

FAQ's: Smoke Alarms/Detectors and CuriePackSM

Q. What's the difference between a smoke alarm and a smoke detector?

A. Most homes have what we now call "smoke alarms." These units detect the presence of smoke and sound the alarm. Many properties, particularly non-home properties, some multi-family complexes, and newer single-family homes, have smoke detectors that are components of an alarm system with a panel. The detection unit itself does not sound the alarm. Instead, when smoke is detected a signal is transmitted from the smoke detector to the control unit that then sounds the alarm throughout the premises. The term "alarm" is used interchangeably for the two by Curie Environmental Services (Curie Services).

Q. How many types of smoke alarms are there?

A. Three; that utilize two different technologies. Most home smoke alarms use either ionization, photoelectric, or a combination of both sensing systems to detect a fire.

Ionizationtype smoke alarms have a small amount of radioactive material – Americium 241 (Am-241) - between two electrically charged plates which ionize the air and cause current to flow between the plates. When smoke enters the chamber, it disrupts the flow of ions, reducing the flow of current and activating the alarm.

Photoelectrictype smoke alarms aim a light source into a sensing chamber at an angle away from the sensor. Smoke enters the chamber, reflecting light onto the light sensor and triggering the alarm.

Photoelectric alarms respond slightly faster to smoldering fires. Ionization alarms respond slightly faster to flaming fires.

Q. Which type is most popular?

A. Ionization alarms are less expensive and because of this, are the most widely used. It is estimated that 87% of all smoke alarms are the ionizing type. You can look at the back of your smoke alarm to determine which type you have.

Q. How often should smoke alarms be replaced?

A. The National Fire Protection Association (NFPA) recommends

consumers **replace all smoke alarms**, including alarms that use 10-year batteries and hard-wired alarms, **when they are 10 years old or sooner if they do not respond properly when tested.** Further, NFPA recommends **when you move into a new home, if you do not know the age of the alarms – it is best to replace them and start fresh.**

Q. Why recycle smoke alarms?

A. Smoke alarms are one of the most widely used consumer products. It is estimated that **96% of all homes** have at least one smoke alarm. This has been true since 2005. Most homes have more than one – with many reporting three or more.

Collectively, as smoke alarms are replaced, the result is a staggering amount of radioactive waste entering the solid waste stream in America's landfills. Solid waste facilities are not designed to manage radioactive waste and hazardous wastes. The integrity of the Am-241 foil can be significantly compromised during solid waste collection and processing. It is when the radioactive material is crushed and compromised that exposure concerns become very real.

The second concern is the printed circuit boards. **Printed circuit boards routinely fail toxicity tests for lead** and therefore are regulated by many states via Universal waste/Electronic waste regulations. Not all states regulate home owner generated waste like commercially generated waste, but some do. California is one of those states. California regulates smoke alarms as an electronic device and they simply cannot be thrown in the trash by homeowners.

Consumer chemical, biological, and electronic waste is widely recognized as a threat to the environment and is collected at community Household Hazardous Waste (HHW) collection events and freestanding collection facilities. However, to date, radioactive items are very seldom accepted due to perceived complexity and cost. Curie has developed a cost effective recycling program to assist HHW programs, consumers and industry to ensure these environmentally sensitive devices can be properly managed.

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Q. I've heard that the amount of radioactivity is small and insignificant in smoke alarms. Are they really a radiation safety hazard?

A. They can be. Let's explore. The amount of Am-241 in typical smoke alarm ranges from 0.5 microcuries to 80 microcuries in older models. **If this activity were not specifically exempted due to being inside a smoke alarm, the radioactive material would otherwise be subject to licensing and regulation by the Nuclear Regulatory Commission (NRC) or NRC agreement states!** Am-241 is regulated at > .05 microcuries. That's 20 times lower than a typical modern 1 microcurie smoke alarm.

Am-241 is a long half life (432 years) and radiotoxic isotope due to the alpha radiation it emits. (Alpha emitters are the most dangerous if ingested.) Low energy gamma radiation is also emitted which contributes to the external dose rate. While the external dose rate for most Am-241 smoke alarms (as for most other primarily alpha emitters) is low, the primary hazard is from ingestion and uptake. (In the 1960's and 70's, Radium 226 (Ra-226) was also used. Ra-226 has a half life of 1600 years.) Older model smoke alarms with higher activities can contribute a moderate to significant dose rate.

The NRC has determined the benefits of smoke alarms manufactured under a NRC license outweigh the small amount of dose received when used to protect life against fire. As a result, smoke alarms are distributed as exempt products with no NRC regulatory implications for the consumer (homeowners, commercial and industrial users). **However, the key is that the smoke alarm must remain intact to remain safe – and that is not likely once it is tossed in the trash.**

The radiation safety hazard occurs when the smoke alarm is thrown away as municipal solid waste. The intact smoke alarms are subsequently crushed during solid waste transport and landfill compaction operations allowing for the spread of alpha contamination to the air, soil and potentially ground water; or alpha particles are released directly into the air from resource recovery combustion facilities.

Q. If a smoke alarm is commercially generated, can it be thrown away in the trash?

A. No. Even though they are exempted from regulation by NRC, they fail the toxicity test for lead. Commercially generated smoke alarms must be recycled or managed as RCRA hazardous waste. Curie Services and the CuriePackSM offers an opportunity for responsible waste management for these environmentally sensitive devices.

Q. My state doesn't regulate smoke alarms generated by homeowners, but I'm environmentally conscious. What should I do if I don't want to throw my smoke alarms in the trash?

A. Curie can recycle your alarms; and you feel good about your responsible stewardship of our planet. Remember, California residents must recycle their alarms, and Curie is monitoring other states that have electronic waste laws that may prohibit homeowners from disposing of their alarms in their garbage. Call us. We can help.

Q. What is a CuriePack?

A. CuriePackSM is a one-of-a-kind, pre-paid mail back system to facilitate recycling of ionizing smoke alarms containing Am-241. The CuriePackSM consists of an outer shipping box, an inner yellow five gallon poly accumulation container, complete packaging instructions and a pre-paid UPS ground shipping label. The five gallon poly is returned in its original shipping box. The CuriePackSM qualifies as a DOT strong tight package suitable for shipping up to 25 typical size smoke alarms under the proper shipping name: Radioactive Material, Excepted Package – Articles, 7, UN2911.

- Larger size containers for commercial/industrial needs are available upon request.
- Also please note that this program is currently available to all US states except Alaska and Hawaii.

Q. Which type of smoke alarm is acceptable for the CuriePackSM?

A. Ionizing smoke alarms containing Am-241 radioactive material.

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Q. Are Ra-226 smoke alarms accepted?

A. Yes, But they must be managed separately from Am-241 smoke alarms. Call or e-mail Curie and provide an inventory by 1) quantity, 2) make, 3) model, and 4) NRC exempt distribution license number for a quote.

Q. How do I know which radioactive isotope type I have – or how much radioactive material is contained in my smoke alarm?

A. You can typically find the radioactive isotope and the number of microcuries in the smoke alarm by looking on the back of the detector. Some of them have the information on the side of the alarm.

Q. How is the shipping handled for the CuriePackSM?

A. Each CuriePackSM comes with a pre-paid shipping label utilizing UPS Ground.

Q. I don't need a 5-gallon CuriePackSM. Can I still get my smoke alarms recycled?

A. Yes. Curie will take direct shipments from homeowners and small businesses, but they must be pre-approved and pre-paid.

Q. I have many smoke alarms and shipping in 5 gallon pails doesn't seem to be the most efficient method. Do you accept larger size containers (e.g. 30 or 55 gallon drums or cubic yard boxes)?

A. Yes, Curie accepts any packaging configuration. Please contact Curie and we will assist you.

Q. How do homeowners or small businesses ship smoke alarms for recycling?

A. First, calculate the total activity of the alarms being shipped. Add up the microcuries that you have identified on each of the detectors. Then call Curie to pre-pay your order.

A Curie representative will review with you the number of smoke alarms that you have, and determine the total activity of the alarms, or if any alarms are over 27 microcuries. The representative will also assist you in determining the proper shipping method.

You will receive an authorization number that will need to be written on the outside of your package. All packages arriving without an authorization number will be refused.

General Shipping Guidelines:

UPS Ground:

- UPS follows DOT regulations for shipping excepted package/ limited quantities of radioactive materials: 49 CFR 173.424 for radioactive material, excepted package – instruments or articles.
- Maximum activity per package: 27,000 microcuries.
- Maximum activity per smoke alarm: 270 microcuries.
- Even with the maximum activity allowed, the maximum dose rate on the package cannot exceed: 0.5 mR/hr. If you are shipping typical modern alarms that are 0.9 – 1 microcuries this should not be a problem. **If you have any single smoke alarm that exceeds 5 microcuries and you are shipping it with other alarms, please call Curie for assistance.**
- External package contamination requirement: **It is important to use a new package that has never been in contact with radioactive materials.** By doing so you will satisfy this requirement.
- All shipments **must be marked with "UN2911"** on the outside of the package.

US Postal Service Ground: PROCEED CAREFULLY. See USPS Guide # 52

- Shipping by US Postal Service is much more stringent than by UPS.
- Maximum activity per package: 2,700 microcuries.
- Maximum activity per smoke alarm: 27 microcuries.
- You must ship via surface transportation – Parcel Post.
- **You should generally ship no more than 5 typical modern alarms that are 0.9 – 1 microcuries in a single package.**
- **If you have any single smoke alarm that exceeds 5 microcuries and you are shipping it with other alarms, please call Curie for assistance.**

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- **If you have a single smoke alarm that exceeds 27 microcuries, you MUST ship that alarm via UPS Ground.**

- The postal service requires that your shipment must be in a sturdy cardboard box with cushioning material surrounding the alarms.

- Package dose rates and external contamination requirements are the same as the above DOT requirement referenced in the UPS guidelines. **Therefore, it is important to use a new package that has never been in contact with radioactive materials.**

- Your outer package must display on the mailing address side the following marking: "RADIOACTIVE. This package conforms to the conditions and limitations specified in 49 CFR 173.424 for radioactive material, excepted package – instruments or articles, UN 2911, and is within Postal Service activity limits for mailing."

- For more information, please see USPS Guide # 52.

Q. What are the "Do's and Don'ts" of shipping smoke alarms for recycling?

A. Do's:

Homeowners/Non-CuriePackSM customers:

1. Write your authorization number on the outside of your package.
2. If you ship by UPS Ground, write "UN2911" on the outside of your package.
3. If you ship by USPS, you must ship by Parcel Post.
4. If you ship by USPS, download from the Curie website the special language (referenced above) that is incorporated into a mailing label or print it yourself on the package.
5. Be sure to use a box that has never been in contact with radioactive materials.
6. Call Curie if any smoke alarm has an activity higher than 5 microcuries.

CuriePackSM customers:

1. Use your CuriePackSM pre-paid shipping label. It is 100% ready to go.
2. Use the box that your CuriePackSM was delivered in or if no longer available use a box that has never come in contact with radioactive materials.

3. Call Curie if any smoke alarm has an activity higher than 5 microcuries.

Don'ts:

1. **Never ship smoke alarms by air** (E.g.: Any overnight air delivery service: Fed Ex, UPS, or USPS first class or Priority Mail).
2. Never ship more than 5 alarms via the US Postal Service in a single package.
3. Never ship via the US Postal Service any single smoke alarm that exceeds 27 microcuries.
4. Never disassemble a smoke alarm – leave them entirely intact.

Q. What happens when the smoke alarms are received by Curie?

A. Each smoke alarm in a shipment is physically inspected and inventoried by a Radioactive Materials Technician. The manufacturer, model and NRC exempt distribution license number are entered into our proprietary database. The customer will receive a Certificate of Management for each shipment with a summary of the number of microcuries that have been diverted from the solid waste stream.

Q. How are smoke alarms recycled?

A. The plastic and metal components are separated and recycled locally. The copper, aluminum and ferrous metal are source separated and shipped for scrap metal recovery locally. The remaining Am-241 foil is shipped for final disposal at a licensed radioactive waste facility. For manufacturers that will accept the alarm back for recycling; Curie will direct ship the entire alarm.

Q. Do other countries ban smoke alarms from being thrown in the trash?

A. Yes. The US is lagging behind the UK and Australia which both require proper disposal or recycling of smoke alarms / detectors. Australia requires that if 10 or more alarms are collected for bulk disposal that they managed as fully regulated radioactive material.

Want more information? Contact Us.