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DEPARTMENT OF THE AIR FORCE
AIR FORCE RESEARCH LABORATORY
WRIGHT-PATTERSON AIR FORCE BASE OHIO 45433

30 June 2000

MEMORANDUM FOR US EPA
NCEA (MD-52)
RTP, NC 27711
ATTN: ANNIE M. JARABEK

FROM: David R. Mattie, Ph.D.
AFRL/HEST
Operational Toxicology Branch
2856 G St, Bldg 79
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SUBJECT: Consultative Letter, AFRL-HE-WP-CL-2000-0039, Hormone Data from Brabant Human Perchlorate (1.0 and 12.0 mg/kg-day) Kinetics Drinking Water Study

1. Drs. Georg Brabant and Holger Leitolf of Medizinische Hochschule, Hanover, Germany, recently conducted an unpublished human perchlorate drinking water study. In the first segment of their study, 7 healthy males ingested 12.0 mg/kg perchlorate dissolved in 1 liter of drinking water daily for 2 weeks. One additional male subject was given 1 mg/kg-day, following the same dosing regime. Serum and urine perchlorate data from this first segment were used in the development of a human physiologically based pharmacokinetic model reported by Elaine Merrill in a consultative letter (AFRL-HE-WP-CL-2000-0036, Human PBPK Model for Perchlorate Inhibition of Iodide Uptake in the Thyroid).

2. Seven more healthy male volunteers participated in the second segment of the study. Three subjects ingested 1.0 mg/kg perchlorate in 1 liter of drinking water daily for 2 weeks. Four more subjects drank 12.0 mg/kg-day perchlorate in drinking water for the same duration. The daily perchlorate dose was divided equally in three portions and ingested three times per day (approximately between 6 and 8 AM, 11 AM and 1 PM, and 6 and 8 PM). Blood and 24-hour urine specimens were collected on days 1, 7 and 14 of perchlorate treatment and on the three mornings after perchlorate administration was discontinued (recovery, days 15, 16 and 17). Collection on day 1 was prior to perchlorate exposure (baseline). Serum samples were analyzed for thyroid stimulating hormone (TSH), thyroxine (T_4), triiodothyronine (T_3) and thyroglobulin (Tg) at the Medizinsche Hochschule. The results of these hormone analyses, received 30 June 2000, are attached.

3. Serum samples from this study segment have been sent to University of Wuerzburg, Germany, for iodine analysis. Serum and urine samples are en route to the Operational Toxicology Branch, Human Effectiveness Directorate at the Air Force Research Laboratory (AFRL/HEST), Wright Patterson Air Force Base (WPAFB), OH, for perchlorate analysis.

4. For further information, please contact Dr. Kyung Yu, Project Manager, or Elaine Merrill by phone: (937) 255-5150 or fax: (937) 255- 1474.

David R. Mattie

DAVID R. MATTIE, Ph.D.
Acting Chief
Operational Toxicology Branch
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Attachments:
1. Table 1. Hormone Data from Brabant Human Perchlorate (1.0 mg/kg-day) Kinetics Drinking Water Study
2. Table 2. Hormone Data from Brabant Human Perchlorate (12.0 mg/kg-day) Kinetics Drinking Water Study

TABLE 1. HORMONE DATA FOR BRABANT HUMAN PERCHLORATE (1.0 mg/kg-day) KINETICS DRINKING WATER STUDY

Dose Group	1.0 mg/kg-day											
ID #	12				14				15			
Body-weight	95 kg				72 kg				73 kg			
	TSH (μU/mL)	T_4 (μg/100 mL)	T_3 (ng/mL)	Tg (ng/mL)	TSH (μU/mL)	T_4 (μg/100 mL)	T_3 (ng/mL)	Tg (ng/mL)	TSH (μU/mL)	T_4 (μg/100 mL)	T_3 (ng/mL)	Tg (ng/mL)
Day 1	2.53	5.7	1.19	3.2	1.9	6.7	1.23	5.9	1.29	8	1.22	10.3
Day 7	1.47	5.5	1.27	3.6	1.4	8.1	1.42	10.3	0.33	7.3	0.95	11.7
Day 14	1.78	5.9	1.32	7.7	1.9	6.7	1.23	9.8	0.79	7.6	1.27	13
Day 15	1.17	6.8	1.4	10	1.24	7.4	1.4	23.6	1.14	8.6	1.44	22.3
Day 16	0.72	6.3	1.48	8.5	0.93	7.8	1.5	19.1	0.82	7.5	1.5	19
Day 17	0.73	5.5	1.25	7.3	1.62	8.2	1.45	16.6	1.24	7.9	1.41	16.9

TABLE 2. HORMONE DATA FOR BRABANT HUMAN PERCHLORATE (12.0 mg/kg-day) KINETICS DRINKING WATER STUDY

Dose Group	12.0 mg/kg-day															
ID #	9				10				11				13			
Body-weight	74 kg				114 kg				74 kg				74 kg			
	TSH (μU/mL)	T_4 (μg/100 mL)	T_3 (ng/mL)	Tg (ng/mL)	TSH (μU/mL)	T_4 (μg/100 mL)	T_3 (ng/mL)	Tg (ng/mL)	TSH (μU/mL)	T_4 (μg/100 mL)	T_3 (ng/mL)	Tg (ng/mL)	TSH (μU/mL)	T_4 (μg/100 mL)	T_3 (ng/mL)	Tg (ng/mL)
	TSH	T4	T3	TG	TSH	T4	T3	TG	TSH	T4	T3	TG	TSH	T4	T3	TG
Day 1	1.3	5.1	1.09	6	1.61	7.5	1.11	18	1.04	8.1	1.21	4.1	2.15	7.8	1.34	9.5
Day 7	0.94	6.1	1.09	8.1	1.35	8.3	1.24	20.8	0.46	7.9	1.09	5.1	1.25	7.7	1.27	10.4
Day 14	0.8	6.2	1.12	9.6	1.24	8.2	1.21	23	0.8	7.8	1.1	6.2	0.97	7.5	1.34	13
Day 15	1.13	6.7	1.21	17.5	0.89	8.1	1.32	35.1	0.51	7.7	1.15	13.1	0.79	7.3	1.24	25.7
Day 16	1.11	6.1	1.19	12.9	0.98	8	1.29	30.2	0.77	8	1.25	11.3	1.23	7.5	1.47	19.6
Day 17	1.72	5.5	1.15	11.6	1.22	8	1.24	30.2	0.78	8.7	1.29	11.1	1.22	7.6	1.29	18.9