PDR - Project M-4

STONE & WEBSTER ENGINEERING CORPORATION

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May 23, 1979

Mr. Donald W. Connor
Senior Analyst
Division of Environmental Impact Studies
Argonne National Laboratory
9700 South Cass Avenue
Argonne, IL 60439

Dear Mr. Connor:

We are pleased to provide the enclosed description and related cost estimate for the Stone & Webster Engineering Corporation Independent Spent Fuel Storage Installation as requested by your letter of May 22, 1979. We consider that this concept for at-reactor storage of spent fuel is not only viable but offers the only storage concept approved as referenceable by the NRC. This option may provide additional storage capacity one year earlier than alternatives due to the availability of the conceptual design and referenceable topical report.

It is our understanding that this information may be used by ANL in completing the Final Generic Environmental Impact Statement (FGEIS) on Handling and Storage of Spent Light Water Power Reactor Fuel. Stone & Webster provides this information on the condition that it be used exclusively for the preparation of the FGEIS.

Very truly yours,

W. G. Culp
Project Engineer

Enclosure

WGC:mrs

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STONE & WEBSTER ENGINEERING CORPORATION
INDEPENDENT SPENT FUEL STORAGE INSTALLATION

The Stone & Webster Independent Spent Fuel Storage Installation (ISFSI) can be located at existing nuclear plant sites to permit the extended storage of nuclear reactor fuel in excess of available capacity. This facility will allow the continued operation of nuclear power plants until U. S. Government decisions are made regarding nuclear fuel reprocessing and/or permanent disposal. Three ISFSI conceptual designs have been completed. The Stone & Webster Topical Report SWEC 7601 describes the 1,300 metric ton uranium design in detail. The design criteria used in all three designs meet or exceed the proposed 10CFR72.

The capacity of ISFSI is dependent on the size of the units it will serve, the unit capacity factor, refueling cycle, and other factors. For a typical two-unit 1,200 MWe PWR recently in operation, a 1,400 metric ton uranium ISFSI is adequate to handle storage until the year 2020. If ultimate disposition is available by 2000 or if only one unit is involved, a 700 MTU ISFSI is adequate.

The ISFSI is a rectangular 120 ft wide by 140 ft long reinforced concrete structure. The roofs of the shipping bay, pool, and auxiliary bay are 71, 55, and 30 ft above grade, respectively. Freestanding storage racks support the spent fuel underwater in a 40 ft deep stainless steel lined pool. The pool is identical in function to the pools in the parent nuclear power plant. The design accommodates PWR or BWR fuel or a combination.

The ISFSI design is based on siting at existing reactor sites to accommodate excess spent nuclear fuel from onsite reactors. If transhipment is allowed, individual or multiple ISFSIs may be used to accommodate excess fuel for individual or groups of utilities. The ISFSI concept utilizes about one acre of land within the existing exclusion area and takes advantage of the parent facility administrative, operational, and security staffs. ISFSI also utilizes existing site access roads and railroads, power supplies, fire protection, communications, makeup, and sewage treatment facilities.

ISFSI may further utilize excess capacity in the parent plant nonsafety related cooling systems and solid radioactive waste system. Alternatively, these latter two interfaces can readily be eliminated by augmenting the ISFSI design with small roof-mounted cooling towers and radwaste solidification equipment.

The design is based on 0.3 g Safe Shutdown Earthquake (0.25 g is allowed by the proposed 10CFR72) and an envelope of subgrade charateristics (soil to rock). The ISFSI design is tornado protected and is assumed to be sited above flood waters although cooling can be interrupted for several days without safety problems. The pool itself is designed to Category I standards, and other areas and equipment are nonsafety related.

The ISFSI concept minimizes environmental interfaces. The concept does not create a new land use since it relies on available land within a typical 1,000 acre nuclear site. In many cases, this land may be already cleared and graded and may be in use for parking or laydown areas left from construction.

Transportation of fuel offsite is minimized and may be eliminated during the ISFSI loading phase. The ISFSI utilizes existing facilities and manpower resources to the maximum extent practical to reduce operating costs. The site environment has already been analyzed for the existing plant. The small increment of releases associated with ISFSI is well within the range of releases assumed in the licensing of existing sites and is below the existing limitations of plant technical specifications. The makeup water requirements are very small compared with the parent facility requirements typically requiring only 30 gpm. Liquid and solid radioactive wastes are processed and up to 600 cu ft per year of solidified wastes may be generated when the installation is filled to capacity. A total of 750 ft^3/yr of compressible and incompressible waste may be generated. No significant quantity of nonradiological solid waste is generated during operation of the installation. The ventilation exhaust may contain very small amounts of radioactivity. An estimated 920 ci/yr of the noble gas Kr 85 may be released which is a factor of approximately 1,000 above other ISFSI releases and a factor of 6 below design release rate of Kr 85 in a standard 1,300 MWe plant.

The total order of magnitude capital cost for a 1,400 MTU ISFSI is $24.4 million ($3/79) based on a 30-page bill of material quantity estimate. The operation of ISFSI is expected to require one operator and security guard during normal operation and seven other personnel during cask handling operations. The additional personnel for cask handling are assumed to be available from the parent facility staff. No estimates of decommissioning costs have been made but are expected to be minimal.

To date, no utility has contracted to build an ISFSI due in part to the stated policy of the government to procure storage space and charge a one-time fee for interim storage and ultimate disposal. The alternatives being studied to fulfill this policy require legislative and licensing approval. The lead times associated with these activities, in addition to the construction time, emphasize the need for at least some first increment of ISFSI storage.

INDEPENDENT SPENT FUEL STORAGE INSTALLATION