From NRC Website

http://www.nrc.gov/materials/miau/med-use-toolkit/seed-localization.html

Iodine-125 and Palladium-103 Low Dose Rate Brachytherapy Seeds Used for Localization of Non-Palpable Lesions

On this page:

Purpose

The purpose of radioactive seed localization (RSL) of non-palpable lesions[1] is to localize suspicious tissues for excision with the use of radioactive seeds. RSL differs from current localization procedures, whereby a non-radioactive wire is implanted into the lesion site and excised along with the affected tissue. The RSL technique offers advantages over the wire implantation technique for localizing lesions. For example, with the use of RSL, the bracketing of lesions and the post-localization of mammograms is not impeded by wires, and RSL can be performed up to 5 days before surgery, minimizing schedule conflicts.

RSL uses radioactive seeds previously approved for the treatment of cancerous tumors. For instance, typically, iodine-125 and palladium-103 seeds[2] between 200 – 300 μCi/seed are implanted into a breast lesion using a standard 18-gauge needle. These seeds are normally implanted within mammography or ultrasound suites and removed within surgical suites between 2 and 5 days post implantation. The radioactive seed(s) can be easily located with appropriate instrumentation (using a technique with which surgeons are familiar because of its similarity to sentinel lymph node biopsy and radioguided

parathyroidectomy) and surgically removed with minimal injury to non-affected tissue. The seed(s) may be removed from the tissue specimen in surgery, or the tissue specimen containing the seed(s) can be sent to pathology for removal of the seed and analysis of the tissue. The seed or seeds are then disposed of in accordance with 10 CFR 35.92 or the equivalent Agreement State regulations.

[1]An area of suspicious tissue detected by mammography that needs further evaluation.
[2]Multiple seeds may be used to define irregularly shaped lesions.

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Licensing Guidance

The use of these iodine-125 and palladium-103 seeds for therapy is currently regulated under 10 CFR 35.400: "Use of sources for manual brachytherapy" and the equivalent Agreement State regulations. In the RSL procedure, the iodine-125 or palladium-103 seeds are implanted for localization by an authorized user and are not intended to deliver a therapeutic dose to tissue. Therefore, this application is not regulated under 10 CFR 35.400 or the equivalent Agreement State regulation. The use of these seeds for RSL procedures will be regulated under 10 CFR 35.1000: "Other medical uses" and the equivalent Agreement State regulations.

This guidance is intended to address situations where the physical locations of implant, excision, and recovery of these seed(s) are all authorized by the same radioactive materials license.

If the licensee intends to transfer the radioactive tissue samples, i.e., the tissues will still contain the seed(s), or more than 1 microcurie of iodine-125 or 100 microcuries of palladium-103 contamination from a leaking source, to an outside pathology laboratory, the licensee must ensure before shipment that the samples will be transferred to an NRC or Agreement State licensed laboratory authorized to receive the seeds or radioactive contaminated tissue (10 CFR 30.41). The applicant must also ensure that packages will be properly prepared in accordance with 10 CFR 71.5 or an equivalent Agreement State regulation for shipping.

This guidance represents an acceptable means to the NRC and Agreement State staff of complying with regulations to apply for RSL and is not intended to be the only means of satisfying requirements for a license. Therefore, to meet the requirements of 10 CFR 30.33 and 10 CFR 35.12 or the equivalent Agreement State regulations, the applicant must provide the information requested below or may, unless the information is specifically required by regulation, submit alternative commitments for review by the NRC or Agreement State staff to determine whether they meet regulatory requirements. In addition, the commitments contained therein will be reviewed during routine inspections.

Applicants are reminded that licenses issued pursuant to 10 CFR 35.1000 or the equivalent Agreement State regulation, must still meet the general requirements in 10 CFR Part 35 or the equivalent Agreement State regulations (e.g., applicable section of Subparts A, B, C, L, and M). For example, 10 CFR 35.67, or the equivalent Agreement State regulation, contains requirements for leak testing sealed sources, 10 CFR 35.75, or the equivalent Agreement State regulation, contains provisions for release of patients containing implants, and 10 CFR 35.3045, or the equivalent Agreement State regulation, contains requirements for reporting medical events.

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General

Radionuclides, Form, Possession Limits, and Purpose of Use:

Identify the radionuclides, chemical/physical form, maximum possession limit, and purpose of use. For example, the following provides the format for an acceptable request:

Radionuclides, Form, Possession Limits

Authorization 6: Iodine-125 or Palladium-103
Authorization 7: Sealed sources (manufacturer and model number)
Authorization 8: 1.5 millicuries maximum per treatment and 15 millicuries total;

Purpose of Use

Authorization 9: For use as temporary implants to localize non-palpable lesions.

Facility Address and Description:

Provide an address of use and submit a facility diagram and description of the location where the radioactive sources will be received, used, and stored.

If the tissues sent to pathology will still contain the seed(s), or more than 1 microcurie of iodine-125 or 100 microcuries of palladium-103 contamination from a leaking source, the licensee should be aware that pathology is a location where radioactive sources will be received, used, and stored and therefore must be identified as a location of use in the application.

Authorized Users:

Identify each authorized user performing seed implants and explants and provide documention of their training and experience in the use of the iodine-125 or palladium-103 seeds for the RSL procedure. NRC Form 313A, "Medical Use Training and Experience and Preceptor Attestation," or other formats may be used to document this

training and experience. The authorized user should be considered qualified for implementation, localization and removal of the seeds if the individual is listed on a license (NRC or Agreement State) and meets the criteria in:

10 CFR 35.490 or the equivalent Agreement State regulations; or

10 CFR 35.290 , including supervised work experience under the supervision of a 10 CFR 35.490 authorized user and preceptor. Training and supervised work experience should include the following:

- Work experience which includes at least 3 cases, wherein the authorized user ordered, received, and unpacked radioactive material safely;
- Work experience that includes performing the related radiation surveys using the appropriate instrumentation;
- Work experience that includes preparing, implanting, and removing RSL sources safely, to include the use of remote handling tools to manipulate seeds and the proper use of shields;
- Work experience that includes routine monitoring before, during, and after all uses of the seeds to ensure rapid identification and remediation of a broken or leaking source;
- Work experience that includes using emergency procedures, such as procedures regarding broken or leaking seeds;
- Work experience that includes reviewing and understanding the administrative controls in place to prevent a medical event; and
- Work experience in maintaining running inventories of radioactive material on hand.

General surgeons, working under the supervision of an authorized user described above, who locate and remove the tissue containing the seed(s) should complete radiation safety training that includes:

- Performing the related radiation surveys using appropriate instrumentation;
- Preparing, implanting, and safety removing brachytherapy sources;
- Performing routine monitoring before, during, and after all uses of the seeds to ensure rapid identification and remediation of a broken or leaking source; and
- Emergency procedures, including how to respond to a leaking source.

This training should be provided by the authorized user described above or the Radiation Safety Officer, as applicable.

Pathology personnel handling specimens containing radioactive material should be instructed in the radiation safety aspects of safely handling the seeds. Radiation safety training should include:

- Minimizing time handling the specimen;

- Using an appropriate survey instrument to perform surveys of hands and work areas following handling of the specimen;
- Routine monitoring before, during, and after all uses of the seeds to ensure rapid identification and remediation of a broken or leaking source.
- Emergency procedures to be followed in the event contamination is identified;
- Accountability, security or the seeds post-implantation; and
- Proper disposal of the seeds and/or specimens containing the seed(s).

Written Directives:

The sources used for this procedure are brachytherapy sources that can deliver a therapeutic dose and a written directive is required. The written directive must meet the requirements in 10 CFR 35.40 (a) and (b)(6) or equivalent Agreement State requirements where the licensee may specify exposure time for the temporary implant.

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Safety Precautions and Instructions for Iodine-125 and Palladium-103 Seed Localization for Non-Palpable Lesions

Provide the following written procedures that describe your radiation safety program for all departments involved in the RSL procedure, including the surgery and the pathology laboratory:

- Written procedures for routine monitoring before, during, and after all uses of the seeds to ensure rapid identification and remediation of a broken or leaking source; and
- Written emergency procedures for responding to an abnormal situation to include: (i) instructions for responding to a source rupture (e.g. cut by a scalpel) during surgical removal to include procedures for retrieval of leaking/cut sources, contamination control, decontamination of the patient and area from a ruptured source and saturation of the patient's thyroid with stable iodine in the case of an I-125 source rupture; (ii) instructions to pathology personnel for responding to a leaking/cut source and decontamination of personnel and area; (iii) the process for restricting access to and posting of the implantation/explantation/pathology area in the event of an unaccounted for or ruptured source to minimize the risk of inadvertent exposure from seeds; (iv) patient follow-up should they not return for explantation, including a commitment to make multiple attempts at contacting the patient and to perform a dose assessment; and (v) names and telephone numbers of the authorized users and the Radiation Safety Officer to be contacted; and

Commit to the following actions for all departments involved in the RSL procedure, including the surgery and the pathology laboratory:

- Emergency response equipment will be available near each surgery suite and pathology laboratory during specimen handling;
- The activity of sealed sources will be verified prior to each patient implant using an instrument calibrated in accordance with nationally recognized standards or the manufacturer's instructions and retain a record that includes: (i) the radioisotope; (ii) the patient's name or identification number; (iii) the measured activity; and (iv) the name of the individual who measured the activity;
- Procedures will be conducted under the supervision of the authorized user, who should consult with the surgeon prior to implanting the sources;
- Surveys will be performed and records will be maintained as described in 10 CFR 35.404 or equivalent Agreement State requirements;
- All sources will be accounted for and all records maintain as described in 10 CFR 35.406 or equivalent Agreement State requirements;
- Procedures will be developed, implemented, and maintained for source accountability from implantation to explantation and final disposal;
- Written waste disposal procedures will be developed, implemented, and maintained for licensed material in accordance with 10 CFR 20.1101, or the equivalent Agreement State regulation, that meet the requirements of the applicable section of Subpart K to 10 CFR 20 and 10 CFR 35.92, or the equivalent Agreement State regulations;
- Patients will be instructed in writing before implantation and agree in writing to return for removal of the radioactive seeds;
- Training will be provided at least annually and covering the topics described in 10 CFR 35.410 and records described in 10 CFR 35.410 or equivalent Agreement State requirements will be maintained; and
- All personnel involved with the RSL procedure, including the Radiation Safety Officer, will be trained on routine monitoring and emergency procedures.

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Notes to Licensees

Survey Instrumentation

Licensees must have adequate equipment and provide information on equipment calibration. The licensee should possess and use a properly calibrated radiation survey instrument. The survey instrument should be a portable survey instrument which is equipped with a thin crystal sodium iodide (NaI) probe when performing surveys for RSL procedures involving iodine-125 and palladium-103. A NaI probe is the most appropriate instrumentation because they are both very low energy gamma emitters and thus are very difficult to detect using a conventional survey instrument. Applicants must submit a description of the survey instrumentation and calibration for the instruments they will use.

Emergency Response Equipment

Licensees must submit information showing it has equipment adequate to protect public health and safety and minimize danger. In order to demonstrate this, it should submit a description of the equipment to be used in the case of an emergency such as loss or rupture of a seed. This equipment should include gloves, reverse action tweezers, shielded containers, a low energy gamma scintillation survey instrument, and caution radioactive materials (CRAM) labels.

Change in Physical Conditions of Use

Because the conditions of use exceed those reported in the Sealed Source and Device (SSD) certificate due to the sources not having been tested for puncture, the limited specific medical use licensee must request an amendment for the new conditions of use.

Note that certain states will not allow variations in the conditions of use unless the original SSD certificate is amended or a custom evaluation is performed. NUREG 1556, Vol. 3, rev. 1, "Consolidated Guidance About Materials Licenses: Applications for Sealed Source and Device Evaluation and Registration" or equivalent Agreement State guidance documents may be used for custom evaluations. A broad scope licensee can perform its own engineering and radiation safety evaluation addressing those differences.

Licensees should submit documentation that addresses the safe use of the source in the normal and emergency conditions associated with this 10 CFR 35.1000, or equivalent Agreement State regulations, use. This documentation for Agreement States may be, but is not limited to, an engineering, historical, or scientific analysis of the surgical removal of these sources. NRC will review the licensee's procedures for routine monitoring before, during, and after all source uses and the licensee's emergency procedures to determine if they are adequate to ensure rapid identification and remediation of broken or leaking sources.

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Suggested Revisions to Existing Iodine-125 and Palladium-103 Seed Localization Programs to Conform to this Licensing Guidance

(Note: Requesting authorization in accordance with the following guidance will permit a licensee to make certain changes under 10 CFR 35.26, "Radiation protection program changes," or equivalent Agreement State regulations, to the RSL safety program that might otherwise require a license amendment).

The above licensing guidance may be revised as additional experience is gained regarding medical use of RSL. A licensee already authorized to use iodine-125 and/or palladium-103 seeds for RSL and committed by license condition to follow the provisions in the guidance existing at the time of commitment must apply for and receive

an amendment to its license in order to make changes to conform to the revised provisions.

An applicant initially applying for authorization for medical use of RSL (or a licensee applying later for an amendment to conform to revisions in this guidance) may request authorization to allow future changes to its radiation safety program, provided the following conditions are met:

- The revision is in compliance with the regulations of the NRC or Agreement State;
- The revision is based on the current guidance for RSL 35.1000 use posted on the NRC website;
- The revision has been reviewed and approved by the licensee's Radiation Safety Officer and management;
- The affected individuals are instructed on the revised program before the change is implemented;
- The licensee will retain a record of each change for 5 years; and
- The record will include a copy of the appropriate website guidance, the old procedure, the new procedure, the effective date of the change, and the signature of the licensee management that reviewed and approved the change.

If this authorization is approved, these conditions will be incorporated as license conditions in the licensee's license.

The above guidance for changes to conform to the revised provisions does not prevent Agreement States from requiring the licensee request an amendment for each change to its radiation safety program if that is their policy.

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Procedures

Because the iodine and palladium seeds are temporarily implanted, the applicant may simplify its submission by confirming that it will:

Meet the requirements for temporary implants and develop, implement, and maintain the appropriate procedures in the following regulations: 10 CFR 35.40(a),(b)(6), (c), and (d), 35.41, 35.67, 35.75, 35.310, 35.404, 35.406, 35.410, 35.432, or the equivalent Agreement State regulations.

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Records

Because the iodine and palladium seeds are temporarily implanted, the applicant may simplify its submission by confirming that it will maintain records for seed localization in accordance with the requirements for temporary implants to include the following, or the equivalent Agreement State regulations:

10 CFR 35.2024	Records of authority and responsibilities for radiation protection programs;
10 CFR 35.2026	Records of radiation protection program changes;
10 CFR 35.2041	Records for procedures for administrations requiring a written directive;
10 CFR 35.2060	Records of calibrations of instruments used to measure the activity of unsealed byproduct materials;
10 CFR 35.2067	Records of leak tests and inventory of sealed sources and brachytherapy sources;
10 CFR 35.2075	Records of the release of individuals containing unsealed byproduct materials or implants containing byproduct material;
10 CFR 35.2310	Records of safety instruction;
10 CFR 35.2404	Records of surveys after source implant and removal;
10 CFR 35.2406	Records of brachytherapy source accountability;
10 CFR 35.2432	Records of calibration measurements of brachytherapy sources.

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Reports

The licensee must report any medical event, except for those that result from patient intervention, in accordance with 10 CFR 35, Subpart M, or the equivalent Agreement State regulation, to include:

10 CFR 35.3045	Report and notification of a medical event;
10 CFR 35.3047	Report and notification of a dose to an embryo/fetus or a nursing child;
10 CFR 35.3067	Report of a leaking source.

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