

## DIFFERENCES IN COST-BENEFIT PRACTICES WITHIN THE NRC

Difference	<p style="text-align: center;">Power Reactor Substantial Safety Enhancement Screen</p> <p>Substantial safety enhancement screens for power reactor backfit analyses are assessed using the Safety Goal Policy Statement to the extent practical. This screen is not applicable to other U.S. Nuclear Regulatory Commission (NRC) business lines and programs subject to backfit requirements.</p>
Basis for Difference	<p>For power reactor safety regulatory actions that are subject to a backfit analysis, the staff uses the Safety Goals to determine if a substantial increase in safety exists.<sup>1</sup> However, reactor Safety Goals or equivalent quantitative criteria do not apply to any other regulated activities subject to backfit analyses. Therefore, for these other non-power reactor regulated activities, the substantial increase in safety or security is qualitatively determined for the justification of the regulatory action.</p>
Additional Information	<p>Benefits involving substantial security enhancements are not quantified because these are generally based on deterministic approaches that may involve compliance with predefined threat levels.</p> <p>To date, no backfit analyses have been required for rules amending Title 10 of the <i>Code of Federal Regulations</i> (10 CFR) Parts 72 (“Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater Than Class C Waste”) and 76 (“Certification of Gaseous Diffusion Plants”).</p>

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<sup>1</sup> Because spent fuel pool (SFP) accident releases are similar enough to reactor accident releases and SFPs are part of nuclear power facilities (and therefore contribute to the overall risk for which the safety goals and quantitative health objectives were formulated), SFP accidents are evaluated using the safety goal policy statement. The subsidiary criteria (e.g., core damage frequency and large early release frequency) are primarily related to reactor accidents.

Difference	<p><b>Time Horizon</b></p> <p>The time horizon for which the NRC staff conducts regulatory analyses is different for nuclear power reactors and materials licensees. For power reactors, the NRC analyst assumes one license renewal and takes the average of the remaining life for the specific class of plants. For materials licensees, the NRC analyst uses the term of the license.</p>
Basis for Difference	<p>Varying degrees of uncertainty exist regarding the life expectancy of NRC licenses and certificates. In general, the uncertainty is less pronounced for power reactor licenses than for non-power reactor licenses and certificates. For reactors, a certain amount of predictability concerning time horizons exists in terms of the initial license period and any anticipated license renewals. However, for many materials licenses, the time horizon is difficult to establish because facility upgrade life extensions and premature shutdowns, which can be driven by the need for process improvements or prevailing market conditions, are not uncommon.</p>
Additional Information	<p>Office of Management and Budget (OMB) Circular A-4 states: “The time frame for your analysis should cover a period long enough to encompass all the important benefits and costs likely to result from the rule. Regulatory analyses specify a base year and include economic benefits and costs for that specified year. Regulatory analyses also typically include estimates for future years (e.g., remaining operating life of a plant, post-operation decommissioning). However, in general, regulatory analyses do not give special consideration to input variables that may change over time (e.g., offsite population, property values, value of statistical life), which may result in the unintentional underestimation of consequences.”</p>

Difference	<p>Sensitivity Analyses</p> <p>The use of sensitivity analysis is not uniformly applied across business lines for regulatory analyses.</p>
Basis for Difference	<p>For power reactors, computer codes allow the staff to conduct sensitivity analyses. These or other similar modeling tools and techniques for conducting sensitivity analyses are largely not available to other NRC business lines and programs. Therefore, detailed sensitivity analyses for such cases are not typically conducted.</p>
Additional Information	<p>Sensitivity analyses constitute a quantitative risk analysis and modeling technique used to help determine the factors that will have the most potential impact as a result of the regulatory action. Sensitivity analyses can examine the extent to which the uncertainty of each element affects the cost to achieve the regulatory objective being examined, or the risk, when all other uncertain elements are held to their baseline values. The NRC can benefit from a more uniform approach in the use of sensitivity analyses across business lines.</p> <p>Sensitivity analyses for cost estimating are also not uniformly applied across business lines for regulatory analyses. Some of the differences are justified, as use of sensitivity analyses is not necessary for all regulatory analyses. Sensitivity analyses for cost estimating provide additional information to the decisionmakers in relation to the potential variation in implementing the regulatory action.</p>

Difference	<p>Quantification of Benefits</p> <p>There is a difference among business lines regarding the extent to which benefits are quantified in regulatory analyses.</p>
Basis for Difference	<p>For power reactors, with the use of computer codes such as MELCOR/MACCS and the application of probabilistic risk assessment techniques, the NRC can provide, in some cases, quantification of benefits in terms of averted consequences and risks. These, or other similar modeling tools and techniques for quantifying benefits, are largely not available to other business lines.</p>
Additional Information	<p>The staff is currently in the process of seeking, per SECY-14-0087, Commission approval for plans to update guidance on qualitatively considering factors in regulatory analyses. Per SECY-14-0087, the staff proposes updating cost-benefit guidance to enhance the transparency and consistency of qualitatively considering factors in analyses as well as emphasizing the importance of a robust quantitative analysis.</p> <p>For material licenses and certificates and for security-related regulatory actions, benefits are typically not quantified other than financial cost savings, if they exist.</p>

Difference	<p>Terminology and other “minor” differences</p> <p>There is a difference among business lines in the terminology used in regulatory analyses. For example, cost offsets are sometimes considered positive and other times considered negative.</p>
Basis for Difference	<p>The difference is due to varying interpretations amongst staff of the NUREG/BR-0058 guidance document and the NUREG/BR-0184 handbook. These guidance documents do not provide detailed terminology to be used within a regulatory analysis. Therefore, based on the business lines’ practices, the meanings of certain terms vary from business line to business line.</p>
Additional Information	<p>The staff believes that these are minor differences than can be addressed in future guidance updates. These differences have no significant impacts on any ongoing regulatory analyses.</p>

Difference	Changes in Variables Over Time
Basis for Difference	<p>For Severe Accident Management Design Alternatives (SAMDA) within NEPA, the analysis includes an assumption for “reasonably foreseeable impacts.” As a SAMDA is performed before the plant is licensed, the analysis forecasts the population density and economic factors during the operating life of the nuclear power plant.</p> <p>For regulatory analyses, modeling assumptions vary between analyses in which some analysts consider the most recent census data and apply multipliers to account for population growth and increases in land value. Other analyses assume that there would be no significant changes in the variables over time. While this is an implicit assumption within regulatory analyses, this is not explicitly addressed in the NUREG/BR-0058 guidance document and the NUREG/BR-0184 handbook and there may be certain situations where the analyst should model that the variables will change over time.</p>
Additional Information	

**Summary Table of NRC Cost-Benefit Regulations, Guidance and Practices**

NEPA Analysis			
	Regulatory Requirements	Guidance	Practice
Operating Reactors	<p><b>Cost Benefit Analysis:</b></p> <p>For draft environmental impact statements (EISs): 10 CFR 51.71(d) and (f)</p> <p>For final supplemental EISs: 10 CFR 51.92(e)(4)</p> <p>For post-construction supplemental EISs: 10 CFR 51.95(c)(2)</p> <p>For records of decision: 10 CFR 51.103(a)(3)</p> <p><b>Applicant’s Environmental Report:</b></p> <p>10 CFR 51.45 and 51.53</p>	<p>NUREG-1555 Supplement 1; RG 4.2 Supplement 1; NUREG/BR-0058; NUREG/BR-0184; NUREG-1530</p>	<p>Assumptions: license life, waste confidence, purpose and need, fuel cycle generic, design specific information probabilistic risk assessment (PRA), emergency response modeled, meteorology data for the airborne plume modeled, other pathways release data (generic or site-specific, economic data (generic or site-specific)</p>
New Reactors	<p><b>Cost Benefit Analysis:</b></p> <p>For draft environmental impact statements (EISs): 10 CFR 51.71(d) and (f), 51.75 and</p>	<p><b>NRC:</b> NUREG-1555; RG 4.2 (in revision), NUREG/BR-0058; NUREG/BR-0184; NUREG-1530</p>	<p>Same as operating reactors.</p> <p>Note: A cost-benefit analysis is required for radwaste systems in the safety review of a new</p>

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NEPA Analysis			
	Regulatory Requirements	Guidance	Practice
	<p>51.76(f)</p> <p>For final supplemental EISs: 51.92(e)(4)</p> <p>For records of decision: 10 CFR 51.103(a)(3)</p> <p><b>Severe Accident Mitigation Design Alternatives (SAMDA)s:</b></p> <p>For SAMDA/Environmental Assessments: 10 CFR 51.30(d)- (e) and 51.31(c)</p> <p>For SAMDA/EISs: 10 CFR 51.75(c)(2)-(3)</p> <p>For SAMDA/Issue Finality: 10 CFR 52.171(a)(3)</p> <p><b>Applicant’s Environmental Report:</b></p> <p>10 CFR 51.45, 51.49(f), 51.50(b)(2) and (c), 51.54, 51.55, 52.17(a)(2), 52.47(b)(2), and</p>		<p>reactor application by Section II.D of 10 CFR Part 50 Appendix I.</p>



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NEPA Analysis			
	Regulatory Requirements	Guidance	Practice
	52.80(b)		
Materials	<p><b>Cost Benefit Analysis:</b></p> <p>For draft environmental impact statements (EISs): 10 CFR 51.71(d) and (f), and 51.80</p> <p>For final supplemental EISs: 51.92(e)(4)</p> <p>For records of decision: 10 CFR 51.103(a)(3)</p> <p><b>Applicant’s Environmental Report:</b></p> <p>10 CFR 51.45, 51.60, 51.61, and 51.62</p>	<p><b>External:</b> None</p> <p><b>NRC:</b> NUREG-1748; NUREG/BR-0058; NUREG/BR-0184; NUREG-1530</p>	No severe accident analyses or use of PRAs. No SAMDAs.
Fuel Cycle Facilities	<p><b>Cost Benefit Analysis:</b></p> <p>For draft environmental impact statements (EISs): 10 CFR 51.71(d) and (f), and 51.80</p>	<p><b>External:</b> None</p> <p><b>NRC:</b> NUREG-1748; NUREG/BR-0058; NUREG/BR-0184; NUREG-1530</p>	No severe accident analyses or use of PRAs. No SAMDAs.

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NEPA Analysis			
	Regulatory Requirements	Guidance	Practice
	For final supplemental EISs: 51.92(e)(4)  For records of decision: 10 CFR 51.103(a)(3)  <b>Applicant's Environmental Report:</b>  10 CFR 51.45 and 51.60		
Emergency Preparedness	Same as for the affected entity	<b>External:</b>  <b>NRC:</b>	No severe accident analyses or use of PRAs. No SAMDAs.

Regulatory Analysis			
	Regulatory Requirements (No regulation requires a regulatory analysis)	Guidance	Practice

## Summary Table of NRC Cost-Benefit Regulations, Guidance and Practices

Regulatory Analysis			
	Regulatory Requirements (No regulation requires a regulatory analysis)	Guidance	Practice
Operating Reactors	None	<p><b>External:</b> OMB Circular A-4, OIRA Primer, EO 12866, EO 13563</p> <p><b>NRC:</b> NUREG/BR-0058, NUREG/BR-0184, NUREG-1748, NUREG/CR-3568, NUREG/CR-3971, NUREG/CR-4627, NUREG-1530</p>	Substantial safety enhancement determinations use Safety Goals as a screen, cost estimating practices; use of quantitative modeling, baseline determinations, inflators, and sensitivity and uncertainty analyses; evaluation of time-frame; consideration of affected parties, affects to non-US entities, and labor rates; ensuring public availability of reference information and documentation
New Reactors	None	Same	Same as operating reactors
Materials	None	Same	Same as operating reactors, except Safety Goals are not used as a screen to determine substantial safety enhancements; and time-frame covered by regulatory analysis is different

**Summary Table of NRC Cost-Benefit Regulations, Guidance and Practices**

Regulatory Analysis			
	Regulatory Requirements (No regulation requires a regulatory analysis)	Guidance	Practice
Fuel Cycle Facilities	None	Same	Same as operating reactors, except Safety Goals are not used as a screen to determine substantial safety enhancements; and time-frame covered by regulatory analysis is different
Emergency Preparedness	None	Same	Same as for the affected entity

## Summary Table of NRC Cost-Benefit Regulations, Guidance and Practices

Backfit Analysis			
	Regulatory Requirements	Guidance	Practice
Operating Reactors	10 CFR 50.109	<p><b>External:</b> None (NRC unique)</p> <p><b>NRC:</b> NUREG-1409, CRGR Charter, Section 043 of NRC Manual Chapter 0514</p> <p><b>NRC Supporting Guidance:</b> NUREG/BR-0058, NUREG/BR-0184, NUREG/CR-4627, NUREG-1530</p>	Determinations of substantial increase in the overall protection of the public health and safety or the common defense and security rely upon the Safety Goals
New Reactors	Issue finality regulations: 10 CFR 52.39 (early site permits [ESP]), 52.31 (ESP renewals), 52.63 (standard design certifications [SDC]), 52.59 (SDC renewals), 52.83 (referenced NRC approvals), 52.98 (combined licenses), 52.145 (standard design approvals), 52.171 (manufacturing licenses), and 52.179 (manufacturing license	Same as operating reactors	Same as operating reactors

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<b>Backfit Analysis</b>			
	<b>Regulatory Requirements</b>	<b>Guidance</b>	<b>Practice</b>
	renewals)		
<b>Materials</b>	10 CFR 70.76 (special nuclear material)	Same as operating reactors	Same as operating reactors except:  Safety goals are not applicable in determining whether proposed regulatory action results in a substantial increase in the overall protection of the public health and safety
<b>Fuel Cycle Facilities</b>	10 CFR 72.62 (ISFSIs); 10 CFR 76.76 (Gaseous diffusion plants)	Same as operating reactors	Same as operating reactors except:  Safety goals are not applicable in determining whether proposed regulatory action results in a substantial increase in the overall protection of the public health and safety
<b>Emergency Preparedness</b>	Same as for the affected entity	Same as for the affected entity	Same as for the affected entity.