#### Isotope Production Run Plan

Revision Number: 1

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Estimated Time to Perform: 2 Days

Document filename: Isotope Beamline Run plan

Procedure Overview

Once the target beamline is commissioned and shown to be able to run 5 kW of beam power to the graphite surrogate isotope target at 32 MeV, we can do an extended run with a gallium target to produce isotopes.

Hazards

1. Radiation activation of the target.
2. Pinch hazards of the target removal system.

Prerequisites

1. The Isotope Beamline recommissioning plan must be carried out successfully.
2. Target system installed and operational with a tungsten radiator, and gallium target in a graphite crucible.
3. ERR must have occurred and all action items must have been addressed.
4. Beam authorization for 5 kw of CW beam at 32 MeV must be given by the head of acceleration operations.

Tune beam tests

# Recover setup to 1X dump

* 1. Restore the settings from the 1X commissioning run at 32 MeV and 156 µA current and cycle all magnets.
  2. Turn on tune beam and adjust the drive laser and cavity 3 phase and laser power to get 156 µA macropulse current and the correct spots on ITV0F04 and ITV0F06 as recorded from the commissioning run.
  3. Verify that the beam is centered in the injector cryounit, the 0F, 1F, and 2F quadrupoles, and the ITV0F01 viewer.
  4. Verify that the zone 2 cavities are properly crested using the 1X01 viewer.
  5. Use the zone 2 gradients to set the beam energy to reproduce the IPM1X01 and ITV1X01 positions from the commissioning run.

# Verify CW operation

* 1. Verify that the beam loss is negligible on all BLMs when their voltages are set to at least -1000 V. If necessary, use small changes in the laser buncher gang phase or the 0F quads to reduce losses.
  2. Set up strip charts of the vacuum levels, target temperatures, and beam current in the gun and current cavity. Make sure that they are all being logged as well.
  3. Unmask all BLMs, withdraw all viewers and ramp up the duty cycle until CW beam is achieved with 156 microamps of beam as indicated on the injector current cavity (560 mV). Mark the time and current.
  4. Monitor the vacuum levels near the 1X beamline. Verify that they do not rise more than a factor of ten.
  5. Allsave this configuration “Isotope production at 5 kW 32 MeV – mm-dd-yyyy”.

# Perform Isotope Irradiation

* 1. While monitoring the vacuum levels and beam current, continue to run CW beam to the target. Reset RF , BLM, and magnet faults as they occur. If they cannot be reset, go back to tune beam and verify the phases and look for magnet alarms.
  2. When 34 hours has elapsed, shut the beam down and Allsave the machine parameters. Log the time that the beam was shut off.
  3. Perform a weekend shutdown but do not drop the vault to restricted access. All personnel entering the vault must be accompanied by Radcon personnel.
  4. When >58 hours has elapsed after the beam shut-off, Radcon can go in and measure the radiation levels around the target.
  5. Conduct a gamma spectrogram on the sample. This will initiall be done on a table in the vault using a portable spectrometer.



Figure 1: Expected timeline for the irradiation. Note that the time scale is not linear.

* 1. After approximately 2 weeks, Radcon will withdraw the target and quickly transfer the crucible to the lead pig. They will then transfer the crucible to the RadCon lab. They will also put about 1 gm of gallium in a coincidence detection setup to better measure 67Cu levels.
  2. Close up the shielding and post the area if necessary.

# Backout procedure

* 1. Restore the settings from the last allsave that reached the 1X dump.
  2. Perform a weekend shut-down procedure.

# Task complete.