

**Table 2. Sulfuryl Fluoride Effects: Thyroid, Adrenal Cortex, Heart, Kidney, Lung**

Excerpts from: [Table 1.--Subchronic, Chronic, and Other Toxicity](#)

Ref: January 23, 2004. Sulfuryl Fluoride; Pesticide Tolerance. Final Rule. 40 CFR Part 180 [OPP-2003-0373; FRL-7342-1]. Federal Register

Study	Effect	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	RESULT
90-Day inhalation toxicity  MOUSE	THYROID	38/36 (Male/Female)	125/121 (M/F)	follicular cell hypertrophy in thyroid.  Note: Increased serum fluoride at >= 26/27 mg/kg/day
1-Year chronic inhalation toxicity  DOG	THYROID	5.0/5.1 (M/F)	50/51 (M/F)	follicular cell hypertrophy in thyroid.
18-Month carcinogenicity inhalation  MOUSE	THYROID	25/25 (M/F)	101/101 (M/F)	follicular hypertrophy in thyroid (M only)
Chronic toxicity  RODENTS	ADRENAL CORTEX	3.5 for M 16 for F	14 for M 62 for F	histopathology in adrenal cortex  [Note: The <b>adrenal cortex</b> secretes precursors to androgens such as testosterone. In females, the adrenal cortex is a major source of androgens.]
Prenatal developmental  RABBIT	CROWN-RUMP Length	Developmental 29/29 (M/F)	86 (F)	decreased crown-rump length – [See FAN comment on page 4]
18-Month carcinogenicity inhalation  MOUSE	HEART	25/25 (M/F)	101/101 (M/F)	heart thrombus (F only)
2-Week inhalation  RAT	KIDNEY	83/89 (M/F)	249/267 (M/F)	slightly increased kidney weights, minimal histopathology in kidney.
			495/534	severe histopathology in the kidney, gross and histopathology in many tissues organs (secondary to kidney effects);
2-Week inhalation  DOG	KIDNEY	26/27 (M/F)	240/250 (M/F)	slight hyperplasia of renal collecting ducts (F only)
Continued ...				

Chronic toxicity RODENTS	KIDNEY	3.5 for M 16 for F	14 for M 62 for F	based on dental fluorosis in males  for females greatly increased mortality (due mostly to severe kidney toxicity which led to kidney failure)
2-Year combined chronic/ carcinogenicity RAT	KIDNEY	3.5 for M 16 for F	14 for M 62 for F	based on dental fluorosis in males  for females greatly increased mortality (due mostly to severe kidney toxicity which led to kidney failure)
1-Year inhalation neurotoxicity (special design) RAT	KIDNEY	3.5/3.9 (M/F)	52/62 (M/F)	increased kidney and liver weights, progressive kidney disease
2-Week inhalation stud RAT	LUNG	83/89 (M/F)	495/534 (M/F)	severe inflammation of respiratory tissues in one survivor
2-Week inhalation study DOG	LUNG	26/27 (M/F)	79/80 (M/F)	Minimal inflammatory changes in upper respiratory tract  Note: Increased serum fluoride level at >= 26/27 mg/kg/day
2-Week inhalation study RABBIT	LUNG	30/30 (M/F)	180/180 (M/F)	moderate inflammation of respiratory tract
90-Day inhalation toxicity RAT	LUNG	24/25 (M/F)	240/250 (M/F)	inflammation of nasal passages, alveolar histiocytes
90-Day inhalation toxicity RABBIT	LUNG	8.6/8.5 (M/F)	86/85 (M/F)	alveolar histiocytes, histopathology in nasal epithelium.
Reproduction and fertility effects PARENTAL / SYSTEMIC	LUNG	3.6/3.6 (M/F)	14/14 (M/F)	based on pale foci in lungs, increased alveolar macrophages in lungs
Chronic toxicity RODENTS	LUNG	3.5 for M 16 for F	14 for M 62 for F	histopathology in nasal tissue and respiratory tract
Continued ...				

1-Year chronic inhalation toxicity DOG	LUNG	5.0/5.1 (M/F)	20/20 (M/F)	increased alveolar macrophages in lungs
18-Month carcinogenicity inhalation MOUSE	LUNG	25/25 (M/F)	101/101 (M/F)	lung congestion (F only)
2-Year combined chronic/ carcinogenicity RAT	LUNG	3.5 for M 16 for F	14 for M 62 for F	histopathology in respiratory tract
90-Day inhalation neurotoxicity (special design) RAT	LUNG	24/25 (M/F)	80/83 (M/F)	Systemic: pale foci in pleura and macrophages in lungs
1-Year inhalation neurotoxicity (special design) RAT	LUNG	3.5/3.9 (M/F)	52/62 (M/F)	histopathology in lung.
2-Week inhalation study RAT	BODY WEIGHT	83/89 (M/F)	495/534	high mortality, decreased body weights
2-Week inhalation study DOG	BODY WEIGHT	26/27 (M/F)	79/80 (M/F)	decreased body weight (F only)  Note: Increased serum fluoride at >= 26/27 mg/kg/day
90-Day inhalation toxicity RAT	BODY WEIGHT	24/25 (M/F)	240/250 (M/F)	decreased body weight
90-Day inhalation toxicity MOUSE	BODY WEIGHT	38/36 (M/F)	125/121 (M/F)	decreased body weight, decreased body weight gain
90-Day inhalation toxicity DOG	BODY WEIGHT	25/26 (M/F)	50/51 (M/F)	decreased body weight, decreased body weight gain
90-Day inhalation toxicity RABBIT	BODY WEIGHT	8.6/8.5 (M/F)	29/28 (M/F)	decreased body weight, decreased body weight gain
Prenatal developmental RABBIT	BODY WEIGHT	Maternal 29 (F)	Maternal 86 (F)	decreased body weight and body weight gain during treatment
Continued ...				

Prenatal developmental RABBIT	BODY WEIGHT	Developmental 29/29 (M/F)	Developmental 86 (F)	decreased fetal body weight
Reproduction and fertility effects	BODY WEIGHT	Offspring 14	Offspring 108	decreased pup weight in the F1 and F2 generations
1-Year chronic inhalation toxicity DOG	BODY WEIGHT	5.0/5.1 (M/F)	20/20 (M/F)	decreased body weight gain
18-Month carcinogenicity inhalation study MOUSE	BODY WEIGHT	25/25 (M/F)	101/101 (M/F)	decreased body weight gain

FAN comment concerning the finding of decreased **crown-rump length** in the rabbit prenatal developmental study:

-- In a 2003 sodium fluoride teratogen study, Gof and Neff reported:

"...The effects of sodium fluoride on the development of frog embryos were studied under conditions described by the Frog Embryo Teratogenesis Assay-Xenopus (FETAX), a screening assay for teratogens. The most prominent malformations caused by sodium fluoride **are reduction in the head-tail lengths** and dysfunction of the neuromuscular system of the tadpoles. The values for LC50, EC50, and minimal concentration to inhibit growth (MCIG) of sodium fluoride met the limits established for a teratogen in frog embryos, showing that **sodium fluoride is a direct acting teratogen on developing embryos...**"  
 Ref: [Effects of fluoride on Xenopus embryo development](#). Food Chem Toxicol. 2003 Nov;41(11):1501-8. – FULL TEXT available at Science Direct.

-- In an August 2001 rat developmental study, Collins & Sprando stated:

**"The single statistically significant decrease in crown-rump length of F2 females at 175 ppm was considered random."**  
 Ref: [Developmental toxicity of sodium fluoride measured during multiple generations](#). Collins & Sprando et al. Food Chem Toxicol. 2001 Aug;39(8):867-76. – FULL TEXT available at Science Direct.

-- In 1985 Hoffman et al. reported the reproductive effects in screech owls (*Otus asio*) of chronic dietary administration:

"... Day-one hatchlings in the 200 ppm [NaF] group weighed almost 10% less than controls **and had shorter crown-rump lengths ...**"  
 Ref: Toxicol Lett. 1985 Jul;26(1):19-24. [Effects of fluoride on screech owl reproduction: teratological evaluation, growth, and blood chemistry in hatchlings](#). Hoffman DJ, Pattee OH, Wiemeyer SN.