

# Covariances QA Procedures: Why Are They Necessary?

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# The Main Point

- Central values – what we traditionally consider to be the most important results from an ENDF evaluation – can be quality assured rather well by **data testing** (e.g., **C/E comparisons** of **calculated  $k_{\text{eff}}$**  and other **important integral parameters** for a **suite of integral benchmarks**).
- There is no comparable way to independently check the “quality” of covariance data, so an **alternative approach** is needed to address the issue of QA in the particular case of covariances.

# An Approach to ENDF/B Covariances QA

- Since there is no independent way to establish the quality of covariance data, we must rely on:
  1. Establishing “quality” requirements for the **procedures** used to actually **generate** evaluated **covariance data**.
  2. Performing **automated tests** of covariance files to assure that they **fulfill** the essential **mathematical** and **physical requirements** to be expected for these data.
  3. Defining and **enforcing** requirements for **documentation**.
  4. Carrying out **timely, independent, “common sense” human reviews** of covariance data before their release.

# ENDF/B-VII.1 Covariances

- The **overall quality** of the **covariance data** found in **ENDF/B-VII.1** is **reasonable** considering the **magnitude** of the **task** and the **limited resources** then available.
- But ... there are some acknowledged **deficiencies**:
  1. There are often **procedural disconnects** between the evaluated **central values** and the related **covariance data**.
  2. The **documentation** provided is often **sparse** (or missing).
  3. The files for **certain materials** and **processes** represented in ENDF/B-VII.1 include **no covariance** data.
  4. Independent **reviews** before release were **hastily done**.

# Improvements for Future ENDF/B Releases

- Some improvements that should be implemented before the next ENDF/B (“raising the bar”) are:
  1. Effort should be made to insure that a closer “linkage” exists between evaluating the central values and generating the corresponding covariance data.
  2. Provide more detailed and specific documentation on the covariances as an integral part of the ENDF/B library.
  3. Provide covariance files for at least every new evaluated cross section included in the next ENDF/B. Why not?
  4. Independent reviews should be performed as early as possible for future ENDF/B evaluated covariance data.

# Guidance and Evaluation Ethics

- A **document** that defines the **contemporary QA requirements** for evaluated **covariances** (and that is **formally adopted** by CSEWG) should **serve** mainly to **guide evaluators** in this area, but it should **not** strive to **rigidly micromanage** the evaluation process.
- This document should be **compatible** with the **ENDF/B Formats Manual** (which may need updating).
- But ... **regardless** of what **QA requirements** are established and spelled out in a **formal document**, the **quality** of these data ultimately will **depend** on the **integrity** of the **evaluators** who generate them.

Good Angel:

“Be good! In the long run it pays to do the right thing.”

Bad Angel:

“Go ahead! Cheat a little and take those shortcuts. No one will notice.”



Evaluators! It's your choice to make.

- Questions?
- Discussion?