



# FACT SHEET

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## Irradiated Gemstones

The Nuclear Regulatory Commission regulates the initial distribution of gemstones (most notably, blue topaz) that have been irradiated in a nuclear reactor or accelerator to enhance their color. Unfortunately, confusion persists in the market about NRC's role in the regulation of these stones and their safety.

***The NRC believes irradiated gemstones currently on the market are safe.  
The NRC has not requested that jewelers take these stones off the market.***

Irradiated gemstones fall under the NRC's regulatory jurisdiction because the process of enhancing the stones' color – through bombardment with either neutrons or electrons – can make the gems slightly radioactive. After irradiation, the stones are typically set aside for a couple of months to allow any radioactivity to decay. NRC requires that the *initial distribution* of these stones be by a distributor licensed by the NRC. This distributor would conduct radiological surveys of each batch of gemstones to ensure that any residual radioactivity falls below regulatory limits. After the initial distribution, the stones would no longer be regulated – in other words, subsequent distributors, jewelers, other retailers and consumers do not need to be licensed.

The “exempt distribution” license provides a safeguard against the possibility that stones might reach the market too soon after irradiation, with radioactivity above NRC limits. The distribution licensee is required to perform sophisticated surveys to verify that the stones meet NRC requirements for exempt distribution.

The key is that NRC regulations apply to *gemstones that contain radioactive material* – in other words, the stones are made radioactive by the process that alters their color. Some processes do not actually make the stones radioactive. For example, processing in a linear accelerator may be done at such low levels that the stones do not become “activated.” Also, treatment in a cobalt irradiator exposes the stones to radiation, but does not make them radioactive.

There are currently seven licensees approved to distribute irradiated gemstones:

- HBM Virginia LLC, c/o HBM Nevada, LLC, 854 Beartooth Falls Court, Henderson, Nevada 89052; 702-292-1701;
- Ideal Source Quality Assurance LLC, 1309 Overhill Court, Columbia, Missouri 65203; 573-529-6820;
- International Isotopes Inc., 4137 Commerce Circle, Idaho Falls, Idaho 83401; 208-524-5300.
- PAJ Inc., 18325 Waterview Parkway, Dallas, Texas 75252; 214-688-0088.
- Sterigenics International Inc., 10811 Withers Cove Park Dr., Charlotte, North Carolina 28278; 704-588-6877.
- Gunter Meelis USA Inc., 1554 Creek St., San Marcos, California 92069; 760-753-6771.
- Gemclear LP, 91 Portsmouth Ave, Stratham, New Hampshire 03885; 413-625-6982. (Note: Gemclear announced in September 2011 that it was suspending operations.)

## **CONTACTS:**

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## **Frequently Asked Questions on Irradiated Gemstones**

### **For consumers:**

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**1. Why and how are gemstones irradiated?**

Gemstones are irradiated in order to enhance and deepen their color. They can be irradiated in a nuclear reactor (neutron bombardment), an accelerator (electron bombardment), or by exposure to gamma rays in a cobalt irradiator. The most commonly treated stone is topaz, which becomes blue as a result of the exposure to radiation.

**2. Does irradiation make the stones radioactive?**

Possibly. Generally, the longer the stones are exposed to radiation – and the more intense the radiation – the deeper and more attractive the resulting color; also, this increases the chance that trace elements in the stone will be “activated” and become radioactive. It is important to note that activation is most likely to occur in stones that are treated in a nuclear reactor, though treatment in an accelerator can also make stones radioactive. Treatment in a cobalt irradiator does not render stones radioactive.

**3. Is it dangerous to wear blue topaz?**

No. The NRC has no indication that wearing irradiated gemstones can be harmful. There have been no reported cases of anyone being harmed by wearing irradiated gemstones.

**4. Should I stop wearing blue topaz?**

From a safety standpoint, there is no reason to stop wearing blue topaz or any other irradiated gems.

**5. A jeweler told me it is now illegal to sell blue topaz because it causes cancer – is this true?**

No. There is no reason to believe blue topaz or any other irradiated gemstone poses any health risk, much less cancer. The NRC has not advised, requested or ordered any retailers or distributors to stop selling irradiated gemstones.

**6. How can I tell if my jewelry has been irradiated?**

A skilled gemologist might be able to tell by examining the gemstone. However, it can be very difficult to determine whether a stone has been treated in a reactor, accelerator or irradiator. Any residual radiation can be detected with a hand-held survey meter; however, determining whether the radiation is below NRC’s regulatory limits requires a trained radiation professional to use sophisticated survey equipment.

**7. Will I receive a radiation “dose” from wearing blue topaz or other irradiated gems?**

Possibly, but it would be an extremely small dose. A study done by the NRC estimated that a person wearing a blue topaz stone at the highest level of radioactivity allowed for distribution under NRC regulations would receive an annual dose of 0.03 millirem ([NUREG 1717, page 2-21](#)). By contrast, a chest X-ray is about 60 millirem.

**8. Do I need an NRC license to sell blue topaz or other irradiated gems?**

Probably not. NRC regulations cover material made radioactive in a nuclear reactor or linear accelerator. The initial transfer of these materials must be made according to an NRC distribution license. If the radioactivity levels are below certain limits in NRC's regulations, the materials become "exempt" from further regulation, and further distribution, including to the end consumer, does not need to be licensed. This means individual jewelers do not need to be licensed provided the stones they sell were initially distributed by an NRC licensee.

**9. Why is an "exempt distribution" license required for the initial distribution of irradiated gemstones?**

The license provides a safeguard against the possibility that stones might reach the market too soon after irradiation, with radioactivity above NRC limits. The distribution licensee is required to perform sophisticated surveys to verify that the stones meet NRC requirements for exempt distribution.

**10. Should I stop selling these popular gemstones?**

That is a business decision only you can make. The NRC has sought information from industry about how irradiated gemstones reach the U.S. market, but the agency has not requested any action, including a halt in sales.

**11. Why do some irradiated gemstones fall under NRC's authority, while others do not?**

All irradiated gemstones that are made radioactive now fall under NRC regulations. Some stones treated at low energy in an accelerator may not actually become radioactive, so they would not qualify as radioactive material under NRC authority. Also, stones treated in a cobalt irradiator do not become radioactive.

December 2011