

RAD Training

Practice Sessions

“Rad Risk on the Rock”



Ready To Practice?



Data Assessment Practice

- Your imaginary San Francisco 0.5 acre (2000 m²) residential site with soil and groundwater has the following contaminants:
 - Am-241 in soil at 0.02 pCi/g
 - Tc-99 in soil at 2 pCi/g
 - Co-60 in groundwater at 80 pCi/L
- Screen against 1E-06 PRGs and 100 mrem/yr ARAR-based DCCs to determine the COPCs. Use No progeny included (with decay)

Contaminant	Concentration	PRG (pCi/g)	DCC ARAR (pCi/g)	COPC?
Am-241	0.02 pCi/g			
Tc-99	2.0 pCi/g			
Contaminant	Concentration	PRG (pCi/L)	DCC ARAR (pCi/L)	COPC?
Co-60	80 pCi/L			

Data Assessment Answers

- When **calculating** ARAR, make sure you:
 1. Use DCC
 2. Change the DL
 3. Select San Francisco for PEF
 4. Change ACF
- When calculating soil PRG select San Francisco for PEF and half acre ACF. All others are default.

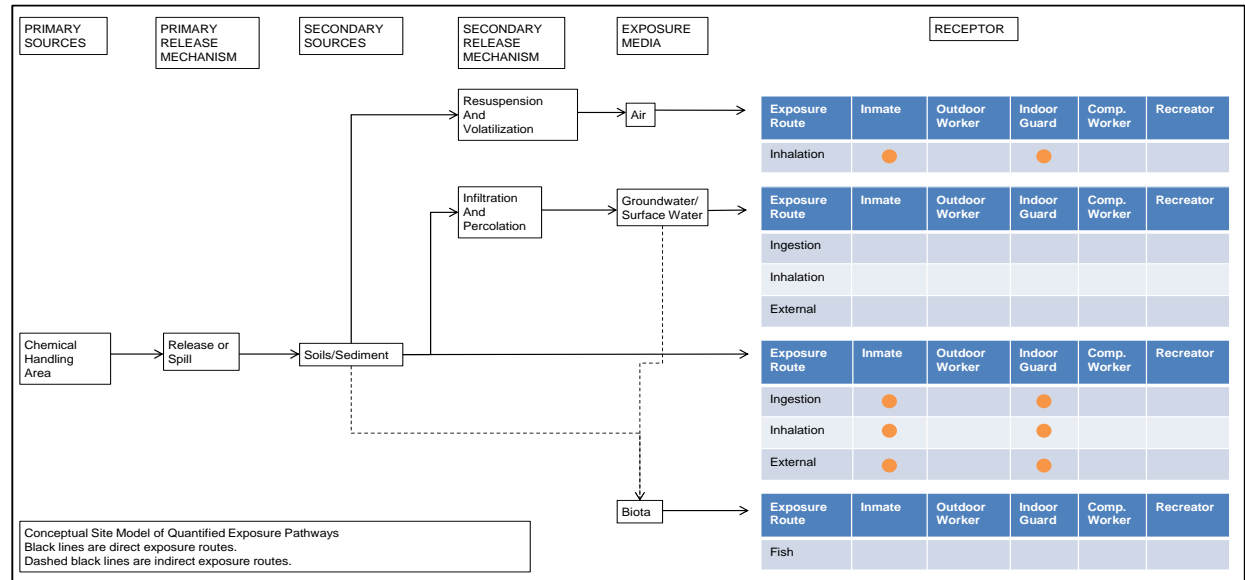
Contaminant	Concentration	PRG (pCi/g)	DCC ARAR (pCi/g)	COPC?
Am-241	0.02 pCi/g	0.506	220	No (below PRG and ARAR)
Tc-99	2.0 pCi/g	0.000861	2.68	Yes (above PRG but below ARAR)

Contaminant	Concentration	PRG (pCi/L)	DCC ARAR (pCi/L)	COPC?
Co-60	80 pCi/L	.695	74.3	Yes (above ARAR and PRG)

Risk Characterization Practice

You developed the following CSM for your imaginary 50 acre site in San Francisco. The prison is built in an active radionuclide processing facility where inmates do hard labor. The 90th percentile served sentence is 30 years and guards assumed employment is 10 years. Perform the risk assessment for each potential landuse for the following soil and air data. Hint: no children are present; adjust ED; prisoners don't get 2 weeks of vacation.

COPC	Soil pCi/g	Air pCi/m ³
Am-241	0.15	0.05
Co-60	17	7
Tc-99	65	60



Risk Characterization Practice Results for Guards

Soil

Isotope	Concentration (pCi/g)	Ingestion Risk	Inhalation Risk	External Risk	Total Risk
Am-241	0.15				
Co-60	17				
Tc-99	65				
*Total Risk					

Air (With or without Decay?)

Isotope	Concentration (pCi/m ³)	Inhalation Risk	External Risk	Total Risk
Am-241	0.05			
Co-60	7			
Tc-99	60			
*Total Risk				

Risk Characterization Practice Results for Guards

Soil

Isotope	Concentration (pCi/g)	Ingestion Risk	Inhalation Risk	External Risk	Total Risk
Am-241	0.15	1.69E-09	5.22E-11	3.76E-09	5.51E-09
Co-60	17	8.66E-09	8.85E-12	9.87E-05	9.87E-05
Tc-99	65	1.08E-08	2.30E-11	4.91E-09	1.57E-08
*Total Risk		<i>2.11E-08</i>	<i>8.41E-11</i>	<i>9.87E-05</i>	<i>9.87E-05</i>

Air (Without Decay)

Isotope	Concentration (pCi/m ³)	Inhalation Risk (no decay)	External Risk (no decay)	Total Risk (no decay)
Am-241	0.05	9.44E-05	6.62E-12	9.44E-05
Co-60	7	3.52E-05	1.80E-07	3.54E-05
Tc-99	60	1.14E-04	5.97E-11	1.14E-04
*Total Risk		<i>2.44E-04</i>	<i>1.80E-07</i>	<i>2.44E-04</i>

Risk Characterization Results for Inmates

Soil

Isotope	Concentration (pCi/g)	Ingestion Risk	Inhalation Risk	External Risk	Total Risk
Am-241	0.15				
Co-60	17				
Tc-99	65				
*Total Risk					

Air (With or without Decay?)

Isotope	Concentration (pCi/m ³)	Inhalation Risk	External Risk	Total Risk
Am-241	0.05			
Co-60	7			
Tc-99	60			
*Total Risk				

Risk Characterization Results for Inmates

Soil

Isotope	Concentration (pCi/g)	Ingestion Risk	Inhalation Risk	External Risk	Total Risk
Am-241	0.15	7.30E-09	6.76E-10	4.86E-08	5.66E-08
Co-60	17	1.70E-08	5.20E-11	5.79E-04	5.80E-04
Tc-99	65	4.71E-08	3.03E-10	6.46E-08	1.12E-07
*Total Risk		<i>7.14E-08</i>	<i>1.03E-09</i>	<i>5.80E-04</i>	<i>5.80E-04</i>

Air (Without Decay)

Isotope	Concentration (pCi/m ³)	Inhalation Risk (no decay)	External Risk (no decay)	Total Risk (no decay)
Am-241	0.05	1.24E-03	8.70E-11	1.24E-03
Co-60	7	4.63E-04	2.36E-06	4.65E-04
Tc-99	60	1.50E-03	7.84E-10	1.50E-03
*Total Risk		<i>3.20E-03</i>	<i>2.36E-06</i>	<i>3.21E-03</i>

Risk Characterization Analysis

- Which receptor has the highest soil and air cancer risk, the guards or inmates? _____
- What isotope is driving cancer risk for guards and inmates exposed to air? _____
- What isotope is driving cancer risk for guards and inmates exposed to soil? _____
- What could be done for the guards to lower cancer risk to $1E-05$? _____

Risk Characterization Analysis Answers

- What receptor is at most soil and air cancer risk, the guards or inmates?
 - Inmates
- What isotope is driving cancer risk for guards and inmates exposed to air?
 - Tc-99
- What isotope is driving cancer risk for guards and inmates exposed to soil?
 - Co-60
- What could be done for the guards to lower cancer risk to 1E-05?
 - Respirators