



STATE OF SOUTH CAROLINA

Governor's Nuclear Advisory Council

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Trip Report: Inspection and Current Status of the Cancelled Barnwell Nuclear Fuel Plant (BNFP) built by the Allied-General Nuclear Service Co. (AGNS)

Authors: Rick Lee, Chairman
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Introduction:

The President's Executive Order of May 25, 2025, required the Department of Energy to evaluate nuclear fuel reprocessing efforts for DOE and DOD reactors. As a follow up to that initiative, GNAC Chairman Rick Lee and Nuclear Industry GNAC member, Jim Little, elected to perform an inspection of the cancelled BNFP in Barnwell, SC.

The BNFP was completed in the mid-1970s and is more than 50 years old. The BNFP was constructed by a consortium of Allied Chemical, Gulf Oil and Royal Dutch Shell who formed the operating company known as Allied Gulf Nuclear Services (AGNS). Construction began in the early 1970s and was completed around 1976. The plant was designed to reprocess 1500 metric tons of spent nuclear fuel per year but was closed following a complete reversal of government policy by the Carter Administration in 1977 before the BNFP ever commenced commercial operation. Because the reprocessing of spent fuel generates a stream of purified plutonium as well as purified uranium, the concern by Carter was that plutonium could produce a source to support nuclear weapons proliferation and should be kept out of the commercial fuel cycle. The BNFP was designed to recover the 90% of the energy which remains in spent nuclear fuel.

As a result of the closure, AGNS sued the Federal Government for \$500 Million to avoid bankruptcy.

In today's dollars the construction cost for the BNFP was somewhere between \$2.7 billion and \$3.85 billion. Some research activities on nuclear fuel reprocessing were performed prior to the plant being closed. There are some limited areas of the plant which are inaccessible due to possible radioactive material exposure.

In the interim since the BNFP plant was closed, China, France, Japan Russia and the United Kingdom have all developed the tools to recycle spent nuclear fuel. In the

absence of a domestic commercial reprocessing facility to extract valuable residual uranium and generated plutonium, the United States had long pursued a plan for a federal repository for spent nuclear at the Yucca Mountain repository, but the Obama Administration reversed national policy and abandoned the \$15 billion dollar project.

Today, spent nuclear fuel from commercial reactors remains stored at originating reactors while awaiting a final solution. It is estimated that a total of over 90,000 tons of spent fuel is currently being stored at nuclear reactors across the United States. According to the Atomic Energy Act of 1954, the United States Government takes title to spent nuclear fuel and is now paying more than \$750M to the utility companies for storage costs each year. This annual expenditure will grow as more spent fuel is generated by the reactor fleet and continue until a permanent solution is established. The US DOE estimates that the spent fuel storage liability for the US Government is as much as \$44.5 billion.

Following closure and decommissioning, the BNFP site was conveyed to the Southern Carolina Alliance which has been trying to redevelop the 1600+ acres with new industry. To date they have successfully brought several industries to the site though most of the acreage is still unused.

The main BNFP building is presently the home of the Government Training Institute. This organization has re-purposed the main building to train law enforcement personnel in tactical activities required to assure mission completion. The current lease holder has what is believed to be a 90 year of which about 10 years have passed.

The Inspection:

On September 5, 2025, we visited the site to conduct a high-level inspection of the equipment, building and facilities to establish whether the BNFP could possibly still accommodate a nuclear fuel reprocessing or blending operation. We were accompanied by representatives from Metatomic. Metatomic was chosen because they are recognized experts in developing processes for converting spent nuclear fuel into both fuels for advanced reactors as well as reprocessing of spent light water reactor fuel. During our inspection, we were accompanied by representatives from Metatomic as well as a representative from the current site lease holder, the Government Training Institute (GTI). The inspection included a walk-through of the main facility as well as exterior observations of the other supporting structures.

It is important to note that all recommendations are based on visual observations only and, as such, does not reflect an in-depth review of any documentation of maintenance records, quality assurance documentation or the like.

Observations:

The BNFP is near the Savannah River Site and Barnwell low level waste disposal facility. The building and location are well suited for reprocessing operations. The key features observed are listed below:

- The building is designed to process 1500 metric tons of spent fuel each year. If a reprocessing facility was built today, it would likely have a similar configuration to what is presently available at BNFP
- The main buildings and concrete appear to be largely structurally sound
- The concrete in the many pits and canyons is lined with stainless steel
- The overhead cranes have not been operated for many years but appear to be visually complete and in potentially operable condition
- 4 water wells supply the operations. We could not verify if they are presently operable
- The hot cells appear fully intact.
- Much of the infrastructure including valves, gauges, controls, electrical system, etc. would require extensive rework or replacement due to age of the components and obsolescence of the technology
- The roof of the building remains intact except for one area where a leak was observed
- Metatomic said they could make advanced fuels through blending of spent fuels in this facility and that it was ideal for that task
- It would probably require about 2 years to retrofit the building with new infrastructure using several hundred craft personnel
- Staircases, doors, structural steel and concrete all appeared to be in excellent condition
- There appears to be little encroachment on the site by residential properties
- The facility was previously licensed to conduct fuel reprocessing activities
- There has been no visible recent maintenance on the valves, pumps, electrical equipment, cranes and other support infrastructure.

To our knowledge this is the only structure in the US besides the GE plant in Morris, Illinois, specifically designed and built to reprocess spent nuclear fuel on a commercial basis. If the Federal Government is serious about reprocessing spent fuel soon, this location is an ideal place to consider.

Use of the existing BNFP facilities as part of an initiative to reprocess spent fuel or manufacture advanced fuels through blending would dramatically accelerate the timetable for putting such an activity into commercial scale operation. Constructing a similar facility will require years of locating a site, local zoning approval, facility design, permitting and construction. The existing BNFP avoids many of these issues.

To be successful, a public private partnership is required wherein the private partner is paid by throughput or on a services contract to reprocess the Government owned fuel. In addition, the Southern Carolina Alliance will also have to be a key member of the effort to bring the BNFP facilities on-line.

With the announcement by Westinghouse of their intention to build 10 AP1000 reactors and the likely addition of SMRs to the domestic fleet, the annual tonnage of spent nuclear fuel will rise and create an increasing problem of disposition. We believe the BNFP can serve as part of the solution to addressing the ever-rising inventory of spent fuel.

Next Steps:

Following this report, it is recommended to enter into discussions with the U.S. DOE to explore this possibility further.



Date: 10-16-25

Rick Lee
Chairman
Governor's Nuclear Advisory Council



Date: 10-16-25

Jim Little
Industry Representative
Governor's Nuclear Advisory Council

Inspection photographic documentation on the following pages.



Photographs of structures and infrastructure



AGNS main building with lab portion on the left



Facility tank farm



Vent piping with warehouses added later in the background



Uranium Hexafluoride Plant



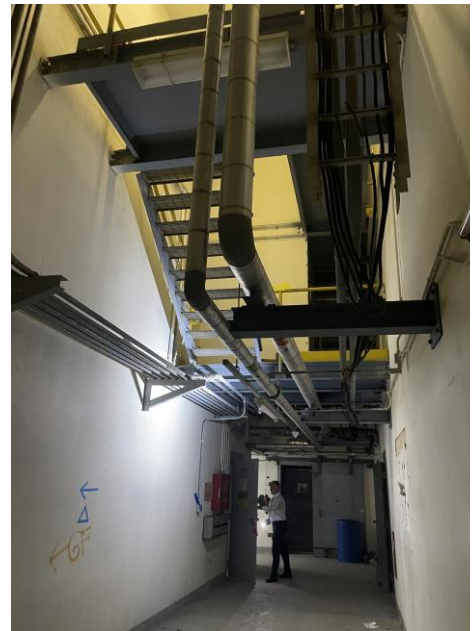
Ventilation fan, filter and ductwork building



Cask washpit service equipment platform



Cask wash basin support equipment



**Hallway showing overhead entrance
to upper level process control bays**



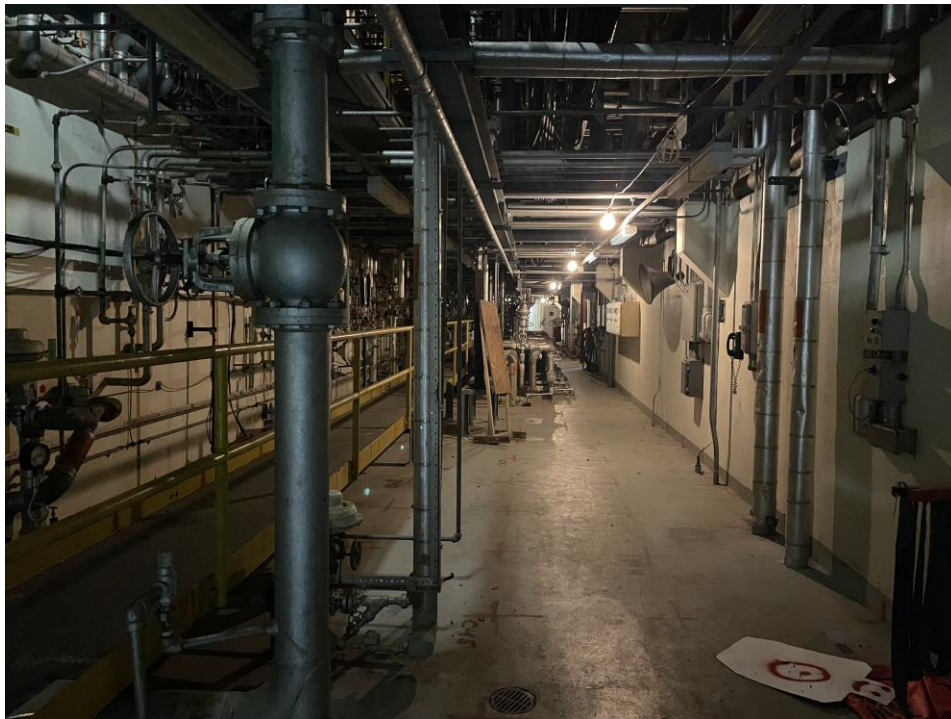
Cask wash pit



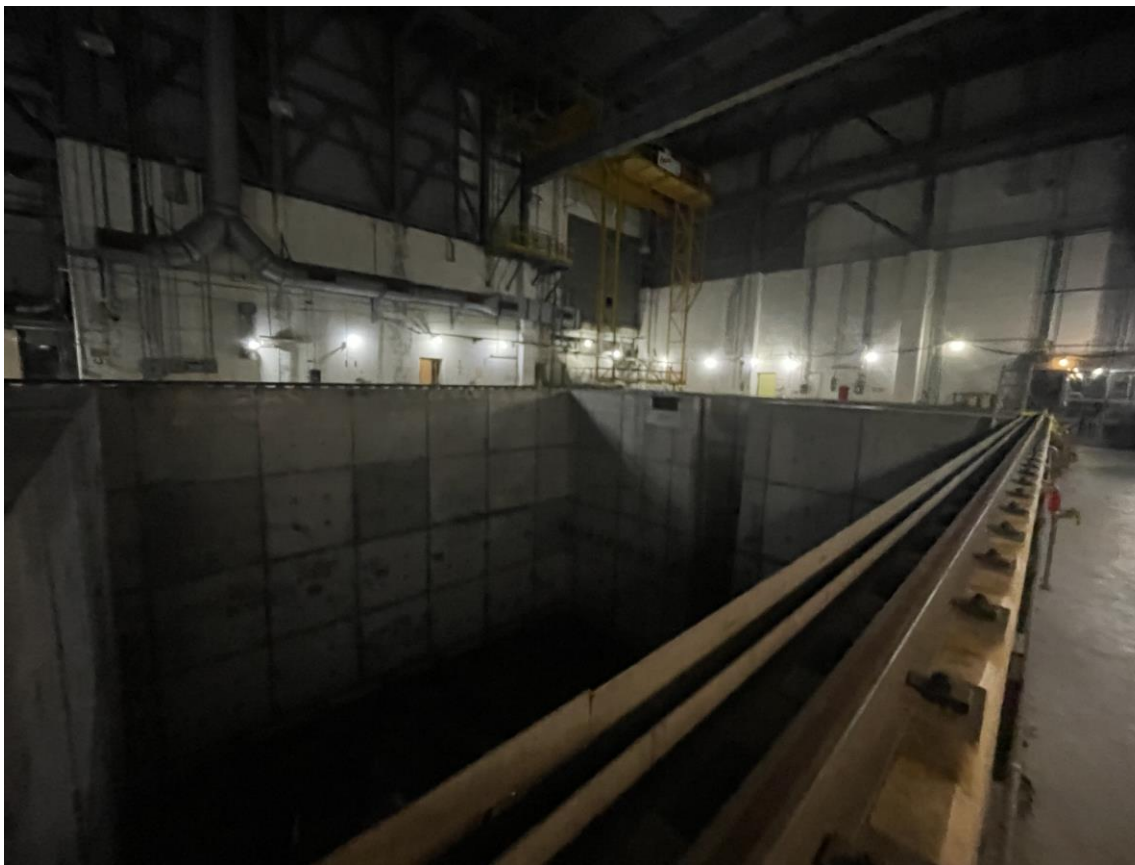
Original control room with analog equipment and dial phone



Hot boxes with mineral oil filled windows and old hand manipulators



Process control bay on ground floor



1 million gallon Fuel rod storage tank lined with stainless steel



Stainless steel air filter ductwork in basement



Steel training cask for fuel rod transport