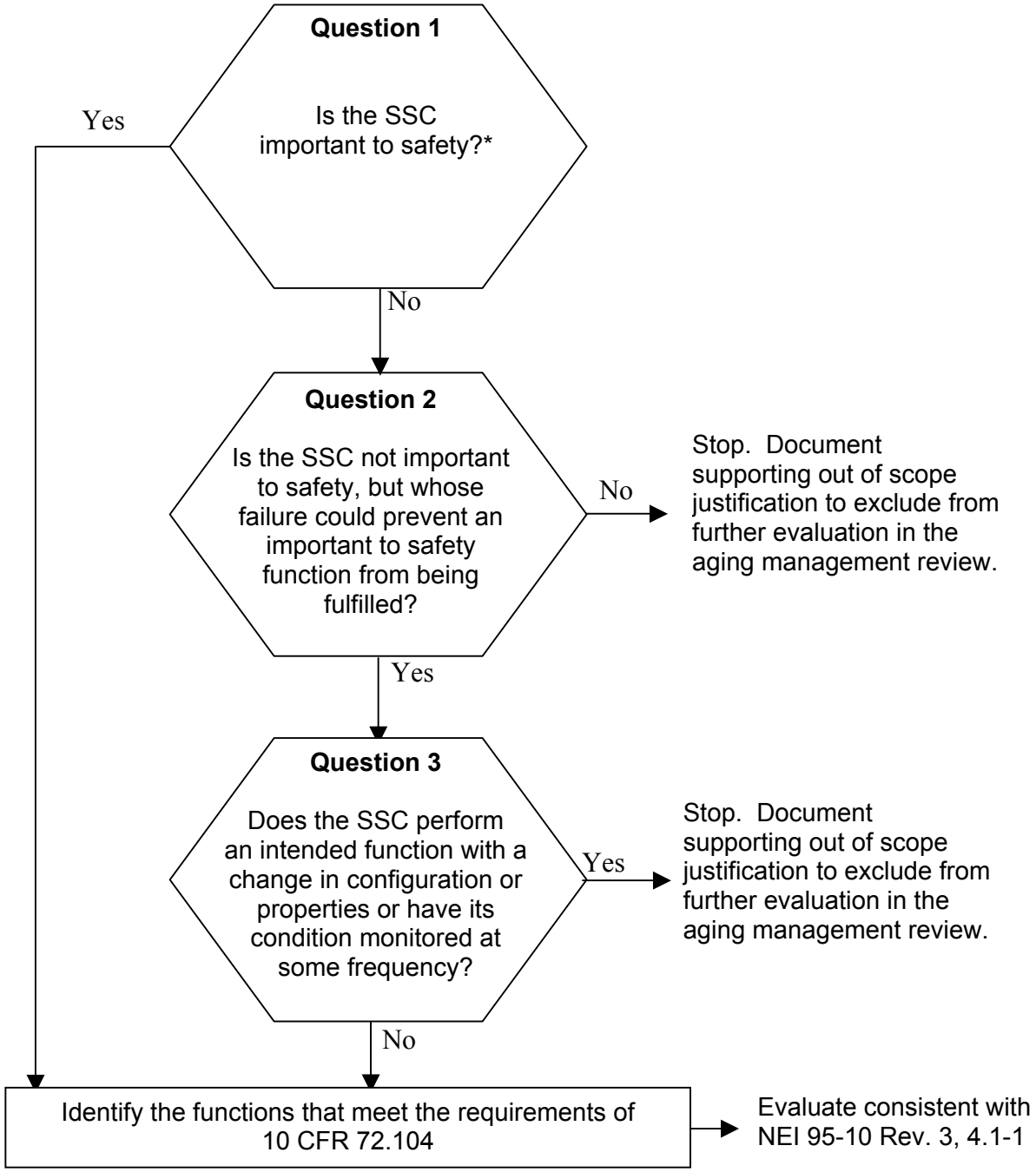
(3) All systems, structures, and components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48), environmental qualification (10 CFR 50.49) pressurized thermal shock (10 CFR 50.61), anticipated transients without scram (10 CFR 50.62), and station blackout (10 CFR 50.63).

As Morris is licensed under 10 CFR 72 and functions as a stand alone ISFSI the requirements of 10CFR50 do not apply.

The basis for evaluating Structures, Systems and Components within the scope for license renewal under 10CFR72 was developed consistent with NEI 95-10 Rev 3, Figure 3.0-1. The process developed is similar to the process described in the GALL report (NUREG 1801) and is consistent, where practical, with the application provided in support of the Surrey application for a dry storage ISFSI. This figure was modified to remove references to 10 CFR 54.4(a)(3) and incorporate guidance from the Surrey application for ISFSI site-specific license renewal.

Basis for evaluating Structures, Systems and Components within the scope for license renewal. (Figure 3.0-1)

For each Structure, System and Component in the Plant
Process the SSC through the following flow path using applicable information sources consistent with NEI 95-10 Rev 3, Table 3.1-1



* Important to safety related SSCs are those which are relied upon to remain functional during and following design basis events to ensure the capability to prevent or mitigate the consequences of accidents that could result in off site exposure exceeding 10 CFR 72.104

1-2 The SER and the EA for the license renewal will require an assessment of the AMR for each SSC relied on in the applicant's Consolidated Safety Analysis Report (CSAR) (Ref. 4). This RAI is necessary for the staff to determine if all appropriate SSCs have been included within the scope of license renewal review and which will support the staff development of the SER and the EA.

Identify those SSCs, other than the SSCs important to safety listed in Section 11.3 of the Consolidated Safety Analysis Report (CSAR), that are relied upon to:

a. Maintain the conditions required to store spent fuel safely;

b. Prevent damage to the spent fuel or the high-level radioactive waste container during handling and storage; or

c. Provide reasonable assurance that spent fuel can be possessed, stored, and transferred without undue risk to the health and safety of the public.

Response – Those SSCs, other than the SSCs important to safety listed in Section 11.3 of the Consolidated Safety Analysis Report (CSAR), that are included within the scope of license renewal review

SSCs subject to an AMR

- Spent fuel cladding
- Basin building (above grade)

SSCs not subject to an AMR as determined through the evaluation process in 1-1.

- SSCs not subject to an AMR
- Air compressors
- Basin leak detection system
- Basin water chillers
- Basin water level monitor
- Basin filter system
- Demineralized water system
- Fuel handling cranes and associated fuel handling equipment
- Ground water monitoring well network
- Off-site power
- Standby diesel generator
- Ventilation system
- Water supply well
- Water tower

1-3 The SER and the EA for the license renewal will require an assessment of the AMR for all SSCs relied on in the applicant's CSAR. This RAI is necessary for the staff to determine if all appropriate SSCs have been included within the scope of the license renewal review and which will support the staff development of the SER and the EA.
Provide a list of SSCs that are not important to safety but whose failure could prevent an important to safety function from being fulfilled or whose failure as a support SSC could prevent an important to safety function from being fulfilled. Also, describe the process used to determine this list of SSCs and the functions performed by these SSCs.

The SER and the EA for the license renewal will require an assessment of the AMR for all SSCs relied on in the applicant's CSAR. This RAI is necessary for the staff to determine if all appropriate SSCs have been included within the scope of license renewal review and which will support the staff development of the SER and the EA.

Response – Those SSCs, other than the SSCs important to safety listed in Section 11.3 of the Consolidated Safety Analysis Report (CSAR), that are included within the scope of license renewal review

SSCs subject to an AMR

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The process used to determine which SSCs would be subject to an AMR is described in the response to Question 1-1. The results are presented in tabular format below to justify the decsion to place a SSC either in scope or out of scope for Aging Management Review. The question numbers refer to specific question on the flow chart provided in the answer to 1-1.

SSC	Question 1	Question 2	Question 3	In Scope	AMR Required	Discussion
Spent fuel cladding	Yes	N/A	N/A	Yes	Yes	Spent fuel in the GE-MO basins are clad with both stainless steel and zircalloy. Per IAEA-TECDOC-1012, "Durability of Spent Nuclear Fuels and Facility Components in Wet Storage", the zirconium alloys represent a class of materials that is highly resistant to degradation in wet storage, including some experience in aggressive waters. The database for the zirconium alloys supports a judgment of satisfactory wet storage in the time frame of 50 to 100 years or more." (IAEA 5). Stainless steel components in wet storage facilities have an excellent history of performance, including service in aggressive waters. Specific examinations of LWR SS fuel claddings indicate no evidence of degradation after periods of wet storage. Satisfactory service of SS clad fuels and facility components can be expected for several decades if materials with favorable microstructures and low stress levels are involved (IAEA 5). Results of basin air and water sampling since the last fuel was received in January 1989 have been consistent, indicating the fuel cladding isn't deteriorating.
Basin building above grade	No	Yes	Yes	Yes	Yes	Section 4.2 of the CSAR discusses in detail wind and tornado loadings on the building, flood design and seismic design. Section 8.6 of the CSAR discusses in detail tornado generated missiles and their affects. There are no postulated releases, due to analyzed accident/event analysis that would allow a release in excess of 10CFR72.104. However, the building structure will be inspected on a regular basis as part of the AMP for any signs of deterioration.
Air compressors	No	No	N/A	No	No	These units were replaced in 1998. The compressors are redundant, one compressor can supply all the air needs for the site. The system has the capability to operate both compressor simultaneously should a greater volume be required. Impact of loss of the compressor systems on basin related activities are as follows: The compressors provide air to the basin level indicator (see Basin Level below), basin LDS pumpout (see Basin Leak Detection System below), ventilation dampers (dampers fail open) and the Basin Filter System flow control valve (fails as is). The impact of a failure of each of these

						systems is discussed individually below, demonstrating failure of the compressors would not cause a failure in any important to safety system. SOP 8-1, Air Compressor Operation provides guidance for the start-up and sequential operation of the air compressors along with operational checks and emergency operation instructions. Correct operation of the compressors is monitored by operators during normal shift rounds. Failure of the air compressors is produces both Site Information Management System (SIMS System) and Control Room alarms.
SSC	**Question 1**	**Question 2**	**Question 3**	**In Scope**	**AMR Required**	**Discussion**
Basin filter system	No	Yes	Yes	No	No	The basin filter system continuously draws water from the basin skimmers maintaining outstanding water clarity. This system's simple robust design (CSAR Section 1, 1.4.3) and operation (CSAR Section 5, 5.5.2) maintains high reliability of the filter system. During periods when the basin filter was shut down, sometimes in excess of 6 weeks for maintenance activities, no measurable degradation of basin water quality was observed. Basin water quality is routinely monitored through SOP 16-10, Basin Water Analysis Compliance Test and SOP 1-20, Basin Filter Operation. Operation of the system is verified by operations personnel twice each shift. Once during normal operator rounds and once by normal mid-shift instrumentation monitoring on the SIMS system. There is no failure alarm on the system, but loss of filter function would not exceed 4 hours without detection. The intake is located at the basin water surface, and the system return is located approximately 31 inches from the top of the basin ensuring a system leak will not approach a Basin water level technical specification limit.
Basin leak detection system	No	Yes	Yes	No	No	Pump outs are continuously recorded on a strip-chart recorder and the information reviewed by the duty operator on rounds. The system also has localized instrumentation that is monitored shiftly by the operator on rounds. Failure of the system causes both Control Room and SIMS alarms. Failure of the pump does not pose a hazard, as a back-up pump is available. Should both pumps fail, the water level in the leak detection system will equalize with the basin water level. In the event of a system outage, increased surveillance of the pool level is

						sufficient to mitigate any loss of this system. System failure would result in an alarm at the guard station?? The following SOPs are routinely performed, 16-11, "Basin Leak Detection Alarm Operability Test"; 16-12 Basin Leak Detection Calibration Compliance Test" in order to assure proper system operation.
SSC	**Question 1**	**Question 2**	**Question 3**	**In Scope**	**AMR Required**	**Discussion**
Basin water chillers	No	No	N/A	No	No	As described in the CSAR, the chillers, and associated piping, pumps, valves, and heat exchangers were installed new in 2000. These units are redundant; only one set is necessary to maintain basin water temperature. The only scenario that could cause both chillers to be inoperable would be loss of both off-site power feeds and the stand-by diesel generator, an event that has never happened in the history of GE-MO. However, as discussed in RAI question 2-7, in the report on basin heat-up, if this event occurred, normal makeup water to off-set effects of evaporation and the slow evaporation rate allow more than ample time to repair/replace the chillers, including bringing in skid mounted units to temporarily cool the basin water while the permanent units are being replaced. Maintenance of cooling with makeup water addition only, can be supported indefinitely. SOP 1-22, Basin Cooler System, describes operation of the basin cooling system. Abnormal system operation is indicated by alarms on the SIMS and in the Control Room. The duty operator checks each chiller shiftly. The new system employs heat pumps (versus external radiator assemblies in the original system) resulting in no basin liquid systems extending external of the pool building.
Basin water level monitor	No	No	N/A	No	No	Basin water level is continuously computer monitored through the SIMS System that will automatically monitor water level and provide an alarm at the guard station. Operations personnel also monitor basin water level during rounds and manual record the basin water level 6 times a day. If this system failed, visual observation by the shift operator would detect any decrease in water level. Pool level is also visible via remote cameras located in the basin area, providing monitoring of the basin from the Central Alarm Station. In addition, due to the location of the suction lines for the basin water chillers, after a drop of less than

						31 inches, which doesn't cause a technical specification violation, the basin chiller system would show a Control Room and SIMS alarm.
SSC	**Question 1**	**Question 2**	**Question 3**	**In Scope**	**AMR Required**	**Discussion**
Demineralized water system	No	No	N/A	No	No	The demineralized water system (including piping) was replaced in 1996. It is a skid mounted resin bed system with its own computer monitoring ties to a phone line. If output water quality is out of specification, the system automatically notifies the supplier and sounds a local alarm. The supplier normally arrives within 24 hours to replace the system resin beds. Typically the basin makeup water is 236 gallons per day. It takes a loss of approximately 1,983 gallons to drop the basin water level one (1) inch. The computer runs on 110 volts, so if all site power was lost, this unit could be connected to one of several on-site 110/220 volt generators. Demineralized water is also routinely sampled per SOP 16-10, Basin Water Analysis Compliance Test. The duty operator verifies system function shiftly once a day totalized and capacity flow and water quality is recorded.
Fuel handling cranes and associated fuel handling equipment	No	No	N/A	No	No	The fuel handling cranes are maintained under the GE-MO preventative maintenance program, and inspected in accordance with the requirements specified in 10 CFR 1910.179 and ANSI B30-2. Yearly inspections are performed by an independent contractor whose crane inspection services are accredited by the U.S. Department of Labor under 29 CFR 1919 to inspect, test and certify cranes. All grapples and associated equipment used to handle fuel or fuel baskets are laid away, and prior to use will be inspected. Repair and/or replacement will be accomplished as required based on the results of the inspections. All are described in Section 5.0 of the CSAR.
Ground water well monitoring network	No	No	N/A	No	No	The eight NRC reviewed and approved ground water sampling wells at MO are used to monitor for any potential leakage of basin water to the surrounding soil. The wells are sampled routinely per SOP 16-102, Sample Well Analysis Compliance Test. In addition, 3 of the wells positioned around the basin are used to monitor for ground water potential effects on below grade concrete.

SSC	Question 1	Question 2	Question 3	In Scope	AMR Required	Discussion
Off-site power	No	No	N/A	No	No	Morris Operation is fed by 2 separate off site power sources with the primary feed coming from Dresden Station. Off-site power is extremely stable with no more than 2 or 3 failures of both feeds at the same time in over 30 years. Those were all during winter periods and were the result of heavy ice storms. In the event of a complete loss of off-site power, a stand-by diesel generator can provide power to operate all systems at GE-MO. Failure of the operating incoming power feed produces both Control Room and SIMS alarms. SOP 14-1, Loss of Incoming Power Line, SOP 14-2 Total Power Loss, and SOP 14-3 Cross-Tie of Incoming Power Busses describe operation of the off-site electrical supply system.
Standby diesel generator	No	No	N/A	No	No	The diesel generator can supply backup power to all site systems, including lighting. It is inspected yearly by a diesel generator contractor. Additionally, it is tested bi-weekly as specified in Operability Test 16-90 and subjected to an emergency start/loading scenario yearly as specified in Operability Test 16-91. SOP 14-4 describes Diesel Generator Operation. Also the duty operator performs a visual inspection of the diesel and checks oil temperature and jacket water temperature each shift and diesel fuel storage tank is checked once a day. In approximately 30 years, total off-site power failed an estimated approximately 2 or 3 times, but the generator never failed to start. If off-site power were lost and the stand-by diesel failed to start, a portable 400kVA diesel driven generator could be brought in operate all systems at MO.
Ventilation system	No	No	N/A	No	No	Air is taken in through the air inlet plenum is distributed through the process building, passed through the sand filter and exhausted out the 300 foot tall exhaust stack. The sand filter was sized to provide filtering for the original reprocessing facility. Air quality is monitored at the facility inlet, at the sand filter inlet and sand filter exhaust. Until 1983 the ventilation system was configured to operate as originally designed for a fuel reprocessing plant with a flow of 24,000 CFM through the filter. During 1983, the ventilation system was re-configured to operate as it does today, at a flow of 14,000 CFM through the

						filter. The sand filter D/P has stayed effectively constant over the 20 years since the change in flow velocity. Routine air samples continue to show the following emissions: Vent Supply Stack Inlet Alpha (µCi/ml) 4.79x10-13 MDA (~1x10-15) Beta (µCi/ml) 1.07x10-12 MDA (~1x10-15) The ventilation system is monitored through SOP 16-81, "Ventilation System Operability Test"; SOP 16-82, "Sand Filter Delta P Operability Test"; SOP 16-84, "Exhaust Sample Analysis Compliance Test". Ventilation system inlet and outlet blowers and air flow are checked on a shiftly basis by the duty operator. Failure of exhaust blowers produce Control Room and SIMS alarms. The concrete structure was designed and constructed in accordance with applicable national standards in effect at the time, specifically, as a minimum, ACI 318-63, and meets conditions consistent with longevity as described by the GALL report, section A1.1 for concrete containments. While it may not be possible to state the expected life of the concrete exactly, the existing conditions avoid the degradation mechanisms that would adversely affect the structural integrity of the concrete.
SSC	**Question 1**	**Question 2**	**Question 3**	**In Scope**	**AMR Required**	**Discussion**
Water supply well	No	No	N/A	No	No	The well had a new pump and discharge pipe installed in March, 2002. The pump has a 150 gpm capacity. If a complete loss of site power occurred the site would rely on gravity feed from the tower (see Water Tower). In the very unlikely event of an extended outage, water can be trucked in and pumped to the tower using truck borne pumps, or pumped from the truck directly to the water system. Flow of water from the well is verified by the duty operator each shift when the well is in operation.
Water tower	No	No	N/A	No	No	Inspected by a nationally established contract company specializing in tanks and towers with the ability to inspect to API and AWWA standards. The tower is divided to provide 10,000 gallons for normal use and approximately 40,000 gallons for emergency use. The tower provides gravity feed to the site. With current water usage (~427.4 total gallons per day), it could

						continue to supply site needs for over 90 days. Water conservation measures could be implemented to extend this capability. Additionally, water can be pumped from the well directly to the site water system bypassing the tower. The duty operator verifies water level at the begining of each shift and then once a day water pumped from the well is verified.
SSC	**Question 1**	**Question 2**	**Question 3**	**In Scope**	**AMR Required**	**Discussion**

1-4 Identify and describe the electrical and instrumentation and control (I&C) components that are required to:

a. monitor pool water level [10 CFR 72.122(h)(2)],
b. monitor pool water leakage [10 CFR 72.122(h)(2)],
c. provide continuous monitoring of storage confinement systems [10 CFR 72.122(h)(4)]
d. monitor systems that are important to safety [10 CFR 72.122(i)],
e. support criticality monitoring systems [10 CFR 72.124(c)],
f. support radiological alarm systems [10 CFR 72.126(b)], and
g. monitor direct and effluent radiation levels [10 CFR 72.126(c)].

Also, identify any SSCs necessary to physically support or protect the above electrical and I&C components.

SSCs important to safety must be designed to meet the overall requirements of 10 CFR 72.122. The staff review should determine whether the applicant's screening included all necessary SSCs for the renewal period. The SER for the license renewal will require an assessment of the AMR for all SSCs relied on in the applicant's CSAR. This RAI is necessary for the staff to determine if all appropriate SSCs have been included within the scope of license renewal review and which will support the staff development of the SER and the EA.

Response - a. The instrument that monitors basin water level (LI-102-51) is a differential pressure (D/P) detector utilizing a D/P transmitter that senses the D/P between the atmosphere above the basin and the pressure on a leg submerged in the basin water. Instrument air is supplied continuously to the submerged leg. The D/P transmitter sends a signal to the Control Room where basin level is indicated on the Main Process Control Panel. An alarm announcer circuit (UA-951A-1-3) provides an alarm in the Control Room if the signal from the D/P transmitter output falls below the set value providing a basin low-level alarm. The SIMS system also monitors the D/P transmitter output, displays a level, and provides a low level alarm. The SIMS is a computer-based system which monitors and records plant parameters. SIMS reading and alarms are continuously displayed in the Control Room and the Central Alarm Station, which is continually manned.

In addition, as a backup for the instrumentation described above, there is a water level measurement scale (ruler) fixed to the side of the basin. Each shift, the duty operator on rounds records the water level from the scale.

b. The instrument that monitors basin water leakage (LI-102-52) is a differential pressure (D/P) detector utilizing a D/P transmitter that senses the D/P between the atmosphere in the Basin Leak Detection (BLD) sump and the pressure on a submerged leg at the bottom of the BLD sump. Instrument air is supplied continuously to the submerged leg. The D/P transmitter sends a signal to the Control Room where basin level is recorded on the Main Process Control Panel. Level is also indicated in the Basin Pump Room. An alarm announcer circuit (UA-951A-2-3) provides an alarm in the Control Room if the signal from the D/P transmitter rises above the set value providing a BLD high-level alarm. The BLD sump pump out system is controlled by a pressure switch that senses the submerged leg pressure and provides a signal to start and stop the pump and air lift that pump the BLD sump contents through a filter and into the basin. The SIMS system also monitors the D/P transmitter output, displays a level, and provides a high level alarm. The SIMS is a computer-based system which monitors and records plant parameters. SIMS reading and alarms are continuously displayed in the Control Room and the Central Alarm Station, which is continually manned.

As in (a.) above, if the instumentation were inoperative, the duty operator would use the same fixed scale to record changes in basin water level.

c. The basin leak detection system and criticality monitoring system is described in the CSAR.

d. The basin leak detection system for the basin liner.
The basin expansion gate pump out system detects any leaks of basin water into the annulus area of the expansion gate.

e. RIA-930-9 and RIA-930-11 are the criticality detection instruments. They are connected to two separate detectors in different locations in the basin area. These detectors continuously monitor radiation levels in the basin area and when radiation level exceeds a set point, the criticality horns would automatically sound. In addition, there is an ARM located in the basin that would alarm before the criticality monitors.

f. The criticality monitoring system continuously monitors radiation levels in the basin area. Alarms would sound in the control room and on the SIMS system.

g. The stack gas monitoring system (equipment number SP-879) continuously samples the inlet to the sand filter and the takes two independent samples of the stack effluent. An alpha/beta counting unit analyzes these samples. The SIMS monitors flow through the sampling system. Stack flow is also continuously monitored by the SIMS and recorded on a regular basis.

1-5 Indicate whether the GE-MO ISFSI Control Room must be continually staffed during any postulated accident. If so, identify the SSCs that are necessary to maintain control room habitability during an accident and their intended function(s) which cause them to be considered within the scope of license renewal.

Per 10 CFR 72.122U), a control room must be designed to permit occupancy and actions to be taken under normal and off-normal or accident conditions. The SER will demonstrate compliance with 10 CFR 72.122 for the renewal period. This RAI is necessary for the staff to determine if all appropriate SSCs have been included within the scope of license renewal review and which will support the staff development of the SER and the EA.

Response - None of the accidents postulated in the GEMO CSAR require continuous manning of the Control Room. While the Control Room is the place where some plant components can be operated from, the same components also have local control, and the control room is non-essential to the operation of GE-MO and has been determined to be a non-critical area.

1-6 Identify and describe the intended functions of instruments and air operated valves that use instrument air in the following systems:

a. basin water cooling system,
b. basin water filter system,
c. ventilation exhaust system, and
d. basin leak detection system

This RAI is necessary for the staff to determine if all appropriate SSCs have been included within the scope of license renewal review and which will support the staff development of the

SER and the EA.

Response - The GE-MO instrument air system is comprised of a two compressors. The compressors are operated alternately to maintain equal wear, but only one is necessary to provide instrument air.

a. There are no air requirements for the basin chiller system

b. Air controlled valves in the basin filter system are designed to fail "as is" except for the flow control valve which fails in the open position. If instrument air flow were lost, the basin water filter continues to operate.

c. Each exhaust blower has a set of air controlled dampers that open when when the blower operates, and close when the blower is in standby keeping air from flowing back through the standy blowers. Instrument air controls the dampers for the individual exhaust blowers and stack airflow monitoring. If instrument air is lost, the open damper would remain in the open position and there would be no affect on the ventilation exhaust system.

d. There are no air operated valves in the basin leak detection system. However, the system does use an airlift siphon during pump out and to operate the sump level indicator. If this system failed, an auxiliary electric pump is available and can be lowered into the sump.

1-7 Identify and describe which SSCs (ie., fire detection, alarm, and suppression systems and components (including fire extinguishers) are necessary for ensuring that a credible fire will not have unacceptable consequences on the safety of the ISFSI. Credible fires should include vehicular fires involving equipment used in the transfer of casks, natural gas line breaks, and fires involving stored flammable materials.

Section 4.3.7.2 of the CSAR indicates that fire detection, alarm, and suppression systems and components (including fire extinguishers) are used at the ISFSI.

Title 10 CFR 72.122(c) states *"Structures, systems, and components important to safety must be designed and located* so *that they can continue to perform their safety functions effectively under credible fire and explosion exposure conditions."* The SER and EA will demonstrate compliance with 10 CFR 72.122 for the renewal period. This RAI is necessary for the staff to determine if all appropriate SSCs have been included within the scope of license renewal review and which will support the staff development of the SER and the EA.

Response – The combination warehouse/maintenance shop is the only building with a fire suppression system. All other buildings with fire potential are monitored by smoke/fire detectors. There is no credible fire potential at GE-MO that could impact fuel storage. Potential for a credible fire in the basin or its support facilities is very unlikely. No combustible materials were used to construct the basin, the basin building, connected support buildings, or basin support systems. No bulk flammable materials are stored in or around the basins, and minimal combustible materials are used in these areas. Any cask movement would be by railcar with only the cask car being able to enter the CRA. Other than a few individual spray cans of material such as WD-40, there is no storage of flammable materials in these areas. All natural gas service was Teminated in October of 2003. No support system involved in a fire, such as the stand-by diesel, would prevent the fuel from being safely maintained as demonstrated in RAI Question 5-3. Fire extinguishers are located in all areas of GE-MO, including the basin and its support

structures.

1-8 Identify the portions of the electrical power systems that are necessary to provide emergency power to the SSCs that are not important to safety but whose failure as support SSCs could prevent an important to safety function from being fulfilled.

Response - GE-MO is supplied with 2 independent electrical feed lines and a back-up diesel generator. The electrical power system that supplies back-up power to SSCs not important to safety is the same system that supplies back-up power to SSCs important to safety, as described in the CSAR. No SSC not important to safety but whose failure as support SSC could prevent an important to safety SSC from functioning has been identified. In addition, if all support systems were shutdown, as described in RAI Question 5-3, there is no immediate impact on fuel storage and ample time exists to make any necessary repairs, modifications or replacements.

1-9 This RAI is necessary for the staff to determine if all appropriate SSCs have been included within the scope of license renewal review and which will support the staff development of the SER and the EA. Also 10 CFR 72.122(k)(3) requires timely and reliable emergency power to specific SSCs.

Describe the process used to demonstrate that the effects of aging are adequately managed such that the intended functions of SSCs subject to AMR are maintained in a manner consistent with the current licensing basis throughout the license renewal period.

The SER and the EA for the license renewal will require an assessment of the AMR for all SSCs relied on in the applicant's CSAR. This RAI is necessary for the staff to evaluate the proposed aging management program for the renewal period and supports the development of the SER and the EA.

Response – The GE-MO Aging Management Program is described in Appendix A-8 of the CSAR. Management Program covering the SSCs considered Important to Safety and the Support Systems.

1-10 Provide copies of appropriate piping and instrumentation diagrams (P&IDs), the drawings listed in Appendix A.14 of the CSAR, and other schematic representations identifying the SSCs, or portions thereof, that are subject to AMR.

Response – The drawing listed above in Appendix a.14 of the CSAR are in the copies of the CSAR supplied with the submittal. There are no other support systems subject to AMR as described in RAI Questions 1-1 thru 1-3.

1-11 The SER and the EA for the license renewal will require an assessment of the AMR for all SSCs relied on in the applicant's CSAR. This RAI is necessary for the staff to determine if all appropriate SSCs have been included within the scope of license renewal review and which will support the staff development of the SER and the EA.

Identify when the high pressure natural gas pipe station was installed at the facility and describe the systems or structures needed to minimize the adverse effects of a natural gas line explosion. Provide the analysis that shows that a gas line explosion will not have an impact on the safe operation of the ISFSI for the license renewal period.

As stated in 10 CFR 72.122(c), SSCs important to safety must be designed and located so that they can continue to perform their safety functions effectively under credible fire and explosion

exposure conditions.

Response – All use of natural gas at GE-MO has been eliminated and the gas line has been cut and capped by the gas supplier beyond the GE-MO fence in October, 2003.

SECTION 2 - AGING EFFECTS FOR IDENTIFIED SSCs

2-1 Identify any age-related degradation that has occurred at the GE-MO ISFSI. Also, identify any cases where the material properties of SSCs subject to an AMR (i.e., within the scope of license renewal) have been altered significantly during the current license period.

Although not required, it is recommended that the GE-MO staff undertake a review of spent fuel pool industry experience with respect to age-related degradation. NUREG1801, *"Generic Aging Lessons Learned (GALL) Report,"* and Appendix C to NUREG1557, *"Summary of Technical Information and Agreements from Nuclear Management and Resources Council Industry Reports Addressing License Renewal'* (see Section C of Ref. 10) may be of assistance in the review.

Response – The following SSCs, not subject to AMR, showed signs of age-related degradation that either caused or contributed to decisions to repair/replace them.

Basin coolers - Over a period of time, the cooler tubes developed small leaks primarily due to weather related stress conditions. With continued operation and additional heating and cooling cycles, tubes, at random intervals, developed small leaks that were detected during required test/inspections. At first, the leaking tubes were plugged, however, as sporadic leaks continued to appear in more tubes, the decision was made to replace the coolers as described in CSAR Section 1.0, ¶ 1.4.3. This decision was also based on removing the environmental and radiological hazard of sending basin water to a cooler located outside the building.

Basin filter pneumatically controlled intake butterfly valve – Erratic operation of the valve was observed and documented by system operators. After monitoring operation of the valve and determining the reason for the erratic operation was valve wear, the valve was replaced with a new one.

Basin leak detection system – The orifice that allowed basin water to travel from the collection grid behind the basin liner into the collection sump plugged. (Described in RAI question 2-8.) The orifice was cleaned and a program put into place (SOP 16-16) to test water transfer from behind the basin liner into the sump.

The following SSCs, subject to AMR, showed signs of age-related degradation that either caused or contributed to decisions to repair or continue to monitor the condition.

Basin liner – The basin liner has always had some flow into the leak detection system however, in 1994, after cleaning of the system orifice, an increased flow from previous years into the sump was documented. (Described in RAI question 2-8.) An inspection company was brought in to perform acoustic emission monitoring of the basin liner weld seams to identify potential leakage sites. A leak in a corner of a liner plate to embedment weld was located in the north wall of the unloading pit and underwater weld repairs performed. The flow rate reduced until the 4th quarter of 1996 when an increase in flow again occurred. The inspection company was brought back, but no reason for the increase was located. The decision was made to continue to monitor flow into the sump for any additional change. Other than small changes due to temperature deltas in the basin, the flow has remained constant. With installation of the new basin water chillers and using a lower temperature for basin water, the flow rate, as shown in 2-8, has decreased. The current flow rate is well within the capability of the pumpout system.

2-2 Age related degradation for the renewal period should include consideration of the requirements in 10 CFR 72.24 and 72.122. The SER and the EA for the license renewal will require an assessment of AMR for all SSCs relied on in the CSAR. This RAI is necessary for the staff to evaluate the proposed aging management program for the renewal period and supports the development of the SER and EA.

For each of the SSCs subject to AMR, identify the material, environment, and potential aging effects applicable for the SSCs. When identifying potential aging effects, programs or activities that are or will be used to prevent or mitigate an aging effect should not be considered (e.g., implementation of the pool chemistry program should not be considered in determining whether SSCs located in the pool water have aging effects; instead the chemistry program should be credited as an aging management program to mitigate any applicable aging effects).

The SER and the EA for the license renewal will require an assessment of the AMR for all SSCs relied on in the applicant's CSAR. This RAI is necessary for the staff to evaluate the proposed aging management program for the renewal period and supports the development of the SER and the EA.

Response – SSCs subject to an AMR as described in the CSAR Section 11.0.

- **Fuel Storage Basin concrete walls, floors and expansion gate**
- **Fuel Storage Basin stainless steel liner**
- **Fuel Storage System including baskets and supporting grid**
- **Unloading Pit doorway guard**
- **Filter Cell Structure**

Fuel storage basin concrete walls, floors and expansion gate – Theses items are all concrete, lined on the inside surface with stainless steel and in contact with bedrock on the outside surface. Aging effects include cracking, spalling, chemical attack. The concrete structures at GE-MO were designed and constructed in accordance with the applicable national standards specifically, as a minimum, ACI 318-63, and meet conditions consistent with longevity as described by the GALL report, section A1.1 for concrete containments. For concrete structures exposed to groundwater, a groundwater sampling program to verify pH, chlorides and sulfates in groundwater per GALL A1.1, "Concrete Structures" for below-grade exterior reinforced concrete such as basemat and embedded walls. Incorporating this sampling program into the Aging Management Program will provide adequate monitoring that these structures should remain sound through the period sought by the license renewal. Basin concrete structures are described in the CSAR Section 5.0, 5.5.1.2, and Section 4.0, 4.2.4.

Fuel Storage Basin stainless steel liner – Aging effects for the stainless steel basin liner include corrosion, damage to the plates and deterioration of the welds. Per IAEA-TECDOC-1012, "Durability of Spent Nuclear Fuels and Facility Components in Wet Storage", SS wet storage facility components have excellent histories of duability in periods approaching 40 years provided that good water chemistry control is maintained. The GE-MO basin water chemistry (described in 3-7) provides an excellent media for SS materials. Using the coupon taken from the basin liner discussed in 2-5 its specific supporting report, corrosion is minimal and should have little or no impact on the basin liner for the term of the license renewal. Basin Liner described in CSAR Section 5.0, 5.5.1.3.

Fuel Storage System including baskets and supporting grid - The basket and supporting grid are inaccessible to a meaningful inspection program. While these items are inaccessible, the static, low mechanical stress (no baskets moved since January 1989),

low thermal stresses (water maintained at 77°F, +/- 2°) environment they are in would lead to their primary means of failure being through corrosion. Per IAEA-TECDOC-1012, "Durability of Spent Nuclear Fuels and Facility Components in Wet Storage", SS wet storage facility components have excellent histories of duability in periods approaching 40 years provided that good water chemistry control is maintained. The GE-MO basin water chemistry (described in 3-7) provides an excellent media for SS materials. The above are supported by a coupon taken from the basin liner discussed in 2-5, and its specific supporting report, showing that corrosion has been minimal. All components in the basin, liner, baskets and grid are 304 stainless steel, and with continued basin water quality, should have little or no impact on these items for the term of the license renewal.

Unloading Pit doorway guard - The unloading pit doorway guard is used to protect a basket in case it is tipped as it enters the basin from the unloading pit. The doorway guard is a component that is only used during fuel movement into or out of the unloading pit. This hasn't occurred since 1989. The doorway guar is constructed of 304 SS and subject to the same environment as the fuel storage system discussed above. Prior to fuel movement, as part of the Aging Management Program, the doorway guard will be inspected and tested to assure its ability to provide the service it was intended for.

Filter Cell Structure - The concrete structures at GE-MO were designed and constructed in accordance with the applicable national standards in effect at the time, specifically, as a minimum, ACI 318-63, and meet conditions consistent with longevity as described by the GALL report, section A1.1 for concrete containments. While it may not be possible to state the expected life of the concrete exactly, the existing conditions avoid the degradation mechanisms that would adversely affect the structural integrity of the concrete. Inspection of the structure is included in the Aging Management Program to insure the structure will remain sound through the period sought by the license renewal.

2-3 Provide a copy of the report on the incident of June 1972 that ruptured the basin liner. Include a description of the necessary repairs to restore the basin liner integrity and a discussion of the introduction of any aging effect that might have resulted specifically from the repair.

Title 10 CFR 72.24 requires an application contain sufficient technical information to support a finding that the ISFSI will satisfy the design basis with an adequate margin of safety. The SER and the EA for the license renewal will be required to present information concerning this incident. This RAI is necessary for the staff to evaluate the proposed aging management program for the renewal period and supports the development of the SER and EA.

Response – As discussed elsewhere, the basin liner rupture was repaired in 1972 using the same materials and techniques as the basin liner was originally constructed of. A caisson was lowered into the unloading pit, sealed to the wall and the repairs were performed dry using the same welding procedures and material as used during original basin liner construction. This patch has been in place over 30 years and no process, or plan is in place for specialized aging management other than the processes discussed elsewhere for the basin liner. It is felt that there is no difference in aging affects on this patch as can be expected for the basin liner as described in CSAR Appendix A-8.

2-4 Identify whether any of the SSCs subject to AMR have inaccessible areas. Describe how aging effects of the portions of SSCs in inaccessible areas are managed.

Age related degradation for the renewal period should include consideration of the requirements in 10 CFR 72.24 and 72.122. This requires AMR in the applicant's CSAR for all SSCs important

to safety or supports a SSCs important to safety. Specifically, 10 CFR 72.24(a) requires the safety assessment to *"...contain an analysis and evaluation of the major structures, systems, and components of the ISFSI ... that bear on the suitability of the site when the ISFSI ... is operated at its design capacity."* This will also support the development of the SER and the EA.

Response – The following SSCs subject to AMR are considered to have inaccessible areas that prevent a meaningful inspection program.

Fuel storage baskets and supporting grid – Due to their compact positioning in the basin and the inability to move them, these items are considered inaccessible to a meaningful inspection program. While these items are inaccessible, their static situation, with low mechanical stress (no baskets moved since January 1989), low thermal stresses (water maintained at 77°F, +/- 2°) environment they are in, leads to their primary means of failure being through corrosion. Per IAEA-TECDOC-1012, "Durability of Spent Nuclear Fuels and Facility Components in Wet Storage", SS wet storage facility components have excellent histories of durability in periods approaching 40 years provided that good water chemistry control is maintained. The GE-MO basin water chemistry (described in 3-7) provides an excellent media for SS materials. The above are supported by a coupon taken from the basin liner discussed in RAI question 2-5, and its specific supporting report, showing that corrosion has been minimal. All components in the basin, liner, baskets and grid are 304 stainless steel, and with continued basin water quality, should have little or no impact on these items for the term of the license renewal.

Fuel storage basin concrete walls, floors and expansion gate – The interior surfaces of these SSCs are inaccessible due to their stainless steel liner. However, these concrete structures were designed and constructed in accordance with the applicable national standards in effect at the time, specifically, as a minimum, ACI 318-63, and meet conditions consistent with longevity as described by the GALL report, section A1.1 for concrete containments. Basin concrete structures are described in the CSAR Section 5.0, 5.5.1.2, and Section 4.0, 4.2.4.

Spent fuel cladding - Spent fuel, clad with both stainless steel and zircalloy, in the GE-MO basins is enclosed in individual tubes of the storage baskets. The construction of the baskets covers the fuel bundles removing possibility of a meaningful visual inspection. Per IAEA-TECDOC-1012, "Durability of Spent Nuclear Fuels and Facility Components in Wet Storage", the zirconium alloys represent a class of materials that is highly resistant to degradation in wet storage, including some experience in aggressive waters. The database for the zirconium alloys supports a judgment of satisfactory wet storage in the time frame of 50 to 100 years or more." (IAEA 5). Stainless steel components in wet storage facilities have an excellent history of performance, including service in aggressive waters. Specific examinations of LWR SS fuel claddings indicate no evidence of degradation after periods of wet storage. Satisfactory service of SS clad fuels and facility components can be expected for several decades if materials with favorable microstructures and low stress levels are involved (IAEA 5). The GE-MO basin water chemistry (described in RAI queastion 3-7) provides an excellent media for long term storage of zircalloy or stainless steel clad fuels. This is supported by the continuing history of basin water and air sampling that shows no signs of deterioration of the fuel since the last fuel bundles were received in 1989.

2-5 Provide information on the types, locations, and results of inspections of the basin liner and liner welds for indications of galvanic or other types of corrosion or cracking on the liner or liner welds. For example, provide a copy of report GENE 689-013-0893 "Morris Fuel Recovery Center Fuel Storage Basin Liner Visual Examination Summary Report," dated September 1993, and

the inspection plan used to perform the examination.

Age related degradation for the renewal period should include consideration of the requirements in 10 CFR 72.24 and 72.122. This information will support the development of the SER and the EA.

Response - Included are copies of;
Morris Fuel Recovery Center Fuel Storage Basin Liner Visual Examination Summary Report, dated September 1993
Morris Fuel Recovery Center Fuel Storage Basin Liner Metallurgical Evaluation, dated May 1994.

2-6 Describe the impacts of aging on the spent fuel and fuel cladding and justify that, during the entire license renewal period, the fuel can be retrieved, packaged and shipped offsite without environmental risk or risk to operations personnel.

The references in the CSAR on the effects of aging on fuel cladding are from 1977 and are based on spent fuel stored for only 9 years. If renewed, some of the fuel currently in storage could remain at the GE-MO ISFSI for over 50 years (The first bundle of fuel was received on January 13, 1972).

The SER and the EA for the license renewal will require an assessment of the AMR for all SSCs relied on in the applicant's CSAR. This RAI is necessary for the staff to evaluate the proposed aging management program for the renewal period and supports the development of the SER and the EA.

Response – Spent fuel in the GE-MO basins are clad with both stainless steel and zircalloy. Per IAEA-TECDOC-1012, "Durability of Spent Nuclear Fuels and Facility Components in Wet Storage", the zirconium alloys represent a class of materials that is highly resistant to degradation in wet storage, including some experience in aggressive waters. The database for the zirconium alloys supports a judgment of satisfactory wet storage in the time frame of 50 to 100 years or more." (IAEA 5). Stainless steel components in wet storage facilities have an excellent history of performance, including service in aggressive waters. Specific examinations of LWR SS fuel claddings indicate no evidence of degradation after periods of wet storage. Satisfactory service of SS clad fuels and facility components can be expected for several decades if materials with favorable microstructures and low stress levels are involved (IAEA 5). Results of basin air and water sampling since the last fuel was received in January 1989 have been consistent, indicating the fuel cladding isn't deteriorating.

2-7 Justify the heat loads used for the license renewal application by providing the burnup and cooling time of the current fuel inventory prior to it being placed in storage at the GE-MO ISFSI and demonstrating that the condition of the fuel currently in storage are within the fuel exposures and cooling times of Table 4-2.

Table 4-2 of the CSAR indicates that many of the safety analyses were performed at fuel exposures of 24,000 MWd/TeU (although the Technical Specifications allow fuel exposures up to 44,000 MWd/TeU). Additionally, Section 4.1.1 of the CSAR states, *"Heat load calculations for basin water temperature and evaporation rates, basin water cooler design, and ventilation air cooling design are based on heat loads from fuel currently in storage and that expected to be stored."*

Title 10 CFR 72.122 provides overall requirements for the safe and continued operation of

SSCs during routine and emergency conditions. Consideration of the heat loads used in the license renewal application supports the staff development of the SER and EA.

Response - All fuel shipped to Morris Operation was required to cool for a minimum of one year. The safety analysis performed were for this minimum 1 year up to and including actual cooling time in excess of 1 year prior to receipt. All fuel approved for storage and received at Morris met the GE-MO license requirements. Fuel currently stored at GE-MO has exposures from 177.9 MWd/TeU to 36,712.9 MWd/TeU. The average burnup of the fuel bundles is 17,740.1 MWd/TeU and the median burnup is 19,327.8 MWd/TeU. The cooling periods range from 17 to 34 years with an average cooling time of about 27 years as of April 2004.

2-8 Provide a history of the leak rate of the basin liner. Section 5.5.1 of the CSAR states, *"The stainless steel liner can be expected to have* a *useful life of more than* 100 *years because of the non-aggressive service environment"* Also, Section A.8 of the CSAR notes that, based on 1993 examination results, continued long-term service of the basin liner is indicated. Justify the assertions contained in the CSAR, especially in light of the fact that the liner currently allows some pool water to flow into the basin leak detection system.

Age related degradation for the renewal period should include consideration of the requirements in 10 CFR 72.24 and 72.122. This information will support the development of the SER and the EA.

Response - Basin Leak Detection System Pump outs (Units: Average Liters/Day/Quarter)

Year	1st quarter	2nd quarter	3rd quarter	4th quarter
1980	0.79	0.81	0.78	0.84
1981	0.60	0.73	0.79	0.76
1982	0.66	0.52	0.61	1.01
1983	0.04	0.10	0.12	0.03
1984	0.17	0.23	0.15	0.02
1985	0.06	0.08	0.06	0.01
1986	0.44	0.13	0.00	0.04
1987	0.03	0.12	0.04	0.11
1988	0.24	0.24	0.23	0.24
1989	0.15	0.10	0.17	0.16
1990	0.15	0.16	0.21	0.17
1991	0.09	0.18	0.14	0.15
1992	0.15	0.16	0.11	0.13
1993	0.13	*	*	*
1994	*	51.1	78.0	60.1
1995	45.0	32.3	28.3	14.7
1996	14.2	14.2	38.3	709.7
1997	595.3	553.3	535.0	543.0
1998	527.7	505.7	559.3	656.3
1999	803.8	792.4	695.3	699.0
2000	696.5	680.1	747.0	731.8
2001	673.8	668.8	672.5	637.2
2002	570.3	527.4	528.7	502.2
2003	537.5	509.8		

*** LDS flow rate evaluation and sump maintenance. Data prior to 1994 is suspect. Through 1993, there was little or no flow in the LDS. In 1993, it was discovered that the orifice to the LDS was blocked. A project was undertaken to examine and fix the system.**

As can be seen from the above table, the basin has continually had some degree of leakage to the LDS, except for the period of 1993 to 1994 when the sump orifice was blocked.

2-9 Provide justification and a reference for the statement in Section 5.5.1 of the CSAR which states, *"Reinforced concrete in basin walls and floors is estimated to have* a *useful life of more than 100 years."*

Age related degradation for the renewal period should include consideration of the requirements in 10 CFR 72.24 and 72.122. This information will support the development of the SER and the EA.

Response – The basin concrete structure is described in 5.5.1.2 along with the construction specifications. Consistent with NUREG 1801 (Chapter III Table A5.1-e). The concrete structures at GE-MO were designed and constructed in accordance with the applicable national standards and meet conditions consistent with longevity as described as described in NUREG 1801. While it may not be possible to state the expected life of the concrete exactly, the existing conditions avoid the degradation mechanisms described in the referenced NUREG that would adversely affect the structural integrity of the concrete. Maintenance of these conditions has been incorporated into the GE-MO Aging Management Program (CSAR A-8) those structures should remain sound through the period sought by the license renewal.

2-10 Indicate which components of the cranes and lifting/handling equipment are subject to AMR or justify why they should not be subject to AMR (e.g., show that the results of fuel lifts and drops are acceptable without taking credit for the components). Include in your response identification and description of the measures taken, or components of the cranes and lifting/handling equipment used to:

a. Prevent a fuel bundle or storage basket from being lifted to an elevation where the uppermost part of a fuel bundle is less that 9 feet below the surface of the basin water;

b. Ensure that the bottom of the fuel bundle or storage basket is no more than 3 feet above the basin floor;

c. Ensure that components handled by the cranes are not dropped or tipped over; and

d. Ensure that the cranes do not fall onto the spent fuel.

Age related degradation for the renewal period should include consideration of the requirements in 10 CFR 72.24 and 72.122. This information will support the development of the SER and the EA.

Response – a. The mechanisms on the cranes that prevent a fuel bundle or basket from being lifted in violation of water or distance requirements are the fixed lengths of the fuel/basket grapples. The grapples attach to a crane hook/cable. The fixed length of the grapple then works with the crane limit travel stops to prevent fuel/baskets from being lifted outside the required dimensions.

b. See a. above.

c. The unloading pit doorway guard is used to protect a basket in case it is tipped as it enters the basin from the unloading pit. It is described in Section 1.0. The doorway guard is a component that is only used during fuel movement into or out of the unloading pit. This hasn't occurred since 1989. Prior to fuel movement, as part of the proposed Aging Management Program, the doorway guard will be inspected and tested to assure its ability to provide the service it was intended for.

d. All cranes are equipped with seismic restraints to prevent the crane wheels from disengaging from the track and allowing the crane to fall.

2-11 Provide the material safety data sheet (MSDS) for Electrofilm. Describe the potential impacts on the seismic and thermal load analysis of the basin grid and walls if the lubricant degrades over time. Identify the aging effects of Electrofilm in an oxygenated water environment Describe the potential for, and GE-MO's plans and proposed actions, should the fuel basket latches not release because of galling, corrosion, or other failure mechanism. Section 5.4.4.2 of the CSAR states, "a solid film lubricant (Electrofilm) was used on wedges to reduce the coefficient of friction between grid and wall to accommodate thermal and seismic movement"

Age related degradation for the renewal period should include consideration of the requirements in 10 CFR 72.24 and 72.122. This information will support the development of the SER and the EA.

Response - Attached is the MSDS for Lube-Lok 4396 by Morgan Advanced Ceramics, Everlube Products Division. This company purchased the company that made Electrofilm 4396, and it is now known as Lube-Lok 4396. The lube is a baked on ceramic coating with a wear life in excess of 300,000 cycles.

The potential for the basket latches not releasing due to galling, corrosion or other failure is considered minimal. The latches were only operated when the baskets were installed in the basin. There is no plan in place as to action to be taken if, for some unforeseen reason, the latches don't release. If this occurred it would be a condition that would be evaluated at that time.

2-12 Provide a copy of report GENE-689-003-0494, *"Morris Fuel Recovery Center Fuel Storage Basin Liner Metallurgical Evaluation,"* dated May 1994. Provide a discussion on the following:

a. Why the corrosion rate for the coupon cut from the basin liner in the cask unloading pit discussed in Appendix A.8 of the CSAR is representative of the rest of the liner and other stainless steel components in the pool;

b. Why the rate should be assumed to remain constant throughout the license renewal period;

c. Provide a description of the method and materials used to repair the basin wall after the coupon was removed;

d. Describe whether there may be parts of the pool liner or other pool components that may be subjected to a different environment than that to which the coupon was exposed (e.g., are there any stagnant, hot, or cold regions in the pool?);

e. Describe the pool chemistry history to which the coupon was exposed; and

f. Describe whether the corrosion rate would differ if the pool chemistry was maintained at the chemistry limits specified in Technical Specification 4.5.1.

Age related degradation for the renewal period should include consideration of the requirements in 10 CFR 72.24 and 72.122. This information will support the development of the SER and the EA.

Response – A copy of report GENE-689-003-0494 was supplied in accordance with RAI Question 2-5.

a. All components in the basin including liner, baskets and grid are 304 stainless steel. Per IAEA-TECDOC-1012, "Durability of Spent Nuclear Fuels and Facility Components in Wet Storage", SS wet storage facility components have excellent histories of durability in periods approaching 40 years provided that good water chemistry control is maintained.

The static, low mechanical stress (no baskets moved since January 1989), low thermal stresses (water maintained at 77°F, +/- 2°) environment they are in would lead to their primary means of failure being through corrosion. Per IAEA-TECDOC-1012, "Durability of Spent Nuclear Fuels and Facility Components in Wet Storage", SS wet storage facility components have excellent histories of durability in periods approaching 40 years provided that good water chemistry control is maintained.

The GE-MO basin water chemistry (described in RAI question 3-7) provides an excellent media for SS materials. The above are supported by a coupon taken from the basin liner discussed in RAI question 2-5, and its specific supporting report, showing that corrosion has been minimal. All components in the basin, liner, baskets and grid are 304 stainless steel, and with continued basin water quality, should have little or no impact on these items for the term of the license renewal.

b. The GE-MO basin water chemistry (described in RAI question 3-7) provides an excellent media for SS materials. The quality of the basin water is the primary element affecting the stainless steel components. The basin water quality is kept to a point where no corrosion producing byproducts are in the water to affect the material. All components in the basin are in a static mode, with no movement since January 1989 during the last fuel receipt. See also a. above.

c. As discussed in RAI question 2-13, the basin liner was welded with E-308L complying with AWS A5.4-62 for covered electrodes. The sample coupon was repaired underwater by divers using underwater welding techniques and E-308L covered electrode complying with SFA 5.4. The coupon material is 304L per ASTM A-240. The filler metal used to repair the liner (E-308L) is an industry recognized weld filler material for 304 stainless steel as it supplies the same corrosion resistance in the as welded condition as the 304 and is the same material specified for the original welding of the basin liner.

d. The unloading pit wall where the coupon was removed is below the level of the main basin floor. Water skimmers are dispersed around the perimeter of the basins, including the unloading pit, however the water suction for cooling/filtering, is only located in the main basins. However during the May through June 2004 (RAI Question 5-3) test of basin heat up and evaporation, temperature and conductivity readings were taken in several representative areas of the basins, including the

unloading pit. At the start of the test, all areas were 77° F. Temperature in the bottom of the unloading pit after 50 days was 70° F, while the rest of the basins reached a relatively uniform maximum temperature of 123° F. Conductivity started at 1.06 μMhos and finished at 1.22 μMhos, the unloading pit at the end of the 50 days was 1.27 μMhos. This demonstrates that there is a constant natural circulation of water in the basins, that does not affect unloading pit water quality, but due to the deep nature of the unloading pit and no direct heat sources, more heat is lost to the surrounding ground that is on all four sides of the unloading pit.

e. Below are the worst case basin water chemistry readings from each year during the period the coupon was in basin water.
SNM-2500 Limits were: pH 4.5 to 9.0, $NaNo_3$ - < 200 ppm, Cl - < 10 ppm

	Cl	$NaNo_3$	pH
Year	ppm	ppm	
1973	9	220	5.5
1974	10	185	5.06
1975	10	45	5.35
1976	4	13	5.81
1977	0.1	1	5.77
1978	<0.1	2	5.71
1979	<0.1	<1.0	5.78
1980	<0.1	<1.0	5.59
1981	<0.1	<1.0	5.49
1982	<0.1	<1.0	5.65
1983	<0.1	<1.0	5.68
1984	<0.1	<1.0	5.71
1985	<0.1	<1.0	5.72
1986	<0.1	<1.0	5.79
1987	0.1	<1.0	6.03
1988	<0.1	<1.0	5.98
1989	0.5	<1.0	5.84
1990	<0.1	<1.0	5.2
1991	<0.1	<1.0	5.03
1992	<0.1	<1.0	4.96
1993	<0.1	<1.0	5.16
1994	<0.1	<1.0	5.18
1995	<0.1	<1.0	4.81

f. The basin water chemistry is in compliance with and normally exceeded Technical Specification limits. The basin water chemistry listed was applicable demineralized water being produced using chemical treatment and to receipt criteria for fuel/casks. If the corrosion rate would of differed if the basin chemistry was kept at the limits specified in the Tech Spec has no bearing here since except for a few months out of the first 3 years, $NaNo_3$ and Cl were normally below detectable. The demineralizer system installed in 1996, uses only resin beds and no chemical treatment. There are

no sources of $NaNo_3$ or Cl in the basin, and are still below minimal detectability. Amendment 12 of SNM-2500 deletes the measurement requirement since the conductivity limit would be easily exceeded if either material appeared in the basin water at limits far below those specified above. See 72.48 attached to SNM-2500 Amendment 12.

2-13 Provide the following information on the stainless steel basin liner:

a. Provide the chemical composition of the Type 304L stainless steel used to line the basin.

b. Provide the type of filler metal and weld rod used to weld the Type 304L stainless steel liner.

c. Describe the repair process and material used to repair the liner rupture and replace the sample coupon.

d. Justify why the corrosion rates for the filler metal and weld rod are equivalent to the corrosion rate found on the sample coupon.

Age related degradation for the renewal period should include consideration of the requirements in 10 CFR 72.24 and 72.122. This information will support the development of the SER and the EA.

Response – a. The 304L used to line the basin was ASTM A-240

b. The basin liner was welded with E-308L complying with AWS A5.4-62 for covered electrodes.

c. The liner rupture was welded through the use of a caisson that was lowered into the unloading pit and sealed against the unloading pit wall. Welding was performed dry, using the same welding procedure and filler metal (E-308L) as used in original construction. The sample coupon, taken several years later, out of the unloading pit, was replaced underwater by divers using underwater welding techniques and E-308L covered electrode complying with SFA 5.4. The coupon material is 304L per ASTM A-240.

d. **The filler metal used to repair the liner (E-308L) in both instances is an industry recognized weld filler material for 304 stainless steel as it supplies the same corrosion resistance in the as welded condition as the 304 and is the same material specified for the original welding of the basin liner.**

2-14 Discuss the potential for stainless steel components, such as the fuel baskets and supporting grids, located in the GE Morris Operations ISFSI spent fuel pool to crack or have a loss of material. Note that Chapter VII, Section A.2, Spent Fuel Storage, of NUREG-1801, *"Generic Aging Lessons Learned (GALL) Report, Volume* 2', dated April 2001 (Ref. 10), indicates that stainless steel storage racks in a chemically treated oxygenated water are subject to crack initiation and growth due to stress corrosion cracking. Also Chapter VII, Section A.4, *"Spent Fuel Pool Cooling and Cleanup',* indicates that stainless steel piping, fitting, and flanges are subject to loss of material due to pitting and crevice corrosion.

Age related degradation for the renewal period should include consideration of the requirements in 10 CFR 72.24 and 72.122. This information will support the development of the SER and the EA.

Response – The basin water at GE-MO is filtered, but not chemically treated. The basin liner was visually inspected (report submitted in RAI Question 2-5) in 1993, and there were no

indications of evidence of structural or environmentally induced degradation including no evidence of a MIC induced condition.

2-15 Provide the surveillance programs and procedures to identify the spent fuel bundles containing defective fuel rods or fuel assemblies with small cladding defects. Describe the methods used to contain escaping fission products (gaseous or dissolved) from degraded or damaged fuel. Please justify the appropriate references relating to the chemical inertness of fuel pellets in water.

Section 5.3.2.2 of the CSAR states *"Special vent hoods can be used for... defective fuel rods to collect escaping gas..."* Section 5.4.4.1 of the CSAR states "... *the effects of small cladding defects in individual fuel rods is relatively minor due to chemical inertness of fuel pellets in water ..."*

Title 10 CFR 72.24 requires an application contain sufficient technical information to support a finding that the ISFSI will satisfy the design basis with an adequate margin of safety and supports the development of the SER and EA. Both 10 CFR 72.122 (h)(1) and 72.122(1) seek to ensure safe spent fuel storage and handling and to minimize post-operational safety problems with respect to retrievability of the fuel from the storage system.

Response - Included in the fuel stored, GE-MO currently has four fuel bundles from San Onofre Unit 1 received in 1975 thru 1980 that exhibited high radionuclide transfer rates, and 753 bundles from Dresden Unit 2 received in 1975 thru 1977 that are warranty returns due to hrdyting. After over 30 years of experience storing spent fuel in ultrapure water, the fuel has shown no indications of leakage either by air or water monitoring. The quality of the water in the GE-MO basin is strictly maintained to inhibit corrosion of Zircaloy and Stainless Steel cladding and components providing an ideal environment for the cladding. The fuel bundles are contained in individual tubes in a fuel basket and are not moved, so no stress from handling has been put on them since being placed in the basin. It is felt that if a fuel bundle did begin to leak, it would be a slow leak and not a catastrophic leak due to cladding failure of many fuels rods at once. The basin ventilation system is more than adequate to handle any escaping gasses until a plan can be put into place to deal with the condition.

Due to the above, the CSAR reference to "Special vent hoods" has been deleted as being unnecessary

Perforations in fuel cladding expose the Uranium oxide pellets to water. Uranium oxide pellets have been observed to be highly stable when in contact with pool water (IAEA-TECDOC-1012 pg. 55). Basin radiochemistry is routinely monitored, an appreciable change in the radionuclide transfer rate of fuel bundles in storage would be evident.

2-16 Identify any defective fuel currently in storage at GE-MO and describe special monitoring efforts (if any) used to monitor the condition of the defective fuel. Section 5.3.2.2 of the GE-MO CSAR states, *"known defective fuel is not normally accepted for storage by GE-MO."* However, page 14 of the Environmental Impact Appraisal for increasing the storage capacity of the Tennessee Valley Authority's Browns Ferry Nuclear Plants dated September 21, 1978 states, *"Operators at several reactors have discharged, stored, and/or shipped relatively large numbers of Zircaloy-clad fuel which developed defects during reactor exposures, e.g., Ginna, Oyster Creek, Nine Mile Point, and Dresden Unit* 1 *and* 2. *Several hundred Zircaloy-clad assemblies which developed one or more defects in-reactor are stored in the GE-Morris pool without need for isolation in special cans."* There is no mention of these defects in the GE-MO CSAR or of the effects from long-term storage for the renewal period.

Title 10 CFR 72.24 requires the application contain sufficient technical information to support a finding that the ISFSI will satisfy the design basis with an adequate margin of safety. Title 10 CFR 72.122 (h)(1) and 72.122(1) seek to ensure safe spent fuel storage and handling and to minimize post-operational safety problems with respect to retrievability of the fuel from the storage system.

Response - Included in the fuel stored, GE-MO currently stores four fuel bundles from San Onofre Unit 1 that exhibited high radionuclide transfer rates, and 753 bundles from Dresden Unit 2 that are warranty returns due to hydriding. These bundles all met the requirements for shipment in affect and were acceptable at GE-MO. (CSAR 4.1.1) The quality of the water in the GE-MO basin is strictly maintained to inhibit corrosion of Zircaloy and Stainless Steel cladding and components. After over 30 years of experience of spent fuel storage in ultrapure water, the fuel has not shown any indications of leakage. The fuel bundles in the basin are not moved so no stress from handling has been put on them since being installed in the basin. It is felt that if a fuel bundle did begin to leak, it would be a slow leakage and not a catastrophic leak due to cladding failure. The basin ventilation system is more than adequate to handle any escaping gasses until a plan can be put into place to deal with the condition.

2-17 Identify and describe the components of the ventilation exhaust system (e.g., air tunnel, fans, duct work, sand filter, stack) and their intended functions that are required to maintain normal and accident doses below the limits in 10 CFR 72.104 and 10 CFR 72.106 and which if any of these SSCs would be considered within the scope of license renewal and therefore subject to AMR. Describe the mechanism (e.g., screen) used to prevent debris from entering and clogging the stack. Based on the above information, describe the aging management program(s) necessary to maintain the noted intended function(s) for the license renewal period.

Note that, with the exception of the tornado-generated missile accident, the accident analyses in Section 8 of the CSAR appear to assume that all of the released radionuclides are expelled from the basin, passed through the sand filter, and released from the main stack. Any justification for not subjecting this structure and system to an AMR should include providing dose results for the accident scenarios evaluated in Section 8 of the CSAR using the assumption that the storage basin is open to the atmosphere.

Title 10 CFR 72.24 requires the application contain sufficient technical information to support a finding that the ISFSI will satisfy the design basis with an adequate margin of safety.

Response - The ventilation exhaust system is not required to maintain normal and accident doses below the limits in 10 CFR 72.104 and 10 CFR 72.106. Stack clogging would be very unlikely due to the physical construction of the system, and there is no screen in place to prevent clogging, however, there is a alternate port that can be used to either clean the stack, have a ground level release point, or erect a temporary stack.
This chart shows modified calculations for all accidents in section 8 of the CSAR that calculate exposures to the public. These are calculated using the Off Site Dose Calculation Manual for the GE Morris Operation using the most restrictive X/Q values for a ground level emergency release.

Activity Released (Ci)

	Missile Accident		Fuel Basket Drop		Fuel Bundle Drop	
	BWR	PWR	BWR	PWR	BWR	PWR
Noble Gas	2500	3700	6156	6120	684	1530
Iodine	1.20E-06	1.80E-06	3.01E-06	2.99E-06	3.30E-07	4.80E-08

	Estimated Dose (mR)					
Whole Body	0.81	1.20	2.00	1.99	0.22	0.50
Thyroid	5.23E-05	7.84E-05	1.31E-04	1.30E-04	1.44E-05	2.09E-06

Calculations From Offsite Dose Calculation Manual

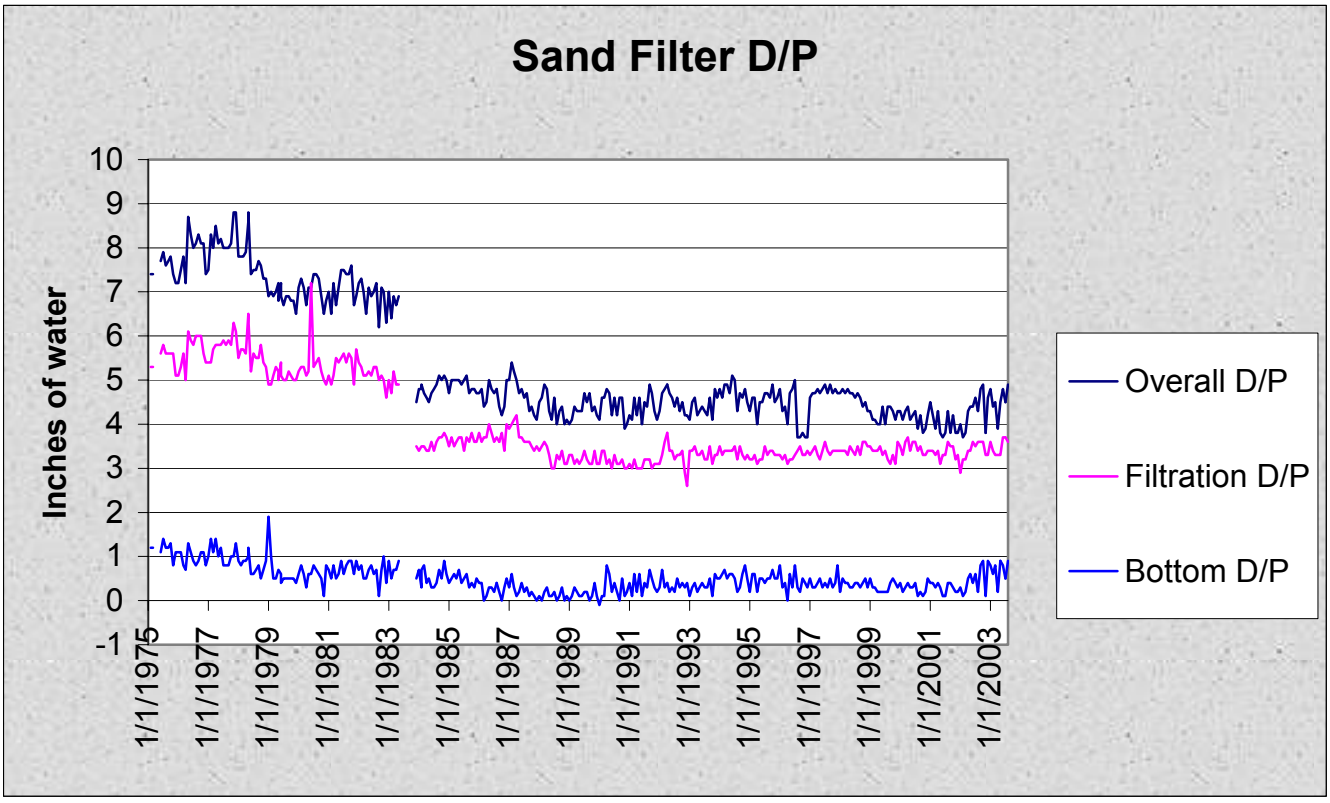
Deep dose from Kr-85	3.17E-05 X/Q Ci	1.12E+01	=
CEDE from I-129	2.64E+02 X/Q Ci	0.18	=
X/Q value	**9.17E-04**		

Attached is a report using the EPA COMPLY program for an unfiltered ground level discharge based on the samples taken for 2002. This dose is still significantly below the 10 CFR limits.

2-18 Describe how the radionuclide removal rate of the deep-bed sand filter and the flow through the filter varies over time. What is the impact of the additional license period on the performance and operation of the sand filter? Identify and describe the structures and structural components (e.g., sealants) that form the basin enclosure confinement boundary.

Age related degradation for the renewal period should include consideration of the requirements in 10 CFR 72.24 and 72.122. This information will support the development of the SER and the EA.

Response – The deep-bed sand filter flow since 1975 is shown in the following chart:



Until 1983 the ventilation system was configured to operate as originally designed for a fuel reprocessing plant. The D/P readings were taken at 24,000 CFM flowing through the

filter. The break in the data during 1983 is when the ventilation system was re-configured to operate as it does today. The data after the break to present was taken at 14,000 CFM flowing through the filter. As you can see, the D/P for the given flow has stayed effectively constant over the almost 20 years since its modification. The amount of activity deposited into the filter is less than .01 µCi per year based on sample data. The effectiveness of the filter will not be affected during the additional license period. There is the piping in place for an additional air filter to tie into our system should one be necessary.

The basin enclosure consists of the following:

- **The main structure surrounding the basin area is a steel framed structure that has a steel shell.**
- **The process building makes up most of the east side of the enclosure and the Cask Receiving Area is adjacent to the north side of the building.**

The structural components of the basin enclosure are concrete and steel. The roofs of the enclosure are steel sealed with commercially available roof sealers and membrane covered.

2-19 Demonstrate that the maximum stresses for the basin structure components still maintain adequate safety margins, considering material properties degradation and use of the most recent site seismic and geologic data, when the components are subject to a postulated design base earthquake. The maximum stresses for the basin structure components under the governing load combinations including accident conditions such as seismic load are provided in Section 4.2.5 of the CSAR.

This information is required for the staff to assess compliance with 10 CFR 72.24(d), 72.122(b)(2).

Response – Consistent with NUREG 1801 (Chapter III Table A5.1-e), the concrete structures at GE-MO were designed and constructed in accordance with the applicable national standards and meet conditions consistent with longevity as described as in the NUREG. Based on analysis of the concrete and its compliance with the requirements of the NUREG for construction and aging, the fact that the basin was poured directly against bedrock, and recognizing there hasn't been any seismic or geological changes in the GE-MO location, the original safety analysis are considered to remain applicable.

2-20 Demonstrate, considering age related degradation of material properties, that the basin structure components (liners, concrete elements etc.) still maintain adequate safety margins under a tornado missile impact accident. Section A.15.6.2 of the CSAR discusses "Effects of Missile Impact on Basin Structures". Penetration depths are provided for different missiles and by different methods. The demonstration should utilize the same methods and choice of missile objects as outlined in original analyses.

This information is required for the staff to assess compliance with 10 CFR 72.122(b)(2).

Response – Based on evaluations of the basin structure components discussed in RAI Questions 2-9, 2-19, and Appendix A-8 of the CSAR, there would be no reason to expect that the safety margins previously established in the CSAR are not currently applicable.

Additionally, Per IAEA-TECDOC-1012, "Durability of Spent Nuclear Fuels and Facility Components in Wet Storage", stainless steel components in wet storage facilities have an excellent history of performance, including service in aggressive waters. Satisfactory

service of SS facility components can be expected for several decades if materials with favorable microstructures and low stress levels are involved. The GE-MO basins are lined with 304 SS and as shown in RAI Question 6-2, SNM-2500 Amendment 12 and CSAR 10.4.5, the GE-MO basin water is kept ultra-pure.

SECTION 3 - MONITORING AND MAINTENANCE PROGRAMS

3-1 Describe the programs or activities used to review and manage the effects of aging. Please include the following information in your response:

a. the specific SSCs for each program subject to an AMR;
b. how the program or activity prevents or mitigates the aging effect;
c. the parameters to be monitored or inspected;
d. how the aging effect is detected before the intended function(s) of the SSCs is lost; e. the criteria to be used to determine whether corrective actions must be implemented;
f. the corrective actions to be taken if the criteria are not met;
g. the confirmation process that ensures that the corrective action was taken and was effective;
h. the administrative controls for maintaining the program or activity; and
i the operating experience of the program or activity, including past corrective actions resulting in program or activity enhancements.

Management and consideration of age-related degradation for the renewal period should consider the requirements of 10 CFR 72.24 and 72.122.

Response – The GE-MO Aging Management program is described in CSAR Appendix A-8. In addition, operating equipment at GE-MO is monitored and maintained through a combination of a Preventive Maintenance Program covering all plant equipment and detailed GE-MO Standard Operating Procedures that include Compliance and Operability Tests for equipment determined to be essential to safe operation of GE-MO. Specific items are discussed throughout this section.

i. See RAI Question 2-1.

3-2 For each SSCs subject to AMR that has a potential aging effect, identify the existing or new program or activity or combination of programs or activities that will be used to manage the aging effect (e.g., preventive maintenance program, pool water chemistry program).

The SER and the EA for the license renewal will require an assessment of AMR for all SSCs relied on in the applicant's CSAR. This RAI is necessary for the staff to evaluate the proposed aging management program for the renewal period and supports the development of the SER and the EA.

Response – Aging management of SSCs subject to AMR is described in CSAR Appendix A-8.

3-3 Identify and describe the surveillance or inspection program used to verify the continued operability of the emergency power and electrical power systems necessary to provide emergency power and to manage the effects of aging on those SSCs within the scope of license renewal.

Title 10 CFR 72.122(k)(3) requires timely and reliable emergency power to specific SSCs.

Response – There is no emergency scenario at GE-MO requiring electrical power as stated in CSAR 5.8.2. In addition, CSAR 5.8.2 describes electrical power supply and use at GE-MO. Commonwealth Edison Company manages the distribution system into the GE-MO

substation. The GE-MO standby diesel generator and internal switchgear are covered by specific PM requirements and the following SOPs, 14-4, Emergency Diesel Generator Operation; 16-90, Emergency Generator – Operability Test; 16-91, Emergency Generator Sequencing – Operability Test, 16-95, 24V DC Load – Operability Test. A GE certified switchgear contractor is used to maintain switchgear and an approved contractor also inspects/maintains the diesel.

3-4 Describe how corrective actions, the verification process (i.e., ensuring that preventive actions are adequate and that appropriate corrective actions have been completed and are effective), and administrative controls associated with managing the aging of SSCs that are not important to safety but that are subject to AMR will be controlled (e.g., will the 10 CFR 72, Subpart G, QA program be applied to these SSCs that are not important to safety).

Response - Applicability of the QA Plan to all SSCs begins with the Functional Classification process described in RAI question 1-1. Functional Classification not only provides a rating process for SSCs by nuclear safety, but also defines quality action levels required, thereby determining applicable portions of the quality program and level of quality for any SSC. The application of Functional Classification is included in the current NRC approved GE-MO QA Plan. Per the QA Plan, Functional Class 1 & 2 definition is *"As used in this Plan, "Structures, systems and components important to safety" means those features of MO whose function is: 1) To maintain conditions required to store spent fuel safely, 2) to prevent damage to spent fuel during handling and storage, or 3) to provide reasonable assurance that spent fuel can be received, handled, stored and retrieved without undue risk to the public health and safety.*

All repairs, modifications, alterations and new installations are through the GE-MO Work Request System. The work request is used for work planning and scheduling, material and equipment ordering, accumulation of equipment history, work measurement and quality requirements and QA data.

Section 16.0, Corrective Action, of the QA Plan, provides measures to ensure conditions adverse to quality are promptly identified and corrected. In the case of significant conditions adverse to quality, the measures ensure the cause is determined and corrective action is taken to preclude repetition. Identification of significant conditions adverse to quality, cause of the conditions and corrective actions are documented and reported to appropriate levels of management.

3-5 Describe the inspection and surveillance program(s), per consistent with your response to RAI 3-1, used to monitor the effects of aging on the electrical and instrumentation and control (I&C) components required to:

a. monitor pool water level [10 CFR 72.122(h)(2)],
b. monitor pool water leakage [10 CFR 72.122(h)(2)],
c. provide continuous monitoring of storage confinement systems [10 CFR 72.122(h)(4)]
d. monitor systems that are important to safety [10 CFR 72.122(i)],
e. support criticality monitoring systems [10 CFR 72.124(c)],
f. support radiological alarm systems [10 CFR 72.126(b)], and
g. monitor direct and effluent radiation levels [10 CFR 72.126(c)].

Management and consideration of age-related degradation for the renewal period should consider the requirements of 10 CFR 72.24 and 72.122.

Response – None of the instrumentation described herein is subject to AMR. Answers to these questions are also discussed in RAI Question 1-4.

a. PM systems include test/calibration of the basin water level detector system. Low and high level alarm indications are on the GE-MO Site Instrumentation Monitoring System (SIMS). In addition, SOP 1-22, Basin Cooler System contains requirements for operator verification of basin water level.

b. See RAI Question 3-6 k.

c. Detailed in PM system and specific SOPs and as described in RAI Question 1-4.

d. Detailed in PM system and specific SOPs and as described in RAI Question 1-4.

e. Detailed in PM system and SOP 16-97, Criticality Alarms Operability – Compliance Test, and as described in RAI Question 1-4.

f. Detailed in PM system and SOP 16-97, Criticality Alarms Operability – Compliance Test; 16-98, ARM Calibration – Compliance Test, and as described in RAI Question 1-4.

g. Detailed in PM system and SOP 16-84, Exhaust Sample Analysis – Compliance Test; 16-85 Exhaust Sampler Calibration – Compliance Test; 16-100 Effluent Water Analysis – Compliance Test; 16-101, Routine Process Stream Samples – Operability Test.

3-6 In order for the staff to adequately review the license renewal application under 10 CFR Part 72, provide a summary of the maintenance and operational history of those SSCs subject to an AMR. Address the following SSCs:

a. spent fuel and spent fuel cladding,
b. fuel baskets,
c. supporting grid structure,
d. basin floor liner,
e. unloading pit energy absorbing pad,
f. unloading pit load distribution plates,
g. concrete basin walls and floor,
h. cask-handling crane,
i fuel-handling crane,
j. basin crane,
k. basin leak detection system,
l. basin water cooling system,
m. basin water filter system,
n. unloading pit doorway guard,
o. filter cell structure,
p. exhaust stack, and
q. water sphere and related distribution system.

Management and consideration of age-related degradation for the renewal period should consider the requirements of 10 CFR 72.24 and 72.122.

Response – a. – The fuel is monitored through gas emissions and basin water quality. There have been no leaking fuel bundles detected.

b. The fuel baskets haven't been moved since they were placed in the basin. Additionally, Per IAEA-TECDOC-1012, "Durability of Spent Nuclear Fuels and Facility Components in Wet Storage", stainless steel components in wet storage facilities have an excellent history of performance, including service in aggressive waters. Satisfactory service of SS facility components can be expected for several decades if materials with favorable microstructures and low stress levels are involved (IAEA 5).

c. Support grid structure is also a static device made from 304 SS. Additionally, Per IAEA-TECDOC-1012, "Durability of Spent Nuclear Fuels and Facility Components in Wet Storage", stainless steel components in wet storage facilities have an excellent history of performance, including service in aggressive waters. Satisfactory service of SS facility components can be expected for several decades if materials with favorable microstructures and low stress levels are involved (IAEA 5).

d. The basin floor liner is not accessible, but as discussed earlier with the coupon removed from the basin wall, and per IAEA-TECDOC-1012, "Durability of Spent Nuclear Fuels and Facility Components in Wet Storage", stainless steel components in weet storage facilities have an excellent history of performance, including service in aggressive waters. Satisfactory service of SS facility components can be expected for several decades if materials with favorable microstructures and low stress levels are involved (IAEA 5).

e. The unloading pit energy absorbing pad was designed and sized for an IF-300 shipping cask. It is made from 304 SS and per IAEA-TECDOC-1012, "Durability of Spent Nuclear Fuels and Facility Components in Wet Storage", stainless steel components in weet storage facilities have an excellent history of performance, including service in aggressive waters. Satisfactory service of SS facility components can be expected for several decades if materials with favorable microstructures and low stress levels are involved (IAEA 5). Use of this pad for any other cask will require evaluation of the pad to the new cask geometry.

f. The unloading pit energy absorption plates are beneath the pit liner. There is no access to the plates.

g. The concrete of the basin walls and floors has no maintenance history. See RAI Question 2-9 for more discussion.

h. The cask handling crane is discussed in the GE-MO Aging Management Program (CSAR A-8). It receives normal preventative maintenance per the PM program and routine inspections to meet OSHA 1910.179. See also GE-MO Aging Management Program, CSAR A-8.

i. Fuel handling crane receives normal preventative maintenance per the PM program and is routinely inspected to meet OSHA 1910.179. It is equipped with seismic restraints to prevent it from jumping its tracks. The crane has no unusual or significant maintenance history. See also GE-MO Aging Management Program, CSAR A-8.

j. The basin crane receives normal preventative maintenance and is routinely inspected to meet OSHA 1910.179 and has no significant maintenance issues. It is equipped with seismic restraints on the wheels. In response to 9-11-01, the crane hoist has been locked out. See also GE-MO Aging Management Program, CSAR A-8.

k. The basin leak detection system been discussed thoroughly elsewhere. Except for the period when the orifice was plugged, there hasn't been a maintenance issue with the system. In addition, after the incident with the orifice, an operability test "SOP 16-16, Basin Leak Detection System Operability Test" was developed and put into place.

This test is performer quarterly and verifies that water is being transmitted by the LDS from anywhere in the basin to the LDS sump. See also GE-MO Aging Management Program, CSAR A-8.

l. The basin water cooling system was installed in 2000 is covered under the PM program. Additionally, a commercial contractor inspects the heat pumps annually. There has been no significant maintenance issues with this system. AMR of this system is not required.

m. The basin water filter system, is a simple resin based filter. It is monitored for D/P, and when required, the filter is back flushed and rebuilt. AMR is not required.

n. The unloading pit doorway guard hasn't been used since 1989 when the last fuel was received. It serves no function unless fuel is being moved from the unloading pit to the basin. As part of the proposed Aging Management Program, this device will be thoroughly inspected and evaluated prior to use. See CSAR A-8.

o. The filter cell structure, as discussed earlier is only the concrete cell surrounding the filter. There have been no signs of the concrete degrading. See CSAR A-8.

p. The exhaust stack is inspected by a nationally recognized contractor to industry standards. During the last inspection, no problem areas were identified. AMR not required.

q. **The water sphere is inspected by a nationally recognized contractor to industry standards. During the last inspection, no defects were identified. Additionally, a cathodic protection system is included that is inspected yearly by a contractor. There have been no significant maintenance issues with the water supply system. AMR is not required**

3-7 Provide the operating specifications and surveillance requirements for basin water turbidity, temperature, and cooling water flow rates for Section 4, "Surveillance Requirements," of Chapter 10 of the CSAR;

Title 10 CFR 72.24 requires an application contain sufficient technical information to support a finding that the ISFSI will satisfy the design basis with an adequate margin of safety.

Response - Basin water is monitored through SOP 16-10, Basin Water Analysis. Basin water quality is described in CSAR Section 5.5.2. Basin cooling water flow rate is per SOP 1-22, Basin Cooler System. The system has a computer that maintains basin water temperature at 77 degrees plus or minus 1.5 degrees. It does this by selectively adding or decreasing the number of chiller units on line. Water flow is set constant at approximately 240 gpm.

3-8 Provide the surveillance requirements for the demineralized water supply used for basin water make-up.

Title 10 CFR 72.24 requires an application contain sufficient technical information to support a finding that the ISFSI will satisfy the design basis with an adequate margin of safety.

Response - Demineralized water used for basin makeup is sampled monthly to the same criteria specified for basin water, except for radiological. In addition, the system that filters the water is computer controlled and self-monitoring. When water quality exceeds a preset level the system supplies a local alarm at GE-MO and automatically notifies Crossbow Industrial Water Systems (formerly Culligan) and they deliver new filter beds. Included for reference is the past 12 months of demineralized water results.

3-9 Outline the aging management program, consistent with your response to RAI 3-1, for the basin structure concrete elements. Reinforced concrete structures when subjected to operational and environmental conditions and loads, may degrade over time. Le. concrete may crack and lose materials, steel may corrode. Consider in your response the following American Concrete Institute (ACI) standards regarding concrete degradation; ACI 224.1 R "Causes, Evaluation and Repairs of Cracks in Concrete Structures, ACI 349.3R "Evaluation of Existing Nuclear Safety-Related Concrete Structures", and ACI 222R "Corrosion of Metals in Concrete."

This information is necessary for the staff to assess consistency with NUREG-1801 XLS6, "Structures Monitoring Program." Additionally, 10 CFR 72.24 requires the application contain sufficient technical information to support a finding that the ISFSI will satisfy the design basis with an adequate margin of safety.

Response – Aging Management for the concrete structures is described in CSAR Appendix A-8, Aging Management.

SECTION 4 – ENVIRONMENTAL CHANGES

4-1 Justify the use of the X/Q (Chi over Q) value of 4.0x1 0-4 sec/m3 in Assumption (h) of Section 8.6.2 for a short-term ground-level release.

The X/Q value is taken from Table A.5-3. However, Table A.5-3 is used to calculate the ground deposition values from a precipitation washout of stack discharge, which is only one component of the radiation exposure that would result from a ground-level release as discussed in Section 3 of Appendix AA. The additional exposure assessments do not appear to have been addressed. Also, provide the source information for the meteorological conditions given in Appendix A.5 and document that they are applicable to the GE-MO site.

Title 10 CFR 72.24 requires the application contain sufficient technical information to support a finding that the ISFSI will satisfy the design basis with an adequate margin of safety.

Response - As specified in Appendix A.5, COMPLY, a computerized screening tool for evaluating radiation exposure from atmospheric releases of radionuclides is used for radionuclide emissions. The COMPLY code may be used for demonstrating compliance with EPA and Nuclear Regulatory Commission regulations. See attached Report on Compliance with the Clean Air Act Limits for Radionuclide Emissions from the Comply Code, Version 1.5d

4-2 Update, or provide documentation to verify the following information is still accurate and current:

a. Table 3-4 Aircraft flight information is from 1979;
b. Table 3-6 Precipitation information is from 1964;
c. Figure 3-8 Wind rose data is from 1971;
d. Figures 3-3, 3-4, 3-5, and 3-6 Population Data is from 1990;
e. Table 3-7 Thunderstorm activity information is from 1976;
f. Table 3-8 Stability class and wind direction information is from 1974;
g. Table 3-12 Water analysis information is from 1977; and
h. Figure 7-1 History of Basin Water Activity ends in 1994.

Additionally, provide updated historical information on tornado activities in the vicinity of the GE-MO facility.

This information is needed to support staff development of the EA.

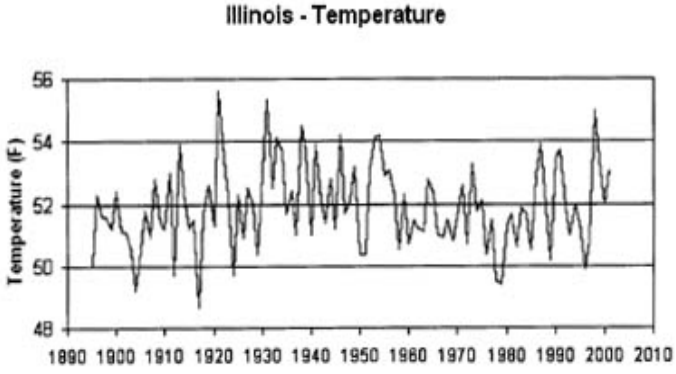
Response – a. The aircraft flight data in Table 3-4 is referenced to VOR flight tracking. As per FAA regional office, since flights use GPS now, this system is no longer used and an update of the info is not possible. The information was retained in the CSAR to depict there are no scheduled flight lanes over GE-MO.

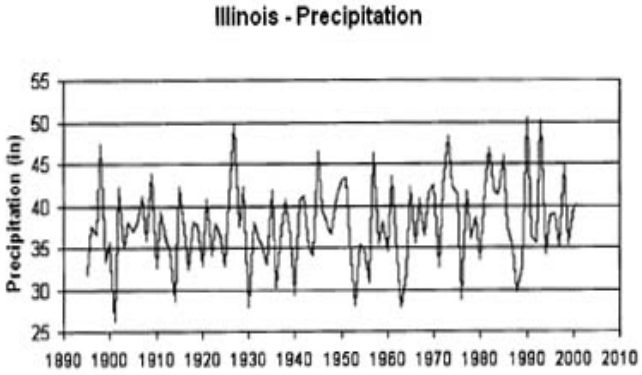
b. Table 3-6 has been updated to include information from 1948 through 2001.

c. See 4-2 f.

d. Figures 3-3, 3-4, 3-5 and 3-6 are used to demonstrate anticipated population growth for the period 1990 to 2015. Table 3-1 has been revised to the 2000 US Census results.

e. The CSAR does not try to document/track weather changes on a year-by-year basis. Weather variations due to atmospheric changes occur continually, however, historically weather in the location of GE-MO has not had a historical reversal or change. The information in Table 3-7 is used as a representative sample to compare 6 specific years to a 33-year average. While weather patterns may vary year to year, there hasn't been a dramatic shift in climate in Illinois in 100 years as demonstrated by the charts below.





f. The CSAR does not try to document wind changes year by year. Wind speed and direction variations due to atmospheric changes occur on a year-by-year basis, however, generally, over a period of time, wind direction and speed does not have a permanent change. As stated in CSAR 3.4.3.2, a detailed study of wind direction information was taken at Dresden NPP from 1971 through 1974, and then 1974 was selected as a representative sample.

g. Table 3-12 refers to a study of groundwater done in 1977 for a potential expansion of GE-MO. This expansion was not used and there are no current or foreseen plans to expand GE-MO.

h. CSAR Figure 7-1 revised to include current data.

4-3 Provide verification that the GE-MO facility is safe from flood damage in the event of a record flood in the Morris, Illinois area. Per Section 4.2.3.2 and Appendix A.6 of the CSAR, the potential flood evaluation is based on a 1970 study. Changing weather patterns in recent years have subjected much of the mid-western USA to both 100-year and 500-year record flooding.

This information is needed to support staff development of the EA.

Response - As stated in the CSAR, Section 3, paragraph 3.5.1.1, and Appendix A.6, potential flooding of the site is very unlikely. Site elevation at the plant location is higher than 532 ft. The normal pool elevation above the Dresden Island Dam is 505 feet. Neither of the record flooding events mentioned in the question above caused river water to flow over the Dresden Islan Lock & Dam located approximately .7 miles from GE-MO.

4-4 Provide water use requirements (gallons/day) for both pool make-up water and sanitary uses and the maximum output capacity of the well. Water for the fuel storage basin, closed loop basin filter and cooling systems, and for sanitary purposes is supplied from an on-site well. Continuous draw down on this well may impact available groundwater resources to the

surrounding area.

This information will be used to understand and develop the environmental setting for the Environmental Assessment and to support staff development of the EA.

Response - The only water that flows through the fuel basin filter and chiller system is drawn from the basins. Water usage at GE-MO for 2002 is listed below:
basin additions averaged 236.0 gallons per day
2002 sanitary and other water uses averaged 191.4 gallons per day
2002 total water usage averaged 427.4 gallons per day

4-5 Provide annual flow data from the gauging station at the Dresden Lock and Dam for the previous 10 years. This gauging station is the closest station to the site on the Illinois River.

This information will be used to understand and develop the environmental setting for the Environmental Assessment and to support staff development of the EA.

Response - Attached is flow data for the Dresden Lock & Dam for the previous 10 years. GE-MO doesn't take water from, or discharge water to the river. The Midwest has experienced floods classified as 100-year floods. The flood affected the entire Mississippi River basin and all tributaries. The Illinois River experienced record flood levels also. However, during the 100 year flood, neither Dresden NPP, nor Morris Operation was ever in any flood related danger. (See 4-3)

4-6 Provide information on the dates which the spray irrigation system was in operation, the volumes of waste water discharged through the system, and the chemical and radiological analysis of waste water piped to the irrigation system. NUREG-O695 "Environmental Impact Appraisal Related to the Renewal of Materials License SNM1265 for the Receipt, Storage and Transfer of Spent Fuel" (Ref. 8), indicates that discharged waste water from the on-site holding ponds was piped to a spray field irrigation system on GE-owned land onsite.

This information will be used to understand and develop the environmental setting for the Environmental Assessment and to support staff development of the EA.

Response - The spray irrigation system was never operated, and all of the equipment for it was never installed. Operation of this system required an Illinois EPA permit and one was never issued.

4-7 Provide information on the groundwater flow velocity and flow direction in the vicinity of the GE-MO site. Provide any available information on groundwater flow velocity and flow direction under the GE-MO ISFSI.

This information is needed to determine any potential impacts from site operations and to support staff development of the EA.

Response - Ground water information is referenced in CSAR Appendix B, Dames & Moore reports from 1975, 1977, 1993 and 1994.

4-8 Provide all the data from groundwater monitoring program at the GE-MO ISFSI. Groundwater monitoring has been performed at the GE-MO site since 1993. Monitoring data provides information on contaminants present in the groundwater and their movement.

This information is needed to determine any potential impacts from site operations and to support staff development of the EA.

Response - Results of ground water monitoring since 1993 are attached.

4-9 Describe the impacts on the groundwater due to operations at the Dresden Nuclear Plant site and what implications the presence of tritium in the groundwater might have on the environmental monitoring program at the GE-MO ISFSI.

This information is needed to determine any potential impacts from site operations and to support staff development of the EA.

Response - There are no perceived impacts on GE-MO ground water by DNPP. As can be seen from the ground water monitoring, activity in the ground water is minimal. Tritium levels are very low (IEPA allows 20,000 ppm in Illinois River). On the infrequent times when tritium does appear, it is in the <2kppm range.

4-10 Provide information (dates, quantities, locations, material released) for all reportable spills, releases, accidental discharges to the environment since the previous Environmental Impact Appraisal.

This information is needed to determine any potential impacts from site operations and to support staff development of the EA.

Response - There has been no reportable level of spills or releases at GE-MO since the last environmental report.

4-11 Provide information on the construction specifications (size, liner thickness, liner materials) for the sanitary waste and other holding basins.

This information is needed to determine if there are any potential environmental impacts from past or continued operations of these basins and to support staff development of the EA.

Response - The sanitary lagoon system is an Illinois EPA regulated and permitted activity. Copy of the current permit is attached. Construction specifications and as-built drawings are no longer available on site. The basins (primary and overflow) function as evaporation ponds, with no other means of release, and there is no release to ground water.

4-12 Provide the analytical data and results from the Holding Basins and Groundwater Supply Well sampling program.

This information is needed to determine any potential impacts from site operations and to support staff development of the EA."

Response - Results of holding basins and groundwater supply well sampling are attached.

4-13 Provide information on the potential man-induced events at nearby (5 mile radius) industrial facilities that have the potential to affect the safe and continued operation of the GE-MO ISFSI. Include supporting documentation for the statement in Section 3.3 of the CSAR *"Explosions or fires at 'nearby' industrial facilities would be too far away to have any influence on fuel storage."* Describe the steps taken by GE-MO to assure that plant workers would not be sickened or

disabled by smoke, vapor clouds, or aerosol releases from nearby facilities.

This information will be used to understand and develop the environmental setting for the EA, to determine any potential impacts from site operations, and to support staff development of the EA.

Response - The statement referenced in the question is misquoted. The statement in CSAR 3.3 reads "any influence on fuel *in* storage", not fuel storage as stated above. Table 3-3 of the CSAR lists industrial facilities near to GE-MO, none of these facilities are deemed to present a danger to the fuel stored as discussed in 3.3. If an emergency did occur that could affect personnel, such as a general emergency at DNPP, GE-MO would follow actions per the GE-MO Emergency Plan. Non-essential personnel would be evacuated and essential personnel could wear respiratory protection until the threat cleared. If an evacuation was ordered by the State, such as in the case of a general emergency at DNPP, GE-MO would follow actions per the GE-MO Emergency Plan, including establishing appropriate security measures with Sate or Federal authorities, and plans for reoccupation of the site as soon as permitted by State authorities.

In addition, per RAI Question 5-3, the site could be left unattended for at least 50 days. During this period, if evacuation was required per the above, appropriate Locan and/or State authorities would provide security for the GE-MO site.

SECTION 5 - GENERAL QUESTIONS

5-1 Provide an updated corporate organization. Chapter 9.0 "CONDUCT OF OPERATIONS" of the CSAR contains Figure 9-1, "GE Morris Operation relationship to the GE Corporate Offices." The relationship depicted in this figure is different from the reporting relationship described during the June 6, 2001 site visit by the NRC.

Title 10 CFR 72.70(a) states that each specific licensee for an ISFSI "... *shall update periodically... the final safety analysis report (FSAR) to assure that the information included in the report contains the latest information developed."*

Response - Figure 9-1, as stated in 9.2 is a depiction of the principal organization levels of General Electric Company. It is not intended to show every level of GE Management between the Manager, MO and the Corporate CEO.

5-2 Justify the calculated direct radiation dose (2.9x1 0-6 mrem) to the public from GE-MO's reported stack discharge of 3.18 I-ICi of Beta (13) emitting nuclides as stated in 7.3.3 of the Consolidated Safety Analysis Report.

Title 10 CFR 72.1 04(a) requires *"During normal operations and anticipated occurrences, the annual dose equivalent to any real individual who is located beyond the controlled area must not exceed 0.25 mSv* (25 *mRem)* ..."

Response - The 2.9 x 10^{-6} has been corrected and 7.3.3 of Section 7 corrected to read 1.1 x 10^{-6} mRem as calculated using the COMPLY computer code.

5-3 Provide justification, or clarify the time estimate, of 54 days for the basin water level to evaporate to the top of the fuel rods if no make-up water is supplied.

Title 1 0 CFR 72.24 requires the application contain sufficient technical information to support a finding that the ISFSI will satisfy the design basis with an adequate margin of safety.

Response - Attached is a copy of Basin Water Heat-up Rate Maximum Temperature and Time Required to Evaporate Down to Top of Fuel by J. D. Kesman, November 27, 2001. In addition, attached is a copy of a test performed at GE-MO where all support systems for the basins were shut down and water quality, radiation levels and water evaporation were measured. After 50 days, the basin water was still almost a foot above the License Tech Spec limit of 9 feet above the fuel.

5-4 Explain why the general licensing conditions given as Section 1.2 of Appendix A of the GE-MO license are missing from Chapter 10 of the CSAR.

Title 10 CFR 72.11 requires *"Information provided to the Commission … be complete and accurate in all material respects."*

Response - The general licensing conditions given in Section 1.2 of Appendix A of the GE-MO license had never been in Chapter 10 of NEDO-21326, however, they have been added with Revision 10.

5-5 Provide a reference or clarify the source for the equation used to estimate the gamma flux at the surface of the pool in Section 8.8.4.1 of the CSAR.

Title 10 CFR 72.24 requires the application contain sufficient technical information to support a finding that the ISFSI will satisfy the design basis with a margin of safety.

Response - CSAR Section 8.9 References -

5. Attenuation in Water of Radiation from Bulk Shielding Reactor: Measurements of the Gamma-Ray Dose Rate, Fast-Neutron Dose Rate and Thermal Neutron Flux, July 8, 1958 (ORNL-2518)

SECTION 6 - REVIEW OF PROPOSED AMENDMENTS 10 & 11

6-1 Provide justification for the relocation of specific surveillance requirements, limits, and frequencies from the TS to an in-house document titled "Morris Operations Compliance and Operability Tests." Section 4.0 of the approved TS contains surveillance requirements for the GE-MO ISFSI. Sections 4.1.1 through 4.10.1 identifies specific surveillance requirements, frequencies, and contamination limits for effluent air, waste water basins, sealed sources, instruments, coolers, process steam, cask coolant, and spent fuel storage basin water. These requirements are summarized in Table 4-1. The proposed Amendment 10 revision moves most of these requirements to in-house procedures.

Title 10 CFR 72.44(c)(1) requires a licensee to incorporate *"Functional and operating limits and monitoring instruments and limiting control settings."* in the TS. This RAI is necessary to help the staff assess how GE-MO intends to maintain regulatory compliance during the license renewal period and support the development of the SER and EA.

Response – The GE-MO Offsite Dose Calculation Manual, CSAR Appendix B-22, and CSAR Section 8.0 define that there is no credible accident scenario at GE-MO that can produce a dose to the public in excess of the limits specified on 10 CFR 72.104 or 10 CFR 72.106. The surveillances now contained in CSAR Section 10.4 are included to provide assurance that inspections and other activities to providing proof of specification compliance are described. The details of how these surveillances are performed and specific reportability limits have always been, and continue to be described in GE-MO specific compliance and operability tests defined in Standard Operating Procedures. Table 4-1 was only a summary of the surveillances. SOPs require review and approval of the Safety Committee.

6-2 Provide additional justification for replacing basin water pH measurements with conductivity. Section 4.8 of the approved TS specifies the basin water shall be maintained as follows: pH = 4.5 to 9.0; $NaNO_3$ less than 200 ppm; and Cl- less than 10 ppm.

The proposed revision in Section 4.8 of Amendment 10 revised pH limit to read *"pH* = 4.5 *to 9.0 or equivalent conductivity measurement less than* 2.5 μ*Mho/cm."* Limits for $NaNO_3$ and Cl- remain unchanged.

The proposed revision in Section 4.5.1 of Amendment 11 eliminates the pH requirement for water chemistry and replaces it with a conductivity measurement of less than 2.5 μMho/cm. Limits for $NaNO_3$ and Cl- remain unchanged.

The NRC staff has reviewed the report by L. L. Denio and does not agree with its conclusions. In brief, the L. L. Denio report makes the assumption that the concentration of Cl- and H+ ions in the basin are equal and are the only electrolytes impacting the basin conductivity. This assumption cannot be conclusively demonstrated and the calculations based on this assumption are potentially erroneous.

Conductivity in any solution is the product of the sums of the individual conductivity of each electrolyte. The GE-MO calculation used to correlate pH and conductivity makes the assumption that the only electrolytes in solution are the Cl- and H+ ions, yet the discussion refers to the presence of dissolved CO_2 in the basin water and the current license allows up to 200 ppm $NaNO_3$ and a maximum of 10 ppm Cl-. Both the CO_2, in equilibrium with atmospheric pressure, and a concentration of 200 ppm $NaNO_3$ would provide a much larger concentration of

electrolytes, and hence a larger conductivity, than the minimal quantities (1 x1 0-5) of H+ and Cl- ions used to establish the conductivity limit of 2.5 μMho/cm. Therefore, the use of conductivity as a measure of pH cannot be relied upon given the presence of $NaNO_3$ and equilibration of basin waters with CO_2 and other atmospheric gasses.

Response - The basin water at GE-MO is kept very pure and purity has been maintained using an upper limit of 2.5 μmho/cm for conductivity. If the 2.5 μmho/cm limit was exceeded, it would likely be because of a source of contaminants in the basin water. In this case, a broader range of tests and evaluations would be performed to determine the cause and type of contaminants. With Amendment 12 of SNM-2500, the conductivity limit has been changed to less than 1.35 μMho/cm and the requirements for $NaNo_3$ and Cl have been eliminated. The below listed documents including 72.48 review is attached to SNM-2500 Amendment 12.

1. **Letter from C. A. Roche to GE-MO Safety Committee dated July 28, 2004, "Justification for Updating Basin Chemistry Technical Specifications.**
2. **Letter from L. L. Denio to GE-MO Safety Committee dated February 16, 1996, "Justification for Assuming Equivalency Between Conductivity and pH"**
3. **Letter from R. A. Morgan to GE-MO Safety Committee dated February 8, 1996**
4. **Fax from Tom Dawkins, Bekman Instruments describing how to measure pH in High Purity Water.**
5. **Culligan Bulletin File No. CI-9443, Dated December 21, 1994 on Deionized Wayer – Its Quality and pH.**
6. **Culligan Bulletin File No. CI-9506, Dated February 15, 1995 on Deionized Water – Its Quality & pH: Part II with Culligan supplied attachment describing pH measurement**
7. **Culligan Technical Applications Bulletin No. DI-111, dated 1/76 on High Quality Water – pH and Specific Resistance.**
8. **Ultrapure Water, the Definitive Journal of High Purity Water, Volume 6, Number 5, dated July/August 1989**
9. **Ultrapure Water, the Definitive Journal of High Purity Water, Back to Basics, Measuring pH in High-Purity Water, dated October 1994**

6-3 Justify the deletion of staff qualifications from the TS. Section 6.2.2. of the approved TS details the minimum qualifications (education, specialized knowledge, and years of experience) for members of the staff, including Manager - Morris Operations, Manager - Plant Operations and Maintenance, and Manager - Plant Services. The proposed revision in Amendment 10 states that these positions are described in specific GE and GE-MO corporate position descriptions.

Title 10 CFR 72.28(c) requires a description of the operating organization, delegations of responsibility and authority, and minimum skills and experience levels for various staff positions. Additionally, 10 CFR 72.190 requires operators and supervisory personnel be certified in the operation of the equipment. In light of these regulatory requirements, the staff needs additional information on how GE-MO qualifies its operators and supervisory personnel and how GE-MO intends to demonstrate regulatory compliance during the license renewal period.

Response - The staff qualifications that existed in Amendment 9 only described 3 positions at GE-MO. Having specific position titles/descriptions in the license requires a revision every time a position title changed. Amendment 12 references the staff organization chart and description of responsibilities contained in the CSAR, Section 9. Specific qualification requirements are detailed in individual GE-MO Human Resources position

descriptions. In addition, personnel changes and qualifications are transmitted to NRC Region III for review.

Attached is GE-MO Morris Operating Instruction (MOI) 606, MO Operations Training Program, Revision 14, dated 04-09-01, describing the operator training program.

6-4 Justify deleting the position descriptions for members of the Plant Safety Committee from the TS. Section 6.4.1. of the current TS states that the Plant Safety Committee will consist of members from the following positions:

a. Manager - Morris Operation
b. Manager - Plant Operations and Maintenance c. Manager - Plant Services
d. Plant Operations Engineer
e. Maintenance Engineer
f. Safety and Security Engineer

The proposed revision in Amendment 10 allows the GE-MO Manager to name the committee members and moves the description of the committee members to the Safety Committee operating procedures.

The Safety Committee is responsible for safety evaluations and, as such, must be technically qualified to review issues brought before it. Identification of the members and qualifications of the Safety Committee helps assure the NRC that potential safety concerns are reviewed by knowledgeable individuals. The proposed revision to the TS does not identify any member of the Safety Committee or provide information as to the qualifications or knowledge base of the committee. The NRC staff needs additional information on the qualifications of the Safety Committee members and how GE-MO plans to maintain committee qualifications during the license renewal period.

Response – Having these positions by Title listed in the license requires a license Amendment anytime a position title changes. Virtually every member of the Management/Supervisory staff at GE-MO is on the Safety Committee resulting in a very stable membership. Personnel changes are described in 6-3 above. The Safety Committee members are depicted in the CSAR, Section 9.0, Figure 9-2, GE-MO Organization Chart. Reorganizations, should they occur, require a revision to the CSAR Section 9.0, with submittal and justification to NRC.

Attached is GE-MO MOI 904, Revision 12, dated 11-19-97, Safety Committee, describing the GE-MO safety committee responsibilities and members.

6-5 Provide additional justification for removing root-cause-of-failure identification and corrective action development from the TS. Section 6.5.2.d. of the TS requires the Plant Safety Committee to identify the cause and define actions to eliminate or reduce the frequency of noncompliance situations that occur more than once in 3-months or twice in 12-months. The proposed revision in Amendment 11 eliminates the requirement for root-cause evaluation and corrective actions. Title 10 CFR 72.172 states: *"In the case of* a *significant condition identified* as *adverse to quality, the measures must ensure that the cause of the condition is determined and corrective action is taken to preclude repetition."* This information will assist the staff with its evaluation of the aging management system for the license renewal period and development of the SER and EA.

Response - The specific SOPs (Compliance & Operability Tests) detail review and reporting requirements based on the required test. A compliance test that does not pass, as required in 6.5 for each condition, requires notification to the Safety Committee. Each non-conforming compliance test result and its degree of impact is individually reviewed

The 10 CFR 72.172 reference to conditions adverse to quality is detailed in NEDE-31559, Morris Operation Quality Assurance Plan, Section 16.0, Corrective Actions, dated April 1998 and approved by NRC on August 8, 2000. This is where the requirement is most logically placed, not in license TS.

6-6 Justify the deletion of the requirement for NRC notification of surveillance requirement violations. Section 6.5.3.c. of the TS states that notification of NRC Inspection and Enforcement Regional Office, Region III, shall be made at the time of the next inspection, advising them of events that resulted in a surveillance requirement being violated. The proposed modification in Amendment 11 has deleted this requirement.

Response - Specific notification time to NRC for noncompliances described in Section 6.5 are described in 6.5.1(c) and 6.5.2(c). The deleted requirement 6.5.3(c) is only an information notification for the NRC Region III inspector during the visit and doesn't fulfill any regulatory requirement.

6-7 Provide additional justification for deleting the environmental monitoring program specifics from the TS. Section 8.1 and Table 8-1 of the existing TS describe the environmental monitoring program and identify specific sample mediums, collection sites, types of analysis, and frequencies for monitoring the environment around the GE-MO ISFSI. The proposed modification in Amendment 10 has deleted this information and allows changes in the program based on historic experience.

Title 10 CFR 72.44(c) & (d)(2) requires each licensee to include a description of the environmental monitoring program in the TS to ensure compliance with the technical specifications for effluents. In addition, historical trend analysis allows the identification of changes in the environment caused by man-made or natural events not directly associated with operation of the ISFSI. Revising the environmental monitoring program on the basis of historical information may enhance the facility's performance monitoring but the program should be clearly identified in the TS to assist the staff with the development of the EA for the license renewal period.

Response - Off-site Dose Calculation Manual is included in Appendix B22 of the CSAR. This manual presents methods for calculating doses to members of the public from releases of radioactive material from GE-MO and is the justification for deleting the environmental monitoring program specifics from the TS. Included in the SNM-2500 Amendment 12 was also a copy of the Off-Site Dose Calculation Manual and a 72.48 Justification for Change to the MO Environmental Monitoring Program by L. L. Denio, dated August 31, 1994.

SECTION 7 - REVIEW OF GE MORRIS OPERATION DECOMMISSIONING COST ESTIMATE

7-1 Reconcile the total decommissioning cost estimate in the Decommissioning Plan submitted by GE Morris with the cost estimate submitted by General Electric Company in its Self-Guarantee of Financial Assurance for Decommissioning.

GE Morris submitted a decommissioning cost estimate of $22,265,000 in its Decommissioning Plan, dated May 5,2000. However, GE Nuclear Energy submitted a decommissioning cost estimate of $31,314,000 for the GE Morris facility in a SelfGuarantee of Financial Assurance for Decommissioning dated March 16, 2000. In addition, by letter dated March 20, 2003, the Corporate Environmental Programs division of General Electric submitted a revised Self-Guarantee, which included a cost estimate of $37,900,000 for the GE Morris facility.

The dates of the cost estimates submitted with the Self-Guarantees of financial assurance bracket the date of the GE Morris estimate, but each of the Self-Guarantees estimate a higher cost than GE Morris.

Therefore, the licensee must reconcile the differences between the cost estimates submitted for the GE Morris Operation to demonstrate compliance with 10 CFR 72.30.

Response - The decommissioning estimate submitted in Section A.7 of NEDO-21326D9 (CSAR) is essentially a re-submittal of the estimate submitted as part of the previous license renewal. This estimate was not adjusted for inflation or other factors. As GE meets the requirements of 10CFR30 Appendix C "Criteria Pertaining to Use of Financial Tests and Self Guarantees for Providing Reasonable Assurance of Decommissioning", personnel preparing the license renewal application considered the use of the previous estimate acceptable.

GE separately updated its Self-Guarantee of Financial Assurance for Decommissioning (dated March 16, 2000) as part of the annual submittal for decommissioning assurance. This update adjusted the overall cost estimate based on inflation.

Due to the implementation of Statement of Financial Accounting Standards No. 143 (SFAS 143), which became effective January 1, 2003, GE modified its calculation of decommissioning obligations consistent with the new rule.

The new decommissioning estimate was developed following the guidelines of SFAS 143 and Statement of Financial Accounting Concept No. 7, *Using Cash Flow Information and Present Value in Accounting Measurements* ("CON 7").

Cost estimates for decommissioning each site are provided based upon a) inputs from third party contractors who undertake decommissioning, b) actual historical costs observed from internal efforts, and c) approved existing estimates.

Labor costs are based on estimates provided by third party contractors that have worked or bid on work at GENE locations.

Burial Costs are calculated based on prices quoted from existing operational burial sites.

Transportation costs are based on actual costs incurred by GENE, using third party contractors for the transportation of waste.

In accordance with SFAS 143 guidance, the current decommissioning estimates are adjusted by the expected inflation factor to determine what the decommissioning costs would be in the future at the time of decommissioning.

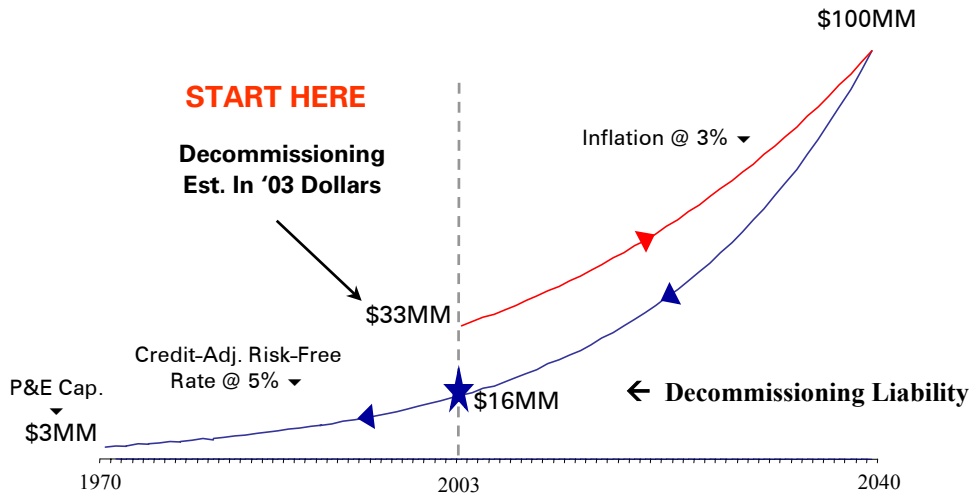
GE Models used inflation rates as published in a third party report on cost escalation and interest rates on the Department of Energy's ("DOE") Technical Studies & Reports website *[Civilian Radioactive Waste Management System, Management and Operating Contractor, Cost Escalation and Interest Rates, TDR-CRW-SE-000019 REV 00, October 2001, prepared for US Department of Energy, Office of Civilian Radioactive Waste Management.].* The decommissioning estimate is based upon an assumed inflation rate, specific to nuclear cleanup cost, calculated based on the S&P's DRI-WEFA. According to the DRI-WEFA data, the long-term inflation rate is estimated to be 3.38%.

The decommissioning estimate used cost contingencies of 25% consistent with previous estimates. In addition, GE also obtained estimates regarding contingencies from a nuclear experienced third party contractor.

The liabilities of GENE are guaranteed by its parent company, GE. Therefore, the appropriated rate for discounting the future cost estimates to the present value at all GE sites, is the credit-adjusted risk-free rate of GE. As of the Valuation Date, GE was rated AAA by S&P, Fitch, and Moody's rating agencies. GENE used the yield on GE's unsecured debt issues that were publicly traded in the US market, as a proxy to estimate the credit-adjusted risk-free rate.

The date of decommissioning of the Morris facility depends upon the completion and operation of the Yucca Mountain facility or an alternate developed by the U.S. Government. For the purposes of the decommissioning estimate, a date of 2025 was used.

An example of the model used is provided below. This is representative of the model only and does not incorporate Morris-specific assumptions.



7-2 Identify radiological criteria for license termination used as the basis for the decommissioning cost estimate.

Section A.7.2.2, Performance Objectives, states that the objective of the licensee's Decommissioning Plan is to reduce residual contamination on exposed surfaces of site structures and components to permit unrestricted use, or to *"entomb on-site if such action is ... accepted by regulatory authority."*

Rules for radiological criteria for license termination were issued on July 21, 1997. Under those provisions, a licensee must meet radiological criteria defined as unrestricted use, restricted conditions, or alternative criteria (10 CFR 20 Sections 20.1402,20.1403, and 20.1404). There is no provision to *"entomb on-site'.*

Consequently, the licensee's Performance Objective must be revised to correspond to the regulatory criteria of Subpart E of 10 CFR Part 20.

In addition, the cost of decommissioning can be significantly affected by the license termination criteria selected by the licensee.

Therefore, the licensee must identify the radiological criteria for license termination, consistent with Subpart E of 10 CFR Part 20, that were used as the basis of its cost estimate, and, if necessary, revise the cost estimate to reflect the costs of meeting the criteria used as the basis.

Response - Section A.7.2.2 states the primary objective is to decontaminate the site to a point where continued USNRC licensing is no longer required. The discussion includes the potential that some residual radioactivity may be left behind assuming such as decision is determined to be protective of the public's health and safety and is approved by appropriate regulatory authority. The basis for the decommissioning estimate assumes unrestricted release, however, it is appropriate to acknowledge other options that may be considered.

7-3 Update the cost estimate to reflect 2003 costs.

The Decommissioning Plan states that the cost estimate is based on:

i) General Electric 1992 manpower rates for onsite work, and
ii) 1996 costs of shipping containers, transportation fees, and burial charges for disposal of low-level waste.

The costs submitted by the licensee are six to ten years old. However, NRC guidance (NUREG-1727, Appendix F, page F27) recommends that costs be updated at least every five years. Adjustments should be made to account for inflation, other changes in the price of goods and services, changes in facility conditions or operations, and changes in expected decommissioning procedures. The cost estimate, as submitted, does not appear to have updated the costs from the dates identified in the Decommissioning Plan.

The Decommissioning Plan states that low level waste will be disposed in the Midwest Compact Commission disposal site. However, that disposal site has not opened, and no date can be predicted when such a disposal site will be available. The licensee must revise its waste disposal costs to include the cost of packaging, transport to, and disposal in an existing waste

disposal site.

Therefore, the licensee must update its decommissioning cost estimate to include current prices for labor, goods, and services used for decommissioning to demonstrate compliance with 10 CFR 72.30.

Response - See response to 7-1 above.

7-4 Include an additional amount in the cost estimate to provide for an independent third party to assume responsibility for decommissioning the facility.

The Decommissioning Plan states that decommissioning tasks will be carried out by GE personnel, contractor personnel, or a combination of both. The Decommissioning Plan states further that General Electric 1992 manpower rates were used to calculate the costs for onsite work.

However, NRC regulatory guidance states that the cost estimate should be based on costs sufficient to allow an independent third party to assume responsibility for decommissioning the facility (NUREG-1727, Section15.1). This will provide sufficient funding to permit completion of decommissioning if the licensee is unable to do so. To assure that the funds are sufficient, the cost estimate must include costs for overhead and contractor profit, not simply the direct labor cost. In contrast to NRC guidance, the licensee's cost estimate does not identify any provisions for overhead and contractor profit costs.

Therefore, the licensee must revise its cost estimate to include additional amounts to cover overhead costs and contractor profit to provide sufficient funds for an independent third party to assume responsibility for decommissioning the facility to demonstrate compliance with 10 CFR 72.30.

Response - See response to 7-1 above.

7-5 Include a description of the means used to adjust the cost estimate and associated funding levels over the life of the ISFSI.

Title 10 CFR 72.30(b) requires the licensee to include information regarding the means used to adjust the cost estimate and associated funding levels over the life of the ISFSI. However, the licensee's Decommissioning Plan does not contain such information.

Therefore, the license must include information regarding the means used to adjust the cost estimate and associated funding levels over the life of the ISFSI to demonstrate compliance with 10 CFR 72.30.

Response - See response to 7-1 above.

7-6 Include the cost of the final status survey in the estimate.

The cost estimate does not specify the cost of the final status survey for license termination. However, NUREG-1727 (Section 15.1.1) states that the cost of the final status survey is a major activity whose cost should be included in the estimate.

Therefore, the licensee must include the cost of the final status survey in the estimate to demonstrate compliance with 10 CFR 72.30.

Response - The estimate prepared in response to SFAS-143 includes both the labor necessary to perform the final status survey and the cost associated with sample analysis at an independent laboratory.

ATTACHMENT INDEX

Section 1 – Identification of SSCs Subject to Aging Management

Description

No New Attachments at This Time

Section 2 – Aging Effects for Identified SSCs

Description

No New Attachments at This Time

Section 3 – Monitoring and Maintenance Programs

Description

No New Attachments at This Time

Section 4 – Environmental Changes

Description

No New Attachments at This Time

Section 5 – General Questions

Question	Description
5-3	Fuel Basin Water Evaluation: Conductivity Change and Evaporation Rate May 2004 thru June

Section 6 – Review of Proposed Amendments 10 & 11

Description -

No New Attachments at This Time

Section 7 – Review of GE Morris Operation Decommissioning Cost Estimate

Tab No. Description

No Attachments at This Time

FUEL BASIN WATER EVALUATION:
CONDUCTIVITY CHANGE and EVAPORATION RATE

(05/05/04 thru 06/24/04)

Author: T. D. Maikoff

Purpose

A physical test was performed in the GE Morris Operation (GE-MO) Fuel Basins to determine how long the Basin Water could perform its safety function without the aid of any support systems operating, and devoid of any License Specification infractions.

Initial Conditions

Prior to commencing the test, baseline temperature and conductivity readings were taken at various locations in both fuel basins, transfer isle and unloading pit (see attached fuel basin map). Data was also recorded at three different elevations in each of those locations.

Elevation[1] (feet)	45	35	25	5
Distance above basin/transfer isle floor	23' 6"	13' 6"	3' 6"	n/a
Distance above unloading pit floor	45'	Not recorded	25'	5'

[1] Zero (0) foot elevation corresponds to the bottom of the unloading pit.

The initial readings revealed consistent results of equal temperature and similar conductivity at all locations where data was taken. This indicates there is uniform mixing of basin water in all locations. Numerically, the initial basin water temperature was 77°F with a mean conductivity reading of 1.06 ±0.05µmho/cm.

The basin support systems, utilized to maintain basin water temperature and water quality, were shut down. Specifically both basin evaporator chiller units and their respective chiller (circulation) pumps and the basin filter system.

The Basin Leak detection system was left in operation so it could be monitored independently of the ongoing basin study. To better simulate loss of all support systems the basin leak detection system pumpout was realigned to a holding tank.

To guarantee there would be no violation of any license requirements, one of the plant ventilation exhaust blowers was left in operation to insure there was positive air flow through the sand filter and out the stack.

Evaluation

For the purpose of this evaluation, figures have been provided depicting the elevations of components within the fuel basin and the locations where conductivity and temperature measurements were taken.

Additionally provided information include; bar graphs depicting basin conductivity, level and temperature for the basin water at the beginning of the test and the last day of the test as well as line graphs depicting same information for entire duration of test.

Fuel Basin Conductivity

For comparative purposes, all the conductivity readings for all locations were averaged to get the mean conductivity for each day. The greatest variance observed between all locations where data was taken was only 0.02μmho/cm.

As basin water temperature increased conductivity decreased (from 1.06μmho/cm) at an average rate of 0.013μmho/cm per day for the first nineteen days down to 0.81μmho/cm. For the next twenty-one days, conductivity increased at an average rate of 0.012μmho/cm per day. During the final ten days of the test slightly less than a 0.02μmho/cm per day increase in conductivity was observed. The highest conductivity (1.23μmho/cm) was measured on the forty-ninth day, the day before the conclusion of the test. The average conductivity at the conclusion of the test, day fifty, was 1.22μmho/cm.

Fuel Basin Level (See Figure 1 depicting various basin elevations)

At the start of the test, Basin level was recorded to be at the 50'el. which is the normal operating level of the basin water. Level decreased about 0.1"/day for the first 6 days. The next 9 days increased in even increments until the level was decreasing almost an inch a day. Level continued decreasing slightly less than an inch per day for the next 16 days. For the final 19 days basin level decreased slightly more than an inch per day. At the end of fifty days the final basin water level was at the 46' 9" elevation mark having dropped a total of 3' 3". The final level was still more than six inches above the licensing requirement that the basin level cannot be less than 9' above the upper most portion of the fuel bundle.

Fuel Basin Temperature

Normal basin water temperature is maintained at 77ºF±2º and basin temperature was 77ºF at the start of the test. During the first seven days, basin temperature increased at the rate of three degrees a day. The next twelve days temperature in rose on the average of slightly over one degree per day, followed by twenty one days where temperature was increasing a little less than one-half (0.5) degree daily. For the final ten days of the test there was no temperature change and the basin remained at a constant 123ºF.

Decay heat from the spent fuel was calculated to be approximately 847,000 Btu/hr.

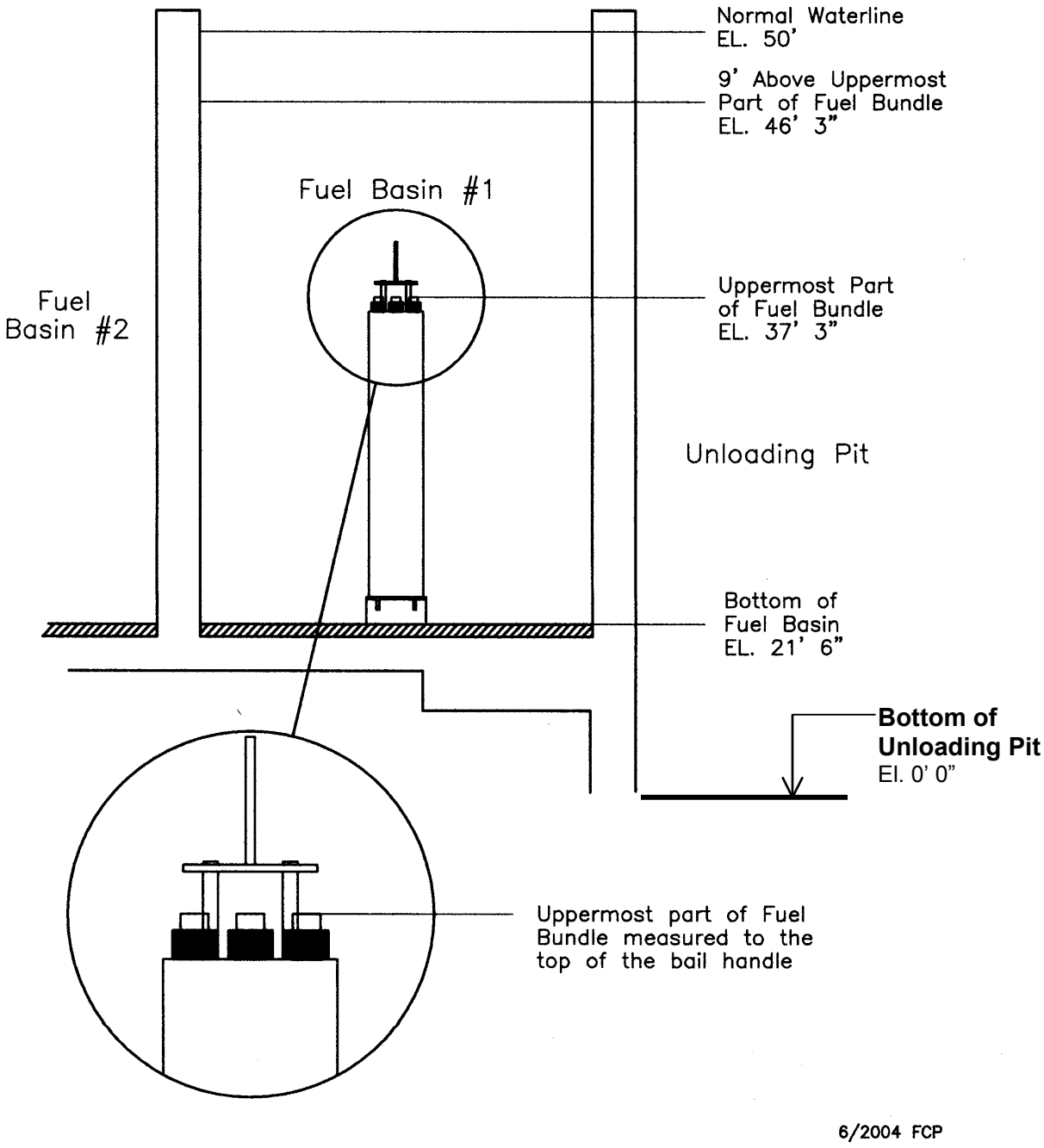
Summary

A review of the data presented proves the GE-MO Fuel Storage Basins can fulfill their intended function of maintaining water conductivity and level without violation of any license specifications for a minimum of fifty days without any support system in operation.

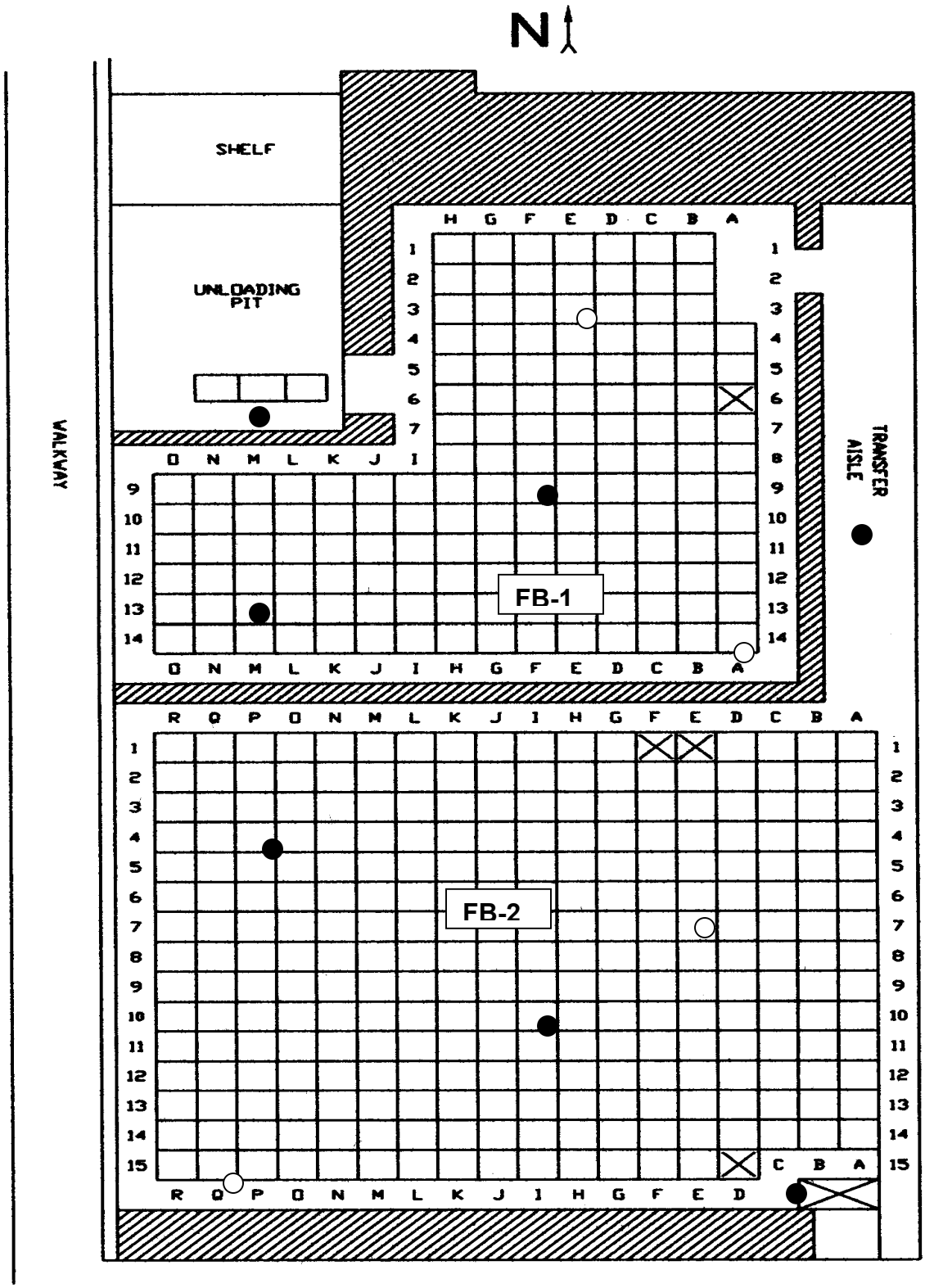
An important point to emphasize here is that basin temperature and conductivity readings, without any support systems operating, were fairly consistent at all locations in the basin for a particular day, throughout the entire testing period. This proves that there is a constant natural circulation of basin water and all equipment in the basin is exposed to water of the same quality and temperature.

In closing, it must be re-emphasized that the results illustrate there is still a comfortable margin past the fifty day mark, upwards to an additional ten days, before the basin water level reached the license specification elevation of 46' 3".

Figure 1
Basin Water Elevations
for Condutivity Test
May–Jun 2004



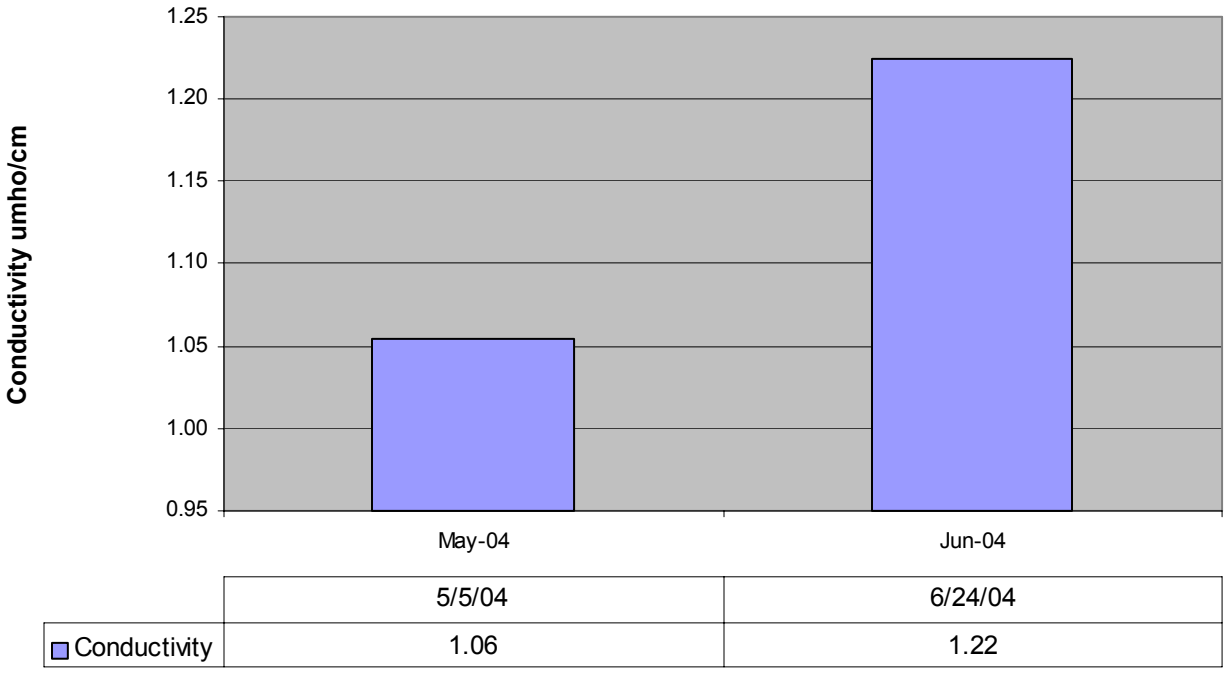
Fuel Basin Map



Legend: ● Denotes location where conductivity probe is lowered for data (7 places)

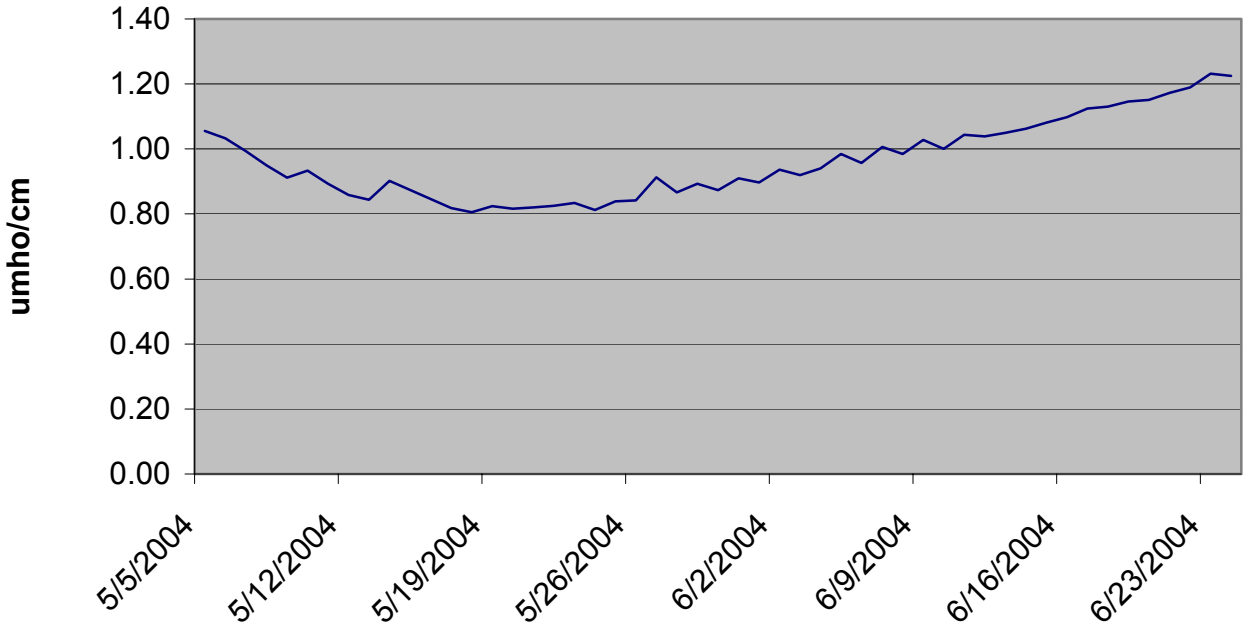
○ Denotes additional locations to take data at conclusion of test.

Basin Start/Finish Conductivity

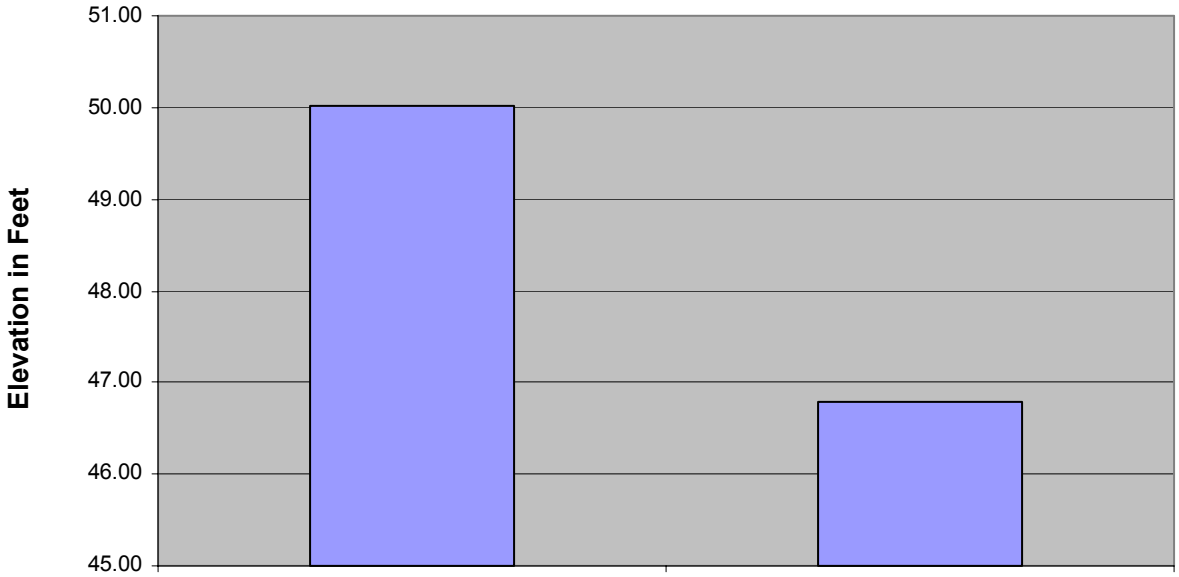


	5/5/04	6/24/04
Conductivity	1.06	1.22

Basin Average Conductivity

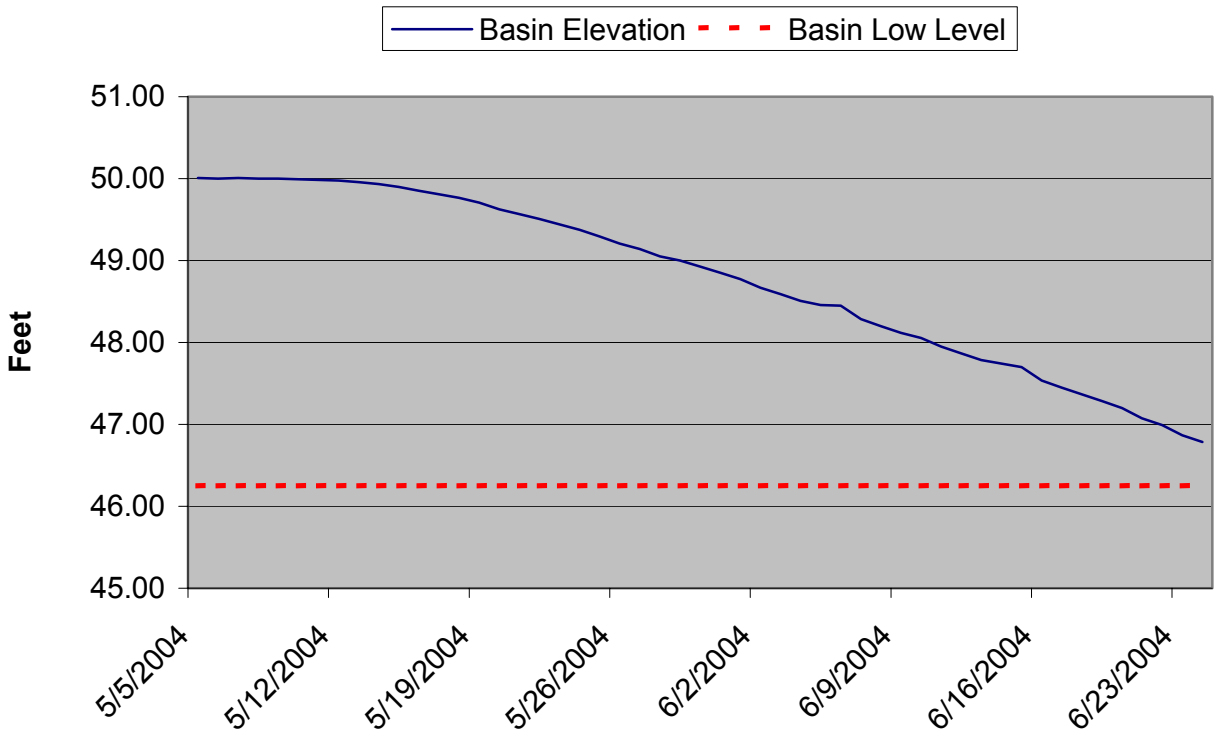


Basin Start/Finish Level

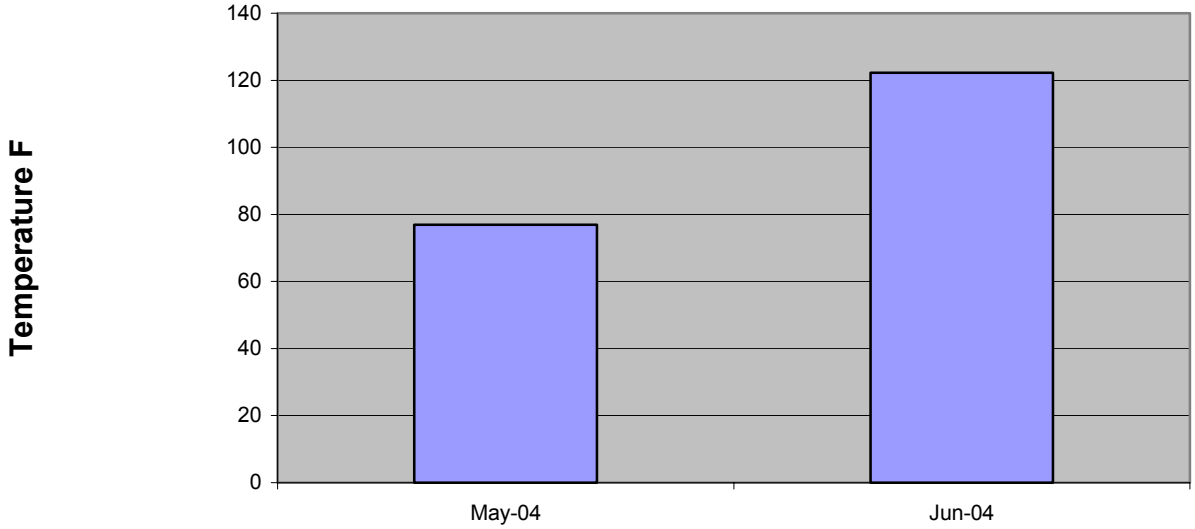


	5/5/04	6/24/04
Level	50.01	46.78

Basin Elevation



Basin Start/Finish Temperature



	5/5/04	6/24/04
Temperature	77	122

Basin Average Temperature