Radionuclide Safety Data Sheet

PHYSICAL DATA

Radionuclide:	Chromium-51 (Cr-51)
Decay Mode:	Electron Capture
Gamma Energies (primary):	320 keV (9.8% abundance)
	5 keV (22% abundance)
Auger Electron:	4 keV (66.9% abundance)
Gamma Constant:	0.018 mR/hr per mCi at 1 meter
	(180 mR/hr per mCi at 1 cm)
Physical Half-Life:	27.7 days
Biological Half-Life:	616 days
Effective Half-Life:	26.6 days
Specific Activity:	9.24 E4 curies / gram

RADIOLOGICAL DATA

Critical Organ:	Lower Large Intestine (LLI)

External & Internal exposure & contamination are primary radiological concerns

Committed Dose Equivalent (CEDE):	0.145 mrem/ uCi (ingestion)
	0.334 mrem/ uCi (inhalation for oxides & hydroxides)
Annual Limit on Intake (ALI):	40 mCi (ingestion)
	20 mCi (inhalation)
	1 ALI = 5000 mrem CEDE (Whole Body)

SHIELDING/LABELING

Shielding: 1/4" – 1/2 " lead shielding is adequate shielding for Cr-51

Half-Value Layer (HVL / Lead):	1.7 mm = 0.7”
Half-Value Layer (HVL / Water or Tissue):	5.7 cm = 2.24”
Half-Value Layer (HVL / Plexiglass):	4.8 cm = 1.9”

Labeling: Container with $\geq$ 1 mCi must be labeled “Caution, Radioactive Material”

SURVEY INSTRUMENTATION

A survey meter equipped with a NaI scintillation probe is suitable for detection of the Cr-51 gammas. Typical detection for thick crystal NaI scintillation efficiency is 1%-3%

A survey meter equipped with a G-M pancake or thin-window probe is NOT recommended for detecting Cr-51. Typical efficiency for a G-M survey meter is < 1% (although it can be used to detect gross contamination)
Indirect counting using a liquid scintillation counter (LSC) or gamma counter should be used to detect removable Cr-51 contamination on smears, swabs, or swipes
Efficiency on a Perkin Elmer (Packard) LSC is 35%. Efficiencies for gamma well counters (2"- 3" NaI crystal) ~5 to 6%

PERSONAL RADIATION MONITORING DOSIMETERS

Personnel dosimetry (whole body & ring badges) recommended when working with Cr-51
Dose rates from an unshielded 1 millicurie point source of Cr-51:

1 cm = 180 mrem/hr 10 cm = 1.8 mrem/hr 100 cm = 0.0.18 mrem/hr

Skin Contamination Dose Rate (Basal Cells): 56 millirad/hour per uCi/cm^2

BIOASSAYS

Not normally required. Notify Radiation Safety if an intake of Cr-51 is suspected.

DOSIMETRY

The lower large intestine is the critical organ for intake of soluble Cr-51 compounds and ingestion of insoluble compounds. An uptake of Cr-51 is slowly eliminated from the body equally via urine and feces with a biological half-life of 616 days. The dose committed is reduced by the short physical half-life of Cr-51.

RADIOACTIVE WASTE

Isolate waste from other radionuclides in clearly labeled containers.
Sanitary sewer disposal limit is 10 mCi in any one day via a designated "hot" sink provided it is readily soluble, dispersible in water, and contains no hazardous materials. A sewer log must be maintained.

GENERAL RADIOLOGICAL SAFETY INFORMATION (Cr-51)

Inherent Volatility (STP): Insignificant / Negligible

- Store millicurie amounts of Cr-51 (including waste) behind lead shielding (¼ - ½ inch thick);
- Use shielding to minimize exposure while handling Cr-51
- Use tools to handle Cr-51 sources and contaminated objects; avoid direct hand contact
- Always wear a lab coat and disposable gloves when handling Cr-51.
- Monitor personnel, work areas, and floors using a survey meter equipped with a 1" x 1" or a low-energy NaI scintillation probe for Cr-51 contamination. A survey meter equipped with a G-M pancake/frisker probe (15.5 cm^2 surface area) can be used for the detection of gross Cr-51 contamination.
- Monitor for removable surface contamination by smearing, swiping, swabbing, or wipe-testing where Cr-51 is used. Count smears or swabs in a liquid scintillation counter (LSC) or a gamma counter.