

Worksheet for Developing & Documenting Uncertainty Analyses (using SOP 29 & 8-step process)

SIQCCEER –

- 1. Specify**
- 2. Identify**
- 3. Quantify**
- 4. Convert**
- 5. Combine**
- 6. Expand**
- 7. Evaluate**
- 8. Report**

1. Specify the Process.

- What calibration is being performed? Enter the name of the calibration (title).

- What documented procedure is being performed? Enter the SOP name/number.

- What is the overview for this procedure? Provide a description or summary of the procedure.

- What equation/option will you use? Insert the “Model” equation for this procedure.

2. Identify and characterize uncertainty sources.

Where possible, create the list by identifying an uncertainty associated with each variable in the measurement equation (ME). What has not been included that may influence the measurement? Enter these items in the list as well. How will the value be determined? I.e., by Type A or Type B methods?

List quantities/variables for each component describe the input source.

Component (symbol)	Description of Input (source)

3. Quantify uncertainty estimates.

Add 4 columns: Uncertainty value, units, and a Reference Source or explanation of how the value was determined. Also enter information on the method used to determine this value. Kragten & Baseline approaches for determining the impact values.

Component (symbol)		Standard Unc. Value	Units	Reference Source	Type (A or B)

4. Convert all factors to standard uncertainties.

Add 4 columns: Distribution type. Correlation coefficient. Adjusted values for standard uncertainties and their adjusted units.

Component (symbol)	Standard Unc. Value	Units	Distribution Type	Sens. Coef.	Standard Uncertainty	Units

5. Combine: Calculate the combined uncertainty, u_c .

Typically linear RSS. Add another row to the table.

Component (symbol)	Unc. value	Units	Type (A or B)	Distribution Type	Sens. Coef.	Standard Uncertainty	Units
Combined Uncertainty							

6. Expand: Calculate the expanded uncertainty, U .

Determine coverage factor, k . Add two rows to the table.

Component (symbol)	Unc. value	Units	Type (A or B)	Distribution Type	Sens. Coef.	Standard Uncertainty	Units
Combined Uncertainty							
Coverage factor, $k=$ _____							
Expanded Uncertainty							

7. Evaluate the expanded uncertainty.

Is it reasonable? Does it make sense?

Have all components been included?

If some components were not included, have statements to that effect been included?

Were the calculations done properly?

Does it meet the customer's needs?

Does it meet tolerance/specifications?

Is it less than your "best measurement uncertainty"?

Can it be validated with a proficiency test?

Does the uncertainty need to be reduced to meet needs?

Do one or two factors contribute significantly compared to the others?

What factors can be reduced through alternative calibration sources, procedures, or equipment? How? How much will it cost?

8. Report the uncertainty.

Have you rounded to 2 significant digits?

Prepare the uncertainty statement for the report.

Items to be included are:

- Proper units (that match the calibration values);
- List of components that are included;
- Document how each of the components was evaluated;
- List of any "significant" components that are not included;
- Coverage factor and level of confidence (and degrees of freedom if appropriate);
- Reference to the Guide to the Expression of Uncertainty in Measurement (GUM);