Cobalt-60 sources are used within wet storage production irradiators for a prolonged period of time, often 20 years or more. Following these conditions and those reflected in the IAEA’s Specific Safety Guide SSG-8 “Radiation Safety of Gamma, Electron and X Ray Irradiation Facilities” will support such longevity.

All sources should:

- Have an outer encapsulation of Type 316L or equivalent stainless steel.
- Meet the performance requirements of ISO 2919, or ANSI N43.6 classification E53424 or E43424.
- Be certified leak tight to ISO 9978.
- Be fabricated, transported and stored at all times in a manner that does not compromise their corrosion resistance through sensitization of their stainless steel encapsulation.
- Be arranged to ensure that when in the irradiate position their maximum surface temperature will not exceed 260°C (500°F) in air.

This information will be of particular interest to:

Irradiator operators/owners
Irradiator and source rack design and installation companies
Cobalt source manufacturers
Regulatory authorities
All source holders should be designed such that:

- Any parts in contact with the source are made of austenitic type stainless steel.
- The only contact between the source holder and any sealed source occurs at the larger diameter end caps. The central tubing section of the source should not be contacted.
- Clearances exist at source holding locations to allow for temperature expansion.
- Water circulates freely about the source surface when it is immersed in the pool and no areas of stagnation exist.
- Water freely drains from the source holder when the sources are raised to the irradiate position and no water is retained in any area around the source.
- Sediment does not accumulate around the sources.

Pool water should be maintained at all times such that:

- Optical clarity is sufficient to read source numbers on capsules.
- Sediment does not accumulate in any part of the pool.
- Conductivity is below 10.0 microsiemens per centimetre (µS/cm).
- Total Chlorine is less than 1 part per million (ppm).
- Total Halide ions (Br−, Cl− and F−) are less than 1 ppm.
- pH is between 4.5 and 8.5.
- Total Silicon is below 5 ppm.

Water testing should be conducted:

- Continuously to monitor conductivity and at least quarterly to monitor the other parameters stated above.
- Using internationally recognized testing methods of sufficient sensitivity.
- By labs accredited in the jurisdiction in which the testing is being completed.

All water testing records should be maintained for the life of the irradiator.

Irradiators should be designed and used such that:

- Mild steel or sensitized stainless steel is not present in any part of the irradiator pool.
- All sources are protected with a mechanical barrier to prevent unintended contact with any item or interference with source holder movement.
- Materials which, by their nature or as a result of irradiation, might affect the physical characteristics of stainless steel and, in particular, the sources, are not irradiated.
- Irradiation area ventilation is of sufficient volume and air quality that the physical characteristics of stainless steel and, in particular, the sources, are not affected.

If you have questions regarding this information, best practices in adhering to the conditions of use, or testing methods, we invite you to contact Nordion at www.nordion.com.