

CHROMIUM - 51

[⁵¹Cr]

PHYSICAL DATA

Gamma Energy: 320 keV (9.8% abundance) *
X-ray Energy: 5 keV (22% abundance) *
*[Percent of disintegration resulting in this radiation being emitted]

No Betas Emitted

Specific Gamma Constant: 0.017 mR/hr per mCi at 1.0 meter

Physical Half-Life: 27.8 days
Biological Half Life: 616.0 days
Effective Half-Life: 26.6 days (whole body)

Specific Activity: 92,000 Curies/gram
Specific Activity (microspheres): 63.56 mCi/gram

RADIOLOGICAL DATA

- Critical Organ: Lower large intestine (LLI)
- Routes of Intake: Ingestion, inhalation, skin contact
- External & internal exposure and contamination are radiological concerns.

Committed Dose Equivalent (CDE): 0.15 mrem/uCi (ingested/gonad)
(gonad & lung) 1.41 mrem/uCi (inhalation/lung/Class W)

Committed Dose Equivalent (CDE): 1.20 mrem/uCi (ingested/GI tract/LLI)
0.22 mrem/uCi (inhaled/LLI Wall/Class D)

Committed Effective Dose Equivalent (CEDE): 0.107 mrem/uCi (ingested)
0.211 mrem/uCi (inhalation/Class D)
0.211 mrem/uCi (inhalation/Class W)

Annual Limit on Intake (ALI)*: 20 mCi (inhalation/Class W & Y)
52 mCi (inhalation/Class D/soluble)
40 mCi (ingestion)

*[1.0 ALI = 40 mCi (⁵¹Cr ingested) = 5,000 mrem CEDE (Whole Body)]

SHIELDING

- Use 1/4" - 1/2" lead shielding for ⁵¹Cr

Half - Value Layer (lead):	2.0 mm = 0.07"
Half - Value Layer (concrete):	2.8 cm = 1.10"
Half - Value Layer (Plexiglas):	4.8 cm = 1.90"
Tenth - Value Layer (lead):	5.6 mm = 0.22"
Tenth - Value Layer (concrete):	9.3 cm = 3.66"
Tenth - Value Layer (Plexiglas):	17.2 cm = 6.80"
Maximum range in lead:	7 mm. = 0.5"
Maximum range in Plexiglas:	65 cm. = 22.0"

SURVEY INSTRUMENTATION

- Survey meter equipped with a NaI scintillation probe is recommended.
- Survey meter equipped with a G-M pancake/detector or standardized cylindrical probe is very **inefficient** for the detection of ^{51}Cr (very low counting efficiency).
- Smears or wipes counted in a liquid scintillation counter (indirect) is best for the detection of **removable** ^{51}Cr surface contamination.

PERSONAL RADIATION MONITORING DOSIMETERS

Whole body & extremity badges required.

REGULATORY COMPLIANCE INFORMATION

- Derived Air Concentration (DAC):
(inhalation) 2.0E^{-5} uCi/cc (Class D)
 1.0E^{-5} uCi/cc (Class W)
 8.0E^{-6} uCi/cc (Class Y)
- Airborne Effluent Release Limit*:
 6.0E^{-8} uCi/cc (Class D)
 3.0E^{-8} uCi/cc (Class W & Y)

* Applicable to the assessment & control of dose to the public (10 CFR 20.1302). If this concentration was inhaled continuously for over one year the resulting TEDE would be 50 mrem.

- Urinalysis : Not required; however, may be requested in the event of a spill of ^{51}Cr .
- Whole Body Bioassay: May be prudent in the event of a suspected intake of ^{51}Cr through ingestion, inhalation, skin absorption, or a wound.
- Gamma (photon) exposure rates from 1.0 mCi ^{51}Cr point source:

<u>Distance</u>	<u>mrads/hr.</u>
1.0 cm	160.0
5.0 cm	6.4
10.0 cm	1.6
100.0 cm	0.016

- Inherent Volatility (STP): Insignificant/Negligible