1.0 Introduction and Purpose

This instruction provides guidance to NDA personnel undertaking the review of SLC estimates including contingency. Reviews may be undertaken as part of the Lifetime Plan review, as part of the CT14 process, or at any other time as the need arises. In addition PCP 09 informs SLC's that the NDA will undertake Independent Cost Estimates (ICE) and conduct Independent Cost Estimate Reviews (ICER).

This instruction provides internal guidance for consistency purposes only and does not take precedence over the Programme Control Procedures (PCPs), contracts or any other NDA requirement document.

The instruction is based around the assessment of good practice which is the responsibility of the SLC to define. The NDA aspiration is that SLCs will provide 100% confidence in the quality of their estimates and NDA reviews of estimates will take place by exception.

2.0 Key Definitions

Key definitions are covered in the Programme Controls Glossary and where necessary in the individual PCPs which should be referenced for further information. Several terms are of particular importance to the clarity an application of this instruction and are defined below.

Independent Cost Estimate

The completion of an estimate by personnel independent of the SLC project or area of work. Independent cost estimates are used to validate SLC cost estimates.

Reasonableness

A cost is reasonable if it does not exceed that which would be incurred by a prudent, effective and efficient contractor in the course of the project or task and is not excessive or extreme. The burden of proof of reasonableness rests with the SLC.

Parametric Estimating

The development of an estimate from algorithms and cost estimating relationships.

Contingency

A provision added to budgets, developed from base estimates to provide for the effects of uncertainty on future performance. Contingency can emanate from 2 sources:

- *Estimating Uncertainty:* uncertainty associated with possible cost performance for project or operational work scope (e.g. uncertainty in work content, labour rates, outputs, durations; pricing for equipment and material, quantities of material, etc.)
- *Discrete Risk:* an event, circumstance or condition that may or may not occur, which could influence delivery of project or operational work scope (e.g. industrial disruptions, supplier failure, discovery of unexpected hazardous conditions on site, exceptionally adverse weather conditions).

Correlation

A measure of the extent to which one activity or risk is influenced by the change in another, or that both are influenced by a third. In general, the effect of increased correlation will be to broaden the range of possible cost for a total scope of work.

Confidence level:

A probability, normally expressed as a percentile value that actual cost will be less than or equal to a specified cost value. Such confidence levels are usually expressed as P value to indicate percentage confidence. For example the P50 value of cost X indicates that there is an equal chance of under or overspending against X.

3.0 Accountabilities/Responsibilities

The NDA is responsible for:

- Developing and maintaining this instruction
- Ensuring that this instruction is communicated within the NDA
- Where required completing estimate reviews using this procedure.
- Carrying out ICE and ICER.
-

The SLC is responsible for:

- Complying with the requirements in PCP 09 and PCP 15.
- Complying with the requirements in PCP 09 with respect to ICE and ICER
- Providing supporting information, schedules, plan, processes and procedures.

4.0 Requirements

4.1 Estimate Reviews

Estimate reviews are undertaken in order to increase the confidence in Lifetime Plans, submissions for approval under CT14 or as part of change control under PCP 05. Estimate reviews enable the assessment of areas of weakness in estimate methodology and/or documentation before these have a negative affect on a project/task. They should also provide a check on the reasonableness of the budgets set as part of the execution year Performance Measurement Baseline (PMB).

4.1.1 Estimate Review Process

The process to undertake Estimate Reviews is contained in the following paragraphs and shown diagrammatically in Figure 1.

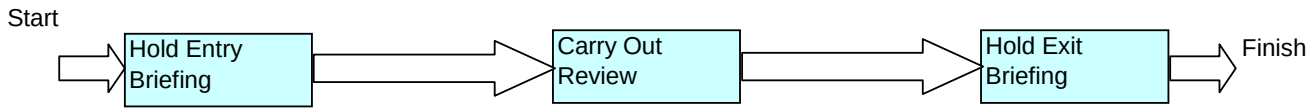

Figure 1

The entry briefing is held as an initial kick off meeting and is used to inform the SLC of the scale and scope of the review, to set the detailed process and arrange a future programme of work with the SLC.

The main work effort is carried out at the review stage according to the programme set at the entry brief and may involve site visits and discussions with the SLC. The exit brief is held to feedback findings to the SLC. All three stages may be held on a single site visit or may involve a number of visits and meetings depending on the scope of the review. The outcome of the discussions with the SLC should be recorded and filed on the NDA Electronic Data Management System.

4.1.2 Estimate Review Outline

The following paragraphs provide an outline of the review process. An example checklist is provided at appendix A.

Estimate background information and context. The requirements for the estimate and background should be understood by the reviewer in order to set the context of the estimate and determine the extent of the review. The example checklist should be adapted at this initial stage.

The coverage of the review should be considered against the estimate background and reviewed in the light of the review purpose and the sponsors requirements.

The estimating methodology should be clear and logical in both choice and execution. The sources of estimate data should be clear and appropriate.

The range of uncertainty should be clearly documented for the appropriate elements of the WBS structure. This should accord with the reviewers prior experience judgement as should the completeness of its application. The assessment of contingency should meet the requirements in PCP 15 and the overall assessment should fall within the accuracy ranges indicated in the PCP 09, unless there is sound supporting evidence to the contrary.

The review should be completed against the assembled checklist and a report that records the findings written.

4.1.3 Levels of Estimate Review

For the purposes of consistency the following paragraphs provide a framework for estimating review based on the levels of detail to be covered. The level chosen will depend on the purpose of the review and the time and resources available. A level 1 review will take the least amount of time and a level 5 review will take significant effort.

In planning an estimate review the NDA resource requirement including the use of the NDA Project Controls support contractor should be considered. The head of PC should be consulted on the availability of the support contractor.

4.1.3.1 Documentation Review (Level 1)

This is an overview and top level review which compares the SLC documentation available with the expectation. This review takes the least time and is aimed at ensuring the necessary support information is available and to highlight any missing information. The review therefore gives a broad level of assurance to the NDA. The level 1 review will be used to guide the reviewer in terms of the overall review requirements. Any further levels of review will be highlighted as part of the level 1 review and the necessary actions undertaken to instigate further more detailed reviews in the areas highlighted.

4.1.3.2 Reasonableness Review (Level 2)

This review will cover the project documentation, briefing and discussion with the SLC project team. Sufficient analysis will be undertaken to assess:

- the reasonableness of the estimate assumptions
- supporting the cost and schedule durations
- validity of the assumptions
- the rationale for methodology used
- Completeness of the estimates.

4.1.3.3 Parametric Check Estimate (Level 3)

The technique in addition to carrying out the bullet points in section 4.1.3.2 uses parametric estimating techniques or factors to compare and analyse project cost and consistency with schedules at an appropriate level. The tools should be based on accepted historical cost and schedule outturn duration analysis.

4.1.3.4 Review Based on Sampling (Level 4)

This technique incorporates all the elements of section 4.1.3.2 and provides an analysis of the major elements of cost and gives appropriate consideration to the sensitivity of the total cost to changes in underlying assumptions, in other words to the major cost drivers present in the total cost estimate. In addition the sample should consider where the highest risks to poor estimating lie. For example, this may be around the technical risk within the project or in the procurement strategy and a sample selected on this basis may be appropriate. An ICE should be compiled which may include elements of SLC derived cost if these are deemed reasonable and elements of factored or parametric based estimates.

4.1.3.5 Full Independent Bottom-up (Level 5)

This is the most detailed level of ICE and requires the most resource effort. It requires all the activities in section 4.1.3.2 to be completed and a detailed build up of a bill of quantities/bill of material, rates, vendor quotations as well as a detailed schedule to be completed. The aim should be to complete independent estimates for 75% of the total cost.

4.2 ICE and ICER

These instructions provide guidance for the NDA regions and HQ when carrying out ICE and ICER. ICEs provide a cross check and validate cost budgets and targets set within the Lifetime Plans. ICE will involve site visits and reviews of SLC documentation and records and may involve individuals or a team effort depending on the scope of the review. In order that the reviews are independent the team will not normally have been involved in the work at the site and may involve NDA PC support contract staff. A number of levels of ICER may be performed as detailed in section 4.1.3. Each level has an increasing resource demand to complete. Judgement should be exercised by the NDA sponsor in the specification of the level of review. Appropriate consideration should be given to such issues as:

- The work already undertaken by the SLC in terms of planning and estimating the work
- SLC ‘soft issue’ drivers: offsets, trade offs, bias and organisation pressure in estimating
- The level of confidence in SLC to deliver a successful outcome in this work
- SLC history
- Controlling mind issues

All SLC estimates will involve a combination of estimating techniques, levels of detail and accuracy ranges. Accordingly the ICEs may involve a mixture of levels 1 to 5.

5.0 Outputs

A concise written report should be completed to document the findings of the review and the main areas of the checklist. A report template is provided at appendix B for the purposes of consistency the main areas should as a minimum be covered in any estimate review. The results of the review should be communicated to the NDA Site Programme Manager (SPM) and to the site. The level and format of the feedback should be decided by the NDA SPM.

The report, together with any other relevant documentation, should be recorded and placed on the EDRMS. This is a key enabler and will facilitate the sharing of lessons learned across the NDA and the continuous improvement of the PCPs. HQ Project Controls will review the outputs located on the EDRMS for cross site issues each year and compile an annual report which consolidates major issues and provides recommendations for future changes to NDA requirements and PCPs. The location on EDRMS is as follows:

Enterprise Workspace/3 Head Office/3.09 Engineering and Strategy/3.09.02 Project Controls/3.09.02.01 Projects Control Systems/3.09.02.01.03 Estimating.

A key requirement in PCP09 is that project close out reports/historical cost reports will be forwarded to the NDA. The purpose of these is to establish an NDA benchmarking database of completed projects. These will be emailed to the a central NDA email address. The data from these reports will then be stored in a central project benchmark database. Access will be given to regional teams via the Project Controls web page. The collection of the “one off” estimates will also be co-ordinated centrally.

6.0 References

Project Controls Procedures:

PCP 01 – Work Breakdown Structure
PCP 04 – Charging Practices
PCP 05 – Change Control
PCP 07 – Life Time Plan
PCP 08 – Funds Management
PCP 09 – Estimating
PCP 10 – Risk Management
PCP 11 – Scheduling
PCP 12 – Performance Monitoring
PCP 13 – Progress Reporting
PCP 15 - Contingency

APPENDIX A - EXAMPLE CHECKLIST

AREA	EXPECTATION
Overview	• All necessary individuals have input into iterations and development of the estimate. • Contractor Team Management use the estimate. • Necessary staff posses an appropriate level of competence, using skills and developing new ones. • Apply new thinking to tailor existing estimating practices. • Developed practices used by others in similar situations through imitation and reflection. • Seeking to learn from the experiences of others.
Stakeholder Engagement	• Stakeholders are involved in the identification of work packages and objectives. • Frequent interaction with the customer and regulators is the norm.
Define Activities	• WBS complete, provide a structure to the estimate and includes objectives/outputs. • The estimate is linked to project/organisational objectives. • The estimate relates to the project milestones and decision points identified • Output definitions are clearly defined with estimate against them. • The estimate against the plan contains just enough detail to manage activities with committed cost estimates.
Estimating Approach	• Estimates are against definite starting, finishing & intermediate activities. • Estimates are against an activity network developed from the WBS. • The estimate type is appropriate for the stage of project and scope involved. • Stakeholders/Suppliers are sometimes involved in the Project Estimating process, input is consistent • Estimates consider both Uncertainty and Risk. • Organisational support has been used within a formal support framework. • Estimates have been verified and validated against independent cost models and previous projects. Differences are understood and explained. • The development of the estimate is fully resourced for both internal and external activities. • The estimating process has been developed through a number of complete iterations, that include modelling of both risk and uncertainty. • Estimates are reviewed within a formal process.
Contingency Approach	• Risk and uncertainty are correctly combined in a model to produce cost and schedule S curves and probability distributions. • Evidence exists to show how the risks in the contingency assessment have come from the system of risk management (NDA Requirements in PCP10) • Detail on each risk provides an adequate understanding of the source of each significant risk included in the contingency assessment. • The risk probability and impacts are assessed against cost, schedule and performance. All significant risks are assessed consistently. • The assessment of individual risk considers the relationship with other risks and the knock on effects one risk may have with another. Correlation is given appropriate consideration within the modelling process. • Estimates of risk impact and probability can be shown to be objective and verifiable. Personnel responsible for the risk estimates can draw on some experience in the relevant areas. • Estimates of risk are free bias caused by pressures of gate review and target setting. • Quantitative risk analysis has been performed and verifiable output S curves and/or probability distributions are available for cost, where required the cost impact of schedule and operational performance has been considered. • Quantitative risk analysis modelling has been used in iteration to support regular project and risk reviews which have informed the Estimate to Complete (ETC) and Estimate at Completion (EAC) which are consistent with the project performance reports. • Fallback plans have been developed at an appropriate level of detail in order to support decision making, issues have been dealt with within the estimate and/or contingency assessment.

Historical Data	• Completed projects have been analysed in a systematic way to provide organisation learning. • Information is captured and structured for the purposes of future reference. • Values used in cost estimates can be supported by the analysis of previous projects. • Organisational learning has been fed into the estimating process.
Expected Outcome	• Targets more likely to be met within resources • Enables proactive decision making • Improved communication and commitment from stakeholders • Outputs are more clearly identified.

NOTE: THE NDA REVIEWER IS TO DECIDE WHICH BULLETS POINTS APPLICABLE TO THE ESTIMATE BEING REVIEWED AND WHICH ARE NOT.

Parent Company & Site:	
Detailed Volume:	
Review Date:	
NDA Lead Reviewer:	
NDA Team:	
Attendees:	
Distribution:	

Review Summary

Heading	Narrative
Aim	
Objective	
Findings	
Observations	
NDA Actions	
Lessons Learnt	

Area	Evaluation	Comments
Overview		
Stakeholder Engagement		
Define Activities		
Estimating Approach		

Historical Data		
Expected Outcome		

Evaluation Index

NDA outputs requirements met.

NDA outputs partially met

NDA output requirements not met