**Issues and Concerns**

**Identified in Documents Related to Making the Test Lab VTA**

**Compliant with DOE O 420.2D**

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Rongli Geng, Principal Scientist, SRF S&T Department Head

With input from

Gigi Ciovati, Senior Scientist, SRFPRG Group Leader

Anne-Marie Valente, Senior Scientist, SRFPRM Group Leader

Pashupati Dhakal, Staff Scientist

Uttar Pudasaini, Staff Scientist

**Background**

On May 7, 2025, I attended the "VTA Operator Training for Work under DOE Order 420.2D," conducted by the VTA Facility Manager. As part of this training, I was asked to review three documents:

1. **VTA Accelerator Safety Envelope (VTA ASE)**
2. **TJNAF Safety Assessment Document (SAD)**
3. **VTA Operations Directive (VOD)**

At the conclusion of the training, I raised a concern regarding the **operating envelope violation**, specifically citing the use of “facility energy” as a control quantity, despite it not being a physically measured parameter.

Upon reviewing the three documents in detail, I identified additional issues. I subsequently shared my concerns with experienced VTA RF operators, brought them up during the SRF planning meeting on May 19, 2025 (8:30 AM), and requested a meeting with the SRF Operations Manager for further discussion.

This was my first exposure to these documents, though I was generally aware of the ongoing efforts to bring VTA into compliance with DOE Order 420.2D. The issues I discovered at this late stage were unexpected. Several colleagues to whom I shared my observations echoed similar concerns.

**Identified Issues**

**1. VTA Operating Envelope**

Section 3.5.2 of the *VTA Operations Directive* states:

"The operational facility energy limit is E ≤ 35 MeV for an individual enclosure."

This statement is problematic. There is currently **no sensor or instrumentation** in the VTA capable of directly measuring the energy of field-emitted electrons. As a result, there is **no viable method to enforce this limit objectively**.

Defining a critical safety control parameter that is **not physically measurable** undermines its enforceability and the validity of the safety protocol. Approving the document in its current form risks placing cavity testers in a **state of uncertainty** regarding whether their test conditions comply with the defined limits. This ambiguity creates both **operational and managerial challenges**.

**2. Operations in the Two Unshielded Dewars**

Section 2.0 of the *TJNAF VTA ASE* states:

"Any operations performed in the two unshielded dewars are cryogenic in nature and do not involve the application of RF."

This is **inconsistent with the intended and demonstrated use** of these dewars, particularly in procedures that **do involve RF application**, such as:

* Testing using the **Surface Impedance Cavity (SIC)**, which is employed for measuring surface losses in novel SRF materials. These experiments routinely apply RF in TE mode, where **field emission is not a credible concern**.
* RF testing of doglegs used for CEBAF cryomodule refurbishment

The statement in Sec. 2.0 of the TJNAF VTA ASE mentioned above contradicts the following statement in Sec. 4.4.3.2 of the TJNAF Safety Assessment Document: "Two dewars (1 and 2) are used only for low-power tests (< 1 W) and require no radiation shielding. Radiation production under these conditions is highly unlikely, and worst-postulated conditions for such testing do not exceed the threshold to require Credited Controls or coverage by an ASE".

This statement reflects a **misunderstanding of the dewars' intended applications**. If left uncorrected, it could lead to **procedural contradictions** or even **compliance violations** during routine RF testing with the SIC.

Moreover, this highlights a **process issue**: experienced personnel from the SRF S&T group—who originally designed the VTA and have continuously developed it—were **excluded** from contributing to key policy documents and compliance planning.

**Observations**

The issues identified above reveal several **systemic deficiencies** in the process of preparing VTA for DOE O 420.2D compliance:

* A lack of understanding that **safety control parameters must be directly measurable**.
* Inadequate knowledge of the **intended operational use** of VTA and its equipment.
* Exclusion of **subject-matter experts** from the policy development and review process.

**Recommendations**

These and other deficiencies (identified but not listed in this note) must be **corrected immediately** to ensure proper compliance, operational clarity, and safety.

Suggested Corrections

1. Section 2.0 of the *TJNAF VTA ASE*:

Change "Any operations performed in the two unshielded dewars are cryogenic in nature and do not involve the application of RF" to “Operations performed in the two unshielded dewars may involve the application of RF with waveguides or special resonator devices. These RF components are unable to generate field emission by design due to the operation mode or regime.”

1. Section 3.5.2 of the *VTA Operations Directive*:

Change "The operational facility energy limit is E ≤ 35 MeV for an individual enclosure" to “The operational facility limit is the integrated gradient over the active length of the subject cavity to be no larger than 55 MV”

**Conclusion**

The last-minute discovery of these serious and avoidable issues is **deeply concerning**. The root cause can, in part, be traced to the **division between SRF Operations and SRF S&T** at JLab. The **exclusion of SRF S&T from ownership and decision-making** regarding VTA operations has directly contributed to these problems.

The **Accelerator Division must take corrective action** to:

* Ensure robust and safe use of VTA,
* Preserve and enhance its capability and productivity, and
* Uphold the scientific excellence of the JLab SRF Institute.

**References**

1. <https://jlabdoc.jlab.org/docushare/dsweb/View/Collection-60379/Document-299265> file title: SAF801.VTA.pptx

**Appendix**

**Critical points needing discussion for corrective actions**

1. It should be discussed as to who has the "authority" to train new VTA RF operators and/or VTA cryo-operators. As discussed at the meeting on Tuesday among the selected SRF colleagues, it appears that no RF S&T staff is currently allowed to provide such training and certify competency of a new operator. This should be changed/clarified in the revised documents.
2. The “VTA operating envelop” should be revised. Replace the “facility energy limit” by a physical parameter that is directed measured for example the integrated gradient over the effective length of the cavity under testing. The limiting value (in MV) needs to be determined with a sound justification.
3. The purpose of the VTA facility and the decision process related to VTA and the prioritization process of its use needs to be clarified with a clear presence of SRF S&T.