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Accelerator Production of Tritium Authorization Basis Strategy

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The Accelerator Production of Tritium (APT) project has proposed a strategy to develop the APT authorization basis and safety case based on DOE orders and fundamental requirements for safe operation. The strategy is viable regardless of whether the APT is regulated by DOE or by an external regulatory body.

Currently the operation of Department of Energy (DOE) facilities is authorized by DOE and regulated by DOE orders and regulations while meeting the environmental protection requirements of the Environmental Protection Agency (EPA) and the states. In the spring of 1994, Congress proposed legislation and held hearings related to requiring all DOE operations to be subject to external regulation. On January 25, 1995, DOE, with the support of the White House Council on Environmental Quality, created the Advisory Committee on External Regulation of Department of Energy Nuclear Safety. This committee divided its recommendations into three areas: (1) facility safety, (2) worker safety, and (3) environmental protection. In the area of facility safety the committee recommended external regulation of DOE nuclear facilities by either the Nuclear Regulatory Commission (NRC) or a restructured Defense Nuclear Facilities Safety Board (DNFSB). In the area of worker safety, the committee recommended that the Occupational Safety and Health Administration (OSHA) regulate DOE nuclear facilities. In the environmental protection area, the committee did not recommend a change in the regulation by the EPA and the states of DOE nuclear facilities [1]. If these recommendations are accepted, all DOE nuclear facilities will be impacted to some extent.

The APT project is currently developing the safety requirements for the facility. These safety requirements will be based primarily on the DOE nuclear safety rules, orders, and standards. The fundamental requirements which will be imposed on the project are expected to be similar regardless of the regulator because similar regulatory requirements are used by the various regulators. However, the specific expectations related to demonstrating that the requirements have been met may vary depending on the regulator. At this time, the project is required to meet DOE requirements and compliance with these requirements will form the basis for the APT safety case. An interface with the NRC, the DNFSB, and the states will be developed to ensure their input into the development of requirements and compliance activities.

A single set of safety documentation for the facility will be developed following the hazard based approach delineated in DOE-STD-3009-94 "Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analysis Reports" [2]. This methodology allows for a graded approach to documenting the safety basis of the facility. Because of the nature of the facility, different DOE requirements will have to be applied to different

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segments. For example, the accelerator segment of the facility would be governed by DOE Order 5480.25 "Safety of Accelerator Facilities" [3] and 5481.1B "Safety Analysis and Review System" [4] and the target/blanket segment of the facility would be governed by DOE Order 5480.23 "Nuclear Safety Analysis Reports" [5].

The foregoing discussion is based on interpreting the DOE orders for non-reactor nuclear facilities (DOE Order 5480.23) and the order governing accelerators (DOE Order 5480.25). In the new DOE orders, facility safety is governed by DOE Order 420.1 "Facility Safety" [6]. This order addresses nuclear safety, criticality safety, fire protection, and natural phenomena hazards mitigation. Fire protection and natural phenomena mitigation apply to all new DOE facilities. Nuclear and criticality safety apply to all DOE non-reactor nuclear facilities and explosives facilities.

DOE Order 420.1 states that accelerator facilities covered by DOE Order 5480.25 are excluded from the non-reactor nuclear requirements. Therefore, the accelerator would be governed by the accelerator order. In essence, the new Facility Safety Order, 420.1, is consistent with the arguments presented above for analyzing APT within a single framework.

If APT were regulated by NRC, it is not clear that any of the current NRC Rules would be directly applicable to the regulation of a tritium production facility. It is clear that 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities" [7] is not applicable. 10 CFR Part 70, " Domestic Licensing of Special Nuclear Material" [8] is not directly applicable since the definition of special nuclear material does not include tritium. Though 10 CFR Part 70 is not directly applicable, we believe it is the most applicable of the NRC rules. Currently, NRC has drafted a revision to 10 CFR Part 70 and has provided draft guidance for its implementation. The DOE has helped NRC with the preparation of the new rule. The new approach is based on a hazards analysis methodology based on the guidance of the AIChE, "Guidelines for Hazard Evaluation Procedures" [9]. This is the same underlying methodology adopted by DOE in DOE-STD-3009-94.

In the current environment of not knowing if APT will ultimately be regulated internally by DOE or externally, it is our conclusion that following the methodology of DOE Standard 3009-94 will enable us to proceed in the face of this uncertainty with the belief that the approach will ultimately meet the requirements of either regulator.

References

[1] Advisory Committee on External Regulation of Department of Energy Nuclear Safety, "Improving Regulation of Safety at DOE Nuclear Facilities," Final Report, December 1995.

[2] U.S. Department of Energy, "Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analysis Reports," DOE-STD-3009-94, July 1994.

[3] U.S. Department of Energy, "Safety of Accelerator Facilities," DOE Order 5480.25, November 3, 1992.

[4] U.S. Department of Energy, "Safety Analysis and Review System," DOE Order 5481.1B, September 23, 1986.

[5] U.S. Department of Energy, "Nuclear Safety Analysis Reports," DOE Order 5480.23, April 30, 1992.

[6] U.S. Department of Energy, "Facility Safety," DOE Order 420.1, October 13, 1995.

[7] 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities."

[8] 10 CFR Part 70, " Domestic Licensing of Special Nuclear Material."

[9] American Institute of Chemical Engineers, "Guidelines for Hazard Evaluation Procedures," 1992.