

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY
MEDICAL TOXICOLOGY BRANCH

SUMMARY OF TOXICOLOGY DATA

TRIBUTYLTIN BENZOATE

Chemical Code # 1114 Tolerance # 50811
SB950 # 911

Summary Initiated on May 16, 1991
Revised on 5/23/91, 5/20/93, 12/29/94, 11/3/95

I. DATA GAP STATUS

Combined, rat:	No data gap, possible adverse effect.
Chronic toxicity, dog:	No data gap, possible adverse effect.
Oncogenicity, mouse:	No data gap, no adverse effect.
Reproduction, rat:	No data gap, no adverse effect.
Teratology, rat:	No data gap, possible adverse effect.
Teratology, rabbit:	No data gap, possible adverse effect.
Gene mutation:	No data gap, no adverse effect.
Chromosome effects:	No data gap, no adverse effect.

DNA damage: No data gap, no adverse effect.

Neurotoxicity: Not required at this time.

Toxicology one-liners are attached.

All record numbers through 140850; volume 081 were examined.

** indicates an acceptable study.

Bold face indicates a possible adverse effect.

File name: T951103

Toxicology Summary Prepared by M. Silva, 5/20/93, 6/10/94, 12/29/94, 11/3/95.

Tributyltin benzoate is grouped with: tributyltin oxide, tri-N-butyltin maleate, tributyltin methacrylate, tributyltin acetate, bis(tributyltin) adipate, tributyltin monopropylene glycol maleate, tributyltin chloride, tributyltin resinate, tributyltin chloride complex of ethylene oxide condensate of abietylamine, tributyltin neodecanate, tributyltin fluoride.

II. TOXICOLOGY ONE-LINERS AND CONCLUSIONS

These pages contain summaries only. Individual worksheets may contain additional effects.

UNLESS OTHERWISE SPECIFIED, THE STUDIES BELOW WERE PERFORMED USING TRIBUTYLTIN OXIDE.

COMBINED, RAT

**** 061, 074, 076, 080 112819, 129001, 131756 & 140161** "Two-Year Feeding Study in Rats with Bis(tri-n-Butyltin)Oxide (TBTO)", (P.W. Wester, E.I. Krajnc, F.X.R. van Leeuwen, J.G. Loeber, C.A. van der Heijden. H.A.M.G. Vaessen & P.W. Helleman, National Institute of Public Health and Environmental Hygiene Bilthoven, Report #: 658112 002, 2/88). Tributyltin Oxide (purity = 95.3%) was administered in the feed at 0 (olive oil), 0.5, 5, or 50 mg/kg diet to Wistar rats (60/sex/group) for 106 weeks. Ten animals/sex/group were interim sacrificed after 1 year. **Possible adverse effects.** NOEL = 0.5 mg/kg diet (Based on increased mortality, with accompanying clinical signs and an increase in pituitary, adrenal (pheochromocytomas) and parathyroid tumors in both sexes at 50 mg/kg diet. Incidence of highly malignant pancreatic tumors were also observed in females at 50 mg/kg diet.) Also of note was decreased bodyweight gain in both sexes at 50 mg/kg diet (sometimes with an increase in food and water consumption). RBC damage and increased erythropoiesis was indicated in both sexes at 50 mg/kg diet. Several blood chemistry parameters were affected at \geq 5 mg/kg diet in both sexes. Kidneys, a target storage/elimination site for tin, were enlarged and showed vacuolation, pigmentation and nephrosis. Originally reviewed as unacceptable (Silva, 10/27/92 & 5/18/94), upon receipt and review of the requested information, the study is upgraded to acceptable. M. Silva, 11/1/95.

CHRONIC TOXICITY, DOG

Rangefinding study:

074 129002 "TBTO: Systemic toxicity study in Beagle dogs with daily oral (intra-gastric) administration over a total of 18-19 weeks," (Sheldon, A.W., Report #: IC 6/88; 4/19/89). TBTO technical (96.1% pure; batch #: 2288) was administered by intra-gastric tube to Beagle dogs (2/sex/dose) at: Group 1 (19 weeks) - 0 (vehicle = arachis oil); Group 2 - 0.1 (5 weeks), 0.2 (4-5 weeks), 10.0 (8-9 weeks); Group 3 - 0.5 (5 weeks), 1.0 (13-14 weeks) and Group 4 - 2.5 (5 weeks), 5.0 mg/kg (13-14 weeks). Dosages described were administered weeks: 1-19, 1-5, 6-10, 10-19, 1-5, 6-19, 1-5 and 6-19, for each dose level, respectively. NOEL = 1.0 mg/kg (Body weight was significantly decreased at 10 mg/kg. Hematology showed decreased leucocyte & neutrophil counts at ≥ 5.0 mg/kg. At 10 mg/kg, dogs showed a decrease in number of nucleated bone marrow cells & neutrophil granulocytopoietic cells. There was increased GOT in females at ≥ 5.0 mg/kg and increased plasma fibrinogen at 10 mg/kg. Decreased serum albumin/globulin quotient at ≥ 2.5 mg/kg and increased relative and absolute serum total α - & β -globulins at ≥ 5.0 mg/kg were observed. Small thymus at 10 mg/kg along with decreased absolute and relative weights were reported. Absolute and relative liver and spleen weights and relative kidney weights were increased primarily at ≥ 5.0 mg/kg. Absolute and relative iliac and mesenteric lymph node weights were significantly decreased at ≥ 10 mg/kg. **Possible adverse effects:** Histopathology showed depletion of thymocytes and decreased lymphocytes in spleen and lymph nodes at 10 mg/kg. Livers at 10 mg/kg had hydropic degeneration and increased glycogen storage. Ovaries of 1/2 females at 10 mg/kg showed inhibited follicular maturation associated with glandular atrophy of the endometrium.) **These data are supplemental.** M. Silva, 5/27/94.

Chronic study:

**** 067, 074, 080 117569, 129002, 140157** "Twelve-Month Chronic Oral Toxicity Study in Beagle Dogs," (Schuh, W., Schering AG, 9/4/92, Study #: TX 85.330). Tributyltin oxide (TBTO, 97.1% pure) was administered to Beagle dogs (4/sex/group) by gavage at 0 (arachis oil), 0.2, 1.0 and 5.0 mg/kg for 12 months. **Possible adverse effect.** NOEL = 0.2 mg/kg (Increased mortality and clinical signs occurred at ≥ 1.0 mg/kg. Decreased food consumption and body weight occurred at ≥ 1.0 mg/kg. Increased liver weights, accompanied by clinical biochemical effects and histopathology, as well as effects to the immune system, including splenic, thymic, lymph node and bone marrow atrophy, accompanied by hematological effects occurred at 5.0 mg/kg.)

Originally reviewed as unacceptable (Silva, 11/4/92 & 5/18/94), upon review of the requested data, the study has been upgraded to acceptable. M. Silva, 11/1/95.

ONCOGENICITY, RAT

See COMBINED, RAT (above).

ONCOGENICITY, MOUSE

Subchronic Studies:

048 091040, " A Three Month Oral Range-Finding Toxicity Study in Mice with bis (tri-n-butyltin) oxide (TBTO)", (I.W. Daly, Bio/dynamics Inc., Project No. 87-3130, 4/10/89). Bis (tri-n-butyltin) oxide, 100% and 97.1% ai, administered in the feed at concentrations of 0 (acetone), 4, 20, 80. or 200 ppm to 10 CD-1* mice (45 days old)/sex/group for 89-90 days. NOEL = 20 ppm/day (Based on an increased hepatocellular necrosis in both sexes at ≥ 80 ppm. Bile duct (female only), gall bladder and liver cholangitis were also observed at 200 ppm.) Additional findings: There was an increased incidence in red & swollen ears, with scabs on ears in both sexes at ≥ 80 ppm. Mean alkaline phosphatase levels were elevated in both sexes at ≥ 200 ppm. Females showed an increased BUN and albumin at 200 ppm and an increased total protein at ≥ 80 ppm. Mean WBC were significantly increased in males at ≥ 80 ppm. Mean HB concentration, % HCT and RBC were reduced for both sexes at 200 ppm. Platelet #'s were elevated for males at 200 ppm and for females at ≥ 80 ppm. The mean absolute lymphocyte counts were significantly increased in males at ≥ 80 ppm. Neutrophil counts were increased in both sexes at 200 ppm. Adrenal, spleen and testes weights were increased in males at 200 ppm. Liver weights were increased in males at ≥ 80 ppm and spleen weight was increased in females at 200 ppm. These data are supplemental. Kishiyama & Silva, 10/16/92.

ONCOGENICITY, MOUSE

** 066 113673, "An Eighteen Month Oncogenicity Feeding Study in Mice with bis (tri-n-butyltin) oxide (TBTO)", (I.W. Daly, Bio/dynamics, Project No. 87-3131, 3/27/92). Bis (tri-n-butyltin) oxide (TBTO) (purity 97.1%) was administered in diet at 0 (untreated feed), 5.0, 25.0, or 50.0 ppm and fed to CD-1* mice (50/sex/group) for eighteen months. Systemic NOEL = 5 ppm (Based primarily on increased mortality and renal amyloidosis, considered to be treatment-related at ≥ 25 ppm.) Females showed an increased body weight and decreased food consumption at 50 ppm. No significant increases in oncogenicity were observed in this study. ACCEPTABLE. (Kishiyama & Silva, 10/16/92).

080 140160 This volume (Appendix B) contains eye evaluations for the mouse study on TBTO. It is supplemental to 066 113673. These data were acceptable. No worksheet. M. Silva, 11/3/95.

REPRODUCTION, RAT

** 063 112824, "A Two-Generation Reproduction Study in Rats with Bis (Tri-N-Butyltin) Oxide", (R.E. Schroeder, Bio/dynamics, Inc., Project No. 88-3261, 10/22/90). Bis (Tri-N-Butyltin) Oxide (TBTO, purity = 97.1%) was fed in diet at 0, 0.5 5.0 and 50 ppm to 2 generations of CD* (30 rats/sex/group). Parental NOEL = 5 ppm/day (Decreased bodyweight gain in both sexes of the F1 generation and decreased food consumption in both sexes of both generations was observed. There was a decreased absolute and relative thymus weight in both sexes of F1. An increase in alopecia and ano-genital stains were observed in F0 females. Males of both generations showed enlarged livers and both sexes of both generations showed pigment in mesenteric lymph nodes. Males of both generations had interstitial lymphocytes in the prostate.) There were no significant reproductive or fetal effects in this study. ACCEPTABLE. (Kishiyama & Silva, 10/29/92).

TERATOLOGY, RAT

064, 074 086967, 129003-129004 "A Teratology Study in Rats with Tributyltin Oxide", (R. E. Schroeder, Bio/dynamics Inc., Project No. 80-2497A, 3/31/81). Tributyltin Oxide (purity not

stated) was administered by gastric intubation to CD female rats (26/dose) at 5, 9, and 18 mg/kg on days 6 through 19 of gestation. The vehicle (corn oil) control consisted of 37 mated rats. **Maternal NOEL** = 9 mg/kg/day (Decreased maternal body weight and body weight gain at 18 mg/kg.) **Developmental NOEL** = 5 mg/kg/day (There was an increased incidence in fetal resorptions and decreased mean fetal body weight at 18 mg/kg. Ossification variations were increased at ≥ 9 mg/kg. Total malformations, including cleft palate were significantly increased at 18 mg/kg.) Originally reviewed as unacceptable (Silva, 8/27/92), upon receipt and evaluation of requested information, the study still lacks information about the stability of the dosing solution after 3 weeks. Possibly upgradeable. (M. Silva, 5/19/94).

Tributyltin benzoate:

**** 008 125710**, "Tributyltin Benzoate: A Study of the Effect on Pregnancy of the Rat", (A.M. Bryson, Huntingdon Research Centre Ltd., England, NDX/41, 8/17/93). Tributyltin benzoate (purity = 97.1%) was administered to mated CrI:CD*(SD)BR VAF/Plus Sprague-Dawley rats (25 females/dose) by intragastric intubation at 0 (1% methylcellulose), 1, 4.5 or 20 mg/kg during Days 6 through 15 of gestation. **Maternal NOEL** = 1 mg/kg (Dams showed increased: post-dose salivation, wet coats, piloerection, impaired respiration and hunched at ≥ 4.5 mg/kg and hair loss, loss of body tone, dirty coats, "bleeding" from vagina, enlarged abdomen and thin at 20 mg/kg. Decreased body weight gain, decreased food consumption and increased water consumption were observed at 20 mg/kg. **Possible adverse maternal effects:** Dams showed an increase in post-implantation loss %, total litter resorptions and % males/litter at ≥ 4.5 mg/kg. There was a decrease in # litters at C-section (≥ 4.5 mg/kg), and in mean fetal weight (20 mg/kg). A treatment-related death occurred at 20 mg/kg.) **Developmental NOEL** = 1 mg/kg (**Possible adverse fetal effects:** Fetuses showed an increase in both visceral and skeletal anomalies at ≥ 4.5 mg/kg (**visceral:** eye, buccal cavity, mandibular, heart, circulatory, thyroid and renal pelvis/ureter **and skeletal:** spinal, rib and sternbrae). ACCEPTABLE. (Kishiyama & Silva, 12/28/94).

TERATOLOGY, RABBIT

**** 062, 074, 080-081 112820, 129004, 140163, 140163 & 140850** "A Teratology Study in Rabbits with TBTO", (M.D. Nemec, WIL Research Laboratories, Inc., Project No. WIL-B0002, 3/27/87). Tributyl tin oxide (100% pure) was administered by gavage at 0 (Mazola* corn oil), 0.2, 1.0 and 2.5 mg/kg/day to 20 artificially inseminated New Zealand White rabbits/group on days 6 through 18 of gestation. **Maternal NOEL = 1.0 mg/kg/day** (Increased abortions, clinical observations and decreased body weight gain at 2.5 mg/kg.) **Developmental NOEL = 1.0 mg/kg/day** (Increased incidence in malformations and variations at 2.5 mg/kg.) Originally reviewed as unacceptable (Silva, 9/2/92 & 5/18/94) upon review of requested information, the study has been upgraded to acceptable. **Possible adverse effect** (increased incidence of abortions at 2.5 mg/kg). M. Silva, 11/2/95.

GENE MUTATION

001 087011, "Mutagenicity Evaluation of ZK 21,955", (D.R. Jagannath, Section Chief, Litton Bionetics, Inc., LBI Project No. 20838, January 1978). ZK 21,955 (purity not stated) was tested at 0 (DMSO), 0.0001, 0.0005, 0.001, 0.005, or 0.01 ul/plate (+ or - S9 from Aroclor induced rat liver) with Salmonella typhimurium strains: TA-1535, TA-1537, TA-1538, TA-98 and TA-100 or Saccharomyces cerevisiae strain, D4). Exposure time was 48 hours. No mutagenic activity was observed with yeast or bacteria in this study. The positive controls functioned as expected. This study is UNACCEPTABLE and not upgradeable (only 1 replicate/dose). (Kishiyama & Silva, 8/28/92).

077 131760 "Commentary on the report of Litton Bionetics Inc. 'Mutagenicity Evaluation of ZK 21.955, Final Report,'" (Kopp, R., Litton Bionetics, Inc., Report #: 21955, 8/11/78). TBTO technical (Batch #: VD486, purity not stated) was used in in vitro mutagenicity assays with Salmonella typhimurium strains TA1538, TA98 and TA100 at 0 (DMSO 0.1 ml/plate), 0.005, 0.01, 0.02, 0.04 & 0.08 ul/plate (3 plates/dose). The positive control was anthracene-2-amine (2 ug/plate). Results showed there was no mutagenic effect induced by TBTO. At 0.04 ul/plate, bacterial toxicity was observed. Positive control functioned as expected. This was a summary only and not a FIFRA Guideline study (supplemental data only). M. Silva, 11/18/94.

077 131764 "Evaluation of the genetic and embryonic effects of bis(tri-n-butyltin)oxide (TBTO), a broad-spectrum pesticide, in multiple in vivo and in vitro short-term tests," (Davis, A. et al., Mutation Research, 188:65-95, 1987; WHO, Parasitic Disease Program, Geneva). TBTO technical (95.3% pure) was used in several different assays to examine DNA-damaging and mutagenic activity. Results showed:

1. TBTO does not induce gene mutations in V79 Chinese hamster cells (to 8-azaguanine-, ouabain- or 6-thioguanine-resistance) with rat liver S9 or in cell (hamster embryo cells & human & mouse epidermal keratinocyte) mediated assays. TBTO did not induce mutations (6-thioguanine or BUdR-resistance) in mouse lymphoma cells.

2. Mutagenicity was not induced in the rec assay with B. subtilis, nor were reverse mutations included in Klebsiella pneumoniae. TBTO did not induce point mutations in S. typhimurium (TA1530, TA1535, TA1538, TA97, TA98 & TA100) with or without S9 from Aroclor induced BD VI rat livers. In the fluctuation assay, however, TA100 showed positive results for mutagenicity (with S9).

3. TBTO did not induce gene mutations in yeast Schizosaccharomyces pombe, mitotic gene conversions in Saccharomyces cerevisiae, nor sister chromatid exchange in CHO cells (with or without S9). In CHO cells, however DNA damage (structural chromosomal aberrations, endoreduplicated & polyploid cells) was induced.

4. Metabolic cooperation between V79 Chinese hamster 6-thioguanine-resistant/sensitive cells was not induced with TBTO.

5. The number of X-linked recessive lethal mutations were not increased when doses of 0.37 & 0.74 mM TBTO were fed or injected into Berlin K male Drosophila melanogaster.

6. An increase in number of micronuclei was induced in the polychromatic erythrocytes of male BALB/c mice 48 hours after a single oral dose of TBTO (60 mg/kg BW), but not at 30 mg/kg. No micronuclei were induced 30 hours after treatment.

7. Pregnant NMRI mice were treated orally (by gavage with olive oil vehical) for 10 days (days 6-15 of pregnancy) with TBTO. Results showed 74 mg/kg BW = LD50 and 34 mg/kg BW = LD10. Fetuses showed an increased incidence in cleft palates: 0.7% = controls, 0.8%, 3%, 4%, 7% & 48% at 1.2, 3.5, 5.8, 11.7 & 35 mg/kg (LD10), respectively. There was a dose-related increase in structural abnormalities and minor deformities, and fetuses with variations. Dams showed increased histopathology in liver.

8. After a single treatment with TBTO (117 mg/kg BW) the total tin content in 11.5 day old embryos 12 hours after TBTO administration was 9.5 nm Sn/g wet weight - 70% above normal. Maternal livers showed a 60% increase in Sn levels 6-24 hours after treatment (no other organs had similar Sn increases).

These data were from a review report in the literature. The studies were not performed according to FIFRA Guidelines and therefore, this information is considered supplemental. M. Silva, 11/17/94.

Tributyltin benzoate:

** 007 125663, "Evaluation of Cotin 310 in the CHO/HGPRT Gene Mutation Assay", (C.J. Rudd, SRI International, Toxicology Laboratory, Menlo Park, CA., Report # 2112-G200-91, 10 October 1991). Cotin 310 was used in an assay with Chinese Hamster ovary cells (CHO-K1) at 0 (DMSO), 0.143, 0.179, 0.224, 0.280 and 0.350 µg/ml (no S9) and at 0, 0.330, 0.410, 0.510, 0.640, 0.800, 1.00, 1.25, 1.56, 1.95, and 2.44 µg/ml (+S9) for 4 hours (duplicate cultures & duplicate trials). **An increased mutant frequency was not observed. Acceptable.** (Green & Silva, 12/28/94).

CHROMOSOME EFFECTS

** 064, 074 086968, 129006 "Studies on the Mutagenic Potential of ZK 21.955 in the Mouse Micronucleus Test", (Dr. R. Lang, Pharma-Forschung, Report No. IC 5/83, Study No. TX 83.110, 8/29/83). ZK 21.955 (Tributyltin oxide [TBTO], purity = 98.2-98.3%) was administered (gavage) in a single treatment at 0 (arachis oil), 31.25, 62.5 or 125 mg/kg to NMRI/SPF mice (15-18/sex/group). Bone marrow smears were taken from 5 mice/sex at intervals of 24, 48, and 72 hours post-treatment. There was no increase in micronuclei in this study. The positive controls functioned as expected. The approximate LD50 was 250 mg/kg. Originally reviewed as unacceptable (Silva, 8/27/92) upon receipt and review of the individual data, the study is now acceptable. No adverse effect. (Silva, 5/17/94).

Tributyltin benzoate:

** 007 125661, "Bone Marrow Erythrocyte Micronucleus Assay of Cotin 310 in Swiss-Webster Mice", (K.G. O'Loughlin, SRI International, Menlo Park, CA, Report # 2112-C100-91, 24 June 1991). Cotin 310 (purity not stated) was administered by gavage to Swiss-Webster mice (10/sex/dose) at 0 (corn oil), 50, 100, or 200 mg/kg on 2 consecutive days. Bone marrow was sampled at 24 and 48 hours after the second treatment in order to assess the number of RNA-positive erythrocytes among total RBC's (to estimate cellularity and the frequency of PCE's among erythrocytes). **No increase in micronucleated polychromatic erythrocytes in bone marrow was observed. Acceptable.** (H. Green & M. Silva, 12/29/94).

DNA DAMAGE

Tributyltin Benzoate:

** 004, 005 & 006; 95750, 089671 & 089867, "Evaluation of the Potential of Cotin 310 to Induce Unscheduled DNA Synthesis in the In Vitro Hepatocyte DNA Repair Assay using the Male F-344 Rat," (Bakke, J.P., SRI International, Menlo Park, CA; 11/30/90; Study No. 1482-V01-90). Cotin 310 (purity = 100%) was used in primary hepatocyte cultures (hepatocytes obtained from

livers of male Fischer-344 rats) exposed for 19 hours at 0 (medium), 0 (1% DMSO), 0.05, 0.1, 0.5, 1, 2.5, and 5 µg/ml (positive control-2AAF, 3 µg/ml). A preliminary and a replicate assay were performed (3 plates/dose/assay). There was no treatment-related increase in unscheduled DNA synthesis for the test article. Originally review as unacceptable (Moore, 5/10/91), upon submission of the requested information (purity and stability of TBTB; data for the evaluation of cytotoxicity of TBTB and information documenting the viability of the initial cell cultures), the study has been upgraded to acceptable. M. Silva, 12/8/92.

NEUROTOXICITY

Not required at this time.

TRIBUTYLTIN BENZOATE SUPPLEMENTAL STUDIES:

Dermal, Rat:

004, 95751; "Three Week Dermal Range-Finding Study in Rats with Tributyltin Benzoate"; 822; Rat; WIL Research Laboratories, Inc., Ashland, OH; Study No. WIL-159010; 12/18/90; Tributyltin benzoate; Vehicle: white, light mineral oil (5 ml/kg); Dose: 0 (mineral oil), 250, 500, 1000, 2000 mg/kg/day, 5 days/week; 5/sex/group; Dosing discontinued after 3 days at 2000 mg/kg/day, and 5 days at 500 and 1000 mg/kg/day due to severity of dermal irritation, animals sacrificed in extremis; Observations: (clinical/behavioral) hypersensitivity to touch, vocalization, abnormal posture, writhing, hyper-reactivity, wet and/or dry urogenital area, common to all dose groups, tremors observed in 250 mg/kg/day treated group during the 3rd week of dosing, (dermal irritation) erythema very slight to moderate, edema very slight to severe, fissuring, eschar, exfoliation and blanching, corrosion, necrosis, and subcutaneous hemorrhage, signs of dermal irritation common to all dose groups, signs of irritation diminished during the 3rd week in the 250 mg/kg/day group; Necropsy: (animals sacrificed in extremis) dermal atonia, thickened dermis, epidermal separation, moist exudate, exfoliation, scabbing, (surviving animals) thickened dermis, scabbing, desquamation (treatment-related); **possible adverse effects:** tremors, severe dermal irritation; **NOEL** can not be determined; Study unacceptable and not upgradeable (no data collected on hematology, serum chemistry or histopathology). (Moore, 5/13/91).

Dermal, Rabbit:

** 002 & 005, 088681 & 089671 "Primary Dermal Irritation Study of Tributyltin Benzoate in New Zealand White Rabbits", (Reagan, E.L., Food and Drug Research Laboratories, Waverly, N.Y., Study # 89.0500.004, 5/16/89). Tributyltin benzoate (purity = 100% DPR volume/record #: 005/089671) was used on New Zealand White Rabbits (3/sex) in a 4-hour semi-occluded exposure of 0.5 ml (undiluted material), applied to clipped, intact skin. Dermal irritation was evaluated at 0.5, 24, 48, and 72 hours and 4, 7, 10, and 14 days following patch removal. Severe erythema and moderate to severe edema was reported for all animals at 72 hours. No animals died. Toxicity Category II (based on 72 hour primary dermal irritation index of

7.07). By 14 days, all eschar had sloughed off and test sites appeared dry. **Acceptable.** (H. Green & M. Silva, 12/4/92).

** 002, 005 088682, 089671 "Acute Dermal Toxicity Study of Tributyltin Benzoate in Albino Rabbits", (David, R.M., Microbiological Associates, Inc., 5221 River Road, Bethesda, MD., Study # G-7132.232, 12/2/88). Tributyltin benzoate (purity = 100% DPR volume/record #: 005/089671) was administered for 24 hours (occluded exposure on shaved, intact skin--240 cm² of dorsal body surface area) to New Zealand albino rabbits (5/sex) at 2 g/kg. Rabbits were observed for 14 days after removal of the occlusive patch. No deaths occurred. LD50 > 2 g/kg. Toxicity Category III. By 14 days, all eschar had sloughed off and test sites appeared dry. **Acceptable.** (H. Green & M. Silva, 12/4/92).