

Table 3-3 Levels of Significant Exposure to Uranium - Dermal

Species (Strain)	Exposure/Duration/Frequency (Route)	System	LOAEL			Reference Chemical Form	Comments
			NOAEL	Less Serious	Serious		
ACUTE EXPOSURE							
Death							
Rat (Wistar)	1-11 d 1x/d				1965 M mg/kg	(60% mortality in 11 days)	De Rey et al. 1983 Uranyl Acetate
Rat (Wistar)	1-11 d 1x/d				1928 M mg/kg	(100% mortality in 5 days)	De Rey et al. 1983 Ammonium Uranyl Tricarbonate
Rat (Wistar)	1-11 d 1x/d				237 M mg/kg	(100% mortality in 5 days)	De Rey et al. 1983 Uranyl Nitrate
Rat (Wistar)	4 hr (EPICU)				101 F mg/kg	(LD50)	Orcutt 1949 Uranyl Nitrate
Mouse (albino)	4 hr (EPICU)				4286 F mg/kg	(LD50)	Orcutt 1949 Uranyl Nitrate
Gn Pig	4 hr (EPICU)				2520 mg/kg	(LD50)	Orcutt 1949 Uranium Tetrachloride
Gn Pig (NS)	once (EPICU)				1190 mg/kg	(LD50)	Orcutt 1949 Uranyl Nitrate
Rabbit (New Zealand)	4 hr (EPICU)				188 mg/kg	(50% mortality)	Orcutt 1949 Uranium Tetrachloride

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(continued)

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			NOAEL	Less Serious	Serious		
Rabbit (New Zealand white,red,chech)	4 hr (EPICU)				3091 mg/kg (83% mortality)	Orcutt 1949 Uranyl Fluoride	
Rabbit (New Zealand)	4 hr (EPICU)				28 mg/kg (LD50)	Orcutt 1949 Uranyl Nitrate	
Rabbit (New Zealand)	once 4 hr (EPICU)				198 mg/kg (33% mortality)	Orcutt 1949 Ammonium Diuranate	
Rabbit (New Zealand)	4 hr (EPICU)				344 mg/kg (67% mortality)	Orcutt 1949 UCl5	
Rabbit (New Zealand)	4 hr (EPICU)				666 mg/kg (67% mortality)	Orcutt 1949 Uranium Trioxide	
Systemic Rat (Wistar)	1-11 d 1x/d	Renal			237 M mg/kg (renal failure)	De Rey et al. 1983 Uranyl Nitrate	
		Dermal		237 M mg/kg (mild lesion)			

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			NOAEL	Less Serious	Serious		
Rat (Wistar)	1-11 d 1x/d	Dermal	1928 M mg/kg			De Rey et al. 1983 Ammonium Uranyl Tricarbonate	
		Bd Wt		1928 M mg/kg	(slight initial weight loss)		
Rat (Wistar)	1-11 d 1x/d	Renal			1965 M (renal failure) mg/kg	De Rey et al. 1983 Uranyl Acetate	
		Dermal	3929 M mg/kg				
		Bd Wt			1965 M (70% weight loss) mg/kg		
Rat (Wistar)	1-11 d 1x/d	Renal			2670 M (renal failure) mg/kg	De Rey et al. 1983 Ammonium Diuranate	
		Dermal		2670 M (mild lesions) mg/kg			
		Bd Wt			2670 M (severe weight loss) mg/kg		

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(continued)

Species (Strain)	Exposure/ Duration/ Frequency (Route)	System	NOAEL	LOAEL		Reference Chemical Form	Comments
				Less Serious	Serious		
Rat (Wistar)	once (EPICU)	Renal		85 F mg/kg	(proteinuria; minimal microscopic lesions in renal tubular epithelium)	Orcutt 1949 Uranyl Nitrate	
		Bd Wt		85 F mg/kg	(unspecified decreased body weight gain)		
Mouse (albino)	4 hr (EPICU)	Renal		948 F mg/kg	(moderate tubular degeneration)	Orcutt 1949 Uranyl Nitrate	
		Bd Wt		948 mg/kg	(unspecified decreased body weight gain)		
Gn Pig (NS)	4 hr (EPICU)	Renal		660 mg/kg	(proteinurea)	Orcutt 1949 Uranium Tetrachloride	
		Bd Wt		660 mg/kg	(10-20% reduction in weight gain)		
Gn Pig (NS)	4 hr (EPICU)	Renal	450 mg/kg	616 mg/kg	(proteinuria)	Orcutt 1949 Uranyl Nitrate	
		Bd Wt	450 mg/kg	616 mg/kg	(unspecified decreased body weight gain)		

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(continued)

Species (Strain)	Exposure/ Duration/ Frequency (Route)	System	NOAEL	LOAEL		Reference Chemical Form	Comments
				Less Serious	Serious		
Gn Pig (NS)	4 hr (EPICU)	Renal		689 mg/kg	(proteinuria)	Orcutt 1949 Uranium Tetrachloride	
		Bd Wt		689 mg/kg	(10-20% decreased bod weight gain)		
Rabbit (New Zealand)	4 hr (EPICU)	Renal	410 mg/kg			Orcutt 1949 Uranium Peroxide	
		Dermal	410 mg/kg				
Rabbit (New Zealand)	4 hr (EPICU)	Renal	458 mg/kg			Orcutt 1949 Uranium Dioxide	
		Dermal	458 mg/kg				
Rabbit (New Zealand)	4 hr (EPICU)	Renal	98 mg/kg			Orcutt 1949 Uranium Tetrafluoride	
		Dermal	98 mg/kg				

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(continued)

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			NOAEL	Less Serious	Serious		
Rabbit (New Zealand)	4 hr (EPICU)	Renal		195 mg/kg	(proteinuria)	Orcutt 1949 Sodium Uranate	
		Dermal	195 mg/kg				
Rabbit (New Zealand)	4 hr (EPICU)	Renal		666 mg/kg	(proteinuria)	Orcutt 1949 Uranium Trioxide	
		Dermal	666 mg/kg				
Rabbit (New Zealand)	4 hr (EPICU)	Renal		147 mg/kg		Orcutt 1949 Triuranium Octoxide	
		Dermal	147 mg/kg				
Rabbit (New Zealand)	4 hr (EPICU)	Renal		344.1 mg/kg	(proteinuria)	Orcutt 1949 UCI5	
		Dermal		344.1 mg/kg	(moderate skin irritation)		

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(continued)

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				Less Serious	Serious		
Rabbit (New Zealand)	once (EPICU)	Renal		618 mg/kg	(proteinuria)	Orcutt 1949 Uranyl Fluoride	
		Dermal	618 mg/kg				
Rabbit (New Zealand)	4 hr (EPICU)	Renal		1.4 mg/kg	(proteinuria)	Orcutt 1949 Uranyl Nitrate	
		Dermal		1.4 mg/kg	(moderate erythema)		
		Bd Wt	6 mg/kg	30 mg/kg	(decreased body weight gain)		
Rabbit (New Zealand)	4 hr (EPICU)	Renal		169 mg/kg	(proteinuria)	Orcutt 1949 Ammonium Diuranate	
		Dermal	169 mg/kg				

INTERMEDIATE EXPOSURE

Death

Gn Pig (NS)	4 wk 3 d/wk			47 mg/kg	(12% mortality)	Orcutt 1949 Uranyl Nitrate	
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(continued)

Species (Strain)	Exposure/Duration/Frequency (Route)	System	LOAEL			Reference Chemical Form	Comments
			NOAEL	Less Serious	Serious		
Gn Pig (NS)	4 wk 3 d/wk				379 mg/kg	(14% mortality)	Orcutt 1949 Uranyl Nitrate
Systemic Gn Pig (NS)	4 wk 3-6 d/wk	Renal		47 mg/kg/day		(proteinuria)	Orcutt 1949 Uranyl Nitrate
		Dermal		47 mg/kg/day		(skin irritation)	
		Bd Wt	47 mg/kg/day	161.2 mg/kg/day		(transitory weight loss)	
Rabbit (New Zealand)	5 wk 5 d/wk	Renal		2.3 mg/kg/day		(proteinuria)	Orcutt 1949 Uranyl Nitrate
		Dermal			2.3 mg/kg/day	(severe dermal ulcers)	
		Bd Wt		2.3 mg/kg/day		(temporary weight loss)	

Bd Wt = body weight; d = day(s); Gn Pig = guinea pig; hr = hour(s); LD50 = lethal dose, 50% kill; LOAEL = lowest-observed-adverse-effect level; M = male; NOAEL = no-observed-adverse-effect level; NS = not specified; wk = week(s); x = time(s)