



REPLOY Power, Inc.
7301 Seneca Falls Loop
Austin, Texas 78739
www.REPLOYpower.com

Enclosure 1
Submersible Power System Prototype Unit Introduction

Revision 0

September 2025

Table of Contents

1.	Introduction	4
1.1.	Contact Information	4
2.	Acronyms	4
3.	Reasons for the Prototype	4
4.	Differences Between the Prototype and Commercial Reactor	6
5.	Licensing Approach	7
6.	Summary	9
7.	References	9

1. Introduction

This white paper introduces the REPLOY Power concept for a prototype reactor. The paper presents the reasoning for this approach, as well as the differences between the prototype reactor and the follow-on commercial reactor. It also contains the licensing strategy and approach for the prototype reactor.

1.1. Contact Information

Donald J. Statile
Director of Licensing, Safety, and Quality Assurance

2. REPLOY Power Inc Acronyms

Acronym	Definition
CBM	Condition-based maintenance
MWe	Megawatt electric
QA	Quality assurance
SPS	Submersible power system
SSC	Structures, systems, and components

3. Reasons for the Prototype

REPLOY Power is in the process of developing a plan for a prototype reactor. The consideration of a prototype is based on the reasoning presented in the list below.

[withheld per 10 CFR 2.390

]

[withheld per 10 CFR 2.390

]

[withheld per 10 CFR 2.390]
[withheld per 10 CFR 2.390

]

4. Differences Between the Prototype and Commercial Reactor

REPLOY Power intends to construct and operate a prototype reactor. The prototype reactor and plant will be different from the commercial reactor and plant. Those general differences

are described below. The follow-on topical report will delve into the details of the prototype design differences.

[withheld per 10 CFR 2.390

]

5. Licensing Approach

REPLOY Power plans to conduct tests and studies using the first reactor assembled. This reactor will be a one-of-a-kind prototype reactor. As stated above, it will have differences with respect to the planned commercial reactor. Thus, it will be somewhat like a first-of-a-kind REPLOY reactor with the differences noted above.

Per 10 CFR 50.2, Definitions:

Prototype plant means a nuclear reactor that is used to test design features, such as the testing required under § 50.43(e). The prototype plant is similar to a first-of-a-kind or standard plant design in all features and size but may include additional safety features to protect the public and the plant staff from the possible consequences of accidents during the testing period.

10 CFR 50.43(e):

(e) Applications for a design certification, combined license, manufacturing license, operating license or standard design approval that propose nuclear reactor designs that differ significantly from light-water reactor designs that were licensed before 1997, or use simplified, inherent, passive, or other innovative means to accomplish their safety functions will be approved only if:

(1)(i) The performance of each safety feature of the design has been demonstrated through either analysis, appropriate test programs, experience, or a combination thereof;

(ii) Interdependent effects among the safety features of the design are acceptable, as demonstrated by analysis, appropriate test programs, experience, or a combination thereof; and

(iii) Sufficient data exist on the safety features of the design to assess the analytical tools used for safety analyses over a sufficient range of normal operating conditions, transient conditions, and specified accident sequences, including equilibrium core conditions; or

(2) There has been acceptable testing of a prototype plant over a sufficient range of normal operating conditions, transient conditions, and specified accident sequences, including equilibrium core conditions. If a prototype plant is used to comply with the testing requirements, then the NRC may impose additional requirements on siting, safety features, or operational conditions for the prototype plant to protect the public and the plant staff from the possible consequences of accidents during the testing period.

5.1. Prototype licensing approach

[withheld per 10 CFR 2.390

]

[withheld per 10 CFR 2.390

]

6. Summary

REPLOY Power will license, construct, and operate a prototype reactor for the purposes of testing and data collection. The license will be a Class 103 power reactor license. The licensing application will be developed per 10 CFR 50, with an application for a construction permit and subsequent application for a license to operate the reactor. The limited work authorization process will also be utilized. [withheld per 10 CFR 2.390

]

7. References

- 10 CFR 21, Reporting of Defects and Noncompliance, U. S. Nuclear Regulatory Commission, November 24, 1992
- 10 CFR 50, Domestic Licensing of Production and Utilization Facilities, United States Nuclear Regulatory Commission, August 28, 2007.
- 10 CFR 50.2, Definitions, United States Nuclear Regulatory Commission, January 29, 2025.
- 10 CFR 50.43, Additional Standards and Provisions Affecting Class 103 Licenses and Certifications for Commercial Power, United States Nuclear Regulatory Commission, August 14, 2024.
- 10 CFR 51, Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions, United States Nuclear Regulatory Commission, September 05, 2024.
- 10 CFR 52, Licenses, Certifications, and Approvals for Nuclear Power Plants, U. S. Nuclear Regulatory Commission, Jan. 19, 2023.
- Atomic Energy Act of 1954, United States of America, 1954 (as amended).
- NUREG-0800 Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition (NUREG-0800, Formerly issued as NUREG-75/087), U.S. Nuclear Regulatory Commission, 03/2007.
- Regulatory Guide 1.206, Revision 0 - Combined License Applications for Nuclear Power Plants, United States Nuclear Regulatory Commission, June 13, 2023.