Title:	**10 CFR 100 Gap Analysis**
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Author:	**Melinda Graham**
Approved By:	**Chanson Yang**
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REVISION LOG

Rev.	Change Summary
0.1	Initial Issue

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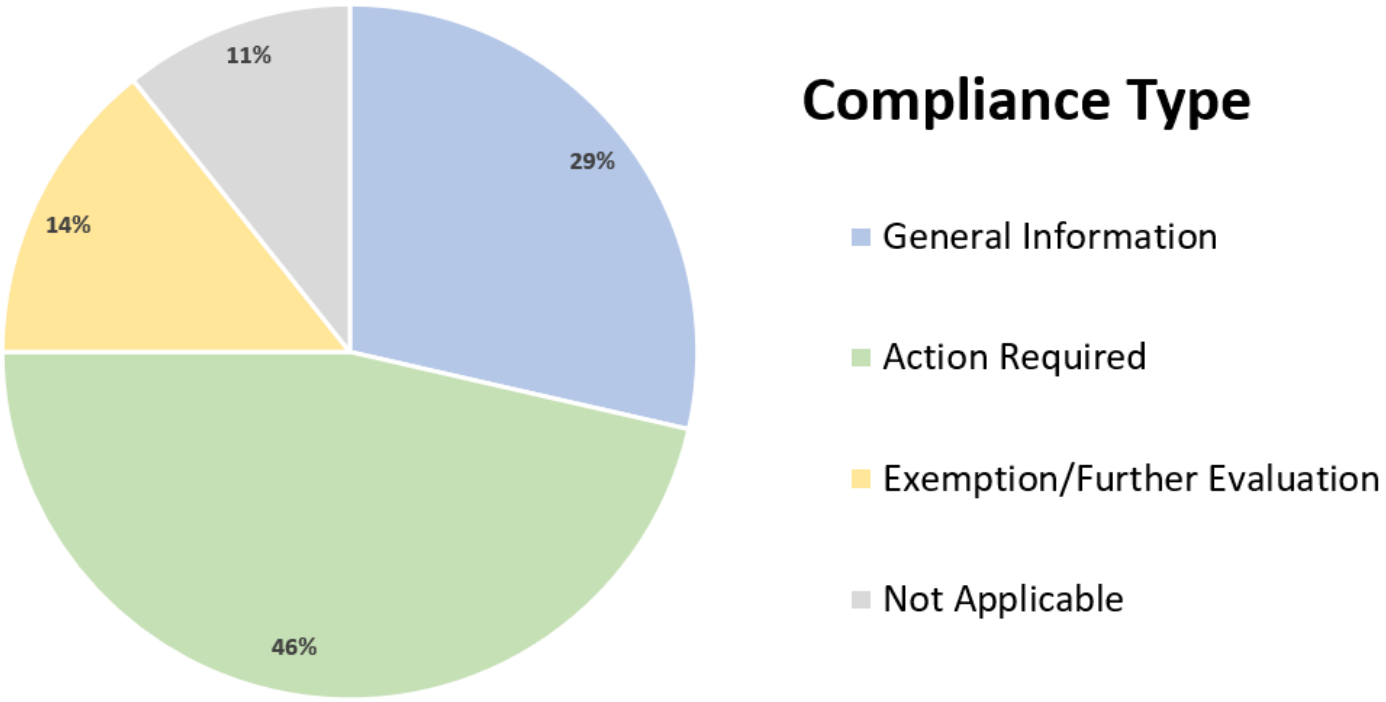
1 PURPOSE

This document is a gap analysis of 10 CFR 100, Reactor Site Criteria against the specific requirements necessary to license an area of the manufacturing facility capable of online reactor testing and deployed microreactor unit(s) for the Kaleidos reactor design. This gap analysis does not represent any specific commitment on Radiant's behalf regarding its licensing strategy; rather it is a document that will be used to inform the framework necessary to license the Kaleidos reactor.

2 EVALUATION CRITERIA

The following evaluation criteria was utilized to categorize the sections and subsections of 10 CFR 100:

- **Action Required:** Items that will be considered/used to inform the design and/or license application.
- **General Information:** Items associated with regulatory action or process, or represents general information that requires no specific action on Radiant's part.
- **Not Applicable:** Items that do not apply by nature of subpart or section applicability.
- **Potential Exemption/Further Evaluation:** Items that require additional evaluation, analysis, discussion, or consideration with regards to integration into the Kaleidos design/license application.



3 GENERAL SUMMARY

Radiant is actively working towards licensing a microreactor design to be manufactured, fueled, tested and then shipped to a remote site for operation and use. At the end of fuel life, the unit will be shipped back to the manufacturing facility for refuel. The unit will ship with fuel following testing at the manufacturing location, and will be ready for operation as soon as it reaches its intended destination. The licensing framework for the Kaleidos design needs to include accommodations to allow for the fuel load and testing at the manufacturing location, subsequent shipment and operation at designated sites, and return shipment of a unit containing spent fuel. Units may also be temporarily deployed to an operating site (i.e., relocated to a new or multiple new locations prior to end of fuel life). Units are anticipated to be deployed in either single units (standalone), or multiple units that would operate in parallel. At end of fuel life, it is possible that a replacement unit is deployed and placed into operation before the unit identified for refuel is removed.

10 CFR 100 was evaluated for rapid deployment, which does not currently fit within the NRC's licensing model; currently reactor unit sites are selected years in advance to accommodate the lengthy licensing process. Radiant will be looking to deploy units within weeks, requiring an efficient and effective licensing envelope for siting the deployed units.

There are several items identified within 10 CFR 100 that may require a graded approach for siting the Kaleidos reactor; this determination is subject to change and may be reflected in a revision to this document, or during submission of the eventual application. Radiant is requesting the following specific feedback and discussion from the staff on siting requirements to ensure regulatory alignment as early as possible in the pre-application process:

1. Comments on identified exemptions and staff initial concerns.
2. Feedback on unique aspects of Kaleidos unit siting (e.g., size of unit(s), lack of necessary utilities/infrastructure).

It should be noted that the scope of 10 CFR 100 applies to "applications for site approval for the purpose of constructing and operating stationary power and testing reactors" only. No specific definition could be found for "stationary" reactor. The Kaleidos unit, in discussions with the NRC, has been identified as a "transportable" reactor. When deployed to a use site, the Kaleidos reactor will be in a fixed location, even if the duration of use is short. Further, Radiant will not be constructing the reactor at the use site; minimal site infrastructure is required for operations of a Kaleidos reactor. It is Radiants position that 10 CFR 100 was written for large scale construction and nuclear power plant projects that do not fully align with the impacts and siting considerations for a small (<10MW) microreactor. This gap analysis represents an initial perspective on the applicability of 10 CFR 100 to the siting of the Kaleidos reactor, however further evaluation and discussion will be needed to ensure appropriate requirement identification and preclude undue regulatory burden with regards to site characterization. This logic will be extended to the portion of a manufacturing facility that will be used for unit testing prior to deployment (the portion licensed under Part 50 or Part 52 Subpart C).

4 GAP ANALYSIS 10 CFR 100: REACTOR SITING

This subsection describes the portions of the NRC required activities associated with siting a reactor power plant. This part in whole is intended to inform Radiants approach to siting both it's the operational testing area of the manufacturing facility and the deployed commercial unit(s).

4.1 General Provisions

Part 100		Compliance Type	Compliance Rationale
100.1	Purpose	General Information	
100.2	Scope	General Information	
100.3	Definitions	General Information	
100.4	Communications	General Information	
100.8	Information collection requirements: OMB approval	General Information	

4.2 Subpart A—Evaluation Factors for Stationary Power Reactor Site Applications Before January 10, 1997 and for Testing Reactors

Part 100		Compliance Type	Compliance Rationale
100.10	Factors to be considered when evaluating sites	Not Applicable	This subsection applies to license applications prior to January 10, 1997.
100.11	Determination of exclusion area, low population zone, and population center distance	Not Applicable	This subsection applies to license applications prior to January 10, 1997.

4.3 Subpart B—Evaluation Factors for Stationary Power Reactor Site Applications on or After January 10, 1997

Part 100		Compliance Type	Compliance Rationale
100.20	Factors to be considered when evaluating sites		
(a)	Population density	Action Required	

Part 100		Compliance Type	Compliance Rationale
(b)	Nature and proximity of man-related hazards	Action Required	
(c)	Physical characteristics of the site		
(1)	Geologic and seismic siting factors	Action Required	
(2)	Meteorological characteristics	Action Required	
(3)	Hydrological radionuclide transport	Potential Exemption	In lieu of doing onsite measurements, and consistent with siting requirements for fuel cycle facilities and non-power production and utilization facilities, publicly available data can provide substantial and reliable information to verify siting characteristics.
100.21	Non-seismic site criteria		
(a)	Exclusion area	Action Required	
(b)	Population center distance	Potential Exemption	Reactor siting with regards to population centers will consider appropriate risk factors; siting distance criteria may utilize a graded approach commensurate with use requirements and risk analysis.
(c)	Atmospheric dispersion	Action Required	
(d)	Physical characteristics	Action Required	
(e)	Transportation routes, industrial and military facilities	Action Required	
(f)	Security measures	Action Required	
(g)	Emergency plans	Action Required	
(h)	Densely populated centers	General Information	
100.23	Geologic and seismic siting criteria		
(a)	Applicability	General Information	
(b)	Commencement of construction	General Information	
(c)	Geological, seismological, and engineering characteristics	Potential Exemption	In lieu of performing field studies, publicly available data can provide substantial and reliable information to verify siting characteristics. Conservative environmental factors will be considered when establishing requirements for the Kaleidos reactor. Site selection will verify that identified sites fall

Part 100		Compliance Type	Compliance Rationale
			within these boundaries and / or engineering solutions related to placement.
(d)	Geologic and seismic siting factors		
(1)	Safe shutdown earthquake	Action Required	Conservative environmental factors will be considered when establishing requirements for the Kaleidos reactor. Site selection will verify that selected sites fall within these boundaries and / or engineering solutions related to placement.
(2)	Tectonic and nontectonic deformations	Action Required	
(3)	Floods and wave waters	Action Required	
(4)	Siting factors	Potential Exemption	Some of the environmental factors listed in this section may not have a direct impact on deployed Kaleidos units, and as such, would represent an undue regulatory burden to analyze for each site. Conservative environmental factors will be considered when establishing requirements for the Kaleidos reactor. Site selection will verify that selected sites fall within these boundaries and / or engineering solutions related to placement.

4.4 Appendix A to Part 100—Seismic and Geologic Siting Criteria for Nuclear Power Plants

Part 100		Compliance Type	Compliance Rationale
App A	Seismic and Geological Siting Criteria for Nuclear Power Plants	Not Applicable	Per 10 CFR 100.10(c)(1), this section is only applicable to reactors licensed prior to January 10, 1997 (10 CFR 100 Subpart A).