

Approved: 2-05-09

Establishment of an Independent Cost Estimate (ICE) Policy



**NATIONAL NUCLEAR SECURITY ADMINISTRATION
Office of Project Management and Systems Support**

ESTABLISHMENT OF AN INDEPENDENT COST ESTIMATE (ICE) POLICY

1. **PURPOSE.** This Cost Estimating Business Operating Policy (BOP) provides for the implementation of policies and responsibilities relating to establishing a policy for independent cost estimating on projects being executed by the NNSA.
2. **CANCELLATIONS.** None
3. **APPLICABILITY.**
 - a. This policy pertains to all capital asset projects as defined in DOE 413.3a (except General Plant Projects and Capital Equipment Projects) constructed for NNSA or managed by NNSA personnel on behalf of other government agencies with an estimated Total Project Cost (TPC) \geq \$20 million. These projects include: Major Items of Equipment (MIE) Line Item (Capital) projects, Operation Expense funded (Op-Ex) projects, lease/alternate finance projects, and Work for Others (WFO) projects. NA-10, NA-20, NA-40, NA-50, NA-60, NA-70 and the service center or their designated Acquisition Executive may invoke this policy for projects with a TPC $<$ \$20 million.
 - b. This policy does not apply to the Naval Nuclear Propulsion Program and its contractors, where inconsistent with the authority of the Director, Naval Nuclear Propulsion Program, pursuant to Executive Order 12344, as set forth in Public Law (P.L.) 98-525, the Department of Energy (DOE) National Security and Military Applications of Nuclear energy Authorization Act of 1985, and P.L. 106-65, the National Nuclear Security Administration Act.
 - c. The Director, Office of Project Management and Systems Support (NA-54) may grant waivers to this policy. This responsibility is non-delegable. There are no other forums of redress.
 - d. This policy will be applied in conjunction with and will not supersede any requirements established by DOE Order 413.3A. Execution of project activities, including review thresholds and responsibilities, will follow the guidance of DOE O 413.3A.
 - e. Financial Assistance awards (grants and cooperative agreements), which are covered under 10 CFR 600, are excluded.
 - f. This policy does not apply to nuclear weapon research and development activities, which are managed in accordance with guidance promulgated by Defense Programs.

4. REQUIREMENTS.

- a. Independent Cost Estimates
 1. Attachment 1 enumerates requirements for the timing of development of ICEs at various stages of line item projects within NNSA.
 2. The classes of ICE in Attachment 1 are tailored to the maturity of a project. The definitions are contained in Attachment 2.
 3. The estimate types will be utilized by the ICE team is tailored depending on the stage of the project, the level of documentation available. The definition and descriptions are contained in Attachment 2.
- b. Cost estimates shall be developed and maintained throughout the life of each NNSA project. The Federal Project Director is responsible for the official baseline estimate, developed prior to project acquisition (via contract/delivery order/task order or subcontract (Management and Operating (M&O) Contract award) and should ensure that adequate design has been accomplished on which a credible estimate can be performed, before the project enters the budget process. The official baseline estimate should be developed to an 85% confidence level..
- c. Each NNSA site or Program Office for projects in foreign locations shall maintain a cost estimate guide approved by the Site Manager containing the following: 1) when estimates are required, 2) how they will be conducted, 3) who will perform and review them, 4) the documentation and maintenance requirements for each estimate. These guides must meet the minimum criteria shown in Attachment 1.
- d. All sequential cost estimates shall be reconciled and kept on file with previous estimates until the project is completed, thereby ensuring traceability from project start to completion. The estimate documentation file shall also include the basis for each estimate (BOE), show how the estimate was performed, and contain a risk and contingency analysis. Risk and contingency analysis are required for both capital and operating costs projects. All estimates shall be performed in constant-year dollars and then escalated into year-of-expenditure (generally fiscal year) dollars. Both the estimates and the escalation rates used will be kept on file until the project is completed.
- e. Check estimates are recommended for validating project estimates. Check estimates can be made by the project engineer/manager or by any qualified DOE or support contractor personnel. It is highly desirable that the check estimate be made by someone other than those who performed the original estimate. The check estimate may utilize any of the estimating methods shown in Attachment 3.

- f. Site Offices or Program Office for projects in foreign locations shall record actual costs while projects are being constructed, and maintain the data in some usable form, either at the sub-element level or at a higher (macro) level. This data will be used primarily to support cost estimating on new local projects, but it would be highly desirable if it were exchanged with other offices, when desired and useful.
- g. For the purpose of this BOP, all ICEs shall be developed concurrently and independently of the prime, Management and Operating (M&O) or Management and Integrator (M&I) contractor's estimate development.
- h. ICE's will be developed for each NNSA project with a TPC >\$100 million prior to CD-2. For NNSA projects with a TPC <\$100 million ICEs will be developed at the discretion of the Acquisition Executive (AE), Program Office or the Federal Project Director.
- i. The ICE will be conducted in an open format. Program offices will be invited to attend all review team sessions.
- j. At the conclusion of each Independent Cost Estimate, an out brief will be conducted with the Site Manager, or his designee, or Program Office for projects in foreign locations regarding the review results.
- k. Funding for ICE's is the responsibility of the program and project office. For line item projects, funding for ICE's shall be included in the Congressional Budget Request for each project and the type of funding (i.e. operating, Project Engineering and Design (PED), or construction) can be determined by the phase of the project. ICEs shall be identified in the planning schedule for the project.
- l. The level of detail of an ICE will be appropriate to the phase of the project being reviewed. (Per Attachment 1 of this BOP)
- m. ICE will be conducted for each NNSA project at successive project phases as delineated by critical decisions.
- o. Guidelines for developing project estimates must be maintained by all NNSA Site Offices or Program Office for projects in foreign locations in accordance with procedures contained in applicable NNSA and DOE policies. Independent cost estimates and independent cost analyses must be conducted outside of proponent organizations in support of Acquisition Executive critical decisions, or in response to requests or recommendations by the Administrator, Principal Deputy, Deputy and Associate Administrators, Program Managers, and Federal Project Directors.

- p. Project estimates and budget requirements shall include identifiable provisions for price changes due to economic inflation or deflation predicted in accord with guidance issued by the Office of Cost Analysis (CF-70).

5. RESPONSIBILITIES.

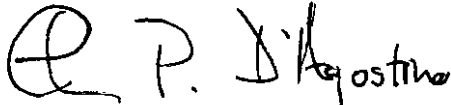
- a. NA-50 is assigned the responsibility to serve as the independent assessor for cost estimating; cost estimating is an essential part of overall project success within the NNSA. The principal customers of these estimates are the Administrator, Principal Deputy, Program Managers, Federal Project Directors and Deputy and Associate Administrators. Cost Estimating is a cornerstone of planning and executing projects.
- b. The Office of Project Management and Systems Support (NA-54) will:
 - 1. Perform all NNSA Independent Cost Estimates and independent cost analyses for projects between \$100 million and \$750 million, or as requested by the Administrator or the Program Deputy Administrator or Program or Project Office. ICE's on Projects with a TPC greater than \$750 million will be performed by CF-70.
 - 2. Serve as a focal point for all cost estimating policy and standardization within NNSA.
 - 3. Improve cost estimating techniques and practices within NNSA.
 - 4. Define policy and establish guidelines for the implementation of independent cost estimating and analysis in NNSA. Any changes will be made in consultation with Program Secretarial Officers and Site Office Managers.
 - 5. Organize, direct, and perform independent cost and schedule estimates, analyses, and reviews of project estimates, and provide members for independent cost estimating task groups.
 - 6. Coordinate expertise requirements supporting independent estimates with the applicable organizations. Conduct reviews, in coordination with the appropriate Associate Administrator, office director, or NNSA Site Office Manager, of major variances (greater than 10%) between independent cost estimates and project office estimates and report the results of such reviews.

7. Reconcile all independent cost estimates with program or project office estimates in order to identify and clarify differences prior to reporting the completion of the independent cost estimate.
 8. Recommend the conduct of an independent cost estimate or independent cost analysis where major budget issues are involved. Serve as focal point for all cost estimating policy and standardization within NNSA.
 9. Develop, and annually update, the NNSA Cost Analysis Improvement Plan.
 10. Help user organizations to develop their own indices as requested. Validate indices developed by using organizations, at least once, to assure that standard guidance is clearly understood and being used.
 11. Provide guidance and, if required, training in the development and use of price change indices.
 12. Develop and establish the NNSA definitions of estimate components such as contingency and escalation, and how they should be estimated and treated in NNSA cost estimates.
 13. Develop databases and models to facilitate and improve cost estimating.
 14. Establish and maintain an NNSA-wide Work Breakdown Structure (WBS) code of accounts for use in cost data collection on NNSA construction projects.
 15. Visit each NNSA Site Office at least once every two years to discuss local cost problems and provide assistance.
 16. Recommend training courses for cost estimators.
 17. Provide members for independent cost estimating activity with contract and other pricing/cost expertise.
 18. Assist in the development and integration of historical cost data, including construction cost data.
- c. Cognizant Deputy and Associate Administrators (NA-10, NA-20, NA-50, NA-60 and NA-70) shall:

1. Provide points of contact for independent cost estimating task groups upon request.
 2. Recommend disposition actions to project managers after major variations between an independent cost estimate and project office estimate have been identified and analyzed.
 3. Approve corrective actions regarding major variances which would entail changes in or to the project cost estimate.
 4. NA-60 shall ensure that cost and schedule data collection and reporting requirements are embedded in the NNSA contracts.
- d. NNSA Sites Offices shall:
1. Develop and maintain local cost guides, per minimum criteria found in Attachment 3, that outline cost estimating procedures to be used by operating contractor and NNSA personnel performing and reviewing cost estimates. Copies of guides are to be forwarded to NA-54 along with the initial issuance or distribution.
 2. Develop local price change indices appropriate for their region. When local indices are developed, separate price indices for construction, operating expenses, and capital equipment categories are necessary. These locally-produced indices are also to be forwarded to NA-54 to add to the knowledge base available to all NNSA programs.
 3. Forward any unusual price change phenomena to CF-70 and NA-54 for dissemination.
 4. Approve project cost estimates developed by the M&O's or other site contractors.
 5. Collect actual cost and schedule data for use in future estimates.
 6. Ensure check estimates are conduct on projects < \$100 million. Approve check estimates.
- e. NNSA Federal Project Director
1. The Federal Project Director is responsible for the development of cost estimates and their maintenance throughout the life of each NNSA project.

2. The Federal Project Director is responsible for the official baseline estimate, developed prior to project acquisition (via contract/delivery order/task order or subcontract (Management and Operating (M&O) Contract award) and should ensure that adequate design has been accomplished on which a credible estimate can be performed, before the project enters the budget process
6. REFERENCE. DOE Order 413.3A, Program and Project Management for the Acquisition of Capital Assets, 7-28-2006.
7. CONTACT. The point of contact for this Policy Letter is the Associate Administrator for Infrastructure and Environment (NA-50) 202-586-7349.

BY ORDER OF THE ADMINISTRATOR:


THOMAS P. D'AGOSTINO
Administrator

ATTACHMENT 1 REQUIRED INDEPENDENT COST ESTIMATES
ATTACHMENT 2 DEFINITIONS AND GENERAL ROLES
ATTACHMENT 3 CRITERIA FOR LOCAL COST ESTIMATING GUIDES

ATTACHMENT 1 INDEPENDENT COST ESTIMATES (1)

ICE's will be developed for each NNSA project with a TPC >\$100 million prior to CD-2. For NNSA projects with a TPC <\$100 million ICEs will be developed at the discretion of the Acquisition Executive (AE), Program Office or the Federal Project Director."

Timing:	Review purpose	Direction	Estimate Class	ICE Type
Prior to CD-0	Project cost magnitude range	A project cost magnitude range should be established based on project alternatives. This establishes the Acquisition Authority Level for Critical Decision-0 (CD-0). Normally, depending on techniques used, there will be little, if any, distinction between components or categories within the cost estimate (e.g., direct costs, indirect costs, contingency, or escalation; labor, materials, equipment, etc.; types of work). The cost estimate for the Conceptual Design Review (CDR) phase of the project should be developed to a more definitive level.	Class 5	Type 1
At CD-0	Conceptual Phase estimate	Cost estimates prepared to support achieving CD-1 will range from Class 5, Order of Magnitude to Class 3, Preliminary cost estimates, using several cost estimating techniques. For alternatives explored, varying levels of available information should be expected. Ranges should be a little more refined than those at CD-0, but still established based on the range of project alternatives. The cost estimate for the Preliminary Design phase of the project should be developed to a more definitive level.	Class 4	Type II, III, IV, V
Prior to CD-1	Alternative analysis ICE (LCCA)	The cost range developed at this point in the project planning process will represent all viable alternatives considered to achieve the required performance capability. These estimates also should include costs for exploring alternative concepts and the development of solutions and alternatives during the project definition phase. Life-cycle cost estimates that are developed early in a project's life may not be derived from detailed engineering, but they must be sufficiently developed to support budget requests for the remainder of the project definition phase. They should also include all anticipated resources, using appropriate estimating techniques that are necessary to acquire or meet the identified capability.	Class 4	Type II, III, IV, V

Timing:	Review purpose	Direction	Estimate Class	ICE Type
	Preferred Alternative and Cost Range ICE	During the project definition phase, at the conclusion of the concept exploration process, the alternative selected as the best solution to a mission need is presented for approval. The solution presented as a subset of a conceptual design report must include the TPC range, a schedule range with key milestones and events, and annual funding profiles. The TPC range presented must be a risk-adjusted cost estimate that defines all required resources necessary to successfully execute the planned work.	Class 3	Type II, III, IV, V
After CD-1	Preliminary Design Phase Estimate	This is the estimated cost associated with the preliminary design and should contain activities for final design phase. This estimate will be the basis for the Federal CD decision process.	Class 2	Type III, IV, V
Prior to CD-2	Performance ICE	Establishes the project's performance baseline. The cost estimate shall be risk adjusted and capture the Total Project Cost (TPC) to acquire the asset. This estimate should be organized using a work breakdown structure that supports earned value management reporting requirements and easily facilitates evaluation of all estimated costs.	Class 1	Type III, IV, V
	Reconciliation between ICE and contractor cost estimate	Reconciliation between the ICE and contractor estimate for the purpose of validating the BOE. This estimate will be the basis for the Federal CD decision process.	Class 1	Type III, IV, V
Prior to CD-3	Construction or Execution Readiness	If $TPC \geq \$750$ million	Class 1	Type III, IV, V

(1) The estimate type to be utilized by the ICE team is tailored depending on the stage of the project, the level of documentation available, and the time available

ATTACHMENT 2 DEFINITIONS

Acquisition Executive – the individual designated by the Secretary of Energy to integrate and unify the management system for a program portfolio of projects, and implement prescribed policies and practices. The Acquisition Executive is the approving authority for a project's Critical Decisions, per DOE O 413.3A.

Basis of Estimate, or BOE—documentation that describes how an estimate, schedule, or other plan component was developed, and defines the information used in support of development. The basis of estimate documents the estimate assumption, exclusions, and criteria used in producing the estimate and include; the cost estimate purpose and class; WBS, including deliverables and scope of work; code of accounts; project/program requirements and milestones, including constraints, special conditions, regulatory drivers, applicable DOE Orders, and industry standards; description of assumptions and exclusions; backup data, including quantity takeoffs, calculations, commercial databases; historical data, cost estimating relationships (CERs), quotes, and other general sources of information; basis of direct costs (e.g., industry standards and historical information); basis of indirect costs (e.g., rates from a corporate perspective); basis of escalation; and basis of contingency, which may include or reference a risk analysis or risk management plan.

Check Estimates - are one way that a field office can infuse quality assurance/quality control practices into a cost estimate. These estimates should be developed and performed by a third party who did not participate in the original cost estimate. An "outsider" provides the opportunity for the estimate to be reviewed by a fresh observer. Check estimators should be able to identify any weaknesses in estimate documentation or methodology before these weaknesses have a negative effect on the estimate. For example, if personnel performing the check estimate cannot follow the existing documentation, chances are that the documentation is not sufficient to support the estimate in the approval process.

Critical Decision – a formal determination made by the Secretarial Acquisition Executive/Acquisition Executive at a specific point in a project's life cycle that allows the project to proceed to the next phase or Critical Decision. Critical Decision requirements are specified in DOE O 413.

Class 5, Order of Magnitude Cost Estimates, also known as rough order of magnitude (ROM) or top-down cost estimates are typically performed in the early stages of a project's life. These cost estimates are based on the least amount of available information and may indicate a low level of confidence or accuracy in the estimate. Techniques used to develop these estimates include stochastic, most parametric, and professional judgment (parametric, specific analogy, expert opinion, trend analysis).

Class 4, include a combination of Class 5 and Class 3 cost estimates. The techniques used to develop estimates in this class vary, with more parametric (parametric, specific analogy, expert opinion, trend analysis) estimates being the norm.

Class 3, *Preliminary*, or budgetary, cost estimates contain diverse levels of available and supporting information, use various techniques, and portray a moderate level of confidence. Various techniques, including combinations (detailed, unit-cost, or activity-based; parametric; specific analogy; expert opinion; trend analysis) are used to develop these estimates.

Class 2, *Intermediate* cost estimates include a combination of Class 3 and Class 1 cost estimates. The techniques employed here vary, with more definitive (detailed, unit-cost, or activity-based; expert opinion; learning curve) approaches being utilized.

Class 1, *Definitive* cost estimates, also known as detailed, detailed unit-cost, or activity-based cost estimates, are those with the most abundantly available support information using a definitive technique for development and representing a greater level of confidence. These techniques include deterministic and most definitive (detailed, unit-cost, or activity-based; expert opinion; learning curve).

Independent cost estimate (ICE) - a documented, independent detailed, unit-cost, or activity-based cost estimate that serves as a tool to validate, crosscheck, or analyze cost estimates developed by project proponents.

Independent Cost Review - An essential project management tool used to analyze and validate an estimate of project costs by individuals having no direct responsibility for project performance.

Life-cycle cost - The overall estimated cost for a particular program alternative over the time period corresponding to the life of the program, including direct and indirect initial costs plus any periodic or continuing cost of operation and maintenance. The sum total of the direct, indirect, recurring, nonrecurring, and other costs incurred or estimated to be incurred in the design, development, production, operation, maintenance, support, and final disposition of a major system over its anticipated useful life span. Where system or project planning anticipates the use of existing sites or facilities, restoration, and refurbishment, costs should be included.

Life-cycle cost analysis (LCCA) - assessment of the direct, indirect, recurring, nonrecurring, and other related costs incurred or estimated to be incurred in the design, development, production, operation, maintenance, support, and final disposition of a major system over its anticipated useful life span.

Project – A group of related activities that has a defined starting and end point and undertaken to create a unique product or service in support of a program.

Traceability - A life cycle cost and schedule estimate file will be maintained on all projects. The file will contain all cost and schedule estimates from the beginning to the end of project construction. Significant variances between subsequent estimates must be explained and kept on file so that traceability can be maintained throughout the project's life. Changes in scope, escalation assumptions, estimating methods, contingency, and schedule shall be explained, recorded, and tracked from one estimate to the next, and kept on file.

Type I - Documentation Review. This type of review is not normally accomplished as an ICE, nor does it fulfill the requirements necessary to support an Energy System Acquisition Advisory Board (ESAAB) decision, since it only consists of an assessment of the documentation available to support the estimate. It is merely an inventory of existing documents, not a review, and determines that the required support documentation exists and identifies missing data.

Type II - Reasonableness Review. For this review, the ICE team reviews all available project documentation, receives briefings from the project team, holds discussions with the project team, completes sufficient analysis to assess the reasonableness of the project assumptions supporting the cost and schedule estimates, ascertains the validity of those assumptions, assesses the rationale for the methodology used, and checks the completeness of the estimate. The result is a report that details findings and recommendations.

Type III - Parametric Estimating Technique. This technique, in addition to incorporating all the activities needed for a reasonableness review, uses parametric techniques, factors, etc., to analyze project costs and schedules and is usually accomplished at a summary (WBS) level. The parametric techniques should be based on accepted historical cost/schedule analyses. At a minimum, these tools should be based on historical estimates from which models have been derived, and, where possible, from actual completed projects. An estimate with a minimum of 75 percent of the total project cost (TPC) based on parametric techniques is classified as a parametric estimate.

Type IV - Sampling Technique. This review also begins with the activities needed for a reasonableness review, but in addition, it requires the ICE team to identify the key cost drivers. A "cost driver" is a major estimate element whose sensitivity significantly impacts the TPC. Detailed independent estimates must be developed, which should include vendor quotes for major equipment and detailed estimates of other materials, labor, and subcontracts. For the balance of the project costs, the project estimate may be used (if deemed to be reasonable through the reasonableness review), or, if appropriate, parametric techniques may be used for certain portions of the project costs. An estimate that provides a detailed cost for all cost drivers is classified as a sampling estimate.

Type V - Bottom-up Estimating Technique. This is the most detailed and extensive ICE effort, and begins with the activities needed for a reasonableness review. In addition, it requires a detailed bottom up independent estimate for both cost and schedule. This involves quantity take-offs, vendor quotations, productivity analysis, use of historical information, and any other means

available to do a thorough and complete estimate of at least 75 percent of the project's cost. It may not be possible to do a completely independent estimate on some portions of the PSO estimate, and for those portions—which should not exceed 25 percent of the total estimate—the project estimate may be used if it has passed the test of reasonableness. In all cases, a total cost (both total estimated cost (TEC) and TPC should be developed. It must be recognized that all estimates will involve a combination of the techniques described in this section, because varying levels of information will be available. The accuracy of the estimate will be subjectively determined based on the weighted totality of the information available.

ATTACHMENT 3 CRITERIA FOR LOCAL COST ESTIMATING GUIDES

While it is recognized that local conditions will influence the content of local cost guides to some degree, these guides must, at minimum, include the following items:

- a. **Types of Cost Estimates.** List and define the seven types of cost estimates.
- b. **Basis for the Cost Estimate.** Establish and document the basis for the estimate. The basis for the cost estimate must describe the purpose of the project, general design criteria, stage of design at the time of the estimate, significant features and components, proposed methods of accomplishment, proposed construction schedule, research and development requirements, and any other pertinent facts that may impact costs.
- c. **Planning for the Estimate.** Describe the need for planning the approach and selecting the cost methods that will be used. Determine the type of estimate to be performed and the level of detail desired. Also, show such items as the basis for estimating quantities of materials not yet detailed on drawings, and for wage rates, productivity factors, and installation unit man-hours.
- d. **Performing the Estimate.** List the steps to be followed in performing a cost and schedule estimate and show the categories of cost that must be included.
- e. **Cost Codes of Account.** The cost codes of account in Chapter 6 of DOE Cost Guide DOE/MA-0063 Volume 6 should be used for the estimates. If sufficient reasons exist, local cost codes may be developed and used.
- f. **Contingency.** A contingency analysis shall be required on all construction project estimates, and the analysis shall become and remain part of the estimate documentation. This section will also show how to estimate contingency.
- g. **Inflation (and Economic Escalation).** All construction projects will be estimated in constant-year dollars in the year the estimate is performed. The constant-year cost will then be spread over the years in which costs will be incurred and each year's cost will then be escalated using an appropriate escalation index. The constant-year estimate, escalated estimate, and indices used will remain on file for future reference.
- h. **Cost Estimate Reviews.** Procedures will be established for reviewing all cost and schedule estimates including: (1) when reviews will be made; (2) how they will be made; and (3) who will make them. Cost review procedures will require all cost estimates to be reviewed by someone other than the estimator. Precaution will be taken to ensure there is

no conflict of interest when operating contractors (or other non-DOE personnel) are reviewing estimates.

- i. **Traceability.** A life cycle cost and schedule estimate file will be maintained on all projects. This file will contain all cost and schedule estimates from the beginning to the end of project construction. Significant variances between subsequent estimates must be explained and kept on file so that traceability can be maintained throughout the project's life. Changes in scope, escalation assumptions, estimating methods, contingency, and schedule shall be explained, recorded, and tracked from one estimate to the next, and kept on file.
- j. **Documentation.** All estimates shall be documented and the documentation file shall be kept current. Documentation shall include: (1) the purpose and basis of the estimate; (2) a technical description and the scope of the project being estimated; (3) all ground rules, constraints, and assumptions; (4) a detailed traceable recording of how the estimate was performed (e.g., quantity takeoffs, price sources, factors, cost estimating relationships, commercial cost manual, and in-house data base), and who performed it; (5) a contingency analysis; (6) a schedule; (7) a spread sheet showing funding requirements by year in both constant-year and escalated dollars; and (8) escalation rates used, and how they were obtained and applied.
- k. **Collecting Actual Cost Data.** Actual cost data will be collected as the project is being built for both project control and for cost data banks. Cost estimating guides will describe how they will be collected, normalized, stored in the data bank, and be available to cost estimators.
- l. **Requirements for Review and Approval.** The Site Manager will review and approve the Local Cost Estimating Guide and ensure it is maintained under change control procedures.