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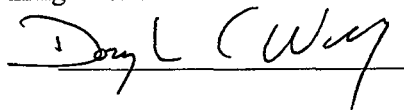
OFFICE OF
RESEARCH AND DEVELOPMENT

MEMORANDUM

DATE: 26 October 2001

SUBJECT: Erratum to the report of the peer review of the thyroid histopathology from rodents and rabbits exposed to ammonium perchlorate in the drinking water.

FROM: Douglas C. Wolf, D.V.M., Ph.D
ECD/NHEERL



TO: Annie Jarabek, M.S., NCEA
William Farland, Ph.D., Director, NCEA

It has come to my attention that there were some typographical and transcription errors in the summary tables derived from my re-read of the thyroids from rodents and rabbits exposed to ammonium perchlorate. In addition, when putting together the summary tables, animals were included in the total that should have been excluded, these include animals with autolysis and animals that were necropsied at a different time than the study protocol called for, or should not have been included in specific groups such as dams that did not have litters. The raw data from which these tables were derived has also been corrected to remove the data from animals that should not be included for the above listed reasons. Corrected tables follow with the changed numbers highlighted in bold and italic print. All Tables are in their corrected form. I apologize for any confusion this may have caused.

Table 1. 14-day oral dosing toxicity study of ammonium perchlorate administered in the drinking water to female Sprague-Dawley rats. WPAFB #A10 (Caldwell et al., 1995). (EPL Study #'s 480-030, 416-002-8)

Dose Group	Dose of Perchlorate (mg/L)	Number of Animals	Decreased Colloid	Follicular Cell Hypertrophy	Follicular Cell Hyperplasia	Mean Severity of Hyperplasia
1	0	6	3	0	0	
2	1.25	6	1	0	0	
3	5	6	2	1	0	
4	12.5	6	1	0	0	
5	25	6	6	4	2	1.5 ± 0.7
6	50	6	6	5	1	1
7	125	6	6	6	3	1
8	250	6	6	6	1	2

Table 2. 14-day oral dosing toxicity study of ammonium perchlorate administered in the drinking water to male Sprague-Dawley rats. WPAFB #A10 (Caldwell et al., 1995). (EPL Study #'s 480-030, 416-002-8)

Dose Group	Dose of Perchlorate (mg/L)	Number of Animals	Decreased Colloid	Follicular Cell Hypertrophy	Follicular Cell Hyperplasia	Mean Severity of Hyperplasia
1	0	6	3	4	2	1
2	1.25	6	5	5	2	1
3	5	6	6	4	2	1
4	12.5	6	6	5	3	1
5	25	6	5	1	0	
6	50	6	6	5	0	
7	125	6	6	6	5	1.2 ± 0.5
8	250	6	6	6	4	1

Table 3. Subchronic, 90-day, drinking water ammonium perchlorate toxicity study in female rats with a 30-day recovery. Interim necropsy, 14 days of treatment. Springborn Labs, SLI3455.1. (EPL Study #'s 480-029, 416-002-7)

Dose Group	Dose of Perchlorate (mg/kg/day)	Number of Animals	Decreased Colloid	Follicular Cell Hypertrophy	Follicular Cell Hyperplasia	Mean Severity of Hyperplasia
1	0	10	0	1	0	
2	0.01	10	0	1	0	
3	0.05	10	0	0	0	
4	0.2	10	0	0	0	
5	1.0	10	0	1	0	
6	10.0	10	4	8	0	

Table 4. Subchronic, 90-day, drinking water ammonium perchlorate toxicity study in female rats with a 30-day recovery. Interim necropsy, 90 days of treatment. Springborn Labs, SLI3455.1. (EPL Study #'s 480-029, 416-002-7)

Dose Group	Dose of Perchlorate (mg/kg/day)	Number of Animals	Decreased Colloid	Follicular Cell Hypertrophy	Follicular Cell Hyperplasia	Mean Severity of Hyperplasia
1	0	10	0	0	0	
2	0.01	10	0	0	0	
3	0.05	10	1	3	0	
4	0.2	10	1	2	0	
5	1.0	10	1	1	0	
6	10.0	10	4	5	3	1

Table 5. Subchronic, 90-day, drinking water ammonium perchlorate toxicity study in female rats with a 30-day recovery. Terminal necropsy, 90 days of treatment, 30 days of recovery. Springborn Labs, SLI3455.1. (EPL Study #'s 480-029, 416-002-7)

Dose Group	Dose of Perchlorate (mg/kg/day)	Number of Animals	Decreased Colloid	Follicular Cell Hypertrophy	Follicular Cell Hyperplasia	Mean Severity of Hyperplasia
1	0	10	0	0	0	
3	0.05	10	0	0	0	
5	1.0	10	0	1	0	
6	10.0	10	0	0	0	

Table 6. Subchronic, 90-day, drinking water ammonium perchlorate toxicity study in male rats with a 30-day recovery. Interim necropsy, 14 days of treatment. Springborn Labs, SLI3455.1. (EPL Study #'s 480-029, 416-002-7)

Dose Group	Dose of Perchlorate (mg/kg/day)	Number of Animals	Decreased Colloid	Follicular Cell Hypertrophy	Follicular Cell Hyperplasia	Mean Severity of Hyperplasia
1	0	7	3	4	3	1
2	0.01	10	0	5	1	1
3	0.05	10	5	5	2	1
4	0.2	10	5	3	0	
5	1.0	10	4	7	4	1
6	10.0	9	7	5	2	1

Table 7. Subchronic, 90-day, drinking water ammonium perchlorate toxicity study in male rats with a 30-day recovery. Interim necropsy, 90 days of treatment. Springborn Labs, SLI3455.1. (EPL Study #'s 480-029, 416-002-7)

Dose Group	Dose of Perchlorate (mg/kg/day)	Number of Animals	Decreased Colloid	Follicular Cell Hypertrophy	Follicular Cell Hyperplasia	Mean Severity of Hyperplasia
1	0	10	0	1	0	
2	0.01	10	1	2	0	
3	0.05	10	1	0	0	
4	0.2	10	1	2	0	
5	1.0	10	2	3	0	
6	10.0	10	9	8	4	1

Table 8. Subchronic, 90-day, drinking water ammonium perchlorate toxicity study in male rats with a 30-day recovery. Terminal necropsy, 90 days of treatment, 30 days of recovery. Springborn Labs, SLI3455.1. (EPL Study #'s 480-029, 416-002-7)

Dose Group	Dose of Perchlorate (mg/kg/day)	Number of Animals	Decreased Colloid	Follicular Cell Hypertrophy	Follicular Cell Hyperplasia	Mean Severity of Hyperplasia
1	0	10	1	2	1	1
3	0.05	10	3	4	3	1
5	1.0	10	0	2	1	1
6	10.0	10	3	0	0	

Table 9. Neurobehavioral development study of ammonium perchlorate administered in drinking water to F0 generation female rats. 1613-002. (EPL Study #'s 480-028, 416-002-6)

Dose Group	Dose of Perchlorate (mg/kg/day)	Number of Animals	Decreased Colloid	Follicular Cell Hypertrophy	Follicular Cell Hyperplasia	Mean Severity of Hyperplasia
1	0	23	4	12	4	1
2	0.1	23	12	12	1	1
3	1	21	18	17	6	1
4	3	23	10	11	3	1
5	10	24	11	12	7	1

The following animals were removed from study 11-89 days after the appointed time for necropsy and so their treatment was different from the protocol specifications for this study group. Therefore the following animals were removed from the data tables.

Dose 1: 19503, 19563; Dose 2: 19515, 19516; Dose 3: 19509, 19510, 19518, 19550; Dose 4: 19507, 19517; Dose 5: 19548

Table 10. Neurobehavioral development study of ammonium perchlorate administered in drinking water to rats. PND5 female rats. Argus Lab #1613-002. (EPL Study #'s 480-031, 416-002-2)

Dose Group	Dose of Perchlorate (mg/L)	Number of Animals	Decreased Colloid	Follicular Cell Hypertrophy	Follicular Cell Hyperplasia	Mean Severity of Hyperplasia
1	0	10	2	0	0	
2	0.1	10	7	0	0	
3	1	10	1	1	1	1
4	3	10	7	6	2	2.5 \pm 0.7
5	10	10	8	3	1	2

Table 11. Neurobehavioral development study of ammonium perchlorate administered in drinking water to rats. PND5 male rats. Argus Lab #1613-002.
(EPL Study #'s 480-031, 416-002-2)

Dose Group	Dose of Perchlorate (mg/L)	Number of Animals	Decreased Colloid	Follicular Cell Hypertrophy	Follicular Cell Hyperplasia	Mean Severity of Hyperplasia
1	0	10	4	0	0	
2	0.1	10	2	0	0	
3	1	10	7	0	0	
4	3	10	7	2	0	
5	10	10	10	6	0	

Table 12. Neurobehavioral development study of ammonium perchlorate administered in drinking water to rats. Adult female rats. Argus Lab #1613-002, study 25F.
(EPL Study #'s 480-031, 416-002-3).

Dose Group	Dose of Perchlorate (mg/L)	Number of Animals	Decreased Colloid	Follicular Cell Hypertrophy	Follicular Cell Hyperplasia	Mean Severity of Hyperplasia
5	0	10	5	0	1	1
4	0.1	10	4	0	0	
3	1	10	8	2	0	
2	3	10	10	2	0	
1	10	10	8	2	1	1

Table 13. Neurobehavioral development study of ammonium perchlorate administered in drinking water to rats. Adult male rats. Argus Lab #1613-002, study 25F. (EPL Study #'s 480-031, 416-002-3).

Dose Group	Dose of Perchlorate (mg/L)	Number of Animals	Decreased Colloid	Follicular Cell Hypertrophy	Follicular Cell Hyperplasia	Mean Severity of Hyperplasia
5	0	10	6	1	1	1
4	0.1	10	2	1	0	
3	1	10	2	1	0	
2	3	10	3	1	0	
1	10	10	8	1	0	

Table 14. Oral (drinking water) 2-generation (1 litter per generation) reproduction study of ammonium perchlorate in rats, first parental generation (P1) female rats. Argus #1416-001. (EPL Study #'s 480-032, 416-002-9)

Dose Group	Dose of Perchlorate (mg/kg/day)	Number of Animals	Decreased Colloid	Follicular Cell Hypertrophy	Follicular Cell Hyperplasia	Mean Severity of Hyperplasia
1	0	27	14	2	0	
2	0.3	21	11	3	0	
3	3	26	21	13	0	
4	30	24	24	17	6	1

There is a discrepancy in animal numbers between group 1 of this report and group 1 of the original study pathologists report. The slide from animal #3812 was not present in the current data set.

Table 15. Oral (drinking water) 2-generation (1 litter per generation) reproduction study of ammonium perchlorate in rats, first parental generation (P1) male rats. Argus #1416-001. (EPL Study #'s 480-032, 416-002-9)

Dose Group	Dose of Perchlorate (mg/kg/day)	Number of Animals	Decreased Colloid	Follicular Cell Hypertrophy	Follicular Cell Hyperplasia	Mean Severity of Hyperplasia
1	0	29	25	16	2	1
2	0.3	30	22	12	1	1
3	3	30	24	22	5	1.2 ± 0.5
4	30	30	30	24	8	1

There is a discrepancy in animal numbers between group 1 of this report and group 1 of the original study pathologists report. Animal #3626 was removed from the report as the tissues were autolytic.

Table 16. Oral (drinking water) 2-generation (1 litter per generation) reproduction study of ammonium perchlorate in rats: F1 generation, second parental generation (P2) female rats. Argus #1416-001 (EPL Study #'s 480-033, 416-002-10)

Dose Group	Dose of Perchlorate (mg/kg/day)	Number of Animals	Decreased Colloid	Follicular Cell Hypertrophy	Follicular Cell Hyperplasia	Mean Severity of Hyperplasia
1	0	20	7	2	1	1
2	0.3	27	1	4	1	1
3	3	27	0	5	3	1
4	30	23	21	12	0	

There is a discrepancy in animal numbers between group 4 of this report and group 4 of the original study pathologists report. The slides from animal #'s 7301 and 7313 were not present in the current data set.

Table 17. Oral (drinking water) 2-generation (1 litter per generation) reproduction study of ammonium perchlorate in rats: F1 generation, second parental generation (P2) male rats. Argus #1416-001 (EPL Study #'s 480-033, 416-002-10)

Dose Group	Dose of Perchlorate mg/kg/day	Number of Animals	Decreased Colloid	Follicular Cell Hypertrophy	Follicular Cell Hyperplasia	Mean Severity of Hyperplasia	Adenoma
1	0	29	3	8	5	1	
2	0.3	30	4	8	5	1	
3	3	30	16	16	11	1	
4	30	30	27	27	13	1.1 +/- 0.3	2

There is a discrepancy in animal numbers between group 1 of this report and group 1 of the original study pathologists report. The slide from animal #5450 was not present in the current data set.

Table 18. Oral (drinking water) 2-generation (1 litter per generation) reproduction study of ammonium perchlorate in rats: F1 and F2 weanlings. first weanling generation (F1) female rats. Argus #1416-001 (EPL Study #'s 480-034, 416-002-11)

Dose Group	Dose of Perchlorate (mg/kg/day)	Number of Animals	Decreased Colloid	Follicular Cell Hypertrophy	Follicular Cell Hyperplasia	Mean Severity of Hyperplasia
1	0	28	2	3	0	
2	0.3	22	3	7	1	1
3	3	24	5	15	1	1
4	30	21	21	21	7	1

There is a discrepancy in animal numbers between group 4 of this report and group 4 of the original study pathologists report. The slides from animal #'s 3919-9 and 3920-10 were not present in the current data set.

Table 19. Oral (drinking water) 2-generation (1 litter per generation) reproduction study of ammonium perchlorate in rats: F1 and F2 weanlings. first weanling generation (F1) male rats. Argus #1416-001 (EPL Study #'s 480-034, 416-002-11)

Dose Group	Dose of Perchlorate (mg/kg/day)	Number of Animals	Decreased Colloid	Follicular Cell Hypertrophy	Follicular Cell Hyperplasia	Mean Severity of Hyperplasia
1	0	28	1	2	0	
2	0.3	22	3	4	0	
3	3	25	4	14	5	1
4	30	23	18	23	6	1

Table 20. Oral (drinking water) 2-generation (1 litter per generation) reproduction study of ammonium perchlorate in rats: F1 and F2 weanlings. second weanling generation (F2) female rats. Argus #1416-001 (EPL Study #'s 480-034, 416-002-11)

Dose Group	Dose of Perchlorate (mg/kg/day)	Number of Animals	Decreased Colloid	Follicular Cell Hypertrophy	Follicular Cell Hyperplasia	Mean Severity of Hyperplasia
1	0	20	0	0	0	
2	0.3	27	3	1	0	
3	3	28	20	8	2	1
4	30	25	23	13	1	1

Table 21. Oral (drinking water) 2-generation (1 litter per generation) reproduction study of ammonium perchlorate in rats: F1 and F2 weanlings. second weanling generation (F2) male rats. Argus #1416-001 (EPL Study #'s 480-034, 416-002-11)

Dose Group	Dose of Perchlorate (mg/kg/day)	Number of Animals	Decreased Colloid	Follicular Cell Hypertrophy	Follicular Cell Hyperplasia	Mean Severity of Hyperplasia
1	0	20	0	0	0	
2	0.3	27	2	0	0	
3	3	28	20	4	0	
4	30	25	19	7	0	

There is a discrepancy in the raw data between group 4 of this report and group 4 of the original study pathologists report. There is no entry indicating slide 7299-2 was read in the original study pathologists report, data from this slide is in the current data set.

Table 22. Oral (drinking water) developmental toxicity study of ammonium perchlorate in rabbits, effects in thyroids of maternal rabbits. Argus ID#1416-002. (EPL Study #'s 480-025, 416-002-1)

Dose Group	Dose of Perchlorate (mg/kg/day)	Number of Animals	Decreased Colloid	Follicular Cell Hypertrophy	Follicular Cell Hyperplasia	Mean Severity of Hyperplasia
1	0	25	0	5	0	
2	0.1	25	1	3	0	
3	1	25	4	1	0	
4	10	25	14	18	10	1
5	30	25	15	18	15	1.3 ± 0.5
6	100	25	14	20	16	1.2 ± 0.4

Table 23. Effects of ammonium perchlorate in thyroid gland of male B6C3F1 mice after 90 days of treatment. Medical University of SC. (EPL Study #'s 480-027; 416-002-5)

Study Group	Dose of Perchlorate (mg/kg/day)	Number of Animals	Decreased Colloid	Follicular Cell Hypertrophy	Follicular Cell Hyperplasia	Mean Severity of Hyperplasia
A	0	6	0	0	0	
A	0.1	6	0	1	0	
A	1	6	0	1	0	
A	3	6	0	2	0	
A	30	6	2	4	3	2
D	0	6	0	0	0	
D	0.1	6	0	0	0	
D	1	6	0	0	0	
D	3	6	0	0	0	
D	30	5	1	4	1	1