

To: D. Meekins, TJNAF

From: G. Staack, SRNL
J. Novajosky, SRTE
C. Clamp, SRTE
J. Schappell, SRTE

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**(U) FY16/17/18 TJNAF-SRTE Tritium Experiment Activity:
Revision 2 of FY15/16 TJNAF-SRTE Tritium Experiment Activity**

Statement of Work and Funding Estimates

The following is a revised Statement of Work (SOW) and Cost Estimate requested for FY16, FY17 and FY18 activities to be led and/or performed by SRNL (Savannah River National Laboratory) and SRTE (Savannah River Tritium Enterprise) at SRS (Savannah River Site), in collaboration with and in support of TJNAF (Thomas Jefferson National Accelerator Facility). The requested period-of-performance (POP) extends through 4/30/2018.

TJNAF will use a tritium filled target vessel in a fundamental physics experiment. SRTE will need to load and ship the vessel to TJNAF between 2 and 4 weeks prior to the experiment. The experiment (beam time) is expected to occur February 2017 – April 2017 and May 2017 – October 2017. It is expected that TJNAF will ship the used vessel to SRTE between 8 and 12 weeks after the experiment. It is expected that the SRTE will revise their Safety Basis to allow receipt and unloading of the tritium filled vessel in FY18. The SRTE scope essentially comprises the following (not necessarily in series):

- 1) Project Planning and Coordination
- 2) Task Technical Plan and Task Quality Assurance Plan for Tritium Loading
- 3) Consultation – TJNAF Tritium Handling (Includes Hut Design)
- 4) Loading of TJNAF Vessel with Tritium
- 5) Packaging and Shipping of TJNAF Vessel to TJNAF
- 6) Installation and Assembly Participation at TJNAF
- 7) Disassembly Participation at TJNAF
- 8) Safety Basis Input/Review
- 9) Task Technical Plan and Task Quality Assurance Plan for Tritium Unloading
- 10) Packaging and Shipping of TJNAF Vessel to SRTE
- 11) Unloading of Tritium and Disposal of TJNAF Vessel

Relevant scope/activity detail is provided throughout this document. The Principal Investigators (PI) are also listed. Additional details for each activity will be provided in the Task Technical

Plans (TTPs). Approved additions, deletions and modifications will be documented in subsequent revisions.

Revision 2

This is the second revision of the original statement of work. It includes the activities from the original statement as well as expanded or new activities:

- 1) Project Planning and Coordination
- 2) Task Technical and Quality Assurance Plans for Tritium Loading
- 3) Consultation – TJNAF Tritium Handling
- 4) Loading of TJNAF Vessel with Tritium
- 5) Packaging and Shipping to TJNAF
- 6) Installation and Assembly Participation
- 7) Safety Basis Input/Review for Tritium Unloading at SRTE
- 8) Disassembly Participation
- 9) Revise Task Technical and Quality Assurance Plans for Tritium Unloading
- 10) Packaging and Shipping to SRTE
- 11) Unloading and Disposal of TJNAF Vessel

In addition to the revised list of activities, the Period of Performance (POP) is extended to 4/30/2018. To complete the activities, additional funding of \$103.3K is estimated for FY17, and \$105.3K is estimated FY18. Any funds left over after completion of Inter-Entity Work Order Reference Number JSA 15-F-0296 between SRS and TJNAF to perform tritium testing of aluminum alloy samples may be applied to this IWO to defray costs.

Activity 1) Project Planning and Coordination

TJNAF PI	David Meekins
SRTE PI	Joseph Novajosky
SRNL PI	Greg Staack

SRNL and SRTE will schedule and track the 11 activities listed above pertaining to this IWO as well as budget.

Activity 2) Task Technical and Quality Assurance Plans for Tritium Loading

TJNAF PI	David Meekins
SRTE PI	Joseph Novajosky
SRNL PI	Greg Staack

SRNL and SRTE will produce a Task Technical Plan for TJNAF's input, review and approval. The TTP will detail tasks, responsibilities, schedule, requirements and specifications for the agreed scope. SRNL and SRTE will produce a Task Technical Quality Assurance Plan to define quality assurance requirements. The TQAP references dozens of internal SRS procedures; therefore the TQAP will be for SRS use only.

Activity 3) Consultation – TJNAF Tritium Handling

TJNAF PI David Meekins
SRTE PI Calvin Clamp
SRNL PI Greg Staack

SRTE and SRNL will assist TJNAF personnel with process definitions and reviews pertaining to tritium handling, monitoring, and decontamination equipment. TJNAF and SRTE personnel may present and discuss project technical details to a TJNAF team to assist with Facility Safety Basis review and approval. SRTE personnel may travel to TJNAF. In addition, SRTE will provide tritium enclosure or hut design consultation, per agreed specifications, to TJNAF for their safe handling of the tritium loaded vessel.

Activity 4) Loading of TJNAF Vessel with Tritium

TJNAF PI David Meekins
SRTE PI Calvin Clamp
SRNL PI Greg Staack

SRTE will develop procedures and provide any necessary hardware and/or instrumentation. Loading and shipping is scheduled for January, 2017.

TJNAF will provide to SRTE:

- load requirements and specifications
- vessel with loading valve
- ASME Code compliance documentation including pressure rating and pressure test data
- protective cover
- schedule requirements

SRTE will provide to TJNAF:

- facility acceptability/compatibility requirements
- schedule capability
- loaded vessel (packaged and shipped)
- documentation of load (pressure, composition)

Activity 5) Packaging and Shipping to TJNAF

TJNAF PI David Meekins
SRTE co-PIs Larry Hancock, Joseph Novajosky
SRNL PI Paul Blanton

SRTE will package and ship tritium loaded vessel. SRTE expertise will be applied. Development may be needed. Receipt of loaded vessel by TJNAF is expected around February 1, 2017.

Activity 6) Installation and Assembly Participation

TJNAF PI David Meekins
SRTE co-PIs Calvin Clamp, Joseph Novajosky
SRNL co-PIs Greg Staack, Paul Blanton

SRTE will assist TJNAF in the unpacking, handling and installation of the tritium loaded vessel. This activity is scheduled to occur in January or February 2017.. TJNAF is scheduled to operate the experiment between February 2017 – April 2017 and May 2017 – October 2017.

Activity 7) Safety Basis Input/Review for Tritium Unloading at SRTE

TJNAF PI David Meekins
SRTE PI John Schappell
SRNL PI Greg Staack

TJNAF and SRTE personnel will discuss project technical details with SRTE to ensure that the Tritium Facility Safety Basis is modified to allow SRTE to unload the slightly activated tritium loaded vessel.

Activity 8) Disassembly Participation

TJNAF PI David Meekins
SRTE co-PIs Calvin Clamp, Joseph Novajosky
SRNL co-PIs Greg Staack, Paul Blanton

SRTE will assist TJNAF in the safe removal or disassembly of the tritium loaded vessel from the experiment.

Activity 9) Revise Task Technical and Quality Assurance Plans for Tritium Unloading

TJNAF PI David Meekins
SRTE PI Joseph Novajosky
SRNL PI Greg Staack

SRNL will revise and approve the Task Technical Plan and Task Quality Assurance Plan as needed to allow for tritium unloading of the vessel. The TTP will detail tasks, responsibilities, schedule, requirements and specifications for the agreed scope. The TQAP will define Quality Assurance requirements.

Activity 10) Packaging and Shipping to SRTE

TJNAF PI David Meekins
SRTE co-PIs Larry Hancock, Joseph Novajosky
SRNL PI Paul Blanton

SRTE will assist TJNAF in the packaging and shipping of the used vessel back to SRTE.

TJNAF will provide to SRTE:

- used vessel (ready to be packaged and shipped)
- documentation of activation products (isotopes, radiation type, exposure values)
- estimated pressure inside vessel

SRTE will provide to TJNAF facility acceptability criteria.

Activity 11) Unloading and Disposal of TJNAF Vessel

TJNAF PI David Meekins
 SRTE PI Calvin Clamp
 SRNL PI Greg Staack

SRTE will develop procedures and provide any necessary hardware and/or instrumentation. TJNAF will package the vessel and ship to SRS once radiation exposure values meet SRTE acceptability criteria (see Activity 10). The anticipated decay delay between the end of the experiment and shipment is 2 months.

Note that possible material property evaluation of the post-test vessel requests will result in a scope change which will be addressed in a revised Statement of Work and ICO Request.

Proposed Schedule and Budget Tables

The tables below show proposed schedule and fully burdened costs for the listed scope split into FY17 and FY18 activities. Labor rates and overheads are subject to change at any time. Labor, materials and limited travel are included in the budget. Note that schedule changes will be addressed in a revised Statement of Work.

The total cost of the program according to the original statement of work was approximately \$88k. As a result of the modifications noted in this statement of work revision the new total cost estimate is \$296k split: ~\$88k previously allocated plus ~\$103k in FY17 and ~\$105k in FY18.

CY/FY	16/16			16/17			17/17			17/18			18/18										
Scope Schedule	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
1) Project Planning and Coordination		as needed									as needed											as needed	
2) Task Technical and Quality Assurance Plans for T ₂ Loading																							
3) Consultation – TJNAF T ₂ Handling						as needed					as needed												
4) Loading of TJNAF Vessel with T ₂			develop				load																
5) Packaging and Shipping to TJNAF			develop				ship																
6) Installation and Assembly Participation																							
Beam Time																							
7) Safety Basis Input/Review for T ₂ Unloading at SRTE					as needed						as needed												
8) Disassembly Participation																							
9) Revise Task Technical and Quality Assurance Plans for T ₂ Unloading																							
10) Packaging and Shipping to SRTE																					ship		
11) Unloading and Disposal of TJNAF Vessel									develop													unload	

	FY17	FY18
1) Project Planning and Coordination	\$ 36,971	\$ 30,735
2) Task Technical and Quality Assurance Plans for T2 Loading	Complete	Complete
3) Consultation – TJNAF T2 Handling	\$ 12,230	\$ 6,213
4) Loading of TJNAF Vessel with T2	\$ 9,547	\$ -
5) Packaging and Shipping to TJNAF	\$ 9,547	\$ -
6) Installation and Assembly Participation	\$ 15,919	\$ -
7) Safety Basis Input/Review for T2 Unloading at SRTE	\$ 12,978	\$ 20,165
8) Disassembly Participation	\$ -	\$ 16,117
9) Revise Task Technical and Quality Assurance Plans for T2 Unloading	\$ -	\$ 6,213
10) Packaging and Shipping to SRTE	\$ -	\$ 16,117
11) Unloading and Disposal of TJNAF Vessel	\$ 6,115	\$ 9,701
Total	\$ 103,307	\$ 105,261