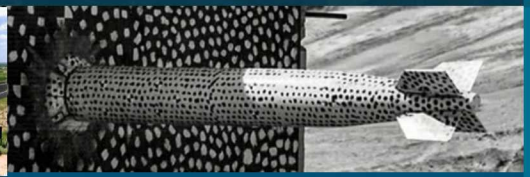
SAND2020-1004PE

Sandia National Laboratories

How an Official PA Run is Accomplished



Jennifer Long, Software Configuration Management Coordinator, Run Control Coordinator and Database Administrator

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Official PA Approach

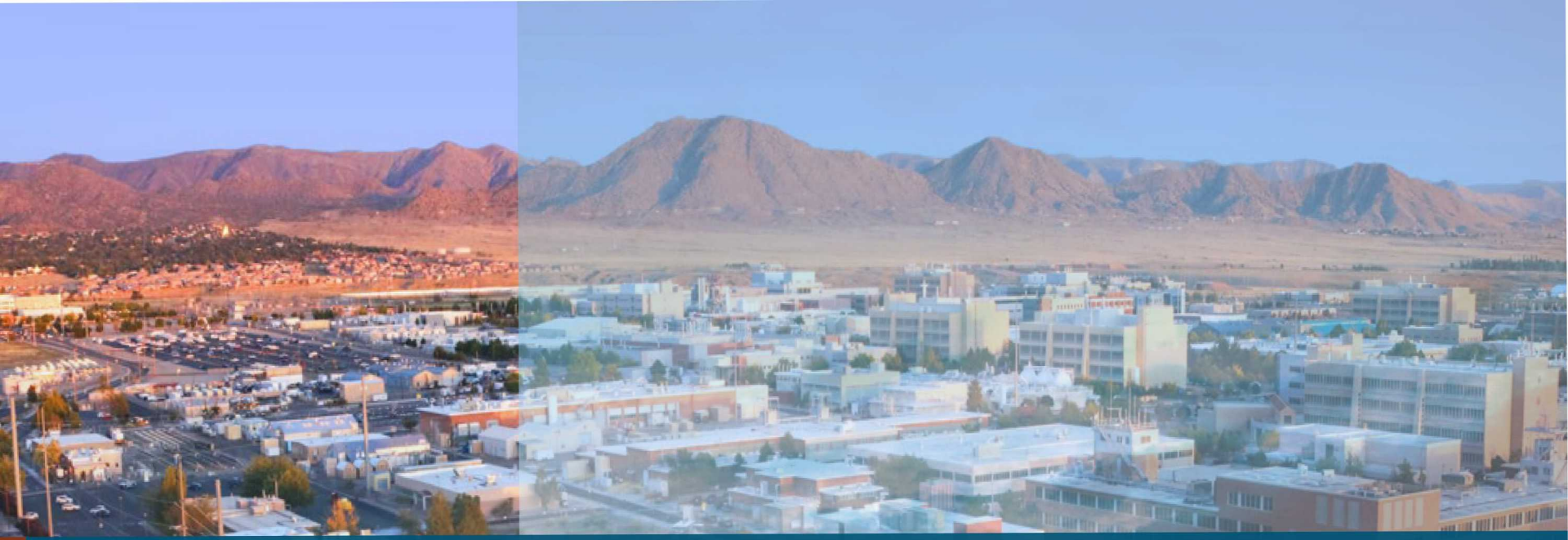
- The Sandia National Laboratories (SNL) Waste Isolation Pilot Plant (WIPP) Quality Assurance (QA) program applies to all activities in the SNL WIPP project. (NP 1-1)

- The SNL WIPP QA requirements applicable to work activities shall be specified during the planning phase to ensure the development and implementation of effective controls so that items, processes, and services meet or exceed customer requirements. (NP 1-1)

Analysis Plan

Analysis Plan

- An Analysis Plan is used to control and document scientific and engineering analyses performed by SNL for the WIPP program. (NP 9-1)
  - **Scope of the analysis**
    - The objectives to be achieved
    - Assumptions related to implementation of conceptual models
    - Identification of potential sources of error and uncertainty and how they will be controlled
  - **Analytical approach**
    - Details of all software being used
    - Justification of the use of all data and inputs
    - Calculation methodology
  - **Tasks to be completed**
    - Resources
    - Completion dates
    - Documentation requirements
  - **Applicable procedures to follow**
  - **Requires Technical, QA and Management review and approval.**



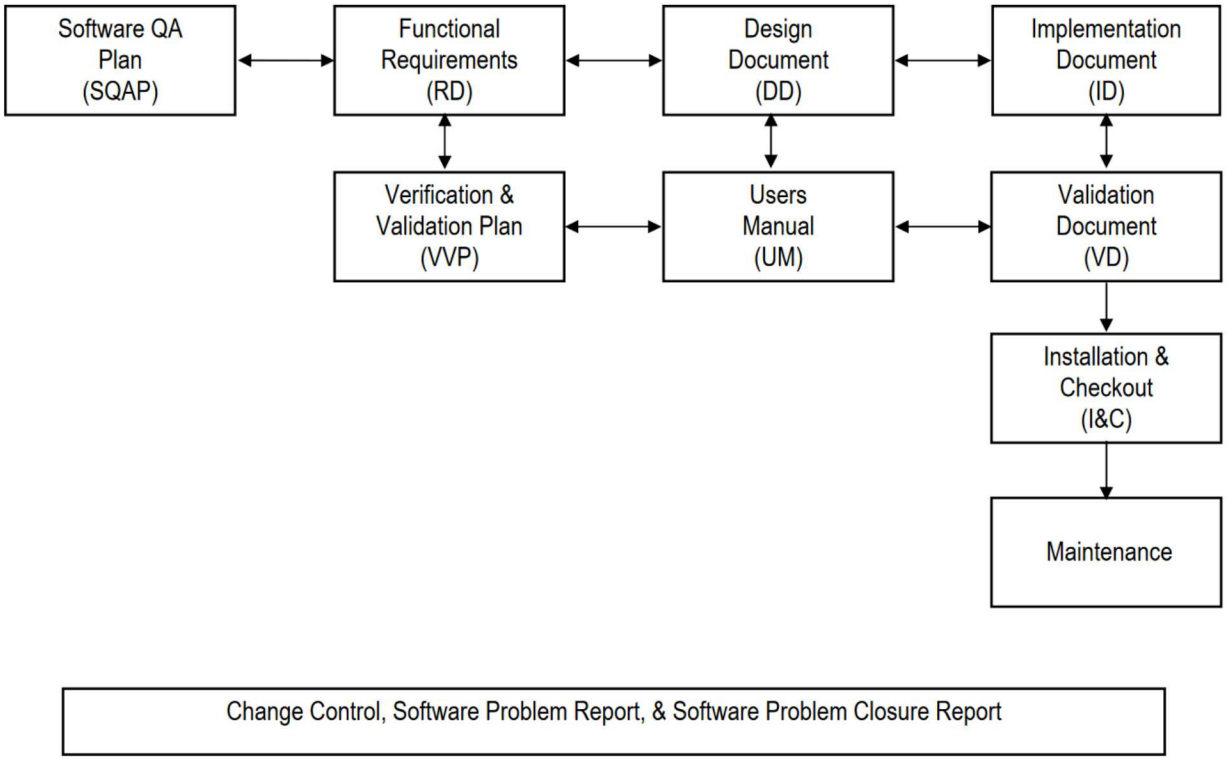
Code Changes

Code Changes

- If a code must be changed to add or modify functionality we must follow NP 19-1 Software Requirements.

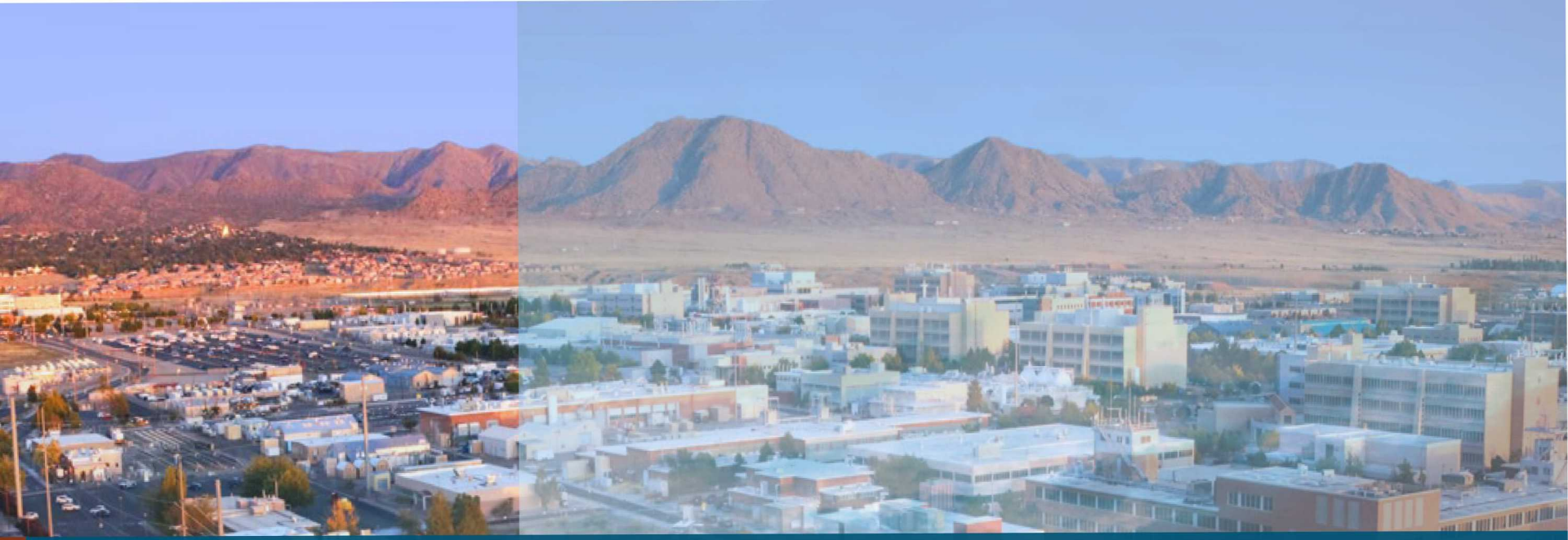
Figure 1

Documentation Development Flow



Code Changes

- If a code must be changed the first step is the Change Control Form. This must be reviewed and approved by a technical reviewer, QA reviewer, management reviewer, and the SCM Coordinator.
  - This form details the changes being made to the code.
    - Version, Hardware/Software Platform, Proposed Changes, Documentation
- After the Change Control Form is approved, the Code Sponsor can make changes to the code.
- Once the Code Sponsor is finished making changes, they give the build and test files to the Build Master for official code compilation and testing.
  - This is done in CVS and using scripts.
- After the code is officially built and tested, the Code Sponsor can finish the documentation changes and submit those for technical, QA, management and SCM Coordinator review.



FEPs Analysis

Features, Events, and Processes

A FEPs analysis documents the screening process and decision for natural, waste - and repository-induced and human-initiated features, events, and processes (FEPs). Those that are retained (not screened out) are included in the conceptual models of repository performance. (SP 9-4)

FEPs reassessments periodically update FEPs based on reviews of new information that relates to the current PA baseline

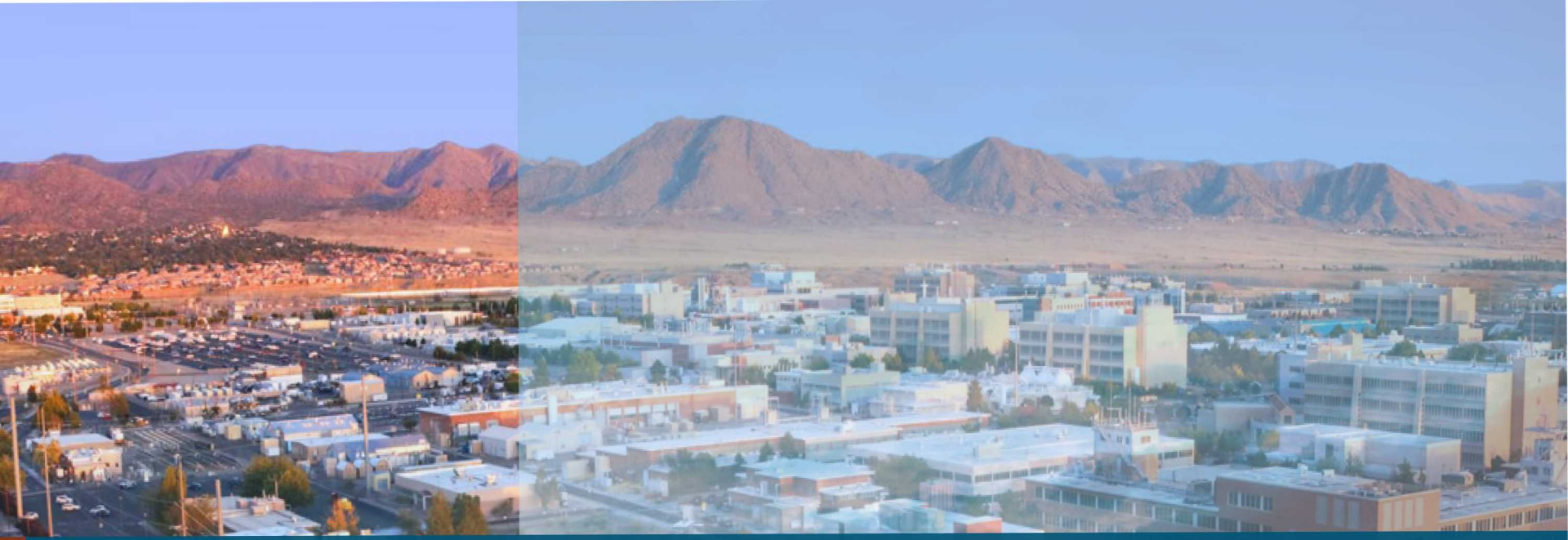
FEPs are reassessed for ANY compliance-level calculation

- Planned Change Notices; Planned Change Requests; Compliance Recertification Applications (CRAs)
- Generally focused on changes outlined in Analysis Plan for any given PA calculation

FEPs reassessments for any CRA consider:

- Changes identified in Analysis Plan outlining the calculation (AP-181 for CRA-2019)
- EPA's review of most recent CRA and associated CARDs and TSDs that pertain to the "Scope of Performance Assessments – 40 CFR Part 194.32"
- WIPP-relevant information that originates outside the WIPP Program (e.g., oil and gas activities, potash mining, etc.) since the last recertification decision
- Any EPA-approved changes since the last rulemaking or recertification decision
- DOE-initiated changes to the PA architecture or any of its components

Appendix SCR-2019 represents the updated baseline for CRA-2019



Parameter Procedure

Parameter

- A parameter is defined as any value or distribution of values, or functions used directly or indirectly as initial input to a Performance Assessment (PA).
- Parameters are developed, documented, and controlled in such a way to ensure that the parameters are traceable. (NP 9-2 Parameters, NP 9-1 Analyses, NP 20-1 Test Plans and NP 20-2 Scientific Notebooks)
- Each parameter is uniquely identified by its two part name consisting of its material and property.
  - For example, BOREHOLE:SAT_RBRN. The material BOREHOLE is Borehole and Fill and the property SAT_RBRN is Residual Brine Saturation).
- Each parameter (that is not a constant) is assigned a distribution. Parameter distribution values are developed based on experimental data, literature data obtained from journal articles, technical references from reference books, or other source information.
- The value(s) of a parameter is referred to as a parameter record and is controlled in the Performance Assessment Parameter Database (PAPDB). Each new or changed parameter value(s) is documented as a separate parameter record in the database.

Roles & Responsibilities

- **Requester:** Technical staff member who has the responsibility for requesting a parameter entry, modification or correction to the database. The requestor also has an understanding of the reasonableness of the parameter distribution(s), value(s) and the appropriateness of its use in context of the model.

- **Database Administrator (DBA):** Staff member responsible for maintaining the parameter database, including its security and maintenance of the data entered into it. The DBA is responsible for the creation, retrieval, and update rules for the database that make it possible to enter the values correctly.

- **PA Manager:** Responsible for accepting the parameter being entered and to assess any impacts on the SNL project and resolve any disputes, as needed.

- **Quality Assurance (QA):** Responsible for reviewing for completeness and correctness to provide assurance that the parameter is consistent with QA procedures, that appropriate quality assurance requirements have been met, and that specified quality requirements have been incorporated.

Parameter Justification

- All data and derived parameters must be justified by an Analysis Plan, Analysis Report or Routine Calculation (per NP 9-1 Analyses)
- The new parameter information is to be provided with the following attributes for entry into the PA Parameter Database (per NP 9-2 Parameters), as appropriate:
  - Material (add description or long name as appropriate with an abbreviation)
  - Property (Add description or long name as appropriate with an abbreviation)
  - Constant Value (if known)
  - Distribution (if not constant)
    - Data values and probability supporting the distribution (as applicable)
    - Mean
    - Mode (triangular distribution only)
    - Standard Deviation
    - Minimum
    - Maximum

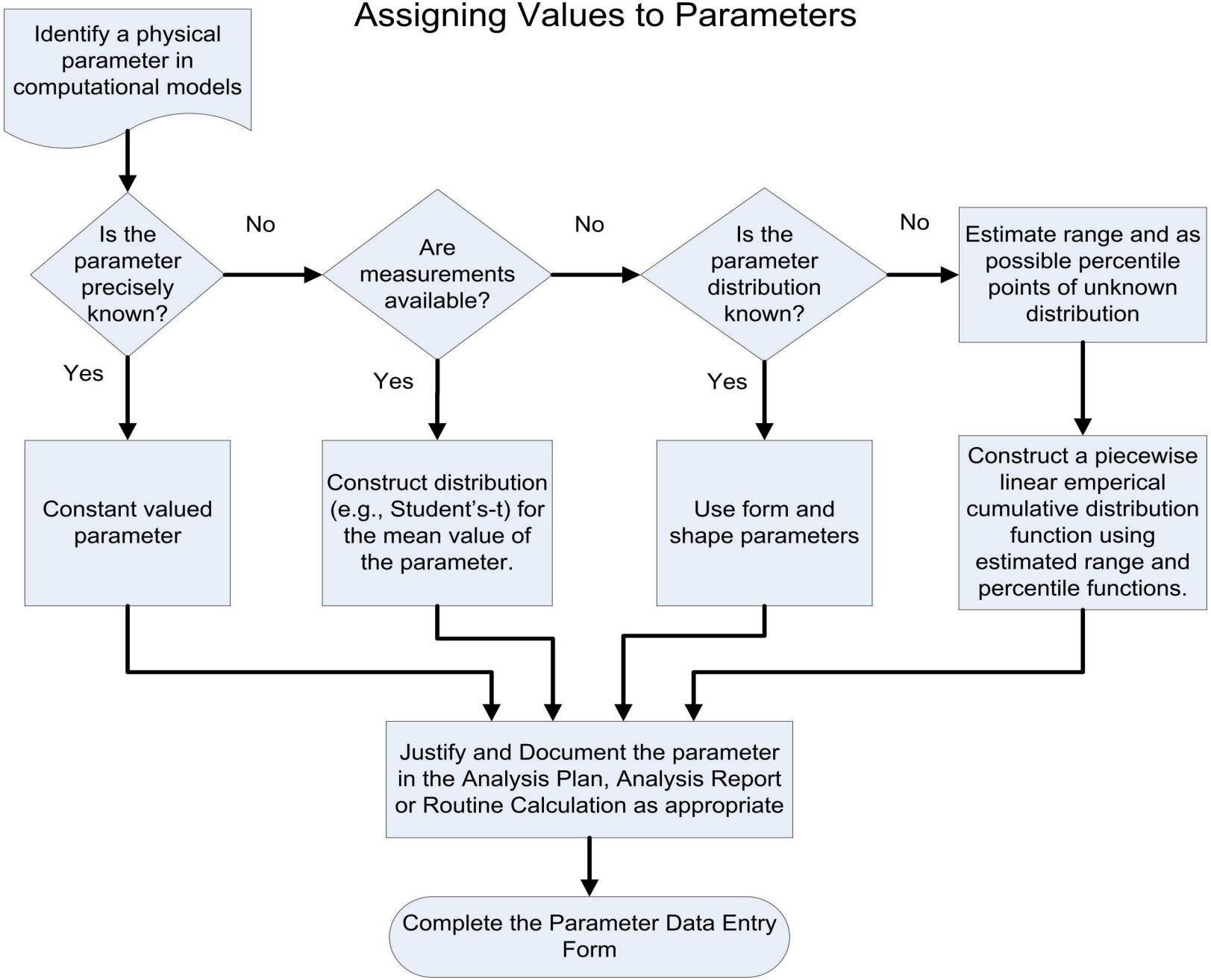
Data from DOE/CBFO Project Participants

- For data reports that come from other project participants (LANL, WTS, etc.,) who have DOE/CBFO approved QA programs, a copy of the completed work product (memo, e-mail, report, etc.) is to be submitted to the SNL WIPP Record Center and cited in the report.

Routine Calculations

- Meant to cover straightforward, simple calculations like a parameter distribution or can also cover decisions like reasoned arguments involving no calculations.
- Can be in memo format and can use tools like Microsoft Excel, Access, Mathematica, MATLAB, and other simple code/utility implementations.

Assigning Values to Parameters



Analysis Definition

- In order for parameter values to be entered into the parameter database, they must be assigned to an analysis.
- This is done by completing form NP 9-2-3, Analysis Definition.
- The Requester:
  - Supplies the full name of and an abbreviated name for the analysis
  - Indicates whether the analysis will be used to support a compliance decision
  - Supplies the planning document for the analysis
  - Supplies the PA codes with related version information to be used for the PA calculation for the analysis
- The QA Reviewer:
  - Reviews the form and any correspondence (as applicable)
  - Verifies it is complete
  - Forwards it to the DBA for entry into the parameter database
- The DBA:
  - Enters the new analysis definition into the parameter database
  - Submits the analysis definition to records following NP 17-1 Records

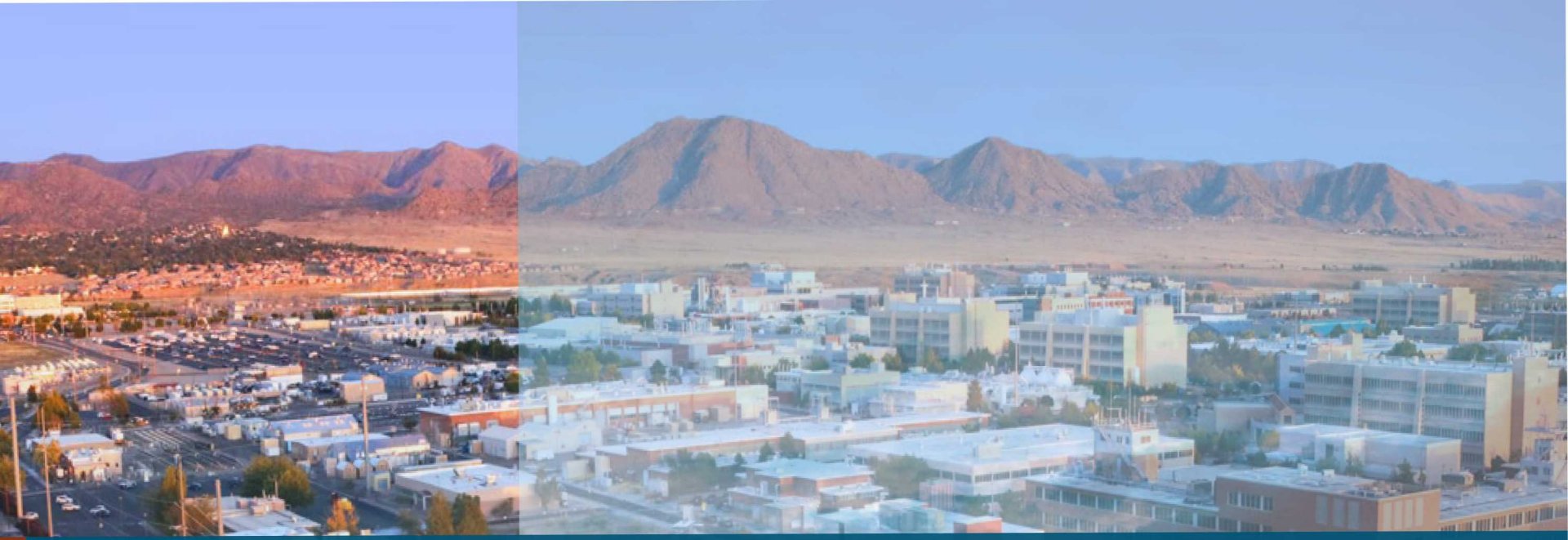
Parameter Data Entry

- The requester will complete the Parameter Data Entry Form, NP 9-2-1
- The requester will attach a copy of the relevant documentation (e.g., page(s) from the Analysis Plan, Analysis Report, or Routine Calculation as applicable.
- The requester will sign and date the form and obtain consensus signature from the PA Manager.
- The requester will submit the form to the Database Administrator (DBA)
- The DBA will enter the parameter(s) and attach print outs of the entries in the database.
- The DBA will pass the package on to the QA Reviewer.
- The QA Reviewer shall verify that the values in the database are identical to those attached to the form and in the database.
- The QA Reviewer reviews the entire parameter record package for completeness and signs and returns the package to the DBA.
- The DBA will then submit the package to records following NP 17-1 Records.

- (Parameter data entry includes: code names, code versions, justification document information, analysis, materials, properties, attributes, etc.)

Parameter Database Analysis Setup

- This is where you set up the analysis to parameter version information
- This assigns which version of a parameter each code will use.
  - If parameters were not added or changed for an analysis, you must select which version of a parameter the code needs to use.
  - The most current version of a parameter can be used or it can be a previous version.
  - Every parameter that will be used must be defined and assigned to the analysis to be run.



Setting up PA Calculation

Official Calculation Steps*

- Backup Parameter Database and Results Database
- Set up Analysis area where calculations will be performed.
- Modify scripts
  - Specify analysis, links, codes to be used, number of replicates, number of scenarios, databases, etc.
  - Links to previous code runs can be set up so all codes do not have to be rerun if not needed.
- Gather all necessary input files from Code Sponsors.
- Upload all scripts and files into CVS.
- Submit the PA calculation to the Solaris cluster.
- Use the website to make sure the calculation is running.
- The results are automatically inserted into the Results database.
- After the calculation is finished, upload all output to the CVS repository.
- The analysis of results and report writing is done by the PA analysts.

- * All of these steps are completed by the Run Master (Only the Run Master has permission to write to the CVS repository.)

References

- Nuclear Waste Management Procedure NP 1-1 Organization and QA Program, Rev. 7
- Nuclear Waste Management Procedure NP 9-1 Analyses, Rev. 10
- Nuclear Waste Management Procedure NP 9-2 Parameters, Rev. 2
- Nuclear Waste Management Procedure NP 19-1 Software Requirements, Rev. 18
- Nuclear Waste Management Procedure NP 20-1 Test Plans, Rev. 5
- Nuclear Waste Management Procedure NP 20-2 Scientific Notebooks, Rev. 10
- Nuclear Waste Management Procedure SP 9-4 Performing FEPs Baseline Impact Assessments for Planned or Unplanned Changes, Rev. 4