



Updating Cost-Benefit Guidance Phase 1

**Public Workshop
March 3, 2016**



Purpose

Provide update on the cost-benefit guidance project

Discuss and receive feedback on proposed document and appendices

Agenda

Introduction and opening remarks

Drivers and changes to the cost-benefit guidance

Structure of the cost-benefit guidance document

Qualitative factors

Cost estimating and best practices

Treatment of uncertainty

Closing Remarks

Announcements

- Category 3 Public Meeting
- Teleconference Number
 - 1-888-593-7858 passcode: 35736
- Webinar
 - <https://attendee.gotowebinar.com/register/2367253303568520193>
- If you are participating via the telephone, please send an email to Pamela.Noto@nrc.gov confirming your attendance

Drivers

SRM-SECY-12-0110, “Consideration of Economic Consequences in the NRC’s Regulatory Framework”

- SECY-14-0002, “Plan for Updating NRC’s Cost-Benefit Guidance”
- SECY-14-0143, “Regulatory Gap Analysis of the NRC’s Cost-Benefit Guidance and Practices”

Drivers (cont'd)

SRM-SECY-12-0157, “Consideration of Additional Requirements for Containment Venting Systems for Boiling Water Reactors with Mark I and Mark II Containments”

SRM-SECY-14-0087, “Qualitative Consideration of Factors in the Development of Regulatory Analyses and Backfit Analyses”

GAO Audit Report Findings

OIG Audit Report Findings

Changes

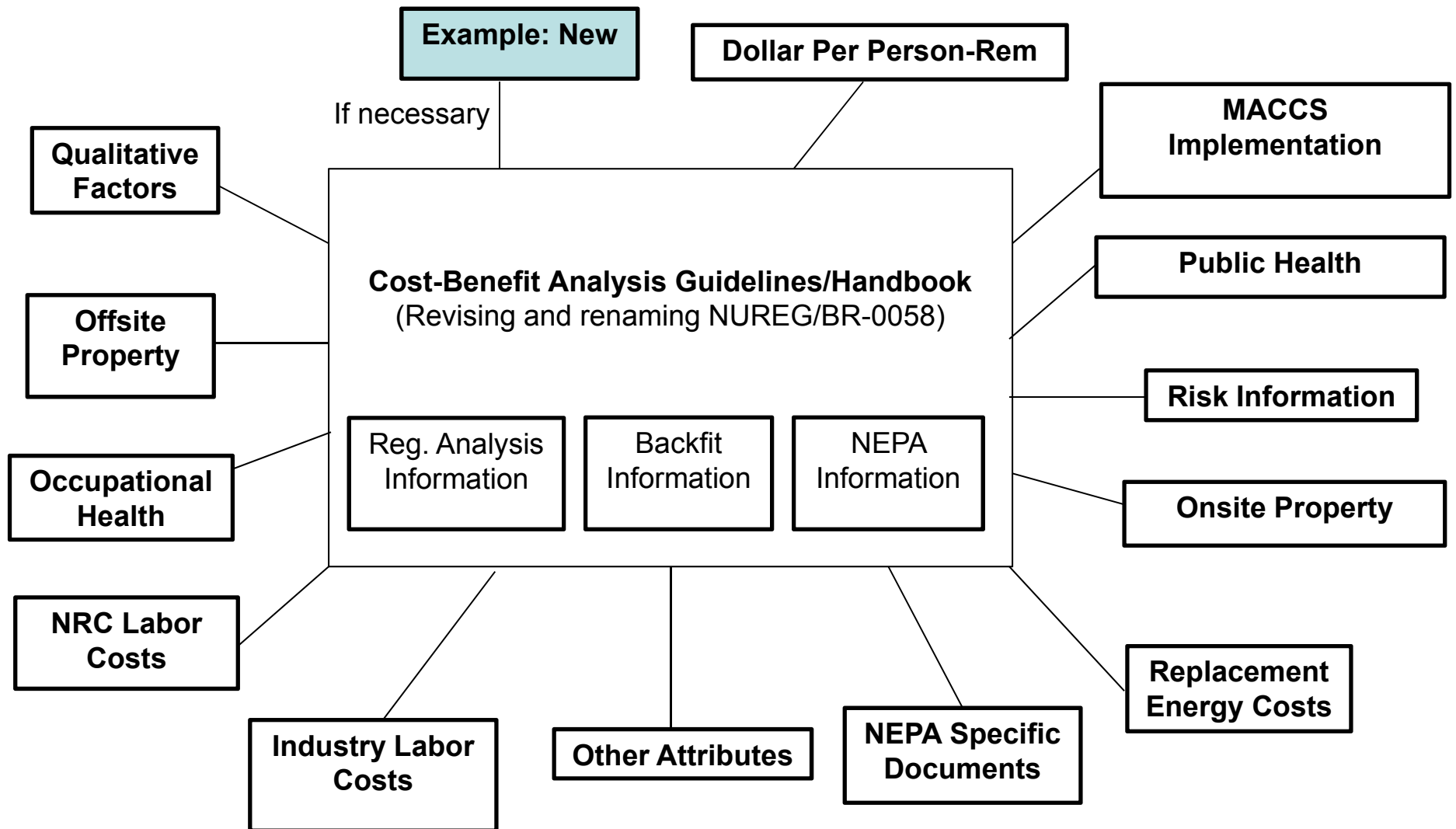
- Refocusing guidance on cost-benefit analysis across the agency. Expands guidance for materials licensees regulatory analysis, backfitting analysis, and NEPA analysis.
- Focuses on quantification and methods for creating realistic estimates.
- Provides methods for assessing factors that are difficult to quantify.
- Incorporation of cost estimating best practices.
- Expands on uncertainties.
- Enhance transparency of analysis for the decisionmaker.

Cost-Benefit Guidance Document Update

Restructure NRC cost-benefit guidance documents

- NUREG/BR-0058, “Regulatory Analysis Guidelines of the U.S. NRC”
- NUREG/BR-0184, “Regulatory Analysis Technical Handbook”
- NUREG-1409, “Backfitting Guidelines”

Mapping of Cost-Benefit Guidance Updates





Cost-Benefit Guidance Document Update

Regulatory Analysis

Backfitting and Issue Finality

NEPA

Cost-Benefit Analysis

Appendices

Cost-Benefit Guidance Document Update (cont'd)

Proposed appendices for discussion

- Qualitative Factors Assessment Methodology
- Cost Estimating and Best Practices
- Treatment of Uncertainty



Open Discussion

Qualitative Factors

NUREG/BR-0058, Rev. 4

- The NRC recognizes that not all regulatory actions are amenable to a quantitative risk assessment and that certain evaluations may be based directly on engineering or regulatory judgment or qualitative analysis.
- If the net value calculation is not positive, further activities and analyses should be terminated unless there is a qualitative justification for proceeding further.
- Values and impacts that are determined to be unquantifiable should be identified and discussed qualitatively. An attribute should not be omitted from a regulatory analysis document simply because it is determined to be unquantifiable.
- Reliance on the qualitative approach should be a last resort, to be used only after efforts to develop pertinent data or factual information have proven unsuccessful.

Qualitative Factors (cont'd)

NUREG/BR-0184 (1997)

- Values and impacts should be evaluated in monetary terms when feasible, resorting to qualitative terms where conversion to monetary equivalents cannot be done.
- The analyst should make every effort to use quantitative attributes relevant to the value-impact analysis.
- If monetary terms are inappropriate, the analyst should strive to use other quantifiable values. However, despite the analyst's best efforts at quantification, there may be some attributes which cannot be readily quantified. These attributes are termed "qualitative" and handled separately from the quantitative ones.
- To the degree to which the considerations associated with these [qualitative] attributes can be quantified, they should be; the quantification should be documented, preferably under one or more of the quantitative attributes. However, if the consideration does not lend itself to any level of quantification, then its treatment should take the form of a qualitative evaluation in which the analyst describes as clearly and concisely as possible the precise effect of the proposed action.

Qualitative Factors (cont'd)

NUREG/BR-0184 (cont'd)

- If the net value is calculated to be strongly positive or negative, the result can be given considerable significance since the variations in the assumptions or data would be much less likely to affect the sign of the net value. Even so, other considerations may overrule the decision supported by the net value (e.g., qualitative factors such as those embodied in the "qualitative" attributes).
- Non-quantifiable attributes can only be factored into the decision in a judgmental way; the experience of the decisionmaker will strongly influence the weight that they are given. These attributes may be significant factors in regulatory decisions and should be considered, if appropriate

Qualitative Factors (cont'd)

Commission Direction in SRM-SECY-14-0087

- The Commission has approved the staff's plans for updating guidance regarding the use of qualitative factors to improve the clarity, transparency and consistency of the agency's regulatory analyses and backfit analyses.
- This approval does not authorize an expansion of the consideration of qualitative factors in regulatory analyses and backfit analyses.
- The appropriate degree of weight of application of qualitative factors in regulatory decision making ultimately lies with the Commission.

Qualitative Factors (cont'd)

Commission Direction (cont'd)

- The focus of the update should be on capturing best practices for the consideration of qualitative factors.
- The updated guidance should provide a toolkit to the analysts to help them clarify their thinking with regard to how they considered qualitative factors.
- The guidance should support regulatory analyses that clearly present the analyst's consideration of qualitative factors in a transparent way that decisionmakers, stakeholders, and the public can understand.
- The updated guidance should not be overly complicated or prescriptive in such a way that would hinder decisionmaking.

Qualitative Factors (cont'd)

Commission Direction (cont'd)

- The guidance should adhere to the following high-level principles:
 - The staff should continue to strive to improve its methods for quantitative analyses, including the treatment of uncertainties.
 - The staff should use the best information available to develop realistic estimates of the cost of implementing proposed requirements.
 - To ensure that qualitative factors are used in a judicious and disciplined manner, the revised guidance should continue to encourage quantifying costs to the extent possible and use qualitative factors to inform decision making, in limited cases, when quantitative analyses are not possible or practical (i.e., due to lack of methodologies or data).
 - To improve transparency and decision making, any revised guidance should outline how the staff will articulate its rationale for the selection of qualitative factors and describe with specificity how these factors were used in the analysis, including the use of sensitivity analyses.

Qualitative Factors (cont'd)

Provides guidance and best practices for use in evaluating qualitative factors

Provides a number of standard methods

Establishes a structured process for when quantification is not practicable

Increases transparency and consistency

Qualitative Factors (cont'd)

Toolkit Methods

- Qualitative Narrative
- Cost Effectiveness Analysis
- Threshold Analysis
- Bounding Analysis
- Pros and Cons Analysis
- Trade-off Analysis
- Decision Matrix
- A Fortiori Analysis
- Maximin and Maximax Analysis
- Conjunctive and Disjunctive Analysis
- Lexicographic Analysis
- Rank-order/weight based analysis
- Outranking Methods Technique



Open discussion

Cost Estimating and Best Practices

Drivers

- Commission directed the staff to improve its cost estimating practices
- GAO
- OIG
- NEI Cumulative Impacts Case Study

Cost Estimating and Best Practices (cont'd)

Characteristics of a High Quality Cost Estimate

- Credible
- Well-documented
- Accurate
- Comprehensive

Cost Estimating and Best Practices (cont'd)

Improvements in Cost Estimating Practices

- Expand guidance to incorporate cost estimating best practices
- Describe methods and procedures recommended for use in preparing cost estimates that are specific to all work
- Describe practices relative to estimating life cycle costs

Cost Estimating and Best Practices (cont'd)

Methods

- Engineering Build-up Estimating Method
- Parametric Estimating Techniques
- Other Estimating Methods

Cost Estimating and Best Practices (cont'd)

Development Process

- Planning
- Inputs
- Preparation
- Review
- Reconciliation
- Documentation



Open Discussion

Treatment of Cost Estimate Uncertainty

NUREG/BR-0058, Rev. 4

- Uncertainties are important to consider and need to be presented in a regulatory analysis. However, common sense needs to be applied in determining the level of effort to be given to the consideration and discussion of uncertainty.
- In general, the detail and breadth of the uncertainty analysis should be commensurate with the overall policy significance, complexity, and level of controversy, as well as the perceived importance of the uncertainties to the bottom line conclusion.
- Sensitivity analysis can be used in addition to, or in lieu of, formal uncertainty analysis. It should be exercised when uncertainty analysis is impractical or exceedingly complicated and costly.
- As a general principle, sensitivity or uncertainty analysis, or both, should be performed whenever the values of key attributes can range widely.

Treatment of Cost Estimate Uncertainty (cont'd)

NUREG/BR-0184 (1997)

- Depending upon the level of effort, either sensitivity or uncertainty analyses should be performed while quantifying the attributes to estimate the effect upon the results of variations in input parameters. Hypothetical best- and worst-case consequences may be estimated for sensitivity analyses.
- Uncertainty analyses should produce actual probability distributions for the overall results based on assumed distributions for selected input parameters.
- Sources and magnitudes of uncertainties in attribute estimates and the methods used to quantify sensitivity or uncertainty estimates should be discussed in all regulatory analyses.
- Section 5.4, "Treatment of Uncertainty," presents a general discussion of the types of uncertainty that will be encountered in a regulatory analysis, primarily the value-impact portion, and outlines some of the more recent approaches to deal with them.

Treatment of Cost Estimate Uncertainty (cont'd)

Drivers

- SRM-SECY-14-0087
 - The staff should continue to strive to improve its methods for quantitative analyses, including the treatment of uncertainties [in regulatory analyses].
 - To improve transparency and decision making, any revised guidance should outline how the staff will articulate its rationale for the selection of qualitative factors and describe with specificity how these factors were used in the analysis, including the use of sensitivity analyses
- GAO Audit Report Findings
 - NRC's procedures do not require uncertainty analyses to always be performed, whereas best practices identified in the GAO Cost Guide always call for uncertainty analyses.

Treatment of Cost Estimate Uncertainty (cont'd)

Methodology

Sensitivity Analysis

Monte Carlo Simulation

Results



Open Discussion



Phase 1 Schedule

September 2016

Issue draft document
for comment

February 2017

Issue document



Next Steps

Address feedback from public workshop

Need for future workshops

References

- GAO Audit Report, GAO-15-98
- GAO Cost Estimating and Assessment Guide, GAO-09-3SP
- NEI Cumulative Impact Case Study Analysis and Recommendations available at ML14028A455
- NUREG/BR-0058, Rev. 4 available at ML042820192
- NUREG/BR-0184 available at ML050190193
- NUREG-1409 available at ML032230247
- OIG Report OIG-15-A-15, Audit of NRC's Regulatory Analysis Process available at ML15175A344

References (cont'd)

- SECYs
 - available at <http://www.nrc.gov/reading-rm/doc-collections/commission/> or in ADAMS
 - SECY-12-0110 available at ML12173A478
 - SECY-14-0002 available at ML13274A519
 - SECY-14-0087 available at ML14127A458
 - SECY-14-0143 available at ML14280A426
 - SRM-SECY-14-0087 available at ML15063A568
 - SRM-SECY-12-0110 available at ML13079A055
 - SRM-SECY-12-0157 available at ML13078A017



Backup Slides

Cost Estimating and Best Practices (cont'd)

- Cost Estimating Inputs
- Cost Estimating Characteristics and Classifications
- Cost Estimating Methods
- Methods of Estimating Other Life-Cycle Costs
- Cost Estimating Development Process
- Cost Estimating Outputs
- Cost Estimating Expectations
- Five Enclosures

Cost Estimating and Best Practices (cont'd)

Methods

- Engineering Build-up Estimating Method
- Parametric Estimating Techniques
 - End Product Unit Method
 - Physical Dimension Method
 - Capacity Factored Method
 - Ratio or Factor Method

Cost Estimating and Best Practices (cont'd)

Other Estimating Methods

- Level of Effort
- Specific Analogy
- Expert Opinion
- Learning Curve
- Count Deliverables Method
- Full-Time Equivalent Method
- Percentage Method

Cost Estimating and Best Practices (cont'd)

Cost Estimating and Best Practices Enclosures

- Enclosure B-1: Cost Estimate Review Criteria
- Enclosure B-2: Definitions
- Enclosure B-3: Independent Cost Review and Independent Cost Estimate Guidance
- Enclosure B-4: Expectations for Quality Cost Estimates
- Enclosure B-5: Cross Reference to GAO-09-3SP