

Brookhaven National Laboratory/ Light Sources Directorate						
Subject:	Elements of Calculations and Analyses					
Number:	DL-QAI-4.2	Revision:	A	Effective:	11/1/2007	Page 1 of 4
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*Approval signatures on file with master copy.

[Revision Log](#)

1.0 PURPOSE

To provide guidance for documenting and maintaining engineering calculations and analyses in the Light Sources Directorate (DL).

2.0 REFERENCES

- 2.1 [Preparation and Revision of Engineering Calculations and Analyses](#) - DL-QAP-0415
- 2.2 [Engineering Design Plan](#) - DL-QAP-0411
- 2.3 Calculation cover and worksheets:
 - [Cover Page](#)
 - [Blank Page Worksheet](#)
 - [Large Grid Worksheet](#)
 - [Small Grid Worksheet](#)

3.0 DEFINITIONS

- 3.1 Independent reviewer - An NSLS or NSLS II individual knowledgeable in the appropriate discipline, an external Department/Division, or an organization outside of BNL.

4.0 INSTRUCTIONS

4.1 GENERAL

- 4.1.1 Calculation and analysis that support systems, structures or components depicted on engineering drawings must be traceable to the drawings.

Calculation worksheets must:

- be legible and reproducible;
- describe the purpose, methods used, assumptions, design basis, references, and units so that a person competent in engineering disciplines and familiar with the subject can understand and verify the adequacy of the calculations or analysis without recourse to the originator;

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- contain the following labeling elements (calculation cover and worksheets are available on line):
 - title or subject;
 - originator's signature and date;
 - reviewer's signature and date;
 - Engineering Design Plan number (if applicable);
 - calculation ID number;
 - page X of Y numbering;
 - a revision letter (initial calculation is Rev. A).

4.2 HAND CALCULATIONS

- 4.2.1 Individual making a change on record originals of hand calculations must mark, initial and date the change. Pen or pencil may be used for record originals. Programmable calculators and computer printouts from spreadsheets, MathCad, Mathematica, etc. may be used in preparing hand calculations. Identify the program used and version number.

4.3 COMPUTER CALCULATIONS

- 4.3.1 Applications and software approved by appropriate NSLS Section Heads or NSLS II Division Directors are acceptable engineering design and analysis tools.

Store computer engineering analysis files on dedicated and backed up hard drives or hard drive partitions (in cases where paper archives are inadequate) in the design room.

Prepare cover and calculation sheets which include the following data:

- originator's signature and date;
- reviewer's signature and date;
- Engineering Design Plan number or unique calculation ID number;
- page X of Y numbering;
- a revision letter;
- computer program and version;

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- filename.

Finite Element Analysis (FEA) files should include only enough information to recreate the final model, but not the output files. The model information should be in an ASCII format so that engineers can recreate calculations in future FEA software. If ASCII format is not available, a detailed description of the model, assumptions, and input parameters will be supplied, such that a qualified FEA analyst can create an equivalent model.

