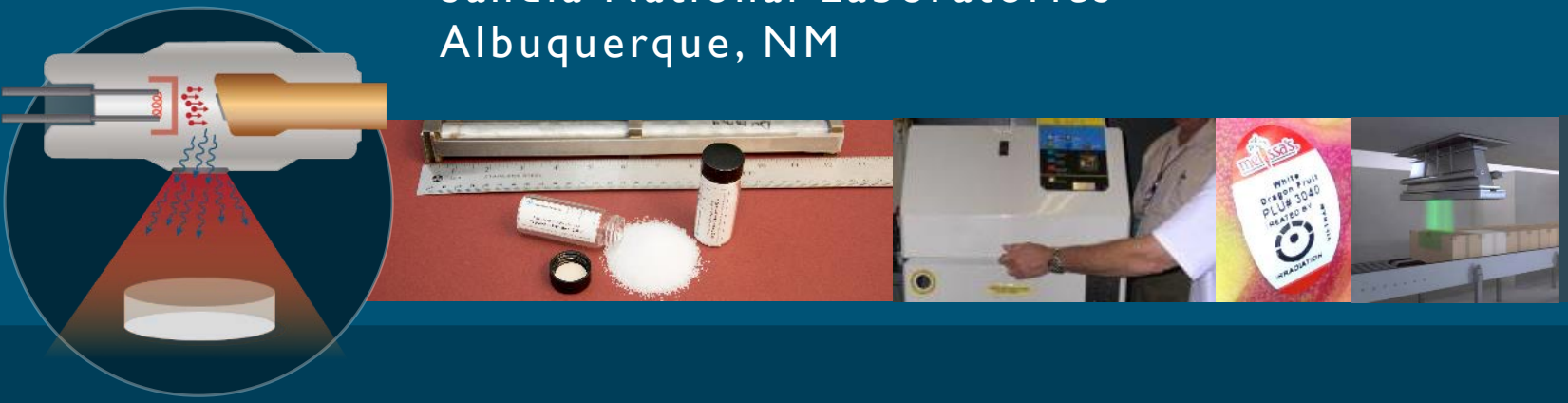
Sandia National Laboratories

# Cesium Irradiator Replacement Project – A Case Study

## *NAS Albuquerque Meeting*

Jodi LIEBERMAN & Michael ITAMURA
Sandia National Laboratories
Albuquerque, NM



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# Role of Sandia

Sandia National Laboratories is one of U.S. Department of Energy's National Nuclear Security Administration national laboratories

Over 12,000 employees, mostly in Albuquerque, New Mexico and Livermore, California

**Goal of NNSA's Office of Radiological Security (ORS)**: Enhance global security by preventing high-activity radioactive materials from being used in acts of terrorism.

- **SNL Supports the ORS <u>Protect</u> Mission:** by installing security systems at sites, in the U.S. and internationally, that use high-activity radiological sources
- **SNL also Supports the ORS <u>Reduce</u> Mission:** by incentivizing sites to replace high-activity radioactive sources with alternative (non-radioisotopic) technologies

# Cesium Irradiator Replacement Project to Date

Begun in 2014

**Voluntary initiative** offering financial incentives to U.S. licensees who choose to replace Cs-137 self-shielded irradiators with alternative technologies

Progress to date: 150 irradiators replaced; more than 35% of U.S. inventory

Sites must contract with Sandia prior to placing X-ray replacement order

**Sites Receive:**

- A financial incentive toward the purchase price of an X-ray machine (typically 50% of device purchase price), paid as a reimbursement
  - Incentive paid after X-ray irradiator commissioned and old irradiator removed
- Removal of radioisotopic device through the Off-Site Source Recovery Program(OSRP)

# Considerations for Replacement of Cs-137 Irradiator

- Cost of Replacement Irradiator
- Facility & Maintenance Needs
- Device Preference & Training Needs
- Research or Clinical Standards
- Operational Protocols
- Technical Performance
- Schedule Requirements
- Government and Industry Approvals, Licensing, or Accreditations

# Site Motivations to Participate in CIRP

- Incentive payment
- CIRP removals are prioritized over non-CIRP removals and conducted free of charge to site (outside of any modifications that are needed to be able to have the device removed)
- Security requirements no longer needed
- Potential liabilities due to accident or security incident with source removed
- Under the Protect program, maintenance and warranty are paid for a duration of 3 years
  - Once that 3 year period is over, instead of bearing the costs associated with maintaining the security equipment, many sites opt to replace their Cs irradiators with x-ray.

# Christus Spohn Hospital Corpus Christi Shoreline – A CIRP Case Study

Hospital located in Corpus Christi, Texas

Provided Sandia with a "Disposition Statement" – a nonbinding commitment to participate in CIRP, replace its current irradiator with an X-ray irradiator and not procure a new Cs-137 irradiator

Contracted with Sandia on February 18, 2019 to replace its Cs-137 based CIS/Pharmalucence IBL 437c-H blood irradiator.

- Site selected replacement device – Rad Source RS 3400
  - Provided quote to Sandia in response to RFQ
- Rad Source RS 3400 in use since August 2019
- IBL removed from the site the on February 27, 2020 via OSRP

Removal Day

# CIRP Time Line for Christus Spohn Hospital

## Kickoff

**9/26/18**
Radiological Security Sustainability Visit

## Year 1

**1/29/19**
Final Disposition Statement sent to NNSA & SOW by SNL

**2/12/19**
Registered Sealed Source through OSRP

**2/15/19**
INL Contacted with Recover Date Scheduled for April 2020

**2/18/19**
X-Ray Replacement Contract Awarded by Sandia

**4/15/19**
Contract Deliverable Initial Report

**7/22/19**
RS 3400 X-Ray Delivered

**8/21/19**
RS 3400 X-Ray Validation Complete and Acceptable for Patient Testing

## Year 2

**1/14/20**
INL Contact with Removal Date of 02/27/20

**2/05/20**
First Hospital Key Stakeholder Meeting

**2/18/20**
Second Hospital Key Stakeholder meeting

**2/25/20**
Third Hospital Key Stakeholder Meeting

**2/27/20**
Removal of Irradiator by OSRP

| Instrument Comparison | Cesium Irradiator IBL 437 | X-Ray Irradiator RS 3400 |
|---|---|---|
| Prevention of TA-GVHD | ✓ | ✓ |
| Terrorist Ability to Use Isotopes | ✓ | X |
| Annual Security Cost | $50,000 | X |
| Radioactive Isotopic Device | ✓ | X |
| Repair of Irradiator Time Frame | Weeks | Days |
| Source Material/Decay | CS-137 / YES | X-Ray Tubes / NO |
| Annual Maintenance | $8,000 | $5,000 |
| Decommissioning Cost | $200,000 | $0 |
| Beam Type (Field Geometry) | Horizontal | Vertical |
| Energy Distribution | Grater | Lower (impacts dose more) |
| Exposure Field | Larger | Smaller |
| Better Partial/Focal Dosing | X | ✓ |
| Quarterly Leak Test | ✓ | X |
| Survey Meter Calibration | ✓ | X |
| Monitoring of Radiation Exposure | ✓ | X |
| Controlled User Access | ✓ | X |
| Impact for Natural Disaster | ✓ | X |
| Background Checks/Fingerprints | ✓ | X |
| FDA Registration | ✓ | ✓ |
| Sealed Source Licensing | ✓ | X |
| Liability Risk | ✓ | X |
| Time Required to Irradiate | Longer | Shorter |

Credit: Christus Spohn Hospital

# Christus Spohn Cost Benefit Analysis

**RESULTS:**

Facility expects a financial savings by transitioning to the X-ray irradiator with a payback ratio of 2.6 years

Facility was able to use the financial incentives of a zero-decommissioning cost via OSRP and a 50% reimbursement for the cost of the RS 3400 X-ray irradiator

Following commissioning of the RS 3400 irradiator in August 2019, projected time frame savings will be August of 2022.

**CONCLUSION:**

- Volunteer enrollment into the CIRP program is a financial benefit
- Prevention of TA-GVHD is a primary goal in transfusion service
- Significant reduction in security monitoring
- Avoidance of the impact of natural disaster
- X-ray irradiators are **cost effective** compared to the cesium irradiator

# Overall CIRP Observations

First come, first served funding availability incentivizes sites to make decision more quickly and to secure capital expenditure approval from site management.

Sites are very enthusiastic about participation in CIRP and, in particular, the ability to have their Cs/Co irradiators removed without cost to them.

Close coordination with the ORS Protect team to identify CIRP opportunities is very helpful.

Ease of use, increased throughput and decreased irradiation time are key selling points for x -ray

Streamlined process flow for blood processing and shipment

Convincing researchers to switch modalities can be a bit more difficult, particularly mid-research project

# Contact Information

**Sandia Reduce Program Contacts**
**Jodi Lieberman**
+1 (505) 844-4389
jbliebe@sandia.gov

**Michael Itamura**
+1 (505) 284-4815
mtitamu@sandia.gov

**ORS Reduce Program Contacts**
**Lance Garrison**
+1 (202) 586-7449
lance.garrison@nnsa.doe.gov

**Malika Taalbi**
+1 (202) 586-1130
malika.taalbi@nnsa.doe.gov