VTA Operations Directives

VTA-AD-01-000
Revision 1
April 21, 2025

Jefferson Lab

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Preface

This document, the Vertical Test Area (VTA) Operations Directives (VOD), provides directives for operation and maintenance of Thomas Jefferson National Accelerator Facility's (Jefferson Lab's) VTA.

The VTA is a TEST facility for testing production and Research & Development of Superconducting Radio Frequency (SRF) cavities and cryogenic testing of other accelerator related components.

The VTA Facility Manager, in conjunction with the Head of SRF Operations Department, has the authority and responsibility to authorize who can operate VTA. Operation in this context means any powering of VTA components which can or have the potential to generate high intensities of low energy x-ray, and penetrating higher energy photon and neutron radiation. (HV and RF). No one shall be authorized to operate the accelerator at the VTA unless they have read and concur with the VOD and have received such hands-on training as required by the VTA Facility Manager for their activity.

As a Test Facility, VTA does not require Continuous Electron Beam Accelerator Facility (CEBAF)/ Low Energy Recirculator Facility (LERF) type Operators and SSOs.

This document consists of the following sections. Each chapter describes the personnel and their responsibilities for VTA operations and the applicable directives.

This document has been approved by:

______________________	April 21, 2025
Antho[illegible]	Date
Head of SRF Operations Department	

Acronyms & Abbreviations

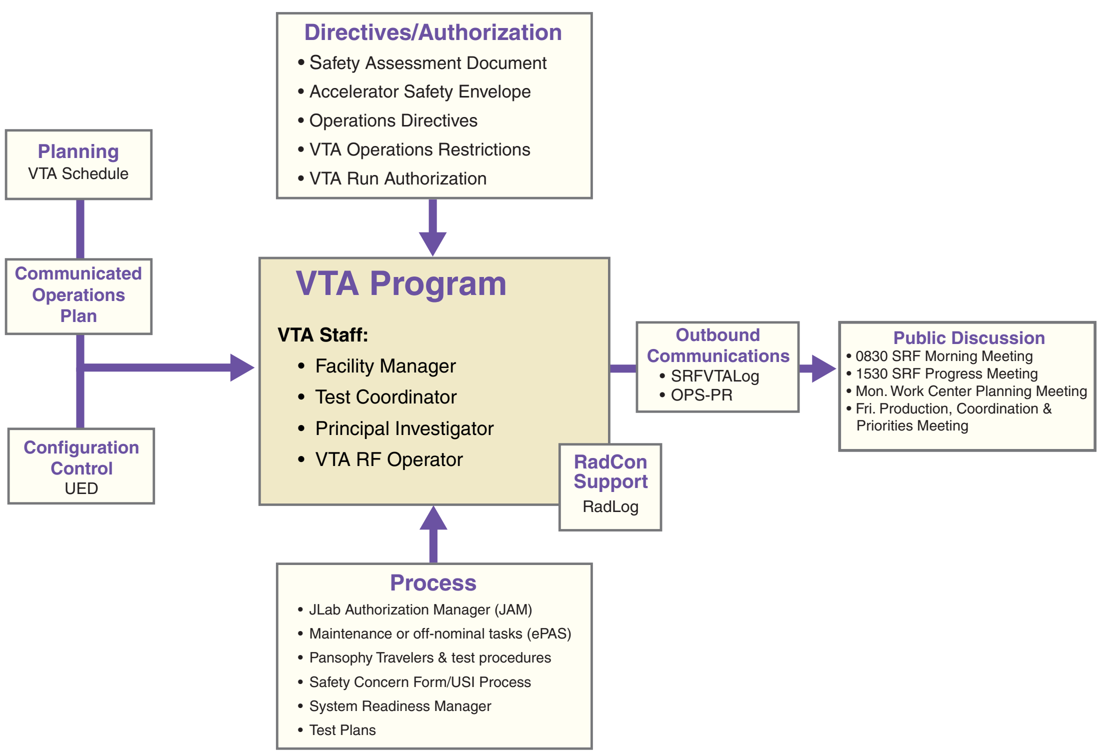
ARM	Assigned Radiation Monitor
CANS	Central Alarm Notification System
CARM	Controlled Area Radiation Monitor
CATS	Corrective Action Tracking System
CEBAF	Continuous Electron Beam Accelerator Facility
CTF	Cryogenic Test Facility
DOE	Department of Energy
DSO	Division Safety Officer
DUT	Device Under Test
ePAS	Electronic Permit Authorization System
EPICS	Experimental Physics and Industrial Control System
ESH&Q	Environment, Safety, Health & Quality
FSD	Fast Shutdown
HPRF	High Power Radio Frequency
IOC	Input/Output Controller
ISM	Integrated Safety Management
JAM	JLAB Authorization Manager
JLab	Thomas Jefferson National Accelerator Facility (Jefferson Lab)
PI	Principal Investigator
LERF	Low Energy Recirculator Facility
MLP	Multi-Lab Partner
ODH	Oxygen Deficiency Hazard
OPS-PR	Operations Problem Report
PSS	Personnel Safety System
RadCon	Radiation Control Department
RF	Radio Frequency
RWP	Radiation Work Permit

SAD	Safety Assessment Document
S&T	Science & Technology Group
SME	Subject Matter Expert
SOP	Standard Operating Procedure
SRF	Superconducting Radio Frequency
UED	UITF Element Database
USI	Unreviewed Safety Issue
VOD	VTA Operations Directives
VAA	Vertical Assembly Area
VSA	Vertical Support Area
VTA	Vertical Test Area

1 Program Control

The SRF Operations Group within the Accelerator Division develops, controls, and manages the VTA program. This chapter describes how safety and work planning are integrated into three different areas: VTA program development and execution, how the program is authorized, and the roles and responsibilities of personnel involved in defining, conducting, and scheduling the program. See Figure 1-1 for an overview of the program.

Figure 1-1: VTA Operations Directives



1.1 Program Safety

All facets of VTA program planning and execution integrate safety as defined in the *JLab Integrated Safety Management System Program Description*.

The JLab safety program establishes integrated safety management (ISM) practices that guide worker actions, from the development of safety directives to work performance. Below are seven ISM guiding principles. Refer to the JLab Integrated Safety Management System Program Description for more information.

1. Line management responsibility for safety
2. Clear roles and responsibilities
3. Competence commensurate with responsibilities
4. Balanced priorities
5. Identification of safety standards and requirements
6. Hazard controls tailored to work being performed
7. Operations authorization

It is Jefferson Lab's policy not to compromise safety and health of personnel and environment regardless of the urgency or importance of any activity. All lab employees, subcontractors, and users have the power to stop any work that endangers people, the environment, property, or quality without fear of reprisal. ES&H Manual, Section 3330, Stop-Work and Re-Start for Safety Program documents this 'Stop work' policy.

In addition to the seven guiding principles, there are five core safety management functions that are integrated into planning and performing all work activity that could adversely affect workers, the public, or the environment. These core functions are as follows:

1. Define the scope of work
2. Analyze the hazards
3. Develop and implement controls
4. Perform work within controls
5. Provide feedback and continuous improvement

A structured framework of administrative tools, policies, and procedures guide the safety and consistency of VTA's program planning and execution. ISM principles and the policies established in the *ES&H Manual* guide scheduled and unscheduled maintenance activities at VTA as described in Section 4.2 on page 4-2 of this document.

1.1.1 Program Scope

There are two broadly definable programs at VTA. These are:

i) **Cavity Acceptance Testing**, e.g. the qualification of cavities produced by JLAB's SRF Operations department for both internal and external customers. These cavities must meet testing requirements defined for each customer's project or face a potential remediation process defined by the nature of the problem and requirement encountered AND ii **Research and Development**, e.g. testing and preparing equipment to advance the capabilities of (S)RF technology in general. These may include tests of new cryomodule or cavity designs, diagnostics, etc.

These break out across three defined ‘projects’ and two ‘services’ as enumerated in SRF Operations work control documents (SRF-11-PD-001 & SRF-11-PR-001):

Projects:

- **CEBAF Support**: Refurbishment of CEBAF cryomodules through projects or service agreements controlled by the JLab Accelerator Division.
- **Multi-Lab Partnership:** Fabrication and delivery of SRF components to external customers through projects controlled by the JLab MLP office.
- **Work for Others/R&D**: Fabrication and delivery of SRF components and/or data to external customers through projects managed through SRF Operations, Lab Directed Research & Development projects, or projects from SRF Science & Technology (S&T).

Services:

- **CEBAF Support Services**: SRF Operations maintains CEBAF cryomodules and components through project / service agreements administered by the Accelerator Division.
- **Lab Service Requests**: SRF Operations provides labor, equipment, products, or data for Work for Other projects controlled by S&T and other JLab organizations.

The VTA is solely a *test facility* used to evaluate critical components intended for use at the CEBAF accelerator or for S&T related experiments. The VTA will **not** be operated as a *user facility*. Activities in partnership with members of other laboratories may occur, but will always be conducted with an internal staff liaison and will be authorized via SRF Operations internal review process.

The testing schedule and prioritization is developed based on an optimization of project deliverables as well as availability of testing resources (staff, cryogens, etc.) in conjunction with the VTA, Upgraded Injector Test Facility (UITF), and Physics Department.

1.1.1.1 Internal Needs

The Test Lab and SRF Institute has been on site at JLab since its inception and stands ready to meet the operational needs of CEBAF and the other Jefferson Lab site accelerators as necessary. As SRF technology advances and the energy requirements of accelerators change, periodically there is a need to either construct new or refurbish existing cryomodules to enhance the availability of accelerating gradient. As these opportunities arise – either funded internally, or through the DOE – project scope and requirements are defined with stakeholders and construction and testing of cryomodules may commence against the schedule and requirements agreed upon by the stakeholders.

1.1.1.2 Externally-Funded Project Proposals

Externally funded projects (aka work for others) may be considered for approval by Jefferson Lab Director, the Associate Director for Accelerators, the Director of SRF Operations, and the VTA Facility Manager. The VTA Facility Manager will schedule approved project cavity tests in consultation with the Project coordinators (internal and external) for the project, as well as the Lab leadership.

1.1.2 Program Hazard Analysis

The potential hazards associated with executing the VTA program are analyzed as two distinct segments:

- Hazards associated with operating the VTA with its base equipment, and
- Hazards associated with each non-JLab activity that will be tested in the VTA.

For all other activities, VTA Facility Manager has the responsibility and authority to require hazard analyses & mitigations measures and safety reviews.

1.1.2.1 VTA Hazard Analysis

As required by DOE Order 420.2D: Safety of Accelerators, two documents address the hazards associated with VTA operations: the JLab Safety Assessment Document (SAD) & VTA Accelerator Safety Envelope (ASE).

JLab Safety Assessment Document (SAD) – The SAD analyzes and identifies hazards and associated on-site and off-site impact to workers, the public, and the environment from normal accelerator operations and credible accidents. The SAD provides descriptions of engineered controls (e.g., interlocks and physical barriers) and administrative measures (e.g., training and documentation) used to eliminate, control, or mitigate the hazards from accelerator operation.

The Department of Energy (DOE) has designated JLab as a “Low-hazard, Non- Nuclear Accelerator Facility.” This designation means that the hazards at Jefferson Lab have the potential for no more than minor on-site and negligible off-site impacts to people or the environment.

VTA Accelerator Safety Envelope (ASE) – The VTA ASE defines the physical and administrative bounding conditions for safe operations based on the safety analysis documented in the SAD. When operations are performed within the boundaries of the ASE, the facility staff, facility users, general public, and environment are protected. Variations beyond the boundaries of the ASE are treated as reportable occurrences and are reported using the process defined in the Environmental Safety & Health Manual, Section 5300, Occurrence Reporting to Department of Energy (DOE). See Section 3.5.1 on page 3-6 for details on responding to violations of the ASE.

VTA Operations Envelope – A second set of more stringent controls known as the Operations Envelope is used to provide assurance that the Safety Envelope is not exceeded. Variations of operating parameters outside the Operations Envelope, but within the Safety Envelope, are not treated as a DOE reportable occurrence but may result in administrative actions taken by JLab management. See Section 3.5.2 on page 3-7 for details on responding to violations of the Operations Envelope.

Operations Envelope limits include Defense-in-depth measures listed in the SAD, and any additional restrictions which the VTA Facility Manager may wish to impose on and communicate to the staff.

1.1.3 Unreviewed Safety Issues

An Unreviewed Safety Issue (USI) is an accelerator safety issue that presents a significant safety risk and was not previously identified, analyzed, and already mitigated as documented in the SAD (see Section 1.1.2 on page 1-4).

The word “unreviewed” in the term USI does *not necessarily* mean that hazards and controls were not properly reviewed; rather, it refers to hazards associated with a particular configuration or activity that may be new or different than those previously identified, analyzed, and mitigated as documented in the SAD. A USI can result from either of the following:

- Discovery of a potential hazard that may not have been fully addressed in the development of the SAD and ASE, including the discovery of errors or omissions in the hazard analysis.
- A proposed accelerator configuration or operational change that is beyond the scope of the hazard analysis in the SAD.

It is important to note that the USI process does NOT apply to standard industrial hazards, unless the hazard could directly impact accelerator safety.

If a USI is suspected, either as the result of a proposed modification or due to unexpected circumstances, then the JLab Unreviewed Safety Issue (USI) Procedure is followed. The Safety Concern Form, is used to report a safety concern as a potential USI. If an activity is *potentially* outside of either the analysis or the set of controls documented in the SAD, then the review process is performed. All personnel must immediately report any potential USI to their supervisor, the owner of the affected system, and the Accelerator Division Safety Officer. If a significant safety hazard is suspected, the supervisor ensures the immediate termination of the suspect activity and follows the notification sequence described in the *Unreviewed Safety Issue (USI) Procedure*.

1.1.4 Program Hazard Controls

1.1.4.1 Credited Controls

The VTA program is conducted using credited controls to eliminate, control, or mitigate the accelerator-specific identified hazards. The credited controls identified in the ASE (see Section 1.1.2 on page 1-4) must be in place and functional before operation of the VTA. Credited controls are described in brief in the following paragraphs. A credited control is determined through hazard evaluation to be essential for safe operation directly related to the protection of personnel or the environment. Credited controls are assigned a higher degree of operational assurance than other controls. If a credited control is altered in any way, the *Unreviewed Safety Issue (USI) Procedure* must be followed (see Section 1.1.3 on page 1-5).

Credited controls used during VTA operation fall into two categories: engineered controls and administrative controls. Engineered controls are identified as either active or passive controls s while administrative controls are usually passive. The Hazard Assessment and Mitigation section of the SAD - the basis for VTA ASE, lists the credited controls for VTA operations are as follows (provided for reference only):

- **Credited Passive Engineered Controls**
    - Permanent shielding
    - Movable shielding
- **Credited Active Engineered Controls**
    - Personnel Safety System (PSS) access controls
- **Credited Administrative Controls**
    - VTA staffing – Operations
    - Operations High Power RF Enabled (No HMI Permit)
    - Operations High Power RF Enabled (HMI Permit)

The Safety Envelopes – The VTA ASE specifies the credited controls, which ensure that the accelerator safety risks are within acceptable limits. These controls are collectively referred to as the Safety Envelope. Variations of operating parameters outside the Safety Envelope are DOE reportable occurrences.

1.1.4.2 Additional Safety Controls

While the credited controls specified by the SAD address worker safety, public safety, and environmental safety, VTA Operations uses other additional safety controls to provide an added safety margin and to help protect against property damage (i.e., damage to accelerator components) arising from accelerator operations. These controls provide additional layers of protection to mitigate potential problems before the credited controls even come into play. Examples of these additional safety controls are as follows:

- **Channel Access Security** - An active engineered system that establishes a security protocol limiting the ability of individuals to access electronic process variables used to control the accelerator (see Section 3.6.1.1 on page 3-8).
- **Group Access Security** – A group username and password is used to establishes a security protocol limiting the ability of individuals to access electronic process variables used to control the accelerator (see Section 3.6.1.1 on page 3-8).
- **VTA-Specific Operational Safety Documents** – VTA-specific Work Control Documents (WCDs) are developed when a task involves unusual safety hazards that are not fully addressed in the *ES&H Manual* or where the hazard has unique operational features such as tasks involving multiple work groups (see *ES&H Manual, Section 3210, Work Planning, Control & Authorization*). Copies of specific WCDs that pertain to VTA accelerator operations are maintained online - for best version control. Paper reference copies are attached in a binder in the VTA Control Room, as well. These documents are reviewed by all VTA Operators.
- **RF Operations Authorization** - The SRF Operations Department Head, with the recommendation and concurrence of the VTA Facility Manager, will use the JLab Authorization Manager (JAM) to authorize VTA Operations. This authorization verifies that the planned program meets all safety standards.
- **VTA Test Plans** – Procedures written by system experts to perform standard tests using VTA systems or execute non-standard RF tests. Test plans are written and submitted using an on-line form in the VTA Service Request system in Pansophy (see Figure 1-1 on page 1-1).

1.1.5 Program Execution Within Controls

As a Test Facility, the VTA does not routinely operate 24/7. Most of the operations take place during work hours and occasionally may extend a few hours past the normal work hours. All VTA operations are conducted by trained SRF Operations and SRF S&T staff under the authority of the VTA Facility Manager. Subject Matter Experts or PIs may perform specific tasks at VTA with permission from the VTA Facility Manager, for example, application of quench detection system, low temperature HPRF testing, and S&T cavities.

- **Training and Qualification** – VTA Operators are trained to a level of proficiency established by the VTA Facility Manager. The list of qualified Operators who are authorized by VTA Facility Manager to operate the facility is displayed in the control room (see Section 3.3 on page 3-4).

- **Pre-shift Preparedness** – The VTA Facility Manager will communicate a daily Operational Plan to the Test Coordinator and the crew. The Operational Plan will also be displayed in the control room.

- **Preshift Reading:**
    - **VTA Logbook** – All pertinent testing activities will be recorded in both the paper and electronic logbooks for later reference.
    - **System Readiness Manager (SRM)** - As part of shift turnover, the VTA-applicable parts of the SRM will be reviewed to ensure that all systems are operational.
    - **JLab Authorization Manager (JAM)** - The authorization manager is used as a method of clearly communicating both the status and readiness of an accelerator's credited controls as well as the authorization to operate the accelerator by the responsible party. In the case of both CMTF and VTA this is the Head of the SRF Operations Department (or their delegate), as advised by each of the respective facility managers. All of a facility's credited controls must be in place and verified by the responsible group's managers in order to proceed with facility operation. Credited control approval may not be masked or bypassed in any way. If for any reason the duration of credited control approval has expired while in operation, or a control is found to not be in place as expected operations must immediately cease and notifications must be made per Section 3.5.1 on page 3-6. If the facility is not in operation, notification to the CMTF Manager is sufficient.
    - **Test procedures** – The VTA Facility Manager will ensure (with their staff) that all documents and procedures required for testing are in place and are readily available to staff conducting the testing.
    - **VTA-specific Work Control Documents** - Read and understand applicable work control documents (Pansophy, TATL, & ePAS).)

- **Shift-Turnover Meetings** – Between consecutive shifts of VTA running, the oncoming & outgoing VTA Operators hold a shift-turnover meeting to discuss the ongoing program and any off-normal conditions that exist. When shifts do not overlap, pre-shift reading and the communicated Operation Plan take the place of the shift-turnover meeting.

- Pansophy – As testing progresses, data will be analyzed online by the VTA Facility Manager or designated RF Operator and be added to the traveler in Pansophy– the formal document outlining tests and results which travels with the piece of hardware under test.

Activities performed by staff outside SRFOPS and the SRF S&T, such as testing equipment either for Physics experiments or for accelerator systems, are also required to adhere to these regulations.

1.1.6 Program Feedback and Continuous Improvement

Feedback and continuous improvement are integrated throughout the process of developing and then executing the VTA program. A variety of communication tools provide opportunities for specific lessons learned and general feedback to flow back into the system, resulting in improvements based on experience. Some feedback channels provide information that can be used immediately, while others gather data that can be used later for trend analysis & future planning.

Examples of feedback and continuous improvement tools used during program development and execution are as follows:

- SRFVTALog – As a time-based repository for information associated with program execution, the SRFVTALog provides a way to document events and can also be searched and sorted for useful information by system experts and other JLab employees with password privileges. Log entries can also be sorted by type, which includes downtime, tune, and OPS-PR entries.

- Operations Problem Reports (OPS-PR) – The OPS-PR system provides system owners with specific information about system failures and a mechanism for communicating when the problems are fixed and how they were repaired. The resulting data can be used for trend analysis.

- TATL – similar to the Accelerator Task List (ATLis) used at CEBAF, the Test Lab Area Task List (or TATL) is a web-based work planning tool where maintenance and project tasks are electronically submitted, approved, and then scheduled. Task descriptions submitted via TATL provide the required supporting information, including task details, the potential impact to accelerator operations, task hazard identification and a hazard mitigation plan, a backout plan, and supporting documentation as attachments.

  Once submitted, a task is automatically routed via email to the appropriate parties for comment and approval. After approval, the task waits in the pending queue until the work is scheduled by the VTA Facility Manager. Although work is scheduled by the VTA Facility Manager, individual work tasks are authorized by the line manager for the staff conducting the work. Following completion, the task and any appended comments remain in the database to provide work history and lessons learned information.

- ePAS – An electronic permit administration system that attempts to improve, simplify, and centralize lab processes for hazard identification and mitigation. The goal for ePAS is to provide a single lab-wide process for task hazard assessment and hazard mitigation, accessible through existing work planning platforms, for activities associated with the maintenance and operation of Jefferson Lab. ePAS is designed to centralize work planning, scheduling, and hazard identification and mitigation through its interface with other pre-existing JLAB work controls.

- Pansophy – An electronic database developed in-house that replaced the need for several commercially available software products. The system is designed to lay out testing processes and procedures within the SRF Institute, while also serving as a location to gather and analyze the data associated with them for both internal and external needs – but to also provide quality control and feedback in addition to program control.

- **Off-Normal Operation and Events** – Off-normal operation and off-normal events should be logged to SRFVTALog and reported to the VTA Facility Manager. The VTA Facility Manager will consult with the Jefferson Lab Reporting Officer so that Off-Normal Events can be screened for reporting requirements to the DOE and for internal review using the Notable Event Investigation process identified in ES&H Manual Section 5200, Event Investigation and Causal Analysis Process.

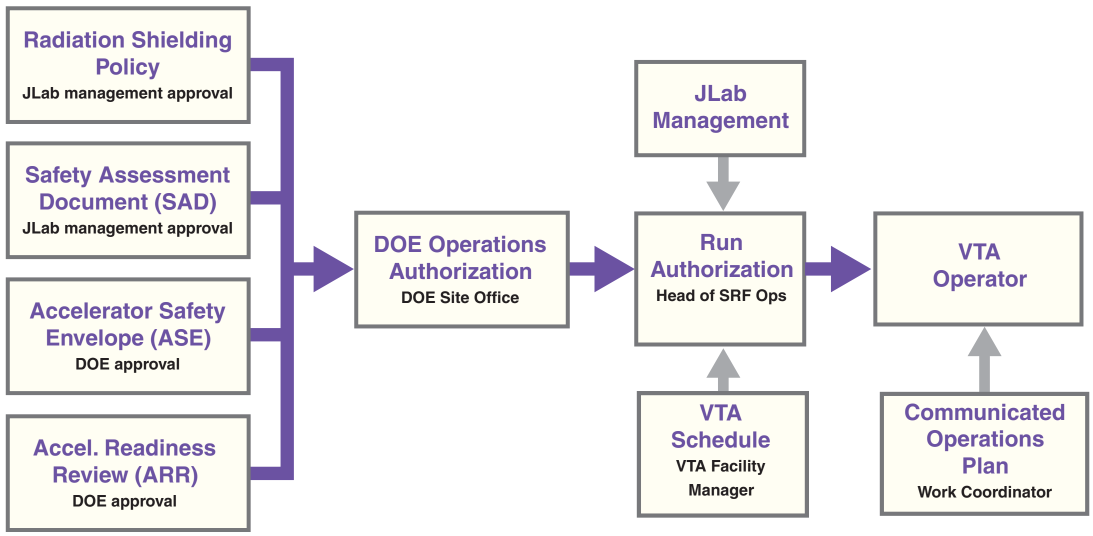
- Corrective Action Tracking System **(CATS)** – The lab-wide CATS system tracks action items that arise from the various inspections, assessments, and audits.

- **DOE/JLab Hotlines/Web Sites** – Telephone hotline numbers for addressing issues such as waste, fraud, abuse, management, and safety concerns are posted on the DOE information bulletin board in the MCC. Such issues shall always be addressed first through the normal supervisory chain, but if results are unsatisfactory or there is fear of retribution, the hotlines provide other avenues of recourse.

1.2 Program Authorization

The DOE Site Office has authorized JLab to perform routine operations of the VTA within the safety envelopes listed in the *VTA Accelerator Safety Envelope* (ASE) (see Section 1.1.2 on page 1-4). Before granting operations authorization, the DOE carried out a rigorous review process (see Figure 1-2) as specified in DOE Order 420.2D: Safety of Accelerators.

Figure 1-2: VTA Program Authorization.



To meet the review requirements, JLab maintains a *Radiation Shielding Policy* and a *Safety Assessment Document* that conformed to DOE standards; these documents were approved by JLab management. JLab also prepares an *Accelerator Safety Envelope* document, which is reviewed and approved by the DOE. With these required documents in place, an Accelerator Readiness Review (ARR) verifies that all conditions for safe operations are met, and the DOE may then subsequently authorize VTA operations. A copy of the DOE letter authorizing VTA operations is posted in the VTA Control Room.

The VTA program is developed by the VTA Facility Manager in consultation with JLab SRF & senior management. The Head of the SRF Operations Department authorizes the VTA Operators to carry out the VTA program as specified in the Communicated Operations Plan by the VTA Facility Manager (see Section 1.4.3 on page 1-15). Before RF is run in the VTA, the Head of the SRF Operations Department must authorize operation via the JLab Authorization Manager (JAM), ensuring all sub-systems and credited controls are ready for testing and operation.

1.3 Personnel and Responsibilities

The key personnel involved in defining, scheduling, authorizing the VTA program and planning for safe operations are described in the following section. Responsibilities of the other personnel are described in the appropriate committee charters and elsewhere. Responsibilities may be delegated to other responsible parties as appropriate.

1.3.1 Head of SRF Operations Department

The Head of the SRF Operations Department owns and authorizes the full cryomodules fabrication and performance verification processes at Jefferson lab, both for internal work and Work-for-Others. Implicit in this is the acceptance testing processes for cavities at the Vertical Test Area (VTA) and cryomodules at the Cryomodule Test Facility (CMTF), as well as the testing of any other equipment which may occur at those facilities. The Head of the SRF Operations responsibility for those facilities includes the following:

- Uses the JAM to authorize the CMTF or VTA Operators to operate those facilities under the parameters laid out in the Facility ASEs, SAD, and the Operational Directives. This confirms that all credited controls are in place and verified as functional.

- Authorize resumption of operations as appropriate following critical events such as Safety Envelope violations, Operations Envelope, Personnel Safety System malfunctions, and Machine Protection System malfunctions as detailed in Section 3.4 of this document.

- Meet with the CMTF Manager and VTA Facility Manager as necessary to stay updated on the status and schedule of the program at those facilities.

1.3.2 VTA Facility Manager

The authority for actions and decisions taken with regard to the Vertical Test Area are delegated to the VTA Facility Manager by the SRF Operations Department Head. This individual has ownership of the facility and has overall responsibility for its safe configuration and operation. The VTA Facility Manager has the responsibility to maintain configuration control over the VTA systems and procedures and has the authority to revoke anything that deems unsafe. They also maintain the list of VTA Authorized Operators, and liaises with the Cryogenics Group for operational issues. The VTA Facility Manager, or their designee, is responsible for training VTA Operators.

Some of the additional responsibilities of the VTA Facility Manager include:

- Review, schedule, and approve proposed tasks submitted via the Test Lab Areas Task List (or TATL).

- With management and Principal Investigators, develop the VTA Schedule for tests that span multiple days or for multiple tests that run concurrently.

- Approve deviations from the VTA Schedule.
- Maintain a list of all safety documentation applicable to the facility and make such documentation accessible to VTA staff.
- Verify that all projects/activities have completed the required safety reviews before authorizing operations
- Post a list of qualified VTA Operators, as assessed by the VTA Facility Manager & Testing Coordinator, in the VTA Control Room.

The VTA Facility Manager also has responsibilities for ensuring system readiness. Those responsibilities are detailed in Section 4.2.6.2 on page 4-8

1.3.3 Work Coordinator

The VTA Facility Manager fulfills the Work Coordinator role.

- Review, schedule, and approves proposed tasks submitted via the Test Lab Areas Task List (or TATL).
- Meet with representatives of potential projects to determine if their requirements are in line with the capabilities of the facility and help facilitate the approval and scheduling process.
- Refer to the Radiation Control Department for special review any potential externally-funded experiment with requirements that fall outside the facility operating envelope.
- With the Principal Investigator (or their designee) and with a variety of internal and external stakeholders, ensure that the facility best accommodates potential users and the program is well defined and supported with appropriate resources.

1.3.4 VTA Test Coordinator

The VTA Facility Manager typically fulfills the role of the Test Coordinator – though they may delegate this responsibility. If a separate Test Coordinator is appointed, that individual will work closely with the VTA Facility Manager.

The VTA Test Coordinator works with the Principal Investigator (PI) or PI's designee and with a variety of internal stakeholders and outside entities. They ensure that the VTA facility best accommodates potential users and the that the operating program is well defined and supported with appropriate resources.

Responsibilities include:

- Coordinate the activities of the PI or PI's designee.
- Provide an Operation Plan for the day based on the VTA Schedule and testing requirements and communicate it to the VTA Operators on duty prior to the start of their shift.

- Serve as the designated spokesman for the facility.
- Schedule staffing for all shifts of VTA operations consistent with staffing requirements.
- Assumes responsibility for activities during unattended periods of operation - such as weekends or overnight.
- Train all VTA Operators to a level that supports safe facility operation.
- Perform online analysis of testing data to determine the need for re-tests and coordination of punch list activities.
- Ensure that acceptance testing travelers are populated promptly with test results.
- If it becomes apparent through testing or data analysis that repairs to the facility or testing apparatus are required, contact the Work Coordinator and help schedule and facilitate necessary repairs.

1.3.5 Principal Investigator

Each non-JLab activity at VTA is required to have an associated Principal Investigator (PI), who supplies all of activity-specific information necessary for any design and safety review process. The PI could be a lab employee or a non-JLab person. Demonstrate to the Test Coordinator that the test is appropriate.

Their responsibilities include:

- Demonstrate to the Test Coordinator that the test is appropriate.
- Ensure that any visiting VTA Operators have the training and ability to perform the test.
- Work with the VTA Facility Manager to conduct a design and safety analysis of all test equipment and proposed operating conditions.
- Work with the VTA Facility Manager to safely install any new equipment for testing.
- At the conclusion of the test, organize the decommissioning of any equipment that is to be removed and arrange for removal.
- The PI (or their designee) must be available on-call while a test is on-going.

1.4 Program Schedules

1.4.1 VTA Activities Schedule

Testing activities are scheduled by the Cavity Processing Group Leader with assist from the VTA Facility Manager or their designee with input from both management and schedule as enumerated in Section 1.2 on page 1-11.

1.4.2 Non-JLab Activities Schedule

These activities are scheduled by the Cavity Processing Group Leader with assist from the VTA Facility Manager and the Principal Investigator of the test or major installation as enumerated in Section 1.2 on page 1-11

1.4.3 Shift-by-Shift Schedule

For JLab activities, the shift-by-shift schedule (aka communicated operations plan) are determined by the VTA Facilities Manager in consultation with the SRF and Operations staff. For non-JLab activities, the VTA Facilities Manager, the VTA Test Coordinator and the experiment PI will meet and determine the shift-by-shift schedule. The shift plan may be communicated verbally or in writing to each oncoming shift for execution, and may be modified based on the progress (or lack thereof) on the previous testing shift. These tasks may be delegated to the VTA Test Coordinator if one is appointed.

1.5 SRF Meetings

Meetings are necessary to plan, schedule, and coordinate activities and to disseminate important information. When appropriate, these meetings are hybrid: they are conducted in person, but use video conferencing tools to allow remote attendance. Meetings that address VTA operations, maintenance, and support include:

- **Shift-Turnover Meeting** – Takes place in the facility control room between oncoming and off-going shifts and is primarily an exchange of information. (See Section 3.6.3 on page 3-11)
- **SRF Morning Meeting** (08:30) to summarize the previous day's progress and coordinate activities for that day.
- **SRF Progress Meeting** (15:30) to update progress over that morning's plan, and to begin to coordinate work for presentation at the following day's 8:30 meeting.
- **Work Center Planning Meeting** (Monday; 9:30) is a manager's meeting to review the Friday 1:30's milestones and to set the plan for the upcoming week's work at a high level.
- **Production, Coordination, & Priorities Meeting** (Friday; 13:30) is a manager's meeting to review the existing weeks progress and to set milestones for coming fer weeks of work.

2 Configuration Management

According to DOE Standard DOE-STD-1073-2016: Configuration Management, the basic objectives of a configuration management system are to

- establish consistency among design requirements, physical configuration, and documentation, and
- maintain this consistency for the life of the facility, especially when changes are made.

Configuration management standards and work practices are already in place for the systems and equipment that make up the Vertical Test Area (VTA). These standards, which are maintained by the specific organizations, also apply to new systems that are designed, fabricated, and then installed in the accelerator.

Successful operation of the VTA, however, requires a single, definitive, up-to-date source of operating information for beamline elements. This central repository for the accelerator is the UITF Element Database (UED), which serves as the information source for such tools as model-driven accelerator setup, on-demand control screens, and element-by-element hot checkout.

The UED was the first such database set up in the test lab, and has sufficient capacity to be used by the UITF, CMTF, and VTA – so it makes sense to use it for all of the accelerators vice setting up multiple parallel databases, which requires significantly more administrative overhead.

Consistency between the installed equipment configuration and the information contained in the UED is critical, making appropriate application of configuration management principles of paramount importance for accelerator operations.

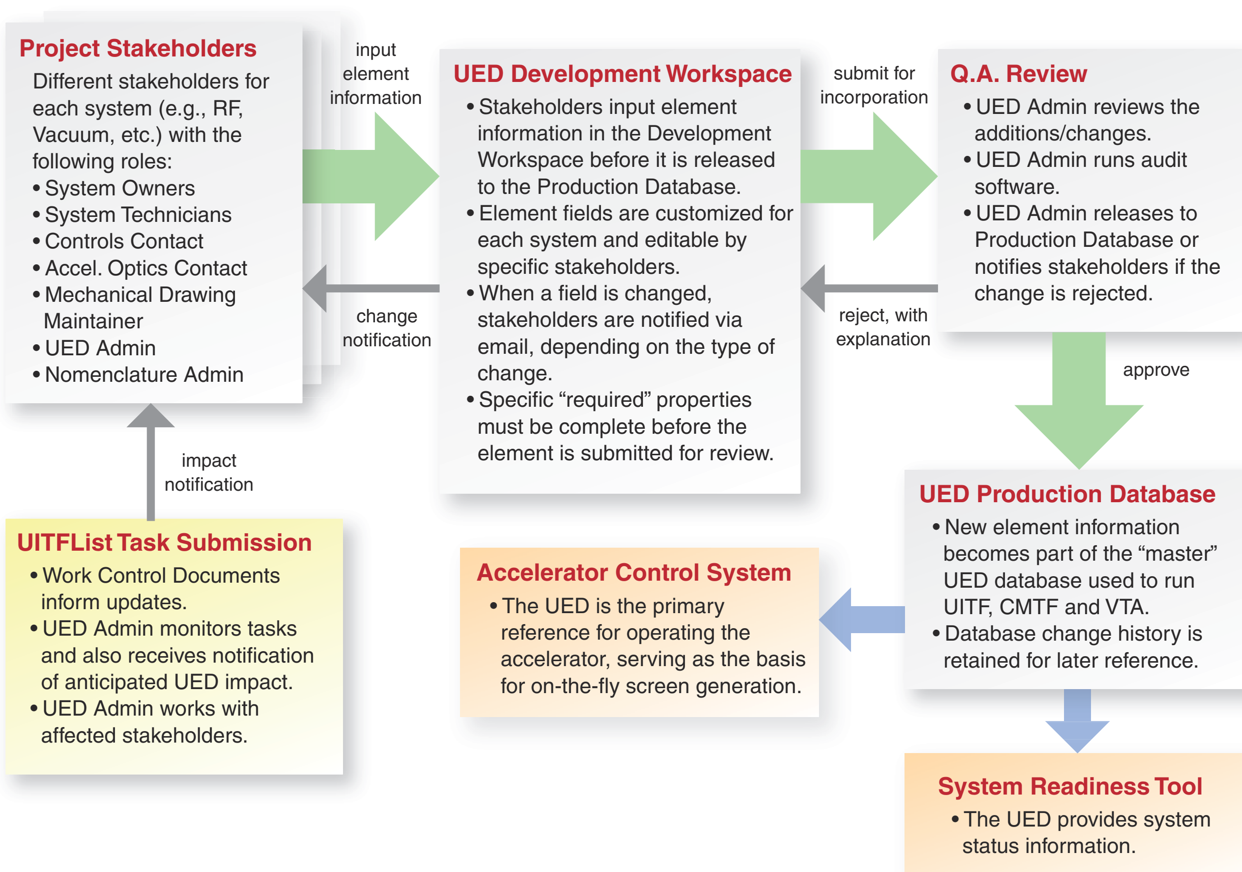
2.1 The UITF Element Database (UED)

The UED is the central element-specific information repository used to operate UITF, CMTF, and VTA. All accelerator elements which beam would eventually transition are included in the database, with the information for each type of element tailored to match the specific function. Operations-critical tools pull element information from the database, relying on the UED as the single, authoritative source for operating information. With the UED as the central information repository, changes ripple immediately through all tools whenever an element in the UED is updated or a new element is added. From a configuration management perspective, the UED is key for establishing and maintaining consistency between the physical accelerator configuration and the tools used to operate it.

2.1.1 The UED Revision Process

A well-defined revision control process is critical for maintaining the integrity of the UED. This includes defining roles and responsibilities and providing appropriate communication tools. Figure 2.1.2, below, provides an overview of the process.

Figure 2-1: The UED Revision Process



2.1.2 Project Stakeholders

Elements in the UED are organized by system (e.g., RF, vacuum, etc.), and each system has a different group of stakeholders. The various stakeholders are listed in Figure 2.1.2 on page 2-2.

Each UED element has a set of associated fields, and each field has assigned write privileges, so that The UED is the central element-specific information repository used to operate UITF, CMTF, and VTA.

All accelerator elements which beam would eventually transition are included in the database, with the information for each type of element tailored to match the specific function.

Operations-critical tools pull element information from the database, relying on the UED as the single, authoritative source for operating information. With the UED as the central information repository, changes ripple immediately through all tools whenever an element in the UED is updated or a new element is added.

From a configuration management perspective, the UED is key for establishing and maintaining consistency between the physical accelerator configuration and the tools used to operate it.

Stakeholders can contribute their portion of the information. Specific “required” fields are assigned only to the Principal Investigator. The Nomenclature Administrator has the final say with regard to element names. Others contribute various information, depending on the type of system and element. An UED Administrator helps facilitate the process and maintain UED standards.

An important by-product of the UED revision process is improved communication between stakeholders. As element changes are made, the various stakeholders are notified, providing them with information that can be used in their planning process.

2.1.3 Timely UED Updates

To accommodate the system readiness management and accelerator operating requirements, UED updates must be incorporated in the production database in order to support the scheduled program. This means that the changes must have already passed the quality review and been incorporated in the production database by UED Administration before the system readiness management begins. Populating a UED Development Workspace during the early stages of any project is a good practice that facilitates consistent nomenclature assignment and makes timely final approval/incorporation much easier.

2.1.4 The UED Development Workspace

System Stakeholders prepare updates or new elements in a development workspace; they do not directly edit the production UED production database (see Section 2.1.6 on page 2-4). Within that workspace, each element can have a variety of fields that are editable by specific stakeholders. Each element has “required” fields that must be completed before the element is submitted for incorporation in the production database. However, during the development phase, the workspace can be quite freeform, allowing stakeholders to add and remove fields and even proceed without a final element designator. As element field changes are made, automatic notifications can be sent, depending on the type of change. After the information in the development workspace is complete, a request to merge the information with the production database is made, and the request is considered by a UED Administrator (see Section 2.1.5 on page 2-4).

2.1.5 UED Quality Assurance Review

Before changes are merged from the development workspace into the production database, the UED Administrator reviews the proposed changes to verify that they are valid. They also run audit software that determines if the information meets UED requirements. If problems are identified, the UED Administrator notifies the person who submitted the proposed changes and discusses how to correct the issues. After all criteria are met, the UED Administrator releases the changes to the UED production database and stakeholders are notified. This review process ensures the integrity of the element data contained in the UED production database.

2.1.6 The UED Production Database

The production version of the UED database is the official repository for VTA element information, storing the present accelerator configuration and serving as the primary reference for the software tools that operate the VTA. This includes element nomenclature designations, where the UED is considered the authoritative reference, with the final designations being approved by the Nomenclature Administrator.

The configuration management process described in Figure 2.1.2 on page 2-2 maintains consistency between the installed equipment and the information contained in the UED. It is critical that all System Stakeholders contribute their portion of the element information when a new element is added and continue to update the information as they make changes in the field. Additionally, the UED automatically creates a series of read-only historical snapshots as element changes are made. This feature provides a means for understanding past configurations should the need arise.

2.1.7 UED Administrator

UED Administrator reviews the proposed changes to verify that they are valid and also runs audit software that determines if the information meets UED requirements. If problems are identified, the UED Administrator notifies the person who submitted the proposed changes and discusses how to correct the issues. After all criteria are met, the UED Administrator releases the changes to the UED production database and stakeholders are notified.

3 VTA Operations

VTA operations refers to the activities associated with operating the VTA. This chapter describes the roles and responsibilities of the operating staff and others involved with VTA program execution, provides protocol for critical event response, and lists directives that govern specific aspects of the conduct of operations.

3.1 VTA Operations Overview

RF operations are authorized by the SRF Operations Department Head.

VTA operations are conducted from the VTA Control Room by authorized staff. The VTA RF Operator controls and monitors one of the High Power Radio Frequency systems. Other qualified individuals can be granted access to the control system but must be in the presence of a qualified VTA RF Operator when making control system changes that will affect the HPRF test. Staffing requirements for operation are described in Section 3.6.2.1 on page 3-10

Critical event response for the VTA is described in Section 3.5 on page 3-6.

3.2 Personnel and Responsibilities

The personnel involved in VTA operations include the VTA RF Operator, Cryogenic System Operator, and support staff.

3.2.1 RF System Operators

The RF Operator ensures that the Operations Plan is executed and communicate any deviations to the VTA Facility Manager.

RF Operators are certified and authorized by the VTA Facility Manager following a period of On-the-Job training (OJT). RF Operators must have a thorough understanding of the configuration and operation of the PSS and MPS systems, as well as the configuration of the MPS and RF systems required for the execution of the planned tests.

The RF Operator is responsible for safe operation of the facility and has the authority to stop any test if they feel that there is unnecessary potential to damage equipment or if there is an elevated level of risk of injury.

Their responsibilities include:

- Read and understand the pre-shift reading outlined in Section 1.1.5 on page 1-7 of this document (SRFLog, System Readiness Manager (SRM), JLab authorization manager (JAM), and all applicable Test Procedures & Work control documents).
- Understand the VTA-specific Operations Plan communicated for your shift.
- Verify that the SRF Operations Department Head has authorized RF Operations in the JAM.
- Monitor operational conditions to ensure that test conditions meet the program goals and safety conditions as outlined in the work control documents.
- Monitor the performance of the RF and supporting sub-systems.
- Measure and adjust accelerator parameters according to approved procedures to optimize performance.
- In case of critical system failure, bring VTA to safe state.
- Be aware at all times of the PSS status of the VTA.
- Ensure that the VTA is operated in accordance with the requirements outlined in the ASE.
- Verify that, before leaving the VTA control room and the bounds of the Test Lab:
    - RF high voltage is off with no HMI Permit and the shielded enclosure is cracked at least six inches.
    - Verify that there has been no CARM alarm. If there has been one, contact the Radiation Control Department for survey of the intended VTA test stand.
    - The PSS state is in Disabled State (if no one else is testing) and that the PSS operations key is returned to the key station and the entire facility is un-posted.
    - Applicable log entries with regards to state change and the end of shift notes. (Paper and electronics logbooks.)
- Verify that, before leaving the VTA control room unoccupied while remaining within the bounds of the Test Lab:
    - -RF high voltage is off with no HMI Permit and the shielded enclosure is cracked at least six inches.
    - -Verify there is no active CARM alarm.
    - -The PSS state remains in Enabled State and the facility is posted.
- Know the energy of the cavity under test, and remain within the maximum acceleration gradient outlined in the safety documentation for the cavity under test.

- Read and understand all approved VTA-specific Work Control Documents.
- Request that the Radiation Control Department conduct a radiation survey of the VTA dewar and test stand after operating the VTA accelerator under new conditions, e.g., at higher gradients and/or DUT peak energy.
- Control or directly supervise the operation of devices that interface to the VTA PSS such as HPRF systems.
- Using the procedures specified in the VTA Posting and Verification Procedure, search and secure the VTA dewar area before HPRF operation.
- Close any VTA-related Operations Problem Reports (OPS-PRs)
- The Duty RF Operator is expected to only interact with the control system from the VTA control room, and must be present there in a manner consistent with section 3.6.2 on page 10.

3.2.2 Cryogenic System Operators

Cryogenic Operators are to be authorized by the VTA Facility Manager. There are three different types of cryo operators in the VTA:

- Prep Cryo Operators (PCOs),
- Basic Cryo Operators (BCOs), and
- Advanced Cryo Operators (ACOs).

They assist the principal investigators in the execution of tests and the changing of system configurations. They must have a thorough understanding of the configuration and operation of the cryogenic systems required for the execution of the planned tests. They should also understand the interactions of the specific RF tests with operations of the cryogenic systems. They are responsible for safe operation of the facility and have the authority to stop any test if they feel that there is unnecessary potential to damage equipment or if there is an elevated level of risk of injury. Cryogenic operations may be executed by the Cryogenics System Operator onsite only.

3.2.3 Duty Operators

The Duty Operators are the individual RF or Cryogenic System Operators whom have been assigned to be responsible for operations of that system on a specific shift. The Test Coordinator assigns Duty Operator shifts.

3.2.4 Visiting Operators

Visiting Operators are approved by the Test Coordinator to assist Principal Investigators in the execution of tests and the changing of system configurations. When using high power RF systems, their activities are to be directed and closely monitored by the Duty Operator.

3.2.5 Radiation Control Department

The Radiation Control Department will provide radiation survey support as well as maintenance support of any radiation monitoring equipment that is associated with Personnel Safety.

3.2.6 Industrial Hygiene

Industrial Hygiene shall be available to provide RF field leakage survey assistance upon request.

3.2.7 Safety Systems Group

The Group Leader of the Safety Systems Group (SSG) or his designee is the designated owner of the Personnel Safety System (PSS).

3.3 Training

VTA Operators are trained to a level of competence that allows for safe operations and maximized operating efficiency. This includes understanding basic accelerator operating concepts, key operational aspects of all systems, and attaining/maintaining a level of competence that contributes to efficient operations.

Each new VTA Operator must successfully complete a training program that consists of

- Reading and understanding the following documents:
  - Jefferson Lab Safety Assessment Document (SAD)
  - Accelerator Safety Envelope for VTA.
  - VTA Operational Directives Document (VOD; this document).
  - VTA-specific Radiological Work Permit (RWP)
- Participation in the following required training:
  - Facility-specific Radiological briefing, which includes a brief on the year’s RWP
  - Facility-specific familiarization training, which includes a briefing on the elements of the Operational Directives document as well as specific configurations, postings, hazards, and credited controls.
  - On-the-Job-Training as designated by the VTA Facility Manager.

The VTA Facility Manager determines who is a qualified VTA Operator and can suspend or terminate such qualifications at their discretion. If some portion of a VTA Operator’s training expires, the VTA Facility Manager may limit their assignments until their qualifications are reviewed. A list of qualified VTA Operators is maintained by the VTA Facility Manager and displayed in the control room.

3.4 The VTA Personnel Safety System

The VTA Personnel Safety System (PSS) provides interlocks that permit high power RF to only be routed to a test enclosure when the designated shield is closed. It also interfaces to the radiation monitoring system, which is composed of several Controlled Area Radiation Monitors (CARMS) with both gamma (13) and neutron (2) probes distributed throughout the facility. The PSS interlock system for the VTA requires that a number of electrical and mechanical conditions be satisfied before ionizing radiation-producing tests can begin.

There are two different methods of delivering HPRF to a device under test (DUT):

- **Primary**: A local RF source is generated using a mobile RF amplifier through the RF Switchbox located on the front of each shield enclosure. The RF Switchbox contains a 1Watt amplifier and coaxial RF switches to route either low power (< 1Watt) or high power to the Dewar. Also, on the front of each Dewar are two PSS controlled AC power receptacles, one for 208V three phase, and one for 120V single phase.
- **Back up**: A dedicated production RF switching and amplifier system located in the Amplifier Rack in front of Dewar 6. The output of an RF amplifier can be routed via the RF switching system to the desired Dewar with the DUT. The production amplifiers can be routed to Dewar 3 through 8.

Pre-routed RF cables are available from the production amplifier systems and from the RF output Switchbox into each Dewar. Furthermore, RF amplifiers involved in these tests must be powered from the PSS controlled AC power receptacle associated with the Dewar. RF amplifiers of 1watt or less may be used to calibrate the RF system with the shield lid open but shall not be phase locked to a cavity under test capable of producing ionizing radiation. Under no circumstances should an RF System Operator bypass the RF interlocks by routing the output of an RF amplifier directly into a Dewar with the capability of producing ionizing radiation.

At least two independent guard lines are used to shut systems down in the event of an unsafe condition. Comprehensive testing of the interlocks, in accordance with the VTA PSS Certification Procedure, is performed periodically in order to assure that the system operates properly.

When radiation above a pre-determined threshold determined by the Radiation Control Department is detected, these devices produce an audible alarm inside the VTA control room. The absence of an alarm with RF and high voltage (HV) off indicates it is safe to enter the designated VTA Dewar enclosure when the PSS state is set to OPEN, as the radiation source term is prompt when in operation. Several of these CARM probes are integrated into the VTA PSS System, and when they reach their ‘High’ threshold the permit to the HV source is removed. The VTA RF Operator will contact the Radiation Control Department when alarms audibly enunciate and RCG will determine if and when a survey of the Dewar test stand and/or test cavity is required per their guidelines.

While individual cavity tests may exceed 10 MV accelerating potential, the duration of tests is short – with 1 hour of continuous operation sufficient to demonstrate cavity capabilities. In addition, radiation sources are typically prompt – due to cavity field emission. During normal testing, equipment is not expected to become activated - but radiation levels measured by the neutron monitors are used to alert operators to the potential for cavity and test hardware activation. The Radiation Control Department will survey each cavity and test stand prior to motion out of the Dewar or after any CARM alarm.

3.5 Critical Event Response

The nature of critical events can vary widely. The basic responses to the most common critical events are described or referenced in the following sections. A 'Critical Event Response' section is available in Web On-Call to aid with the following notifications.

3.5.1 Safety Envelope Violations

If the Safety Envelope is violated during VTA operations, all HPRF must be terminated and the JLab Unreviewed Safety Issue (USI) Procedure be followed.. The incident will be investigated using the process specified in the *ES&H Manual, Section 5200, Event Investigation and Causal Analysis Process*. The Associate Director of Accelerators, the VTA Facility Manager, the Safety System Group Leader, and the Accelerator Division Safety Officer must be notified as soon as possible.

HPRF Operations shall not resume until the Associate Director of Accelerators gives direct approval to the VTA Facility Manager.

Possible Safety Envelope Violations include:

- Permanent Shielding that is out of place, damaged, or inspection period has lapsed.
- Movable Shielding that is out of place, damaged, or inspection period has lapsed. (Movable shielding package data is available.)
- PSS System damage or malfunctions: See Section 3.5.3 on page 3-7.
- PSS System lapse of certification: Operation of the facility with a lapsed PSS system certification is considered an ASE violation. The certification schedule for the PSS and ODH systems are located online.
- Inadequate Staffing: If staffing is not maintained as outlined in Section 3.6.2.1 on page 3-10 this is an ASE violation.

In addition to the credited controls, the facility's shielding has been evaluated under RCD-DEP-24 #001. Operation of a cavity at energies above the limits set by RCD are also considered a safety envelope violation and would provoke the critical event response described here.

Violation of any element of the safety envelope will result in an immediate cessation of facility operations and provoke the critical event response outlined above.

3.5.2 Operations Envelope Violations

If an Operations Envelope violation occurs, RF and High Voltage operations must be terminated and the VTA Facility Manager, Head of SRF Operations, the Safety System Group Leader (for PSS-related violations), and the Accelerator Division Safety Officer must be notified as soon as possible.

VTA Operations must not resume until the Head of SRF Operations gives direct approval to the VTA Facility Manager.

The present VTA Operating Envelope is as follows:

- The operating facility energy limit is E<=35 MeV for an individual enclosure.
- Any detection of Test Stand Burst Disk Failure.

3.5.3 Personnel Safety System (PSS) Malfunctions

The PSS is designed to protect personnel during VTA operations. If, during operations, a malfunction of the PSS is perceived, HPRF delivery shall be terminated immediately. The VTA RF Operator shall report the perceived malfunction to the Safety System Group Leader for resolution.

If, on investigation, the Safety System Group Leader determines that the PSS operated as designed and such operation does not pose a previously undetected personnel hazard, then HPRF operations may resume after direct approval is given by the VTA Facility Manager.

If the Safety System Group Leader determines that a previously unidentified hazard exists, the USI process must be followed (see Section 1.1.3 on page 1-5).

If the Safety System Group Leader determines that the PSS did not function correctly, the occurrence reporting process described in Section 3.5.1 on page 3-6 shall be followed.

3.5.4 Emergency Response

In the event of most emergencies, the role of the VTA Duty Operator is to take the facility to a safe state with RF and High Voltage off – and to set the PSS to an open state. Afterwards, they should follow the emergency response guidance which can be found at the JLab Emergency Management web page.

VTA-specific Emergency response guidance is given in the VTA Operational Safety Procedure which outlines the principal hazards and mitigations in the VTA including the requires actions and escalation calls for specific classes of emergencies. The locations of alarm panels, emergency shutoff switches / breakers, Run Safe Boxes, fire extinguishers, Muster Points, etc. in covered via on-the-job training.

3.6 Directives

This section specifies directives that shall be followed by all VTA personnel and others engaged in the operation or oversight of components that are part of the VTA.

3.6.1 Control System Interaction

The VTA is operated using a blend of EPICS (Experimental Physics and Industrial Control System), an open-source computer interface that reads and writes to process variables, which remotely control accelerator system components and LabVIEW – a proprietary visual programming tool for rapid prototyping and data acquisition created by National Instruments.

All VTA RF operations will be conducted from a computer terminal inside the VTA control room.

The VTA Cryogenic Systems are operated using a blend of EPICS for process variable reference and Programmable Logic Controller (PLC) system that remotely control cryogenic components at each dewar. There is a main control panel and eight individual control panels for each cryostat. All advanced cryogenic operations must be performed during normal operational hours and with a cryogenic system operator on site. Automated cryogenic operations may be performed at any time. Alarms are integrated into EPICS to alert the guard shack when issues may arise.

3.6.1.1 VTA Control System Access

The VTA Facility Manager provides authorization to manipulate system process variables via EPICS to approved individuals (i.e., VTA Operators) through the use of the channel access security protocol. Approved Operators can open VTA IOC channel access to anyone with a valid operations computer system account for limited time periods in order to accomplish specific tasks.

During operations, channel access is generally closed to everybody except trained VTA RF or Cryogenic System Operators and system subject matter experts. The VTA Operators can use discretion to temporarily grant channel access to others via opening IOC channel access so long as the activity is not expected to negatively affect the ongoing test in progress.

Channel access control generally remains in place even during scheduled accelerator downs and maintenance periods.

The VTA LabVIEW environment is maintained on a few computers in the VTA control room specifically designated for data acquisition and pushing selected information into the EPICS environment. Access to these computers is regulated through a group login which rotates passwords frequently and requires face-to-face communication with the software administrator in order to get the new password in order to prevent hacking or social engineering scenarios to gain unauthorized access. Addition of personnel which are qualified for access is specifically communicated from the VTA Facility Manager to the software administrator.

3.6.1.2 VTA Operator Control System Interaction

Only qualified VTA Operators have unlimited access to all VTA process variables at all times; however, these personnel must observe the following restrictions.

- Be approved by the VTA Facility Manager and added to the list of qualified VTA Operators.
- RF operator must be physically present in the VTA Control Room and working from a VTA computer console when making control system changes during HPRF operations.
- Cryogenic Operators must be physically present in the VTA Control Room from a VTA PLC station at the beginning of every operation. Automated operations can be left unattended, as long as they remain available for constant communication to available to Cryogenics On-call personnel, the VTA facility Manager, and the VAT RF Operator on-duty. All advanced operations require a cryogenic operator at all times during the operations.

3.6.1.3 Control System Interaction Affecting HPRF by Others

Personnel other than VTA Operators who, when HPRF is present in the VTA accelerator, need to make control system changes that will affect HPRF transport, must meet the following requirements.

- Be approved by the Duty Operator or the VTA Facility Manager and be cognizant of any tests presently in progress
- Have explained to the Duty Operator, in advance, the anticipated changes and been given VTA Operator approval. The VTA Operator will open access as appropriate for the task.
- Remain available for constant contact to the Duty Operator or the VTA Facility Manager (as appropriate) and make periodic progress reports on ongoing work

NOTE: On occasion, those who are solving specific problems at the request of the VTA Operator may need access to the control system but may not meet the following criteria. They can be granted access to individual IOCs for a limited time period under the direct supervision of the VTA Operator because they are solving a specific problem disrupting the executing the VTA program.

3.6.2 Shift Protocol

Shift protocol includes staffing requirements, shift schedules, and control room staff conduct.

3.6.2.1 Staffing Requirements for Operations

Table 3-1and the paragraphs that follow describe minimum staffing requirements for the VTA.

Table 3-1: Minimum Staffing Requirements for VTA Operations

VTA Operating Condition	VTA PSS State	Minimum Required Staffing
RF OFF	*No RF (Disabled) State*	None
HPRF OFF	*High-Power Enable State (No HMI Permit)*	Authorized VTA RF Operator in Test Lab.
HPRF ON	*High-Power Enable State (HMI Permit)*	Authorized VTA RF Operator in Control Room.

VTA has three PSS states: *No RF*, *Low-Power RF Enabled/Area Posting*, and *High-Power RF Enabled*.

The staffing requirements shown in Table 3-1 address the possible VTA operating conditions; other constraints and conventions are as follows:

- **HPRF ON** is defined as the VTA being in PSS *High-Power Enable State (HMI Permit)* and capable of sending MeV levels of gradient.
- **RF OFF** is defined whenever the VTA is in a safe condition that is incapable of delivering MeV levels of gradient, as outlined in Table 3-1.
- **HPRF OFF** and PSS State: *High-Power Enable State (no HMI Permit)* – is defined as the time for performing the area posting procedure and verifying all personnel of dosimetry and RWP status. This state also helps secure hazardous energy so that the Duty Operator is permitted to leave the control room as long as they remain in the Test lab. This is intended to accommodate bathroom breaks, virtual meetings or meetings within the Test Lab, and meal breaks for the Duty Operator.
- Whenever VTA RF Operator change occur for any reason, the oncoming staff member must receive a summary of the shift activities, receive task assignments from the off-going VTA RF Operator.
- After the last test of the day, the PSS key will be returned to the VTA control room key station – preventing possible operation of the PSS chassis to the High-Power RF Enabled state. The VTA RF operator may leave the JLab site after securing the key and un-posting the testing area.

- The key box (used for key control) is located in the VTA Control Room 1115 adjacent to Dewar 2 Cryogenic Rack. The combination is managed by the VTA Facility Manager and rotates as needed.

3.6.3 Shift-Turnover Meeting

The shift-turnover meetings are held between consecutive shifts so that the off-going staff can transfer information to the oncoming staff. Typically, VTA tests are concluded within a single work shift. In the event of an extended test, the oncoming staff will conduct a review with the off-going staff, encompassing test results, the shift summary log, and the Communicated Operations Plan provided by the VTA Test Coordinator or their designee.

The shift-turnover meetings are held in the VTA Control Room and usually last less than fifteen minutes.

3.6.4 CARM Response

3.6.4.1 CARM Alarm Response

CARM alarms will terminate VTA radiation-producing activities by dropping the high voltage supplying the RF source. In event of a CARM alarm, the Principal Investigator (PI) or Duty Operator shall notify RadCon through the duty phone 757-876-1743 and discuss the operational activities that preceded the alarm. The Test Coordinator and VTA Facility Manager should also be notified – though this may be done in writing by email, text, etc. RadCon staff may require a supplementary radiation survey as radiation producing activities recommence.

RadCon staff will address the results of the radiation survey with the Test Coordinator, VTA Facility Manager, PI and/or Duty Operator and discuss the mitigating measures, if necessary, for continued operation. The Test Coordinator will then determine when operations may resume.

3.6.4.2 Neutron CARM Alert Response

Two neutron radiation detectors underneath the floor in the Dewar testing area are configured to produce an "alert level" alarm in the control room. This alarm will occur if the neutron levels in the vicinity of the cavity exceed 0.5 mrem/hr. This alarm will NOT terminate the test. The Operator may acknowledge the alarm to silence the audible annunciator. When this condition occurs, the Duty Operator shall proceed with the CARM Alarm Response described above and place lock and sign on the lifting lug of the potential activated test stand.

In the event that the alarm occurs outside of a day shift and a survey is not immediately available, the Duty Operator shall place a lock and signage on the DUT test stand's lifting lug stating "Contact RadCon at 876-1743 Survey required" and make an appropriate ELog/SRFVTALog entry copied to the Radiation Control Manager, VTA Facility Manager, and to the Test Coordinator.

3.6.5 Radiation Surveys

Radiation surveys will be performed by the Radiation Control Department each time the VTA accelerator is operated, a CARM response is triggered, and the Radiation Control Department deems a survey necessary.

- Any activation of equipment will require radiological work controls or access controls, with instructions from the RadCon conveyed to the VTA Facility Manager who is responsible for transmitting work restrictions to all affected personnel.

Radiation surveys are recorded as discussed in Section 3.6.8.4 on page 3-14

3.6.6 System Test Plans

System test plans are procedures written by system experts to perform specific tests of VTA systems, execute non-standard RF tests, or as work control documents to coordinate repairs beyond the scope of program outlined in the Pansophy traveler.

Test plans are written and submitted using an on-line form that is a part of the web-based Test Lab Area Task List (TATL) work planning system (which interfaces with the electronic Permit Authorization System). The form is used to provide the specific test steps, along with a variety of other critical information such as a backout plan, any safety considerations, test conditions required, and contact persons.

Once submitted by the author, each test plan is electronically routed for review by key personnel. The test plan can either be approved for execution or rejected for revision. The VAT Facility Manager evaluates all test plans and schedules them for execution by control room staff.

3.6.7 Control Room Equipment

The VTA Control Room equipment consists of console equipment, fire alarm equipment, radiation-monitoring equipment, communications equipment, computer workstations, video monitors.

3.6.8 Record Keeping

Accurate record keeping is an essential part of VTA operations and is required for both administrative and technical reasons. VTA operations record-keeping documents include the ELog (specifically the SRFVTALog), VTA test execution service request in Pansophy, and control room paper logbook. Requests for additional record keeping by the control room staff should be directed to the VTA Facility Manager.

The VTA RF Operators are responsible for on-shift record keeping. The VTA RF Operators must enter and review these records frequently to ensure that entries clearly and accurately describe shift activities.

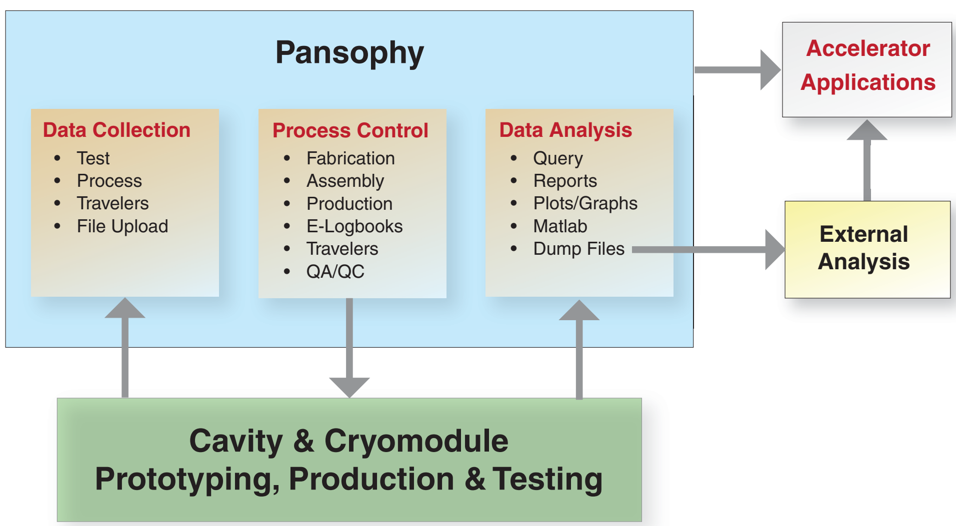
3.6.8.1 Pansophy

Constructing and managing SRF accelerator systems is complex logistically – with the need to keep track of assembly and subcomponent test data and an ever-evolving set of processes and testing procedures presenting a very real challenge. In addition, accelerator development and construction projects often intentionally push the envelope of well-established technical performance and manageable complexity.

The desire to efficiently retain and exploit accumulated experience across the multi-decade life cycles of major SRF installations led to the development of a robust user-friendly online knowledge management system. Users range from process managers, shop-floor technicians, test engineers, to after-the-fact data miners and operations staff.

To create the possibility for maximum learning from expensive prototyping and low-volume production work Pansophy integrates elements of procedural control, quality assurance, automated data accumulation into a secured central database, prompt and reliable data enquiry and retrieval coupled with a variety of automated online analysis tools – replacing the need for a host of commercially available software packages simultaneously. The system was put into place in 2001, and successfully used for support of the construction of the initial complement of cryomodules for the ORNL Spallation Neutron Source. It has been in continuous operation ever since.

Figure 3-1: The Pansophy System



Pansophy is used throughout the JLAB SRF institute. For the purposes of the VTA, the two portions which applies are largely used from program control and definition - the VTA Service Request system and the Vertical Device Under Test (DUT) testing traveler. Subject Matter Experts or Principal Investigators will submit experiment or test plan proposals to the VTA Service Request system. This is used to determine the DUT and the related testing parameters and standard requirements. Once approved, a testing traveler is implemented to record and track important parameters related to the DUT.

The outlined process includes such items as relief valve verification, testing parameters (i.e. RF and frequency requirements, cooldown profile, instrumentation requirements, etc.), verifying all connections to the DUT test stand and operation of interlocks as they come online, cool-down and warm-up of the module to operational and room temperatures, as well as the actual testing of the properties and capabilities of the assembled DUT itself. To properly gate the flow of work, this traveler works through the program in small, sequential-but-related portions of the test process. This allows for multiple hold points in the process for appropriate managers to stop and review information prior to moving on with the next stage of testing.

Testing in the VTA establishes the capabilities of the DUT. In addition, the various work control processes (Pansophy, TATL, & ePAS) also provide an opportunity to discover and correct any issues with the DUT before it is installed in another accelerator. This saves program time further down the line.

3.6.8.2 Paper Logbooks

Hard-copy paper logbooks are the oldest continuous form of record keeping in use by VTA. Laboratory style gridded paper composition notebooks are labeled with the date, project, and cryomodule(s) under test. Each preparatory step, test, and result is logged sequentially in the logbook along with the date and person(s) performing the test. Any errors in the logbook are struck with a single line and initialed.

The logbook is a legal document which must be retained per government standards. Project logbooks are retained in the office of the VTA Facility Manager and may be checked-out as needed if they need to be referred to later. Paper logbooks for past projects are in the process of being digitized for easier reference by multiple parties. The hard-copy paper logbooks will be retained for at least the required length of time specified for US government record keeping.

3.6.8.3 SRFVTALog

The SRFVTALog is the sequential record of the events occurring during the operation of the VTA. All information must be entered promptly, since delays often lead to incomplete or inaccurate entries. All entries require the date, time and name of the person making the entry. The SRFVTALog is a computer based electronic logbook which can be accessed from the ELog home page.

3.6.8.4 Radiation Survey Sheets

The radiation survey sheet must be filled out in pen, signed, and dated by the Radiation Control Department staff member. The original survey sheet must be scanned, with the resulting image posted in the electronic SRFVTALog and Radiation Survey Log and the original paper survey sheet archived by the RadCon.

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4 Maintenance

Maintenance refers to work performed on the hardware or software of the VTA. Examples of VTA maintenance activities include:

- Making repairs after a failure
- Periodic replacement of high-wear parts
- Fixing inspection deficiencies
- Post-repair testing
- Calibration
- Alignment
- Equipment and software upgrades

As a test facility, the VTA maintenance tasks are expected to be carried out within the priorities for resources set by the laboratory management.

Any major installations may be performed either by JLab staff and/or subcontractors and require either cross-divisional coordination or extensive engineering effort in the planning and execution phases and during checkout.

4.1 Personnel and Responsibilities

For JLab-related tasks, maintenance of the VTA is the responsibility of VTA Facility Manager. Maintenance and project oversight for non-JLab tasks is a shared responsibility between the VTA Facility Manager and the project's Principal Investigator. For these tasks, the VTA Test Coordinator handles day-to-day task scheduling and oversight.

Maintenance and project activities for VTA are supported by the Jefferson Lab system support groups. Approved repairs are performed by authorized personnel.

4.1.1 VTA Work Coordinator

The Work Coordinator role is typically filled by the VTA Facility Manager, though they may delegate those responsibilities at their discretion. The VTA Work Coordinator responsibilities encompass the VTA and include coordination and scheduling of all maintenance and non-JLab installation activities.

VTA Work Coordinator responsibilities are as follows:

- Serve as the primary contact for work to be performed in the VTA.
- Review, schedule, and approve proposed work submitted via the appropriate Work Control Documents (Testlab Areas Task List (TATL), ePAS, or Pansophy).
- Coordinate and schedule the safe and efficient installation of equipment in the VTA, including new experiment equipment and VTA system modifications or upgrades to accommodate the non-JLab projects.
- Participate in the demonstration and testing of new equipment and systems as they move from development to operational running.
- Meet with representatives of potential projects to determine if their requirements are in line with the capabilities of the facility and help facilitate the approval and scheduling process.
- Maintain equipment documentation and work control documents in a central electronic repository.
- Lead focus meetings to address any potential or existing issues.

4.1.2 System Owners

System Owners oversee all aspects of a specific VTA system (e.g., SRF, RF, Cryo, etc.) to assure system performance in support of the scheduled program. System Owners should ensure that the element data contained in the UITF Element Database (UED) matches the existing system configuration, and incorporate any UED changes in a timely manner.

4.2 Directives

4.2.1 Safety Guidelines for Maintenance Activities

Maintenance and project tasks are performed within the guidelines established by the Jefferson Lab *ES&H Manual, Section 3000, Planning for Safe Operations.*

Work control documents associated with these tasks include, but are not limited to, Standard Operating Procedures (SOPs). Fire Hazard Work Permits, Confined Space Work Permits, Electrical Service Work Permits, and Radiological Work Permits. Prior to performing work, the *ES&H Manual, Section 3210, Work Planning, Control, and Authorization Process* must be followed in order to properly plan the work, identify and analyze risks, and gain the required authorization.

The Testlab Area Task list (TATL) Work Planning Tool and electronic Permit Authorization System (ePAS), contain a hazard identification worksheet that helps facilitate preliminary task hazard analysis and identify any risks associated with the planned work.

If a hazard associated with a task is not addressed by the ES&H Manual, then the hazard is considered unusual, and specific written approval in the form of task submission, review, and approval via the ePAS system is required before work may commence. This process employs required peer review, hazard identification and mitigation, ES&H required review, isolation certificates, and permit / work authorization. It includes required lock-out/tag-out work controls and pre-job briefings as part of tasks.

When planning or performing maintenance work, Unreviewed Safety Issues (USIs)(see Section 1.1.3 on page 1-5) that might arise from the work must be identified and reported. In general, the standard industrial hazards encountered during maintenance are addressed by the ES&H Manual. However, certain work may affect systems that act as credited controls used to mitigate the known hazards of VTA operations. Such work includes, but is not limited to the following:

- VTA modifications that are not replacement-in-kind activities.
- Change-out/replacement of safety equipment that is identified in the SAD or *VTA ASE* and not identical in form, fit, and function.
- Changes to the safety systems and equipment.

The Unreviewed Safety Issue (USI) Procedure provides additional guidance helpful in identifying USIs and specifies the steps required to address any USI.

4.2.2 Bypassing System Interlocks

Interlocks are present in many VTA systems and serve to protect personnel, equipment, or both. Interlocks constrain the operation of equipment in some fashion, either electronically or mechanically. Interlocks found in the VTA typically rely on some type of electronic transducer, sensor, switch or physical mechanism to keep equipment from being placed in an unsafe state.

It can be difficult to determine whether or not a specific item should, in fact, be considered an interlock. For example, a water valve is not an interlock, but an associated sensor that detects water flow, temperature, pressure, or valve position and constrains the operation of equipment is part of an interlock for that equipment.

From time to time it may be necessary to bypass a system interlock. Bypassing can be accomplished in a variety of ways, including installing a physical wire or jumper, modifying software, or making a change in one or more process variables or set points. Specific steps must be taken whenever an interlock is bypassed; however, these steps differ depending on whether the equipment remains in service or is physically disconnected from the accelerator (i.e., out-of-service).

These two possibilities and the required steps are defined in the following sections. It should be noted that this directive does not apply to equipment associated with the Personnel Safety System, which is governed by a separate document, the Jefferson Lab Personnel Safety System Configuration Control Policy.

4.2.2.1 In-Service Equipment

Equipment is “in-service” when the physical, critical connections to the accelerator remain in place. In other words, the equipment remains in-service even if a switch (or switches) is thrown or a fuse is removed. Only actions like physically removing the equipment or disconnecting critical cabling change the status to “out-of-service.”

When an interlock is bypassed on an in-service system, the person performing the bypass must ensure that an appropriate entry is made in the VTA Logbook and also apply a standard Interlock Bypassed tag when the interlock is bypassed. This tag must include the name of the person installing the bypass, the date, the purpose, the location of the jumper. Each bypass requires a separate tag, and the tag must be placed in a location that is obvious to anybody who would be removing the bypass.

Whether a paper tag is required or not, bypasses of in-service equipment shall be logged in the SRF paper and electronic logbooks.

4.2.2.2 Out-of-Service Equipment

Equipment is considered to be “out-of-service” when critical physical connections to the VTA have been removed. This is accomplished by, at a minimum, physically removing critical cabling that connects the system to the VTA. Equipment such as a power supply may remain in place but be considered out-of-service after critical physical disconnects have been made. Equipment that has never been installed in the accelerator is also considered to be out-of-service.

Bypassed interlocks in out-of-service equipment must be identified by a tag. The person installing the bypass must fill out and apply a standard Interlock Bypassed tag when the interlock is bypassed. This tag must include the name of the person installing the bypass, the date, the purpose, and the location of the jumper (a serial number is not required for out-of-service equipment). The tag must remain attached to the equipment until the bypass is removed. Each bypass requires a separate tag, and the tag must be placed in a location that is obvious to anybody installing the equipment.

4.2.3 OPS-PR Problem Reporting System and Repair Protocol

OPS-PR (Operations Problem Report) is an electronic tracking and reporting system for corrective action requests. OPS-PR entries are made using either the control screen interface or the web-based interface.

The OPS-PR initiator describes the problem and also selects from the lists of systems, groups, and regions to categorize the problem. For some common problems, guidance for a solution may be presented as the entry is made. Files can be attached, and the entry can also be associated with other similar entries. The electronic logbook(s) where the entry will appear can also be specified. When the entry is submitted, the system owner and other subscribed personnel automatically receive the entry via email; other recipients can also be entered. Once generated, an OPS-PR can be reassigned by the system owner and comments can be added as progress is made toward resolution. When a repair has been completed, an OPS-PR may be marked 'No attention required.'

4.2.3.1 VTA Repair Protocol

Accelerator repairs are made whenever hardware or software problems interrupt the primary program. The following guidelines describe the repair process:

- The Duty Operator determines whether the problem can be corrected quickly by SRF or control room staff or if external on-call help is required. If on-call help is required, the Duty Operator uses the protocol established by the Web On-Call tool (see Section 4.2.3.2 on page 4-5).
- The Duty Operator shall update the Ops Problem Report with the details of the repair (if known), and record any notifications there associated with program interruptions.
- The Duty Operator notifies the VTA Testing Coordinator if the program interruption is anticipated to be longer than two hours.
- The Duty Operator notifies the VTA Facility Manager if the program interruption is anticipated to be longer than four hours.
- At the 8-hour mark, the Duty Operator shall update the VTA Testing Coordinator, VTA Facility Manager, and apprise the Head of SRF Operations of the issue.
- If the repair takes longer than eight hours or spans two or more shifts worked by repair personnel, then the component must be downgraded in the System Readiness Tool, either by the technician or the Duty Operator (see Section Section 4.2.6 on page 4-6).

4.2.3.2 On-Call Lists

On-Call lists are used to summon support staff to carry out immediate repairs or to perform repairs that require specific expertise. Support Group Leaders are ultimately responsible for organizing their on-call response program and providing contact information for continuous 24/7 coverage. The on-call information, including escalation contacts, must be supplied using the Web On-Call tool.

4.2.4 Testlab Areas Task List Work Planning Tool

Through the Testlab Areas Task List (TATL), accelerator personnel can electronically submit tasks for approval and scheduling. This is a means to efficiently perform work that could interfere with accelerator operations, or VTA-related work performed by other groups, or activities happening outside of VTA but within the Test Lab High Bay.

Each TATL submission includes task details, the potential impact to accelerator operations, task hazard identification and a hazard mitigation plan, a backout plan, and supporting documentation as attachments. Once submitted, a task is automatically routed via email to the appropriate parties for comment and approval. After approval, the task waits in the pending queue until the work is scheduled by the VTA Facility Manager.

4.2.5 The electronic Permit Authorization System Work Planning Tool

The goal for the electronic Permit Authorization System (ePAS) is to provide a single lab-wide process for task hazard assessment and hazard mitigation, accessible through existing work planning platforms, for activities associated with the maintenance and operation of Jefferson Lab. ePAS is a commercially available industrial-scale software product which is intended to supplement ATLis (and its local clone the TATL), which were locally generated at Jefferson Lab. More information about generating permit requests / permits to work, isolation certificates, and other work planning may be found in the ePAS manual.

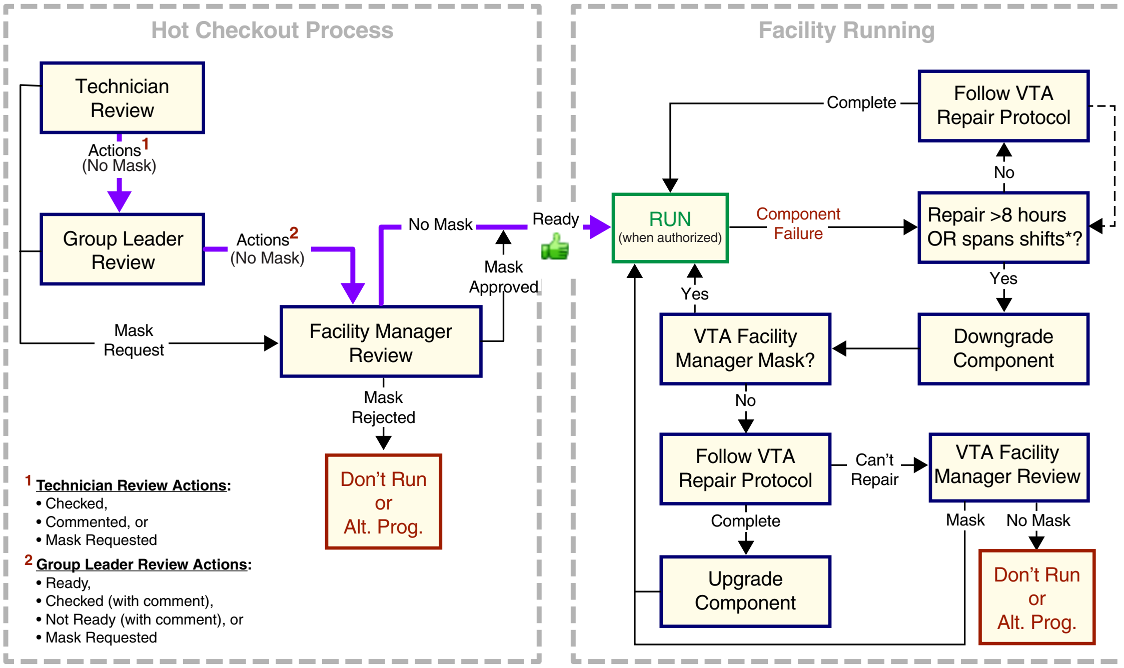
4.2.6 System Readiness

Whether or not a system is ready to support the accelerator program is referred to as system readiness. Because an accelerator has many complex, interdependent systems, it is important to transition to a higher state of readiness in an organized, prescribed fashion, and then continue to know the readiness state of every system during accelerator running. Each system has three possible states of readiness as follows:

- Off – No planned operations.
- Hot Checkout – The transition from Off to Running using a pre-defined process. When the hot checkout process is complete, system experts have confirmed that their systems are ready to support 24/7 operations.
- Running – The turnover to Operations is complete and components are in a state that supports scheduled operations. Component failures during running are addressed using the VTA repair protocol.

Figure 4-1 shows how system readiness flows through the hot checkout process and integrates with the accelerator repair protocol during running. Additional hot checkout and running details are provided in the following sections.

Figure 4-1: VTA System Readiness for Hot Checkout and Running



* "Shifts" refers to shifts worked by repair personnel.

The readiness status of any individual component can be "downgraded" at any time, by anybody, if a component is reconfigured, modified, or potentially compromised. It is ultimately the responsibility of System Support Groups to maintain their components and systems statuses in the System Readiness Manager. Group Leaders and the VTA Facility Manager routinely downgrade components before any scheduled run period, and System Support

Groups are responsible for downgrading components worked on during a shutdown. The responsible group(s) receives email notification any time a component is downgraded.

4.2.6.1 System Hot Checkout

System hot checkout is a period of scheduled, dedicated time, during which all accelerator systems are recovered, exercised, and made ready for facility operations. Hot checkout ensures that systems and tools are verified as operational. The technicians responsible for facility system installation and maintenance and their managers must participate in hot checkout activities to ensure that their systems are ready for accelerator operations.

The System Readiness Manager is a database-driven web tool that supports a consistent, prescribed hot checkout process. The tool is used to track and communicate progress toward system readiness, and when complete – communicate that readiness to the Head of SRF Operation to issue the Authorization to run for the facility and for the Duty Operators to inspect continued system readiness..

The System Readiness Manager is populated with readiness checklists and checkout procedures that are detailed and repeatable. As shown in Figure 4-1, technicians execute the documented process for each system by changing the status to Checked, adding a comment to explain why the system is not ready, or making a mask request. Group Leaders perform a second level of readiness verification, changing the status to Ready, Checked (with a comment added), Not Ready (with a comment added), or making a mask request.

As the period of planned operations approaches, the VTA Facility Manager (or their designated work coordinator) evaluates the status of all systems. They review downgraded components and work with System Support Groups to verify that downgrades align with maintenance tasks. As the hot checkout process progresses, the VTA Facility Manager coordinates with relevant stakeholders to shepherd the process to completion and reviews component mask requests. After all systems reach a sufficient state of readiness, the VTA Facility Manager completes the checkout process by issuing final approval via the ‘Run Authorization’ in the System Readiness Manager along with a logbook entry verifying that all required systems are ready to support facility operations.

Component mask requests can be made at any point during the hot checkout process. Mask requests are submitted with an expiration date. A masked component is hidden in the System Readiness Manager readiness reports. Masks can be removed prior to their expiration or will automatically be removed upon expiration. Mask requests are approved by the VTA Facility Manager.

While the goal is every relevant component be marked Ready in the System Readiness Manager, this is not a requirement for Operations – though all credited controls must be in place and verified as specified by the VTA Accelerator Safety Envelope for the facility to operate. The System Readiness Manager is used by the VTA Facility Manager to assess the technical status of accelerator systems. There may be some individual components not ready and not masked, and the SRF Operations Department Head may choose to authorize RF operations.

After all systems reach a sufficient state of readiness, the Facility Manager completes the checkout process by issuing final approval of system readiness via a check-off in the System Readiness Manager along with a logbook entry verifying that all required systems are ready to support facility operations. The Head of the SRF Operations Department may then inspect the state of accelerator readiness - as well as the credited controls - and choose to Authorize facility operations, or not.

4.2.6.2 Work Coordinator Responsibilities in the Systems Readiness Process

The role of the Work Coordinator in the Systems Readiness Process is as follows:

- Oversee the System Readiness Manager and coordinate functional changes as necessary.

- Ensure that all systems required for upcoming operations are included in the System Readiness Tool.
- Define which components will be automatically downgraded at the beginning of every shutdown.
- Work with System Support Groups to downgrade specific components at the beginning of each shutdown, considering planned work and the upcoming program schedule.
- Monitor TATL, ePAS, & Pansophy tasks and work with System Support Groups to downgrade components as necessary.
- Report on readiness progress at the accelerator as necessary during preparations to run.
- Track system readiness and keep the SRF Operations Department Head (and the VTA Facility Manager, if these responsibilities have been delegated) apprised of potential readiness problems.

When the Systems Readiness process has completed and the VTA Facility Manager has been notified the hot checkout process has concluded – the VTA Facility Manager may audit the tool and decide whether or not recommend to the Head of the SRF Operations Department that ‘Authorization to Run’ the facility be issued.

See Section 1.3 on page 1-12 for detailed personnel responsibilities.

4.2.6.3 System Readiness During Running

During scheduled running, it is important to be able to determine the readiness state of all systems required to support the run program. When a component fails, the VTA repair protocol (see Section 4.2.3 on page 4-4) is followed and the system readiness state is tracked as shown in Figure 4-1 on page 4-7. If the repair progresses quickly, there is no need to downgrade the component; however, if the repair takes longer than eight hours or spans two shifts worked by repair personnel, then the component must be downgraded in the System Readiness Manager by the RF Operator.

Each mask must have an accompanying comment in the System Readiness Manager to explain the rationale for the exception and any associated limitations that the non-operational component may cause. If the failed component will be non-operational for an extended period of time, the VTA Facility Manager can review and extend the expiration of the mask for the component.

Appendix A List of External Links

General Description:

These external documents were linked to in the document.

- Accelerator Bypassed-Interlock Log (ABIL): http://opsweb.acc.jlab.org/abil/pro/
- Corrective Action Tracking System (CATS): https://mis.jlab.org/ehs/
- DOE Order 420.2D: Safety of Accelerators: https://www.directives.doe.gov/directives-documents/400-series/0420.2-BOrder-d
- DOE Standard DOE-STD-1073-2016: Configuration Management (Invoked): https://www.standards.doe.gov/standards-documents/1000/1073-astd-2016
- electronic Permit Authorization System (ePAS) Manual: https://www.jlab.org/esh-man/epas
- Emergency Management: https://www.jlab.org/esh/emergmgt
- Environmental Safety & Health Manual: https://www.jlab.org/eshq/ehsmanual
- JLab Integrated Safety Management System Program Description: https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-149177
- JLab Safety Assessment Document: https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-21395
- Logbooks: https://logbooks.jlab.org/logbooks
  - SRFLog: https://logbooks.jlab.org/book/srflog
  - SRFVTALog: https://logbooks.jlab.org/book/srfvtalog
- Movable shielding package data https://misportal.jlab.org/radcon/shielding/packages
- Operations Problem Reports (OPS-PRs): https://logbooks.jlab.org/content/web-based-pr-form
- Pansophy: https://pansophy.jlab.org/pansophy/

- PSS Configuration Management Procedure
https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-110171/PSS%20Config%20Mgmt%20Proc%201.pdf

- PSS and ODH System Certification Schedule:
https://jlabdoc.jlab.org/docushare/dsweb/View/Collection-10790

- Personnel Safety System Configuration Control Policy:
https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-110171/

- RCD-DEP-24 #001: Review of Radiation Production and Shielding Effectiveness at the Vertical Test Area:
https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-285815/final%20%20RCD-DEP-24%20_001%20%20Rev%20of%20Radiation%20Production%20&%20Shielding%20Effectiveness%20at%20the%20Vertical%20Test%20Area.pdf

- Safety Concern Form:
https://jlabdoc.jlab.org/docushare/dsweb/Services/Document-17393

- SRF Project Execution Program Description:
https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-261051

- SRF Project Execution:
https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-260685

- Testlab Areas Task List (TATL):
https://tasklists.jlab.org/tatl/tasks?statusCode=approved

- UITF Element Database (UED): https://ued.acc.jlab.org/

- Unreviewed Safety Issue (USI) Procedure:
https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-16644/USI%20Procedure.doc

- Web On-Call: http://opsweb.acc.jlab.org/CSUEApps/weboncall/WebOnCallMain.htm

Appendix B VOD Release Memo

General Description:

After each revision, the VOD is re-released under cover of the VOD Release Memo, which includes a brief change summary and a list of those receiving notification of the document.

These directives will remain in effect until superseded. Major reviews and updates occur approximately every two years by the VTA Facility Manager, MCC Documentation Coordinator, and the Director of Accelerator Operations.

Major revisions are noted by a whole number increase in the document's version number. Minor updates that occur before the next major review will be noted by a 0.1 increase in version number and will be announced on the OpsDocs website and via email with this memo attached. Updates for the purposes of correcting spelling or grammatical errors will not be announced, nor will they require a change in version number.

Following is the Release Memo for this version of the VOD.

Figure B-1: VOD Release Memo, p. 1

Jefferson Lab

MEMORANDUM

To: Distribution

AVR

From: Anthony Reilly, Head of SRF Operations Department

Subject: VTA Operations Directives (VOD), Rev. 1

Date: April 21, 2025

Announcing the initial version of the Vertical Test Area (VTA) Operations Directives. These directives define how the facility

- Approves, schedules, and authorizes activities.
- Operates safely, and within established limits
- Applies configuration management principles to establish and maintain consistency between the physical configuration of the facility and the tools used to operate it.
- Conduct operations of the facility, both in and out of the VTA Control Room.
- Staff the control room to support the various VTA operating states
- Respond to critical events
- Maintain necessary records for VTA Operation
- Repair and maintain hardware associated with the VTA.

These new VTA Operations Directives (VOD), dated April 21, 2025, remain in effect until superseded by a revised version and will be reviewed in approximately two years by the VTA Facility Manager and the MCC Documentation Coordinator. This is the initial version, or Revision 1. All requests for changes or corrections to these directives should be referred to the VTA Facility Manager, Justin Kent, who keeps a list of pending changes.

This document is available online. The on-line version is considered to be the master copy and supersedes any printed version when there is a difference.

Figure B-2: VOD Release Memo, p. 2

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