



U.S. DEPARTMENT OF  
**ENERGY**



# Tritium Experiment Readiness Review

*charge items 6 and 7*

Radiation Budget Estimate and Safety Document

Presented by Douglas Higinbotham

# Hall A Safety Documentation

- Using Github to manage Hall A LaTeX Documentation:  
<https://github.com/JeffersonLab/halla-osp>
  - COO: Conduct of Operations
  - ESAD: Experimental Safety Assessment Document
  - Hall A Standard Equipment Documentation
- RSAD done in collaboration with Radcon
- ERG – Emergency Response Guidelines
  - word document with map from facilities with labeled safety equipment
- OSP's by system owners

# COO & ESAD

- Working forward from previously approved Hall A COO and ESAD documents (version control maintained with Github)
- Adding information about tritium and new training requirements COO & ESAD
- Adding information about students working in the Hall. This has been missing from experiment COO and added thanks to Ed Folts.

# Radiation Budget Estimate

Energy	GeV	2.2	2.2	2.2	2.2	2.2	
Current		20.0	20.0	20.0	20.0	20.0	
Element		Be	Be	Be	Be	Be	
Thickness	mg/cm2	36.0	36.0	36.0	36.0	36.0	
Element		Al	Al	Al	Al	C	
Thickness	mg/cm2	160.0	160.0	160.0	160.0	100.0	
Element		H	D	T	3He		
Thickness	mg/cm2	50.0	120.0	75.0	75.0		
Time	days	1.0	6.0	6.0	6.0	1.0	
estimated							
Dose Rate	urem/hr	0.3	0.0	1.1	1.1	0.1	
estimated							
dose/setup	urem	8.0	0.0	161.3	161.3	3.2	<b>333.8 urem total</b>

Energy	GeV	8.8	8.8	8.8	8.8	8.8	
Current		20.0	20.0	20.0	20.0	20.0	
Element		Be	Be	Be	Be	Be	
Thickness	mg/cm2	36.0	36.0	36.0	36.0	36.0	
Element		Al	Al	Al	Al	C	
Thickness	mg/cm2	160.0	160.0	160.0	160.0	100.0	
Element		H	D	T	3He		
Thickness	mg/cm2	50.0	120.0	75.0	75.0		
Time	days	1.0	1.0	10.0	10.0	1.0	
estimated							
Dose Rate	urem/hr	0.7	1.2	1.0	1.0	0.2	
estimated							
dose/setup	urem	16.0	28.8	240.0	240.0	4.2	<b>529.0 urem total</b>

Energy	GeV	4.4	4.4	4.4	4.4	4.4	
Current		20.0	20.0	20.0	20.0	20.0	
Element		Be	Be	Be	Be	Be	
Thickness	mg/cm2	36.0	36.0	36.0	36.0	36.0	
Element		Al	Al	Al	Al	C	
Thickness	mg/cm2	160.0	160.0	160.0	160.0	100.0	
Element		H	D	T	3He		
Thickness	mg/cm2	50.0	120.0	75.0	75.0		
Time	days	1.0	8.0	20.0	20.0	1.0	
estimated							
Dose Rate	urem/hr	0.7	1.2	1.0	1.0	0.2	
estimated							
dose/setup	urem	16.0	230.4	480.0	480.0	3.8	<b>1210.2 urem total</b>

Energy	GeV	11.0	11.0	11.0	11.0	11.0	
Current		20.0	20.0	20.0	20.0	20.0	
Element		Be	Be	Be	Be	Be	
Thickness	mg/cm2	36.0	36.0	36.0	36.0	36.0	
Element		Al	Al	Al	Al	C	
Thickness	mg/cm2	160.0	160.0	160.0	160.0	100.0	
Element		H	D	T	3He		
Thickness	mg/cm2	50.0	120.0	75.0	75.0		
Time	days	1.0	1.0	28.0	28.0	1.0	
estimated							
Dose Rate	urem/hr	0.7	1.2	1.0	1.0	0.2	
estimated							
dose/setup	urem	16.0	28.8	672.0	672.0	4.2	<b>1393.0 urem total</b>

Total Days: 152.0 days

Total Estimated Dose 3465.9 urem

The thickness single material in the beam is the Al walls of the target (160 mg/cm<sup>2</sup>)

Assuming 100% running, the maximum tritium runs could use is ~35% of annual dose budget.  
(nominal running efficiency is ~50% so likely dose will be < 18% )

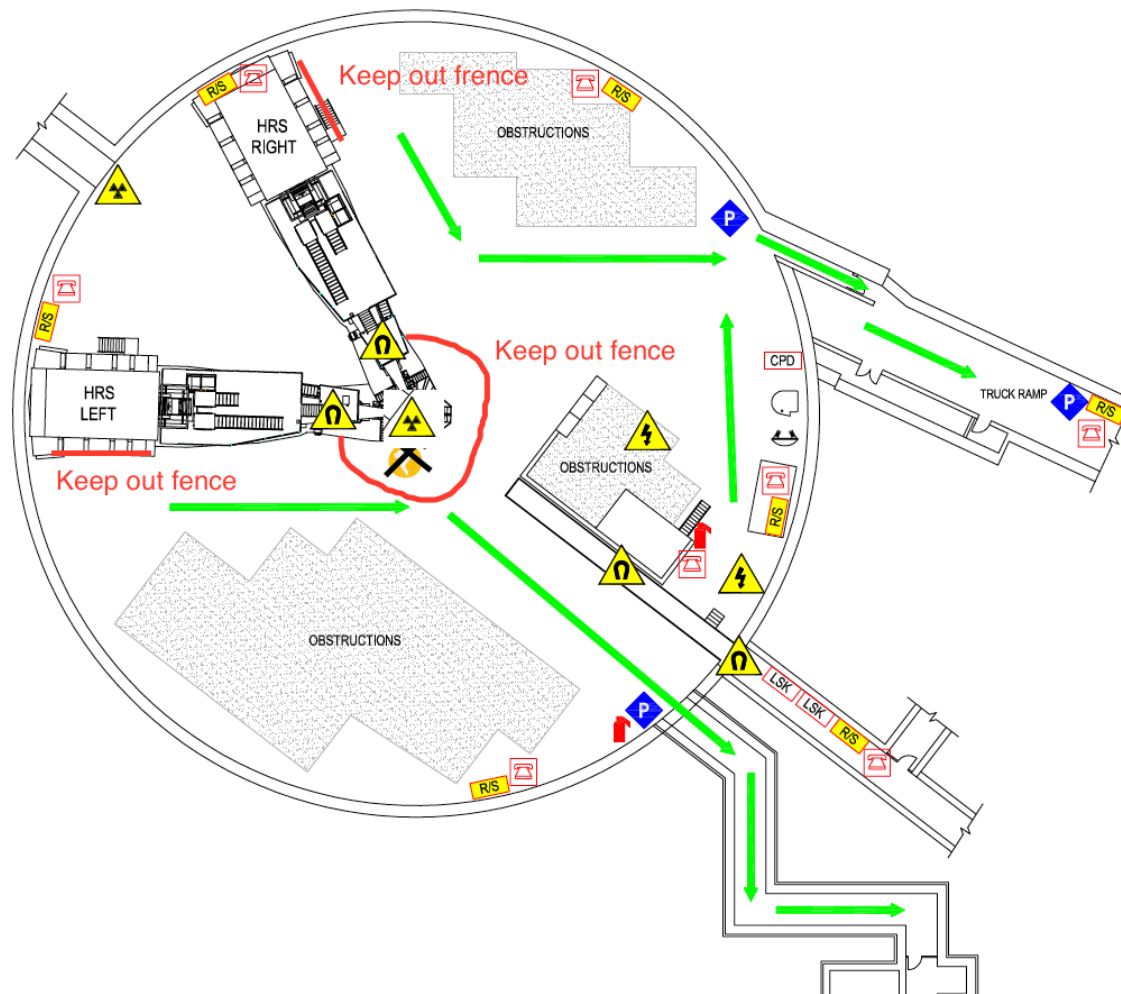
This is a lower luminosity experiment then the currently running DVCS experiments.



# Emergency Response Guideline

## DRAFT Hall A ERG Map For Tritium

**FOR HALL WORKER  
AWARENESS TRAINING ONLY**



EXPERIMENTAL HALL A  
BUILDING 101, FLOOR 1  
EMERGENCY PLAN

**IN CASE OF FIRE:**

- STAY CALM
- WALK, DO NOT RUN
- ACTIVATE NEAREST PULL BOX, FOLLOW ARROWS IN DIAGRAM, & MEET AT MUSTER POINT

**IN CASE OF SEVERE WIND:**

IF A TORNADO WARNING IS ISSUED BY THE NATIONAL WEATHER SERVICE, AND JLAB IS WITHIN THE WARNING AREA, MOVE QUICKLY TO ONE OF THE DESIGNATED SEVERE WIND "TAKE COVER" AREAS.

**LEGEND**

- ➔ EGRESS PATH
- 🔥 FIRE EXTINGUISHER
- 🚒 FIRE ALARM PULL STATION
- ☄ SEVERE WIND "TAKE COVER" AREA
- 🚪 MUSTER POINT
- ☎ TELEPHONE
- 🚪 R/S RUN/SAFE BOX
- 🚪 CPD CRANE POWER DISCONNECT
- 🚪 LSK LASER KILL BUTTON
- ⚠ MAGNETIC FIELD
- ⚡ ELECTRONICS / POWER
- 🚰 EYE WASH
- ↻

# Tritium Operational Safety Procedures

- Details of tritium target will be covered in the version controlled tritium target Operation Safety Procedure.
- Everyone working in Hall A will be required to review this OSP and take Tritium I training.
- CANS system will be used to ensure people have been trained (*Note: historically Hall A used the CANS system to control the hall during laser work*)
- Following the example of Radworker I vs. Radworker II, a Tritium II training will be used to train workers who will need to work with and/or near the tritium target.

# Summary & To Do List

- Draft COO and ESAD Circulating
  - Added Tritium Information & Training Requirements
  - Added Information about students in the hall from Ed Folts
- Working on updating ERG
  - Updating Map with Tritium Target & Fences
  - Adding Information about Tritium Alarms & Contacts
- Working with Radcon to finalize RSAD documentation
- New OSP Document & New Training In Progress
  - Tritium Target Operational Safety Procedure
  - Tritium I (general) and Tritium II (specialized) training