# APPENDIX 2

# ACTIVITY PROFILES FOR GENETIC AND RELATED EFFECTS

*Methods*

The x-axis of the activity profile represents the bioassays in phylogenetic sequence by endpoint, and the values on the y-axis represent the logarithmically transformed lowest effective doses (LED) and highest ineffective doses (HID) tested. The term 'dose', as used in this report, does not take into consideration length of treatment or exposure and may therefore be considered synonymous with concentration. In practice, the concentrations used in all the in-vitro tests were converted to μg/ml, and those for in-vivo tests were expressed as mg/kg bw. Because dose units are plotted on a log scale, differences in molecular weights of compounds do not, in most cases, greatly influence comparisons of their activity profiles. Conventions for dose conversions are given below.

Profile-line height (the magnitude of each bar) is a function of the LED or HID, which is associated with the characteristics of each individual test system – such as population size, cell-cycle kinetics and metabolic competence. Thus, the detection limit of each test system is different, and, across a given activity profile, responses will vary substantially. No attempt is made to adjust or relate responses in one test system to those of another.

Line heights are derived as follows: for negative test results, the highest dose tested without appreciable toxicity is defined as the HID. If there was evidence of extreme toxicity, the next highest dose is used. A single dose tested with a negative result is considered to be equivalent to the HID. Similarly, for positive results, the LED is recorded. If the original data were analysed statistically by the author, the dose recorded is that at which the response was significant ($p < 0.05$). If the available data were not analysed statistically, the dose required to produce an effect is estimated as follows: when a dose-related positive response is observed with two or more doses, the lower of the doses is taken as the LED; a single dose resulting in a positive response is considered to be equivalent to the LED.

In order to accommodate both the wide range of doses encountered and positive and negative responses on a continuous scale, doses are transformed logarithmically, so that effective (LED) and ineffective (HID) doses are represented by positive and negative numbers, respectively. The response, or logarithmic dose unit ($LDU_{ij}$), for a given test system *i* and chemical *j is* represented by the expressions

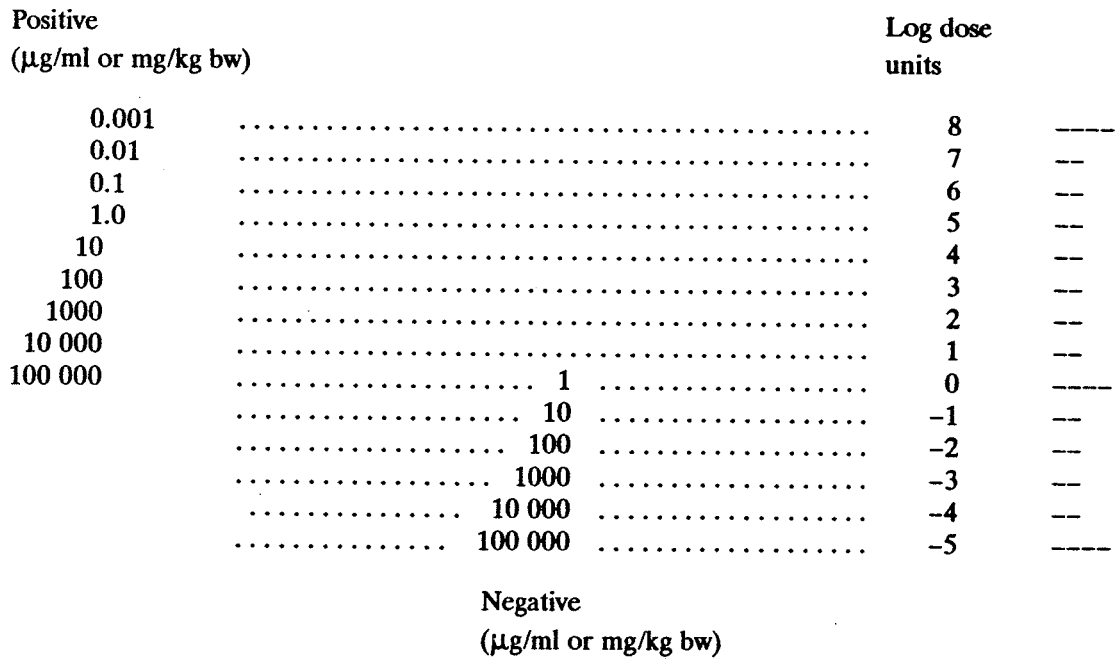
$$LDU_{ij} = -\log_{10}(\text{dose}), \text{ for HID values; } LDU \leq 0$$

and (1)

$$LDU_{ij} = -\log_{10}(\text{dose} \times 10^{-5}), \text{ for LED values; } LDU \geq 0.$$

These simple relationships define a dose range of 0 to -5 logarithmic units for ineffective doses (1–100 000 μg/ml or mg/kg bw) and 0 to +8 logarithmic units for effective doses (100 000–0.001 μg/ml or mg/kg bw). A scale illustrating the LDU values is shown in Figure 1. Negative responses at doses less than 1 μg/ml (mg/kg bw) are set equal to 1. Effectively, an LED value $\geq$100 000 or an HID value $\leq$1 produces an LDU = 0; no quantitative information is gained from such extreme values. The dotted lines at the levels of log dose units 1 and -1 define a 'zone of uncertainty' in which positive results are reported at such high doses (between 10 000 and 100 000 μg/ml or mg/kg bw) or negative results are reported at such low dose levels (1 to 10 μg/ml or mg/kg bw) as to call into question the adequacy of the test.

**Fig. 1. Scale of log dose units used on the y-axis of activity profiles**




LED and HID are expressed as μg/ml or mg/kg bw.

In practice, an activity profile is computer generated. A data entry programme is used to store abstracted data from published reports. A sequential file (in ASCH) is created for each compound, and a record within that file consists of the name and Chemical Abstracts Service number of the compound, a three-letter code for the test system (see below), the qualitative test result (with and without an exogenous metabolic system), dose (LED or HID), citation number and additional source information. An abbreviated citation for each publication is stored in a segment of a record accessing both the test data file and the citation file. During processing of the data file, an average of the logarithmic values of the data subset is calculated, and the length of the profile line represents this average value. All dose values are plotted for each profile line, regardless of whether results are positive or negative. Results obtained in the absence of an exogenous metabolic system are indicated by a bar (–), and results obtained in the presence of an exogenous metabolic system are indicated by an

upward-directed arrow (↑). When all results for a given assay are either positive or negative, the mean of the LDU values is plotted as a solid line; when conflicting data are reported for the same assay (i.e., both positive and negative results), the majority data are shown by a solid line and the minority data by a dashed line (drawn to the extreme conflicting response). In the few cases in which the numbers of positive and negative results are equal, the solid line is drawn in the positive direction and the maximal negative response is indicated with a dashed line.

Profile lines are identified by three-letter code words representing the commonly used tests. Code words for most of the test systems in current use in genetic toxicology were defined for the US Environmental Protection Agency's GENE-TOX Program (Waters, 1979; Waters & Auletta, 1981). For this publication, codes were redefined in a manner that should facilitate inclusion of additional tests in the future. If a test system is not defined precisely, a general code is used that best defines the category of the test. Naming conventions are described below.

*Dose conversions for activity profiles*

Doses are converted to μg/ml for in-vitro tests and to mg/kg bw per day for in-vivo experiments.

1. In-vitro test systems
   - *(a)* Weight/volume converts directly to μg/ml.
   - *(b)* Molar (M) concentration x molecular weight = mg/ml = $10^3$ μg/ml; mM concentration x molecular weight = μg/ml.
   - *(c)* Soluble solids expressed as % concentration are assumed to be in units of mass per volume (i.e., 1% = 0.01 g/ml = 10 000 μg/ml; also, 1 ppm = 1 μg/ml).
   - *(d)* Liquids and gases expressed as % concentration are assumed to be given in units of volume per volume. Liquids are converted to weight per volume using the density (D) of the solution (D = g/ml). If the bulk of the solution is water, then D = 1.0 g/ml. Gases are converted from volume to mass using the ideal gas law, PV = nRT. For exposure at 20–37 °C at standard atmospheric pressure, 1% (v/v) = 0.4 μg/ml x molecular weight of the gas. Also, 1 ppm (v/v) = $4 \times 10^{-5}$ μg/ml x molecular weight.
   - *(e)* For microbial plate tests, concentrations reported as weight/plate are divided by top agar volume (if volume is not given, a 2-ml top agar is assumed). For spot tests, in which concentrations are reported as weight or weight/disc, a 1-ml volume is used as a rough approximation.
   - *(f)* Conversion of asbestos concentrations given in μg/cm$^2$ are based on the area (A) of the dish and the volume of medium per dish; i.e., for a 100-mm dish: $A = \pi R^2 = \pi \times (5\text{cm})^2 = 78.5\ \text{cm}^2$. If the volume of medium is 10 ml, then 78.5 cm$^2$ = 10 ml and 1 cm$^2$ = 0.13 ml.
2. In-vitro systems using in-vivo activation

   For the body fluid-urine (BF-) test, the concentration used is the dose (in mg.kg bw) of the compound administered to test animals or patients.

3. In-vivo test systems

   *(a)* Doses are converted to mg/kg bw per day of exposure, assuming 100% absorption. Standard values are used for each sex and species of rodent, including body weight and average intake per day, as reported by Gold *et al.* (1984). For example, in a test using male mice fed 50 ppm of the agent in the diet, the standard food intake per day is 12% of body weight, and the conversion is dose = 50 ppm × 12% = 6 mg/kg bw per day.

   Standard values used for humans are: weight - males, 70 kg; females, 55 kg; surface area, 1.7 $m^2$; inhalation rate, 20 l/min for light work, 30 l/min for mild exercise.

   *(b)* When reported, the dose at the target site is used. For example, doses given in studies of lymphocytes of humans exposed *in vivo* are the measured blood concentrations in μg/ml.

*Codes for test systems*

For specific nonmammalian test systems, the first two letters of the three-symbol code word define the test organism (e.g., SA- for *Salmonella typhimurium*, EC- for *Escherichia coli)*. In most cases, the first two letters accurately represent the scientific name of the organism. If the species is not known, the convention used is -S-. The third symbol may be used to define the tester strain (e.g., SA8 for *S. typhimurium* TA1538, ECW for *E. coli* WP2*uvrA*). When strain designation is not indicated, the third letter is used to define the specific genetic endpoint under investigation (e.g., —D for differential toxicity, —F for forward mutation, —G for gene conversion or genetic crossing-over, —N for aneuploidy, —R for reverse mutation, —U for unscheduled DNA synthesis). The third letter may also be used to define the general endpoint under investigation when a more complete definition is not possible or relevant (e.g., —M for mutation, —C for chromosomal aberration).

For mammalian test systems, the first letter of the three-letter code word defines the genetic endpoint under investigation: A— for aneuploidy, B— for binding, C— for chromosomal aberration, D— for DNA strand breaks, G— for gene mutation, I— for inhibition of intercellular communication, M— for micronucleus formation, R— for DNA repair, S— for sister chromatid exchange, T— for cell transformation and U— for unscheduled DNA synthesis.

For animal (i.e., nonhuman) test systems *in vitro*, when the cell type is not specified, the code letters -IA are used. For such assays *in vivo*, when the animal species is not specified, the code letters -VA are used. Commonly used animal species are identified by the third letter (e.g., —C for Chinese hamster, —M for mouse, —R for rat, —S for Syrian hamster).

For test systems using human cells *in vitro*, when the cell type is not specified, the code letters -IH are used. For assays on humans *in vivo*, when the cell type is not specified, the code letters -VH are used. Otherwise, the second letter specifies the cell type under investigation (e.g., -BH for bone marrow, -LH for lymphocytes).

Some other specific coding conventions used for mammalian systems are as follows: BF- for body fluids, HM- for host-mediated, —L for leucocytes or lymphocytes *in vitro*

(-AL, animals; -HL, humans), -L- for leucocytes *in vivo* (-LA, animals; -LH, humans), —T for transformed cells.

Note that these are examples of major conventions used to define the assay code words. The alphabetized listing of codes must be examined to confirm a specific code word. As might be expected from the limitation to three symbols, some codes do not fit the naming conventions precisely. In a few cases, test systems are defined by first-letter code words, for example: MST, mouse spot test; SLP, mouse specific locus test, postspermatogonia; SLO, mouse specific locus test, other stages; DLM, dominant lethal test in mice; DLR, dominant lethal test in rats; MHT, mouse heritable translocation test.

The genetic activity profiles and listings that follow were prepared in collaboration with Environmental Health Research and Testing Inc. (EHRT) under contract to the US Environmental Protection Agency; EHRT also determined the doses used. The references cited in each genetic activity profile listing can be found in the list of references in the appropriate monograph.

*References*

Garrett, N.E., Stack, H.F., Gross, M.R. & Waters, M.D. (1984) An analysis of the spectra of genetic activity produced by known or suspected human carcinogens. *Mutat. Res., 134,* 89–111

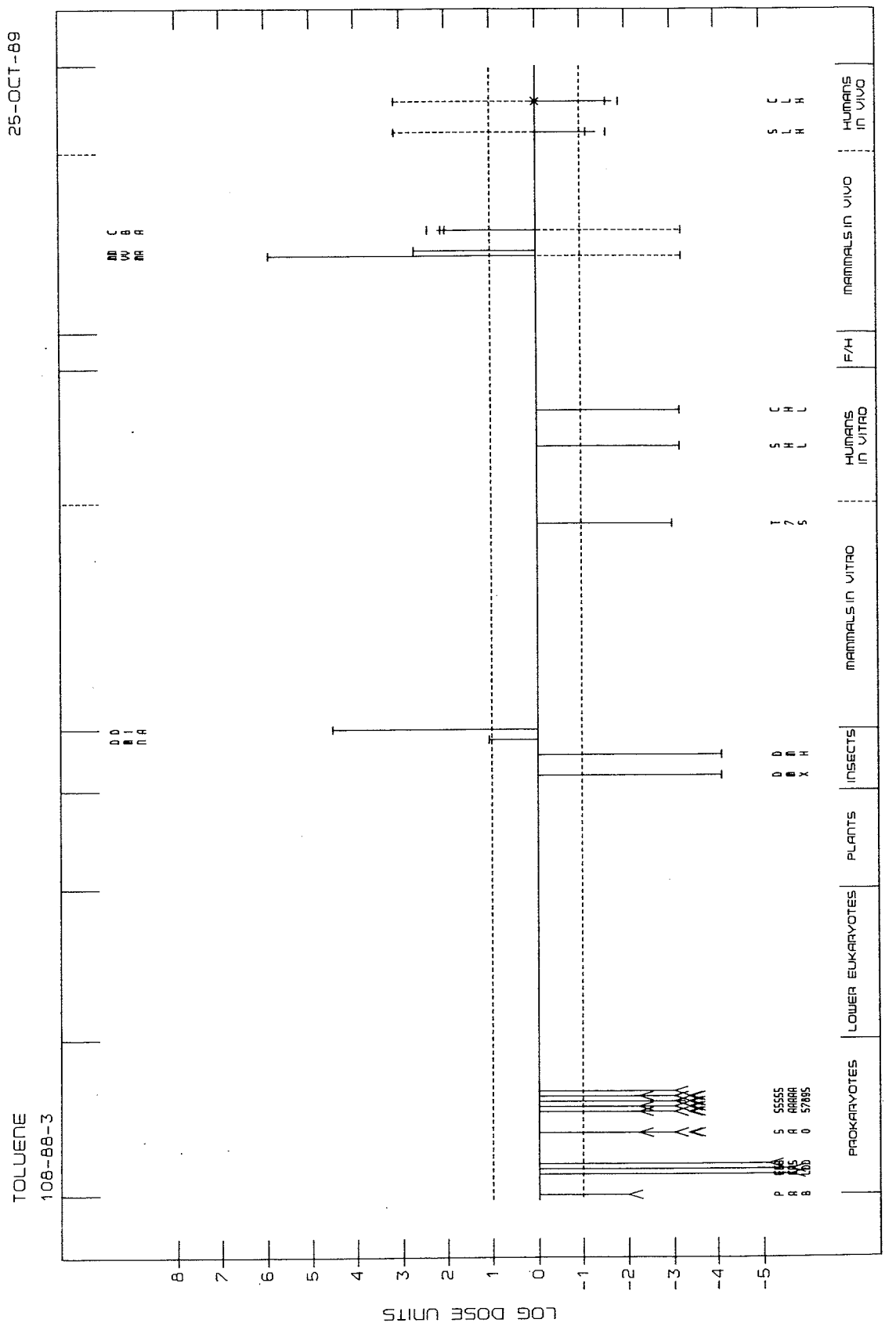
Gold, L.S., Sawyer, C.B., Magaw, R., Backman, G.M., de Veciana, M., Levinson, R., Hooper, N.K., Havender, W.R., Bernstein, L., Peto, R., Pike, M.C. &Ames, B.N. (1984) A carcinogenic potency database of the standardized results of animal bioassays. *Environ. Health Perspect., 58,* 9–319

Waters, M.D. (1979) *The GENE-TOX program.* In: Hsie, A.W., O'Neill, J.P. & McElheny, V.K., eds, *Mammalian Cell Mutagenesis: The Maturation of Test Systems (Banbury Report 2),* Cold Spring Harbor, NY, CHS Press, pp. 449–467

Waters, M.D. & Auletta, A. (1981) The GENE-TOX program: genetic activity evaluation. *J. chem. Inf. comput. Sci., 21,* 35–38

TOLUENE

| END POINT | TEST CODE | TEST SYSTEM | RESULTS NM | RESULTS M | DOSE (LED OR HID) | REFERENCE |
|---|---|---|---|---|---|---|
| D | PRB | PROPHAGE, INDUCT/SOS/STRAND BREAKS/X-LINKS | - | - | 100.0000 | NAKAMURA ET AL., 1987 |
| D | ECL | E. COLI POL A, DIFFERENTIAL TOX (LIQUID) | - | - | 400000.0000 | MCCARROLL ET AL., 1981b |
| D | ERD | E. COLI REC, DIFFERENTIAL TOXICITY | - | - | 400000.0000 | MCCARROLL ET AL., 1981b |
| D | BSD | B. SUBTILIS REC, DIFFERENTIAL TOXICITY | - | - | 127000.0000 | MCCARROLL ET AL., 1981a |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | - | - | 2500.0000 | SPANGGORD ET AL., 1982 |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | - | - | 1000.0000 | BOS ET AL., 1981 |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | - | - | 2150.0000 | NESTMANN ET AL., 1980 |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | - | - | 1000.0000 | CONNOR ET AL., 1985 |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | - | - | 167.0000 | HAWORTH ET AL., 1983 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | - | - | 2500.0000 | SPANGGORD ET AL., 1982 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | - | - | 2150.0000 | NESTMANN ET AL., 1980 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | - | - | 1000.0000 | BOS ET AL., 1981 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | - | - | 167.0000 | HAWORTH ET AL., 1983 |
| G | SA7 | S. TYPHIMURIUM TA1537, REVERSE MUTATION | - | - | 2500.0000 | SPANGGORD ET AL., 1982 |
| G | SA7 | S. TYPHIMURIUM TA1537, REVERSE MUTATION | - | - | 2150.0000 | NESTMANN ET AL., 1980 |
| G | SA7 | S. TYPHIMURIUM TA1537, REVERSE MUTATION | - | - | 1000.0000 | BOS ET AL., 1981 |
| G | SA7 | S. TYPHIMURIUM TA1537, REVERSE MUTATION | - | - | 167.0000 | HAWORTH ET AL., 1983 |
| G | SA8 | S. TYPHIMURIUM TA1538, REVERSE MUTATION | - | - | 2150.0000 | NESTMANN ET AL., 1980 |
| G | SA8 | S. TYPHIMURIUM TA1538, REVERSE MUTATION | - | - | 2500.0000 | SPANGGORD ET AL., 1982 |
| G | SA8 | S. TYPHIMURIUM TA1538, REVERSE MUTATION | - | - | 1000.0000 | BOS ET AL., 1981 |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | - | 1000.0000 | BOS ET AL., 1981 |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | - | 2500.0000 | SPANGGORD ET AL., 1982 |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | - | 2150.0000 | NESTMANN ET AL., 1980 |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | - | 1000.0000 | CONNOR ET AL., 1985 |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | - | 167.0000 | HAWORTH ET AL., 1983 |
| G | SAS | S. TYPHIMURIUM (OTHER), REVERSE MUTATION | - | - | 1000.0000 | CONNOR ET AL., 1985 |
| G | DMX | D. MELANOGASTER, SEX-LINKED RECESSIVES | - | 0 | 13000.0000 | RODRIGUEZ ARNAIZ & VILLALOBOS-PIETRINI, 1985b |
| C | DMH | D. MELANOGASTER, HERITABLE TRANSLOCATIONS | - | 0 | 13000.0000 | RODRIGUEZ ARNAIZ & VILLALOBOS-PIETRINI, 1985b |
| A | DMN | D. MELANOGASTER, ANEUPLOIDY | + | 0 | 8700.0000 | RODRIGUEZ ARNAIZ & VILLALOBOS-PIETRINI, 1985a |
| D | DIA | STRAND BREAKS/X-LINKS, ANIMAL CELLS IN VITRO | + | 0 | 3.0000 | SINA ET AL., 1983 |
| T | T7S | CELL TRANSFORMATION, SA7/SHE CELLS | - | 0 | 1000.0000 | CASTO, 1981 |
| S | SHL | SCE, HUMAN LYMPHOCYTES IN VITRO | - | 0 | 1500.0000 | GERNER-SMIDT & FRIEDRICH, 1978 |
| C | CHL | CHROM ABERR, HUMAN LYMPHOCYTES IN VITRO | - | 0 | 1500.0000 | GERNER-SMIDT & FRIEDRICH, 1978 |
| M | MVM | MICRONUCLEUS TEST, MICE IN VIVO | + | 0 | 0.1200 | MOHTASHAMIPUR ET AL., 1985 |
| M | MVM | MICRONUCLEUS TEST, MICE IN VIVO | - | 0 | 1700.0000 | GAD-EL-KARIM ET AL., 1984 |
| M | MVR | MICRONUCLEUS TEST, RATS IN VIVO | + | 0 | 200.0000 | ROH ET AL., 1987 |
| C | CBA | CHROM ABERR, ANIMAL BONE MARROW IN VIVO | + | 0 | 1000.0000 | LYAPKALO, 1973 |
| C | CBA | CHROM ABERR, ANIMAL BONE MARROW IN VIVO | + | 0 | 400.0000 | ROH ET AL., 1987 |
| C | CBA | CHROM ABERR, ANIMAL BONE MARROW IN VIVO | + | 0 | 800.0000 | DOBROKHOTOV, 1972 |
| C | CBA | CHROM ABERR, ANIMAL BONE MARROW IN VIVO | + | 0 | 0.0000 | ARISTOV ET AL., 1981 |
| C | CBA | CHROM ABERR, ANIMAL BONE MARROW IN VIVO | - | 0 | 1700.0000 | GAD-EL-KARIM ET AL., 1984 |
| S | SLH | SCE, HUMAN LYMPHOCYTES IN VIVO | + | 0 | 75.0000 | BAUCHINGER ET AL., 1982 |
| S | SLH | SCE, HUMAN LYMPHOCYTES IN VIVO | - | 0 | 14.0000 | HAGLUND ET AL., 1980 |
| S | SLH | SCE, HUMAN LYMPHOCYTES IN VIVO | - | 0 | 40.0000 | MAKI-PAAKKANEN ET AL., 198 |
| C | CLH | CHROM ABERR, HUMAN LYMPHOCYTES IN VIVO | + | 0 | 75.0000 | BAUCHINGER ET AL., 1982 |
| C | CLH | CHROM ABERR, HUMAN LYMPHOCYTES IN VIVO | - | 0 | 40.0000 | MAKI-PAAKKANEN ET AL., 198 |
| C | CLH | CHROM ABERR, HUMAN LYMPHOCYTES IN VIVO | - | 0 | 75.0000 | FORNI ET AL., 1971 |
| C | CLH | CHROM ABERR, HUMAN LYMPHOCYTES IN VIVO | - | 0 | 0.0000 | PELCLOVA ET AL., 1987 |
| P | SPM | SPERM MORPHOLOGY, MICE | - | 0 | 900.0000 | TOPHAM, 1980 |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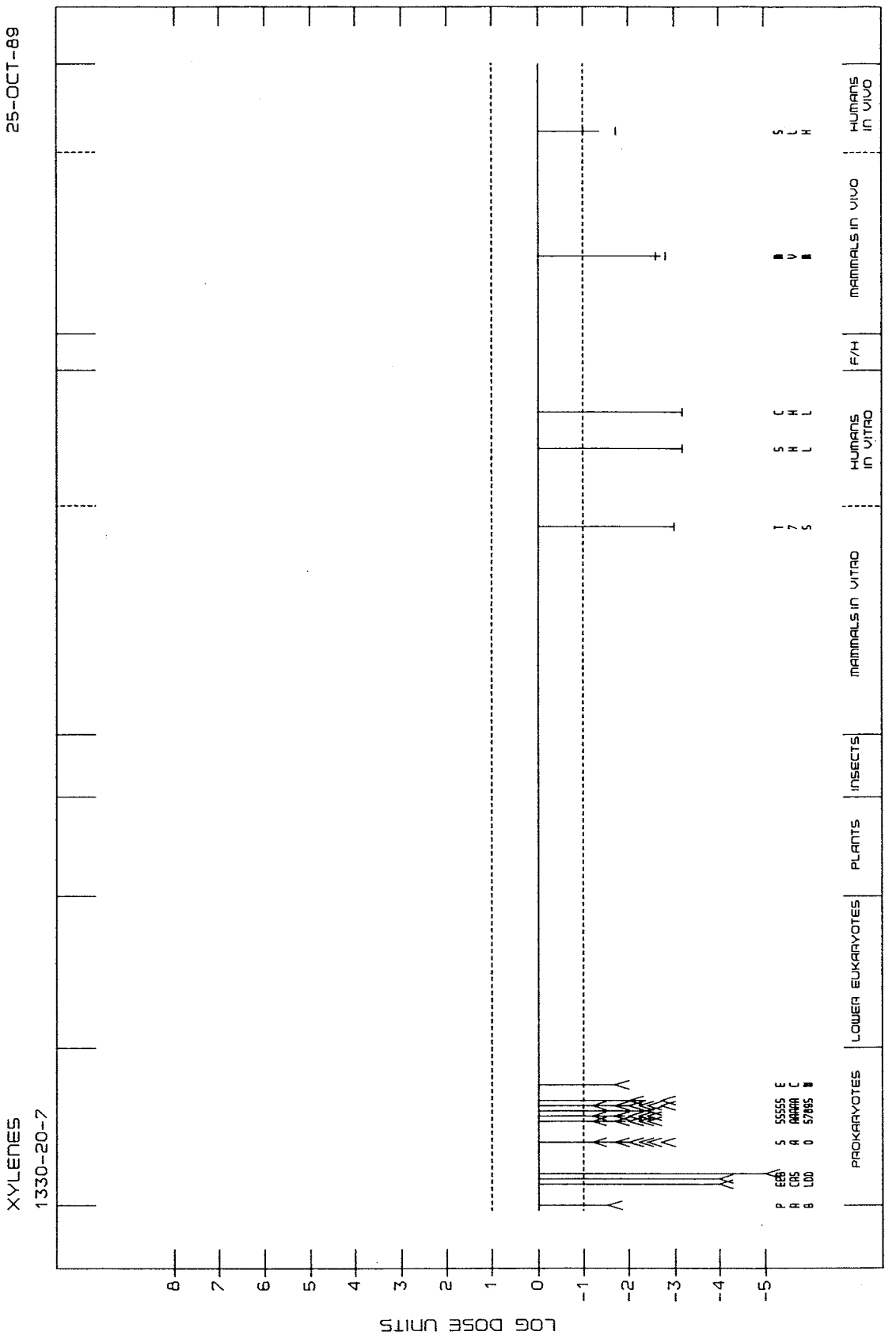
108-88-3
LOG DOSE UNITS
8
7
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
PROKARYOTES
LOWER EUKARYOTES
PLANTS
INSECTS
MAMMALS IN VITRO
HUMANS IN VITRO
F/H
MAMMALS IN VIVO
HUMANS IN VIVO

XYLENES

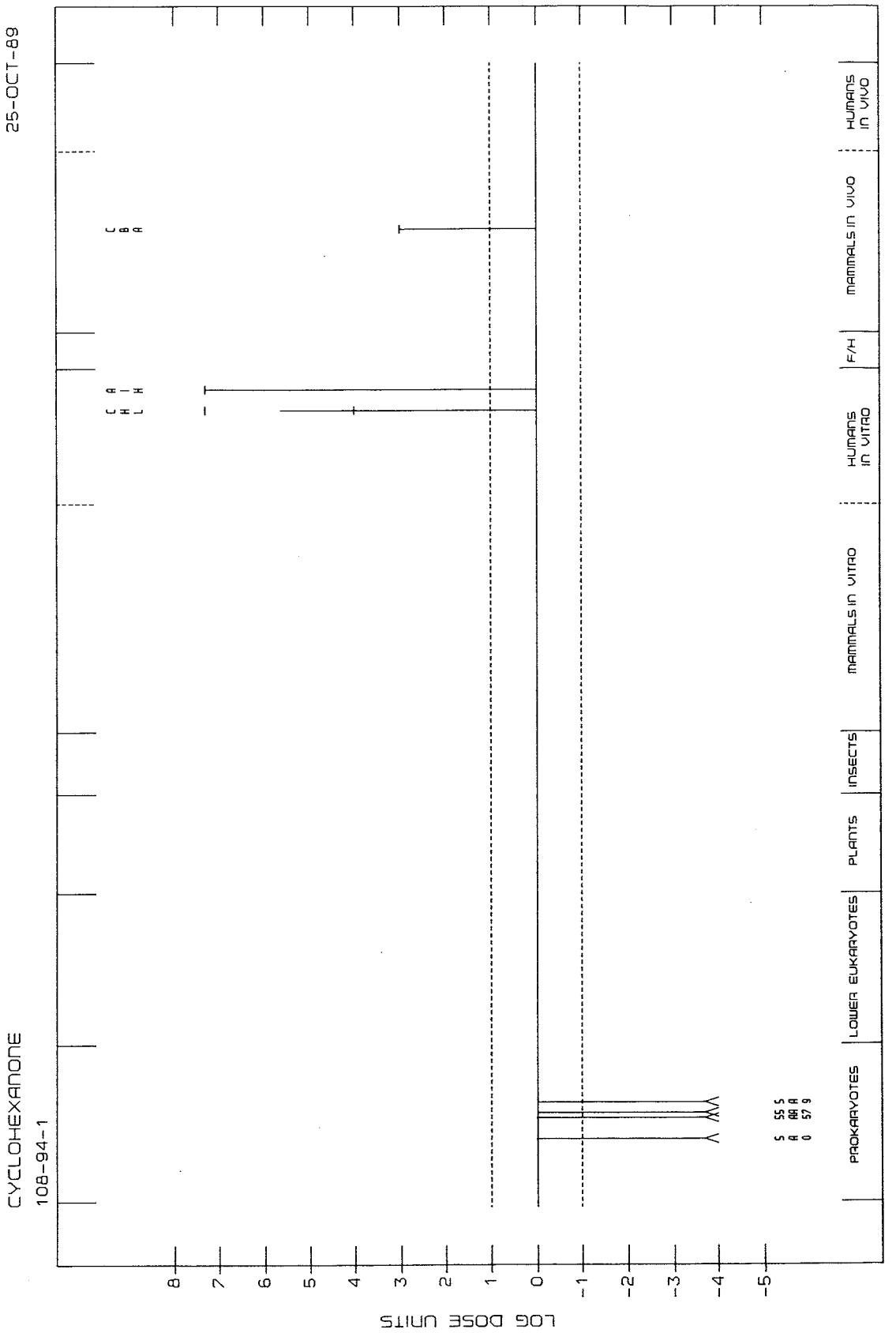
| END POINT | TEST CODE | TEST SYSTEM | RESULTS NM | RESULTS M | DOSE (LED OR HID) | REFERENCE | |
|---|---|---|---|---|---|---|---|
| D | PRB | PROPHAGE, INDUCT/SOS/STRAND BREAKS/X-LINKS | - | - | 36.0000 | NAKAMURA ET AL., 1987 | (us) |
| D | ECL | E. COLI POL A, DIFFERENTIAL TOX (LIQUID) | - | - | 10000.0000 | MCCARROLL ET AL., 1981b | (tg) |
| D | ERD | E. COLI REC, DIFFERENTIAL TOXICITY | - | - | 10000.0000 | MCCARROLL ET AL., 1981b | (tg) |
| D | BSD | B. SUBTILIS REC, DIFFERENTIAL TOXICITY | - | - | 100000.0000 | MCCARROLL ET AL., 1981a | (tg) |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | - | - | 100.0000 | ZEIGER ET AL., 1987 | (x) |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | - | - | 50.0000 | SHIMIZU ET AL., 1985 | (p) |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | - | - | 250.0000 | BOS ET AL., 1981 | (o,m,p) |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | - | - | 166.0000 | HAWORTH ET AL., 1983 | (o) |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | - | - | 16.0000 | HAWORTH ET AL., 1983 | (m) |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | - | - | 100.0000 | HAWORTH ET AL., 1983 | (p) |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | - | - | 500.0000 | CONNOR ET AL., 1985 | (o,m,p) |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | - | - | 100.0000 | ZEIGER ET AL., 1987 | (x) |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | - | - | 166.0000 | HAWORTH ET AL., 1983 | (o) |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | - | - | 16.0000 | HAWORTH ET AL., 1983 | (m) |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | - | - | 100.0000 | HAWORTH ET AL., 1983 | (p) |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | - | - | 50.0000 | SHIMIZU ET AL., 1985 | (p) |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | - | - | 250.0000 | BOS ET AL., 1981 | (o,m,p) |
| G | SA7 | S. TYPHIMURIUM TA1537, REVERSE MUTATION | - | - | 50.0000 | SHIMIZU ET AL., 1985 | (p) |
| G | SA7 | S. TYPHIMURIUM TA1537, REVERSE MUTATION | - | - | 166.0000 | HAWORTH ET AL., 1983 | (o) |
| G | SA7 | S. TYPHIMURIUM TA1537, REVERSE MUTATION | - | - | 16.0000 | HAWORTH ET AL., 1983 | (m) |
| G | SA7 | S. TYPHIMURIUM TA1537, REVERSE MUTATION | - | - | 100.0000 | HAWORTH ET AL., 1983 | (p) |
| G | SA7 | S. TYPHIMURIUM TA1537, REVERSE MUTATION | - | - | 250.0000 | BOS ET AL., 1981 | (o,m,p) |
| G | SA8 | S. TYPHIMURIUM TA1538, REVERSE MUTATION | - | - | 250.0000 | BOS ET AL., 1981 | (o,m,p) |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | - | 100.0000 | ZEIGER ET AL., 1987 | (x) |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | - | 250.0000 | BOS ET AL., 1981 | (o,m,p) |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | - | 50.0000 | SHIMIZU ET AL., 1985 | (p) |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | - | 166.0000 | HAWORTH ET AL., 1983 | (o) |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | - | 16.0000 | HAWORTH ET AL., 1983 | (m) |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | - | 100.0000 | HAWORTH ET AL., 1983 | (p) |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | - | 500.0000 | CONNOR ET AL., 1985 | (o,m,p) |
| G | SA5 | S. TYPHIMURIUM (OTHER), REVERSE MUTATION | - | - | 100.0000 | ZEIGER ET AL., 1987 | (x) |
| G | SA5 | S. TYPHIMURIUM (OTHER), REVERSE MUTATION | - | - | 500.0000 | CONNOR ET AL., 1985 | (o,m,p) |
| G | ECW | E. COLI WP2 UVRA, REVERSE MUTATION | - | - | 50.0000 | SHIMIZU ET AL., 1985 | (p) |
| T | T7S | CELL TRANSFORMATION, SA7/SHE CELLS | - | 0 | 1000.0000 | CASTO, 1981 | (us) |
| S | SHL | SCE, HUMAN LYMPHOCYTES IN VITRO | - | 0 | 1500.0000 | GERNER-SMIDT & FRIEDRICH, 1978 | (us) |
| C | CHL | CHROM ABERR, HUMAN LYMPHOCYTES IN VITRO | - | 0 | 1500.0000 | GERNER-SMIDT & FRIEDRICH, 1978 | (us) |
| M | MVM | MICRONUCLEUS TEST, MICE IN VIVO | - | 0 | 400.0000 | MOHTASHAMIPUR ET AL., 1985 | (o) |
| M | MVM | MICRONUCLEUS TEST, MICE IN VIVO | - | 0 | 650.0000 | MOHTASHAMIPUR ET AL., 1985 | (m,p) |
| S | SLH | SCE, HUMAN LYMPHOCYTES IN VIVO | - | 0 | 10.0000 | HAGLUND ET AL., 1980 | (us) |
| S | SLH | SCE, HUMAN LYMPHOCYTES IN VIVO | - | 0 | 55.0000 | PAP & VARGA ET AL., 1987 | (tg) |
| P | SPR | SPERM MORPHOLOGY, RATS | (+) | 0 | 400.0000 | WASHINGTON ET AL., 1983 | (o) |

o — ortho
m — meta
p — para
us — unspecified
x — mixture of isomers
tg — technical grade


25-OCT-89
XYLENES
1330-20-7
LOG DOSE UNITS
8
7
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
PROKARYOTES
LOWER EUKARYOTES
PLANTS
INSECTS
MAMMALS IN VITRO
HUMANS IN VITRO
F/H
MAMMALS IN VIVO
HUMANS IN VIVO

CYCLOHEXANONE

| END POINT | TEST CODE | TEST SYSTEM | RESULTS NM | RESULTS M | DOSE (LED OR HID) | REFERENCE |
|---|---|---|---|---|---|---|
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | - | - | 5000.0000 | HAWORTH ET AL., 1983 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | - | - | 5000.0000 | HAWORTH ET AL., 1983 |
| G | SA7 | S. TYPHIMURIUM TA1537, REVERSE MUTATION | - | - | 5000.0000 | HAWORTH ET AL., 1983 |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | - | 5000.0000 | HAWORTH ET AL., 1983 |
| C | CHL | CHROM ABERR, HUMAN LYMPHOCYTES IN VITRO | + | 0 | 0.0000 | COLLIN, 1971 |
| C | CHL | CHROM ABERR, HUMAN LYMPHOCYTES IN VITRO | + | 0 | 10.0000 | LEDERER ET AL., 1971 |
| C | CHL | CHROM ABERR, HUMAN LYMPHOCYTES IN VITRO | + | 0 | 0.0050 | DYSHLOVOI ET AL., 1981 |
| A | AIH | ANEUPLOIDY, HUMAN CELLS IN VITRO | + | 0 | 0.0050 | DYSHLOVOI ET AL., 1981 |
| C | CBA | CHROM ABERR, ANIMAL BONE MARROW IN VIVO | + | 0 | 100.0000 | DE HONDT ET AL., 1983 |


25-OCT-89
CYCLOHEXANONE
108-94-1
LOG DOSE UNITS
8
7
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
C
B
A
C A
H I
L H
S 55 S
A 00 A
O 57 9
PROKARYOTES
LOWER EUKARYOTES
PLANTS
INSECTS
MAMMALS IN VITRO
HUMANS IN VITRO
F/H
MAMMALS IN VIVO
HUMANS IN VIVO

DIMETHYLFORMAMIDE

| END POINT | TEST CODE | TEST SYSTEM | RESULTS NM | RESULTS M | DOSE (LED OR HID) | REFERENCE |
|---|---|---|---|---|---|---|
| D | ECL | E. COLI POL A, DIFFERENTIAL TOX (LIQUID) | - | - | 2300.0000 | ROSENKRANZ ET AL., 1981 |
| D | ERD | E. COLI REC, DIFFERENTIAL TOXICITY | - | - | 0.0000 | GREEN, 1981 |
| D | ERD | E. COLI REC, DIFFERENTIAL TOXICITY | - | 0 | 0.0000 | ICHINOTSUBO ET AL., 1981a |
| D | ERD | E. COLI REC, DIFFERENTIAL TOXICITY | - | - | 0.0000 | TWEATS, 1981 |
| D | BSD | B. SUBTILIS REC, DIFFERENTIAL TOXICITY | - | - | 19000.0000 | KADA, 1981 |
| G | SAF | S. TYPHIMURIUM, FORWARD MUTATION | 0 | - | 1000.0000 | SKOPEK ET AL., 1981 |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | 0 | - | 1250.0000 | PURCHASE ET AL., 1978 |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | - | - | 94.0000 | ANTOINE ET AL., 1983 |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | 0 | - | 1000.0000 | FALCK ET AL., 1985 |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | - | - | 5000.0000 | MORTELMANS ET AL., 1986 |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | - | - | 2500.0000 | MACDONALD, 1981 |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | - | 0 | 0.0000 | ICHINOTSUBO ET AL., 1981b |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | - | - | 0.0000 | NAGAO & TAKAHASHI, 1981 |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | - | - | 5000.0000 | RICHOLD & JONES, 1981 |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | - | - | 1000.0000 | ROWLAND & SEVERN, 1981 |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | - | - | 1250.0000 | TRUEMAN, 1981 |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | - | - | 250.0000 | VENITT & CROFTON-SLEIGH, 1981 |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | - | ? | 500.0000 | HUBBARD ET AL., 1981 |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | - | - | 1000.0000 | BROOKS & DEAN, 1981 |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | - | - | 500.0000 | BAKER & BONIN, 1981 |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | - | - | 0.0000 | SIMMON & SHEPHERD, 1981 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | 0 | - | 1250.0000 | PURCHASE ET AL., 1978 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | - | - | 94.0000 | ANTOINE ET AL., 1983 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | 0 | - | 1000.0000 | FALCK ET AL., 1985 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | - | - | 5000.0000 | MORTELMANS ET AL., 1986 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | - | - | 5000.0000 | RICHOLD & JONES, 1981 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | - | - | 1000.0000 | ROWLAND & SEVERN, 1981 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | - | - | 1250.0000 | TRUEMAN, 1981 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | - | - | 1000.0000 | GATEHOUSE, 1981 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | - | - | 1000.0000 | BROOKS & DEAN, 1981 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | - | - | 500.0000 | BAKER & BONIN, 1981 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | - | - | 0.0000 | SIMMON & SHEPHERD, 1981 |
| G | SA7 | S. TYPHIMURIUM TA1537, REVERSE MUTATION | - | - | 94.0000 | ANTOINE ET AL., 1983 |
| G | SA7 | S. TYPHIMURIUM TA1537, REVERSE MUTATION | 0 | - | 500.0000 | FALCK ET AL., 1985 |
| G | SA7 | S. TYPHIMURIUM TA1537, REVERSE MUTATION | - | - | 5000.0000 | MORTELMANS ET AL., 1986 |
| G | SA7 | S. TYPHIMURIUM TA1537, REVERSE MUTATION | - | - | 0.0000 | NAGAO & TAKAHASHI, 1981 |
| G | SA7 | S. TYPHIMURIUM TA1537, REVERSE MUTATION | - | - | 5000.0000 | RICHOLD & JONES, 1981 |
| G | SA7 | S. TYPHIMURIUM TA1537, REVERSE MUTATION | - | - | 1000.0000 | ROWLAND & SEVERN, 1981 |
| G | SA7 | S. TYPHIMURIUM TA1537, REVERSE MUTATION | - | - | 1250.0000 | TRUEMAN, 1981 |
| G | SA7 | S. TYPHIMURIUM TA1537, REVERSE MUTATION | - | - | 5000.0000 | MACDONALD, 1981 |
| G | SA7 | S. TYPHIMURIUM TA1537, REVERSE MUTATION | - | - | 1000.0000 | GATEHOUSE, 1981 |
| G | SA7 | S. TYPHIMURIUM TA1537, REVERSE MUTATION | - | - | 1000.0000 | BROOKS & DEAN, 1981 |
| G | SA7 | S. TYPHIMURIUM TA1537, REVERSE MUTATION | - | - | 500.0000 | BAKER & BONIN, 1981 |
| G | SA7 | S. TYPHIMURIUM TA1537, REVERSE MUTATION | - | - | 0.0000 | SIMMON & SHEPHERD, 1981 |
| G | SA8 | S. TYPHIMURIUM TA1538, REVERSE MUTATION | 0 | - | 1250.0000 | PURCHASE ET AL., 1978 |
| G | SA8 | S. TYPHIMURIUM TA1538, REVERSE MUTATION | - | - | 94.0000 | ANTOINE ET AL., 1983 |
| G | SA8 | S. TYPHIMURIUM TA1538, REVERSE MUTATION | 0 | - | 1000.0000 | FALCK ET AL., 1985 |
| G | SA8 | S. TYPHIMURIUM TA1538, REVERSE MUTATION | - | - | 5000.0000 | RICHOLD & JONES, 1981 |
| G | SA8 | S. TYPHIMURIUM TA1538, REVERSE MUTATION | - | - | 1000.0000 | ROWLAND & SEVERN, 1981 |
| G | SA8 | S. TYPHIMURIUM TA1538, REVERSE MUTATION | - | + | 0.0000 | TRUEMAN, 1981 |

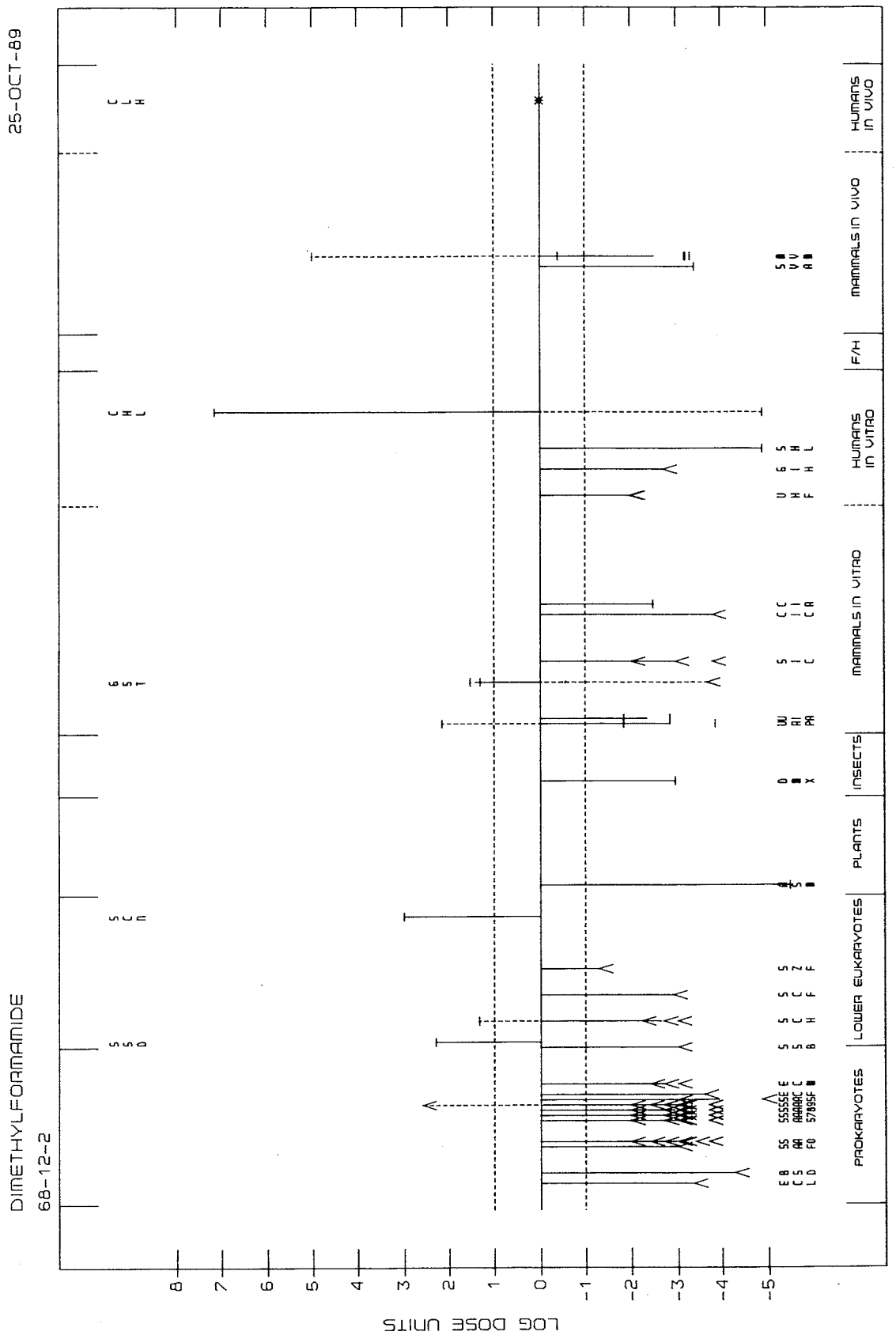
DIMETHYLFORMAMIDE

| END POINT | TEST CODE | TEST SYSTEM | RESULTS NM | RESULTS M | DOSE (LED OR HID) | REFERENCE |
|---|---|---|---|---|---|---|
| G | SA8 | S. TYPHIMURIUM TA1538, REVERSE MUTATION | - | - | 1000.0000 | BROOKS & DEAN, 1981 |
| G | SA8 | S. TYPHIMURIUM TA1538, REVERSE MUTATION | - | - | 500.0000 | BAKER & BONIN, 1981 |
| G | SA8 | S. TYPHIMURIUM TA1538, REVERSE MUTATION | - | - | 0.0000 | SIMMON & SHEPHERD, 1981 |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | 0 | - | 1250.0000 | PURCHASE ET AL., 1978 |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | - | 94.0000 | ANTOINE ET AL., 1983 |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | 0 | - | 1000.0000 | FALCK ET AL., 1985 |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | - | 5000.0000 | MORTELMANS ET AL., 1986 |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | - | 5000.0000 | MACDONALD, 1981 |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | 0 | 0.0000 | ICHINOTSUBO ET AL., 1981b |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | - | 0.0000 | NAGAO & TAKAHASHI, 1981 |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | - | 5000.0000 | RICHOLD & JONES, 1981 |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | - | 1000.0000 | ROWLAND & SEVERN, 1981 |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | + | 250.0000 | TRUEMAN, 1981 |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | - | 250.0000 | VENITT & CROFTON-SLEIGH, 1981 |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | ? | 500.0000 | HUBBARD ET AL., 1981 |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | - | 1000.0000 | GATEHOUSE, 1981 |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | - | 1000.0000 | BROOKS & DEAN, 1981 |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | - | 500.0000 | BAKER & BONIN, 1981 |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | - | 0.0000 | SIMMON & SHEPHERD, 1981 |
| G | SAS | S. TYPHIMURIUM (OTHER), REVERSE MUTATION | 0 | - | 73000.0000 | GREEN & SAVAGE, 1978 |
| G | SAS | S. TYPHIMURIUM (OTHER), REVERSE MUTATION | - | - | 1000.0000 | BROOKS & DEAN, 1981 |
| G | ECF | E. COLI (EXCLUDING K12), FORWARD MUTATION | 0 | - | 4000.0000 | MOHN ET AL., 1981 |
| G | ECW | E. COLI WP2 UVRA, REVERSE MUTATION | 0 | - | 1000.0000 | FALCK ET AL., 1985 |
| G | ECW | E. COLI WP2 UVRA, REVERSE MUTATION | - | - | 250.0000 | VENITT & CROFTON-SLEIGH, 1981 |
| G | ECW | E. COLI WP2 UVRA, REVERSE MUTATION | - | - | 500.0000 | GATEHOUSE, 1981 |
| G | ECW | E. COLI WP2 UVRA, REVERSE MUTATION | - | - | 0.0000 | MATSUSHIMA ET AL., 1981 |
| D | SSB | SACCHAROMYCES, STRAND BREAKS/X-LINKS | - | - | 1000.0000 | KOSSINOVA ET AL., 1981 |
| D | SSD | SACCHAROMYCES, DIFFERENTIAL TOXICITY | + | + | 500.0000 | SHARP & PARRY, 1981a |
| R | SCH | S. CEREVISIAE, HOMOZYGOSIS | - | - | 500.0000 | SHARP & PARRY, 1981b |
| R | SCH | S. CEREVISIAE, HOMOZYGOSIS | + | + | 4700.0000 | ZIMMERMANN & SCHEEL, 1981 |
| R | SCH | S. CEREVISIAE, HOMOZYGOSIS | - | - | 167.0000 | JAGANNATH ET AL., 1981 |
| R | SCH | S. CEREVISIAE, HOMOZYGOSIS | - | - | 1000.0000 | KASSINOVA ET AL., 1981 |
| G | SCF | S. CEREVISIAE, FORWARD MUTATION | - | - | 800.0000 | MEHTA & VON BORSTEL, 1981 |
| G | SZF | S. POMBE, FORWARD MUTATION | - | - | 20.0000 | LOPRIENO, 1981 |
| A | SCN | S. CEREVISIAE, ANEUPLOIDY | + | + | 100.0000 | PARRY & SHARP, 1981 |
| G | ASM | ARABIDOPSIS SPECIES, MUTATION | - | 0 | 300000.0000 | GICHNER & VELEMINSKY, 1987 |
| G | DMX | D. MELANOGASTER, SEX-LINKED RECESSIVES | - | 0 | 900.0000 | WURGLER & GRAF, 1981 |
| D | URP | UDS, RAT PRIMARY HEPATOCYTES | (+) | 0 | 700.0000 | WILLIAMS, 1977 |
| D | URP | UDS, RAT PRIMARY HEPATOCYTES | - | 0 | 7300.0000 | WILLIAMS & LASPIA, 1979 |
| D | URP | UDS, RAT PRIMARY HEPATOCYTES | - | 0 | 70.0000 | ITO, 1982 |
| D | UIA | UDS, OTHER ANIMAL CELLS IN VITRO | - | 0 | 700.0000 | MCQUEEN ET AL., 1983 |
| D | UIA | UDS, OTHER ANIMAL CELLS IN VITRO | - | 0 | 70.0000 | KLAUNIG ET AL., 1984 |
| G | G5T | MUTATION, L5178Y CELLS, TK LOCUS | (+) | - | 5000.0000 | MCGREGOR ET AL., 1988 |
| G | G5T | MUTATION, L5178Y CELLS, TK LOCUS | - | - | 4700.0000 | MITCHELL ET AL., 1988 |
| G | G5T | MUTATION, L5178Y CELLS, TK LOCUS | (+) | - | 3000.0000 | JOTZ & MITCHELL, 1981 |
| G | G5T | MUTATION, L5178Y CELLS, TK LOCUS | - | - | 4700.0000 | MYHR & CASPARY, 1988 |
| S | SIC | SCE, CHINESE HAMSTER CELLS IN VITRO | - | - | 100.0000 | PERRY & THOMSON, 1981 |
| S | SIC | SCE, CHINESE HAMSTER CELLS IN VITRO | - | - | 900.0000 | EVANS & MITCHELL, 1981 |
| S | SIC | SCE, CHINESE HAMSTER CELLS IN VITRO | - | - | 6300.0000 | NATARAJAN & VAN KESTEREN-VAN LEEUWEN, 198 |
| C | CIC | CHROM ABERR, CHINESE HAMSTER CELLS IN VITRO | - | - | 6300.0000 | NATARAJAN & VAN KESTEREN-VAN LEEUWEN, 198 |

DIMETHYLFORMAMIDE

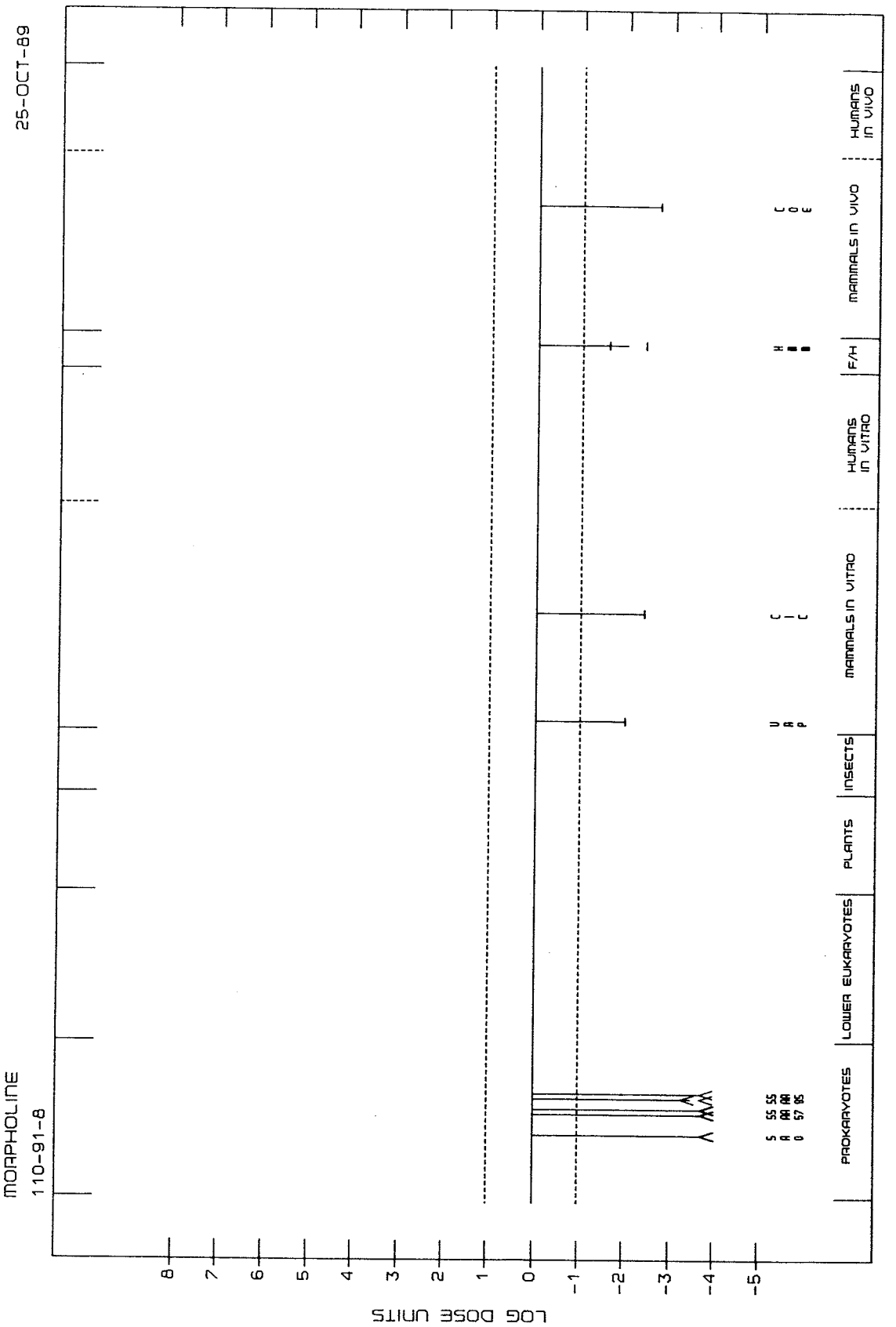
| END POINT | TEST CODE | TEST SYSTEM | RESULTS NM | RESULTS M | DOSE (LED OR HID) | REFERENCE |
|---|---|---|---|---|---|---|
| C | CIR | CHROM ABERR, RAT CELLS IN VITRO | - | 0 | 300.0000 | DEAN, 1981 |
| D | UHF | UDS, HUMAN FIBROBLASTS IN VITRO | - | - | 90.0000 | ROBINSON & MITCHELL, 1981 |
| D | UHF | UDS, HUMAN FIBROBLASTS IN VITRO | 0 | - | 0.0000 | AGRELO & AMOS, 1981 |
| D | UHF | UDS, HUMAN FIBROBLASTS IN VITRO | - | - | 100.0000 | MARTIN & MCDERMID, 1981 |
| G | GIH | MUTATION, HUMAN CELLS IN VITRO | - | - | 500.0000 | GUPTA & GOLDSTEIN, 1981 |
| S | SHL | SCE, HUMAN LYMPHOCYTES IN VITRO | - | 0 | 80000.0000 | ANTOINE ET AL., 1983 |
| C | CHL | CHROM ABERR, HUMAN LYMPHOCYTES IN VITRO | - | 0 | 80000.0000 | ANTOINE ET AL., 1983 |
| C | CHL | CHROM ABERR, HUMAN LYMPHOCYTES IN VITRO | + | 0 | 0.0070 | KOUDELA & SPAZIER ET AL., 1979 |
| S | SVA | SCE, ANIMALS IN VIVO | - | 0 | 2500.0000 | PAIKA ET AL., 1981 |
| M | MVM | MICRONUCLEUS TEST, MICE IN VIVO | - | 0 | 2.5000 | SALAMONE ET AL., 1981 |
| M | MVM | MICRONUCLEUS TEST, MICE IN VIVO | - | 0 | 1600.0000 | KIRKHART, 1981 |
| M | MVM | MICRONUCLEUS TEST, MICE IN VIVO | - | 0 | 1500.0000 | TSUCHIMOTO & MATTER, 1981 |
| M | MVM | MICRONUCLEUS TEST, MICE IN VIVO | - | 0 | 2000.0000 | ANTOINE ET AL., 1983 |
| M | MVM | MICRONUCLEUS TEST, MICE IN VIVO | + | 0 | 1.0000 | YE ET AL., 1987 |
| C | CLH | CHROM ABERR, HUMAN LYMPHOCYTES IN VIVO | + | 0 | 0.0000 | BERGER ET AL., 1985 |
| C | CLH | CHROM ABERR, HUMAN LYMPHOCYTES IN VIVO | + | 0 | 0.0000 | KOUDELA & SPAZIER ET AL., 1981 |
| P | SPM | SPERM MORPHOLOGY, MICE | - | 0 | 667.0000 | ANTOINE ET AL., 1983 |
| P | SPM | SPERM MORPHOLOGY, MICE | - | 0 | 900.0000 | TOPHAM, 1980 |
| I | ICR | INHIBIT CELL COMMUNICATION, ANIMAL CELLS | + | 0 | 3800.0000 | CHEN ET AL., 1984 |

Dimethylformamide was one of the compounds tested in 17 studies on mutation in bacteria in the International Collaborative Program for the Evaluation of Short-term Tests for Carcinogens (de Serres & Ashby, 1981). In two of the studies, results for dimethylformamide were not reported directly, so these are not included in the above listing.


25-OCT-89
DIMETHYLFORMAMIDE
68-12-2
LOG DOSE UNITS
8
7
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
PROKARYOTES
LOWER EUKARYOTES
PLANTS
INSECTS
MAMMALS IN VITRO
HUMANS IN VITRO
F/H
MAMMALS IN VIVO
HUMANS IN VIVO

MORPHOLINE

| END POINT | TEST CODE | TEST SYSTEM | RESULTS NM | RESULTS M | DOSE (LED OR HID) | REFERENCE |
|---|---|---|---|---|---|---|
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | - | - | 5450.0000 | HAWORTH ET AL., 1983 |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | - | - | 5000.0000 | ISHIDATE ET AL., 1984 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | - | - | 5450.0000 | HAWORTH ET AL., 1983 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | - | - | 5000.0000 | ISHIDATE ET AL., 1984 |
| G | SA7 | S. TYPHIMURIUM TA1537, REVERSE MUTATION | - | - | 5450.0000 | HAWORTH ET AL., 1983 |
| G | SA7 | S. TYPHIMURIUM TA1537, REVERSE MUTATION | - | - | 5000.0000 | ISHIDATE ET AL., 1984 |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | - | 1800.0000 | HAWORTH ET AL., 1983 |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | - | 5000.0000 | ISHIDATE ET AL., 1984 |
| G | SAS | S. TYPHIMURIUM (OTHER), REVERSE MUTATION | - | - | 5000.0000 | ISHIDATE ET AL., 1984 |
| D | URP | UDS, RAT PRIMARY HEPATOCYTES | - | 0 | 100.0000 | CONAWAY ET AL., 1984 |
| C | CIC | CHROM ABERR, CHINESE HAMSTER CELLS IN VITRO | - | 0 | 250.0000 | ISHIDATE ET AL., 1984 |
| H | HMM | HOST-MEDIATED ASSAY, MICROBIAL CELLS | - | 0 | 250.0000 | BRAUN ET AL., 1977 |
| H | HMM | HOST-MEDIATED ASSAY, MICROBIAL CELLS | - | 0 | 40.0000 | EDWARDS ET AL., 1979 |
| C | COE | CHROM ABERR, OOCYTES OR EMBRYOS | - | 0 | 500.0000 | INUI ET AL., 1979 |

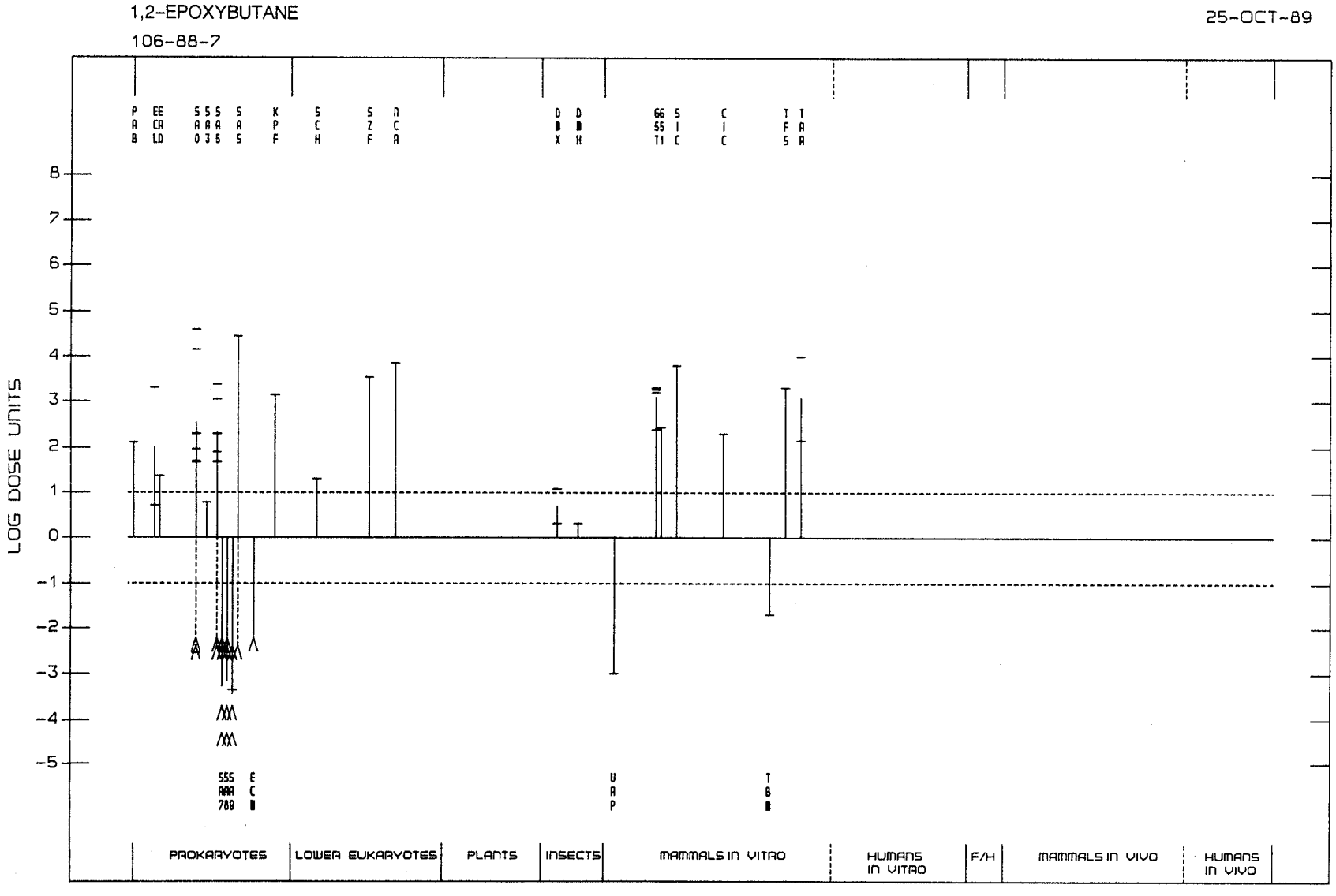

MORPHOLINE
110-91-8
25-OCT-89
LOG DOSE UNITS
8
7
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
PROKARYOTES
LOWER EUKARYOTES
PLANTS
INSECTS
MAMMALS IN VITRO
HUMANS IN VITRO
F/H
MAMMALS IN VIVO
HUMANS IN VIVO

1,2-EPOXYBUTANE

| END POINT | TEST CODE | TEST SYSTEM | RESULTS NM | RESULTS M | DOSE (LED OR HID) | REFERENCE |
|---|---|---|---|---|---|---|
| D | PRB | PROPHAGE, INDUCT/SOS/STRAND BREAKS/X-LINKS | + | 0 | 780.0000 | NAKAMURA ET AL., 1987 |
| D | ECL | E. COLI POL A, DIFFERENTIAL TOX (LIQUID) | + | 0 | 20000.0000 | MCCARROLL ET AL., 1981b |
| D | ECL | E. COLI POL A, DIFFERENTIAL TOX (LIQUID) | + | 0 | 50.0000 | ROSENKRANZ & POIRIER, 1979 |
| D | ERD | E. COLI REC, DIFFERENTIAL TOXICITY | + | 0 | 4300.0000 | MCCARROLL ET AL., 1981b |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | + | 0 | 0.0000 | MCMAHON ET AL., 1979 |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | (+) | 0 | 2100.0000 | MCCANN ET AL., 1975 |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | + | 0 | 7.0000 | SPECK & ROSENKRANZ, 1976 |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | + | 0 | 2100.0000 | HENSCHLER ET AL., 1977 |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | - | - | 167.0000 | DUNKEL ET AL., 1984 |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | - | - | 250.0000 | SIMMON, 1979a |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | + | + | 2.5000 | DE FLORA, 1979 |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | + | + | 2000.0000 | DE FLORA, 1981 |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | + | 0 | 1100.0000 | GERVASI ET AL., 1985 |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | + | + | 0.0000 | DE FLORA ET AL., 1984 |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | + | + | 500.0000 | CANTER ET AL., 1986 |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | - | 0 | 360.0000 | ROSMAN ET AL., 1987 |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | + | + | 500.0000 | NTP, 1988 |
| G | SA3 | S. TYPHIMURIUM TA1530, REVERSE MUTATION | + | 0 | 17000.0000 | CHEN ET AL., 1975 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | + | 0 | 2100.0000 | MCCANN ET AL., 1975 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | + | + | 0.0000 | DE FLORA ET AL., 1984 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | - | - | 167.0000 | DUNKEL ET AL., 1984 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | - | - | 250.0000 | SIMMON, 1979a |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | + | + | 42.0000 | ROSENKRANZ & POIRIER, 1979 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | + | + | 1250.0000 | WEINSTEIN ET AL., 1981 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | + | + | 2000.0000 | DE FLORA, 1981 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | + | + | 500.0000 | CANTER ET AL., 1986 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | + | 0 | 90.0000 | ROSMAN ET AL., 1987 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | + | + | 500.0000 | NTP, 1988 |
| G | SA7 | S. TYPHIMURIUM TA1537, REVERSE MUTATION | - | - | 167.0000 | DUNKEL ET AL., 1984 |
| G | SA7 | S. TYPHIMURIUM TA1537, REVERSE MUTATION | - | - | 250.0000 | SIMMON, 1979a |
| G | SA7 | S. TYPHIMURIUM TA1537, REVERSE MUTATION | - | - | 20000.0000 | DE FLORA, 1981 |
| G | SA7 | S. TYPHIMURIUM TA1537, REVERSE MUTATION | - | - | 5000.0000 | CANTER ET AL., 1986 |
| G | SA7 | S. TYPHIMURIUM TA1537, REVERSE MUTATION | - | - | 5000.0000 | NTP, 1988 |
| G | SA8 | S. TYPHIMURIUM TA1538, REVERSE MUTATION | - | - | 250.0000 | SIMMON, 1979a |
| G | SA8 | S. TYPHIMURIUM TA1538, REVERSE MUTATION | - | - | 20000.0000 | DE FLORA, 1981 |
| G | SA8 | S. TYPHIMURIUM TA1538, REVERSE MUTATION | - | - | 167.0000 | DUNKEL ET AL., 1984 |
| G | SA8 | S. TYPHIMURIUM TA1538, REVERSE MUTATION | - | - | 5000.0000 | NTP, 1988 |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | - | 20000.0000 | DE FLORA, 1981 |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | 0 | 2200.0000 | GERVASI ET AL., 1985 |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | - | 5000.0000 | CANTER ET AL., 1986 |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | - | 250.0000 | SIMMON, 1979a |
| G | SAS | S. TYPHIMURIUM (OTHER), REVERSE MUTATION | + | 0 | 3.5000 | ROSENKRANZ & SPECK, 1975 |
| G | SAS | S. TYPHIMURIUM (OTHER), REVERSE MUTATION | - | - | 250.0000 | SIMMON, 1979a |
| G | ECW | E. COLI WP2 UVRA, REVERSE MUTATION | + | 0 | 0.0000 | MCMAHON ET AL., 1979 |
| G | ECW | E. COLI WP2 UVRA, REVERSE MUTATION | - | - | 167.0000 | DUNKEL ET AL., 1984 |
| G | KPF | K. PNEUMONIA, FORWARD MUTATION | (+) | + | 72.0000 | VOOGD ET AL., 1981 |
| G | KPF | K. PNEUMONIA, FORWARD MUTATION | + | 0 | 72.0000 | KNAAP ET AL., 1982 |
| R | SCH | S. CEREVISIAE, HOMOZYGOSIS | + | + | 5000.0000 | SIMMON, 1979b |
| G | SZF | S. POMBE, FORWARD MUTATION | + | + | 29.0000 | MIGLIORE ET AL., 1982 |
| G | NCR | N. CRASSA, REVERSE MUTATION | (+) | 0 | 14.0000 | KOLMARK & GILES, 1955 |

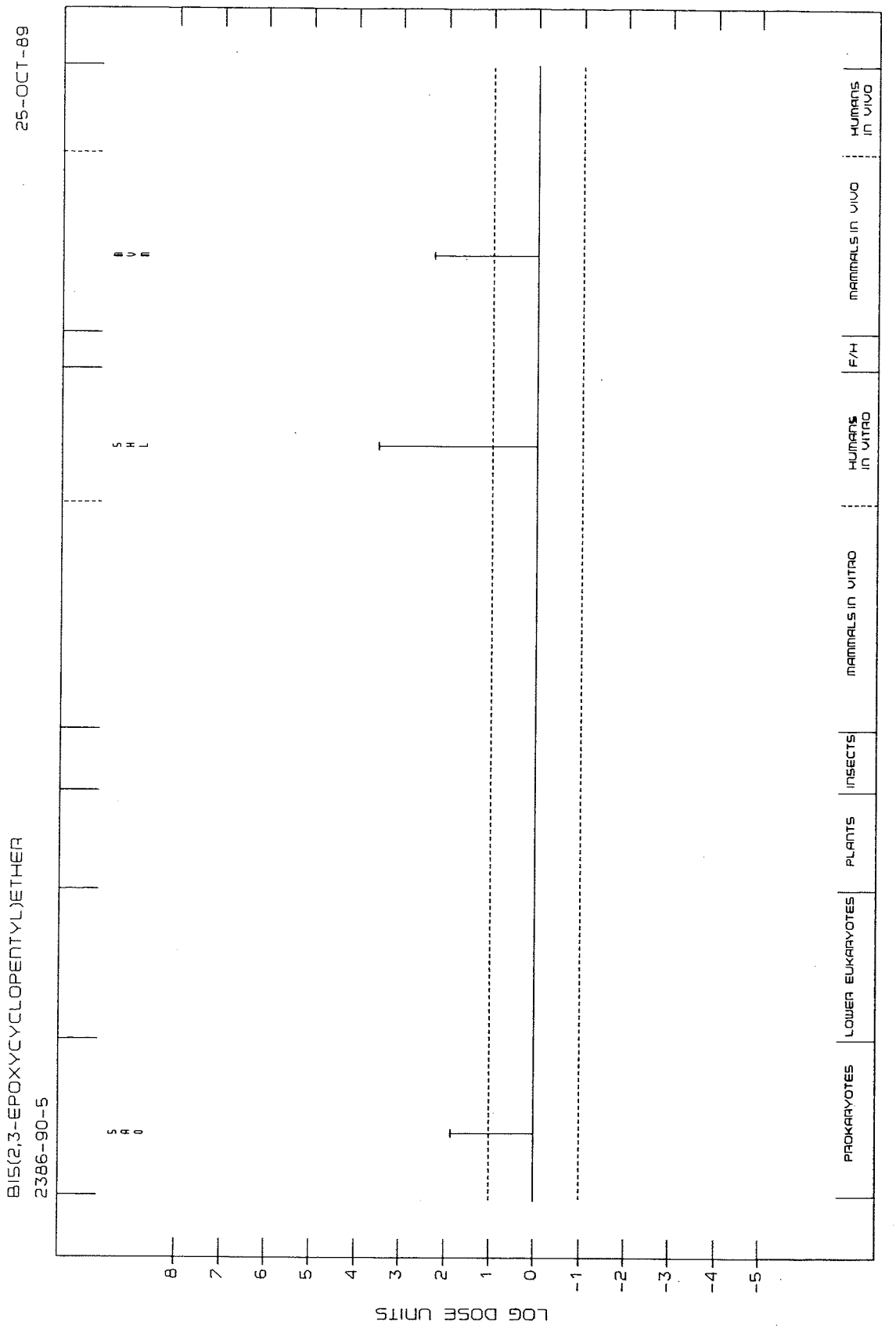
1,2-EPOXYBUTANE

| END POINT | TEST CODE | TEST SYSTEM | RESULTS NM | RESULTS M | DOSE (LED OR HID) | REFERENCE |
|---|---|---|---|---|---|---|
| G | DMX | D. MELANOGASTER, SEX-LINKED RECESSIVES | + | 0 | 8400.0000 | KNAAP ET AL., 1982 |
| G | DMX | D. MELANOGASTER, SEX-LINKED RECESSIVES | + | 0 | 50000.0000 | NTP, 1988 |
| C | DMH | D. MELANOGASTER, HERITABLE TRANSLOCATIONS | + | 0 | 50000.0000 | NTP, 1988 |
| D | URP | UDS, RAT PRIMARY HEPATOCYTES | - | 0 | 1000.0000 | WILLIAMS ET AL., 1982 |
| G | G5T | MUTATION, L5178Y CELLS, TK LOCUS | + | 0 | 63.0000 | AMACHER ET AL., 1980 |
| G | G5T | MUTATION, L5178Y CELLS, TK LOCUS | + | + | 400.0000 | MCGREGOR ET AL., 1987 |
| G | G5T | MUTATION, L5178Y CELLS, TK LOCUS | + | + | 55.0000 | MITCHELL ET AL., 1988 |
| G | G5T | MUTATION, L5178Y CELLS, TK LOCUS | + | + | 50.0000 | MYHR & CASPARY, 1985 |
| G | G5T | MUTATION, L5178Y CELLS, TK LOCUS | + | + | 50.0000 | NTP, 1988 |
| G | G51 | MUTATION, L5178Y CELLS, ALL OTHER LOCI | + | 0 | 360.0000 | KNAAP ET AL., 1982 |
| S | SIC | SCE, CHINESE HAMSTER CELLS IN VITRO | + | + | 16.0000 | NTP, 1988 |
| C | CIC | CHROM ABERR, CHINESE HAMSTER CELLS IN VITRO | (+) | (+) | 500.0000 | NTP, 1988 |
| T | TBM | CELL TRANSFORMATION, BALB/C3T3 CELLS | - | 0 | 50.0000 | DUNKEL ET AL., 1981 |
| T | TCS | CELL TRANSFORMATION, SHE, CLONAL ASSAY | + | 0 | 0.0000 | PIENTA ET AL., 1981 |
| T | TFS | CELL TRANSFORMATION, SHE, FOCUS ASSAY | (+) | 0 | 50.0000 | DUNKEL ET AL., 1981 |
| T | TRR | CELL TRANSFORMATION, RLV/FISCHER RAT | + | 0 | 10.0000 | PRICE & MISHRA, 1980 |
| T | TRR | CELL TRANSFORMATION, RLV/FISCHER RAT | + | 0 | 700.0000 | DUNKEL ET AL., 1981 |


1,2-EPOXYBUTANE
106-88-7
25-OCT-89
LOG DOSE UNITS
8
7
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
PROKARYOTES
LOWER EUKARYOTES
PLANTS
INSECTS
MAMMALS IN VITRO
HUMANS IN VITRO
F/H
MAMMALS IN VIVO
HUMANS IN VIVO

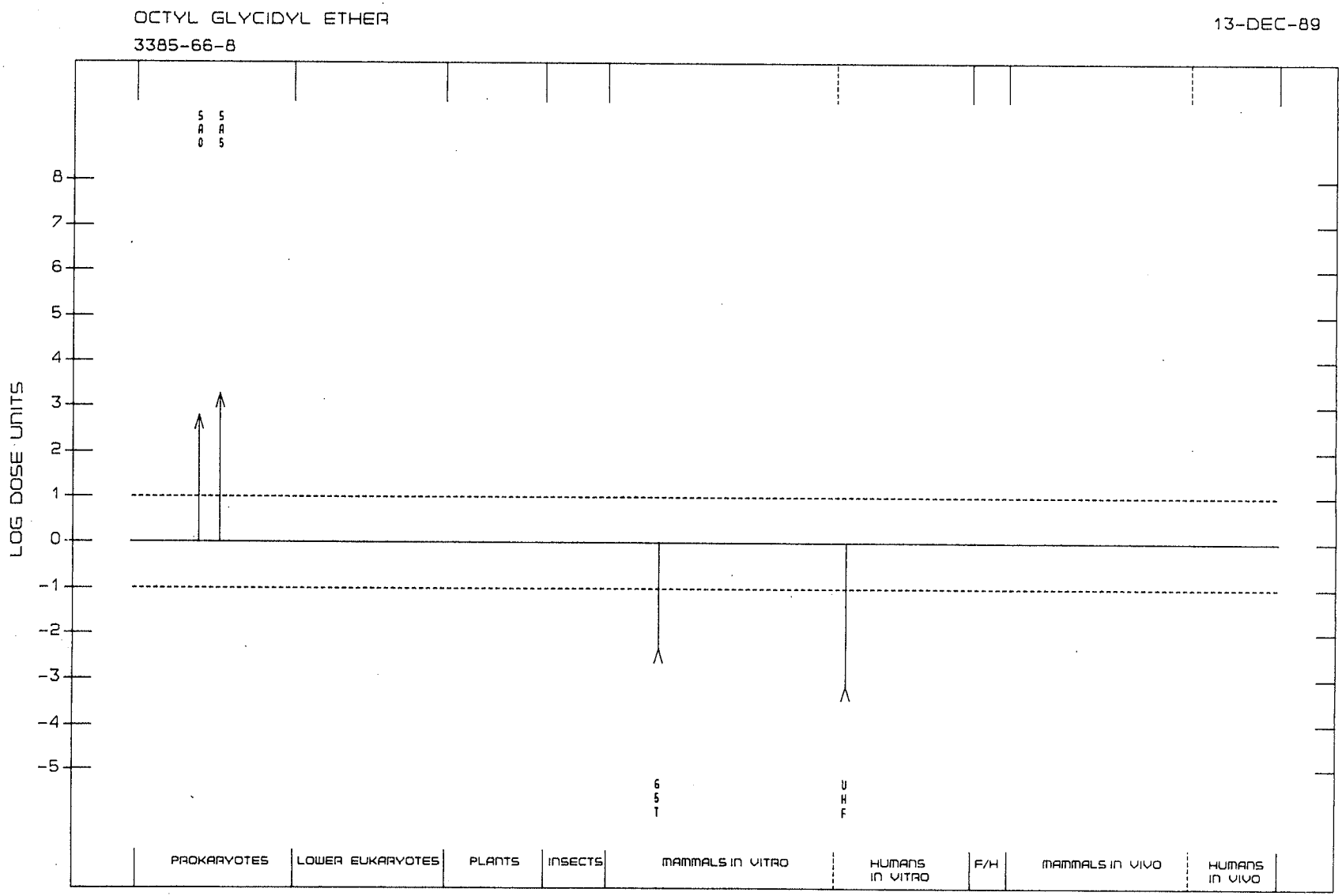
BIS(2,3-EPOXYCYCLOPENTYL)ETHER

| END POINT | TEST CODE | TEST SYSTEM | RESULTS NM | RESULTS M | DOSE (LED OR HID) | REFERENCE |
|---|---|---|---|---|---|---|
| G | SAO | S. TYPHIMURIUM TA100, REVERSE MUTATION | + | + | 1425.0000 | XIE & DONG, 1984 |
| S | SHL | SCE, HUMAN LYMPHOCYTES IN VITRO | + | 0 | 30.0000 | XIE & DONG, 1984 |
| M | MVM | MICRONUCLEUS TEST, MICE IN VIVO | + | 0 | 500.0000 | XIE & DONG, 1984 |


BIS(2,3-EPOXYCYCLOPENTYL)ETHER
2386-90-5
25-OCT-89
SAO
SHL
AVA
LOG DOSE UNITS
8
7
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
PROKARYOTES
LOWER EUKARYOTES
PLANTS
INSECTS
MAMMALS IN VITRO
HUMANS IN VITRO
F/H
MAMMALS IN VIVO
HUMANS IN VIVO

OCTYL GLYCIDYL ETHER

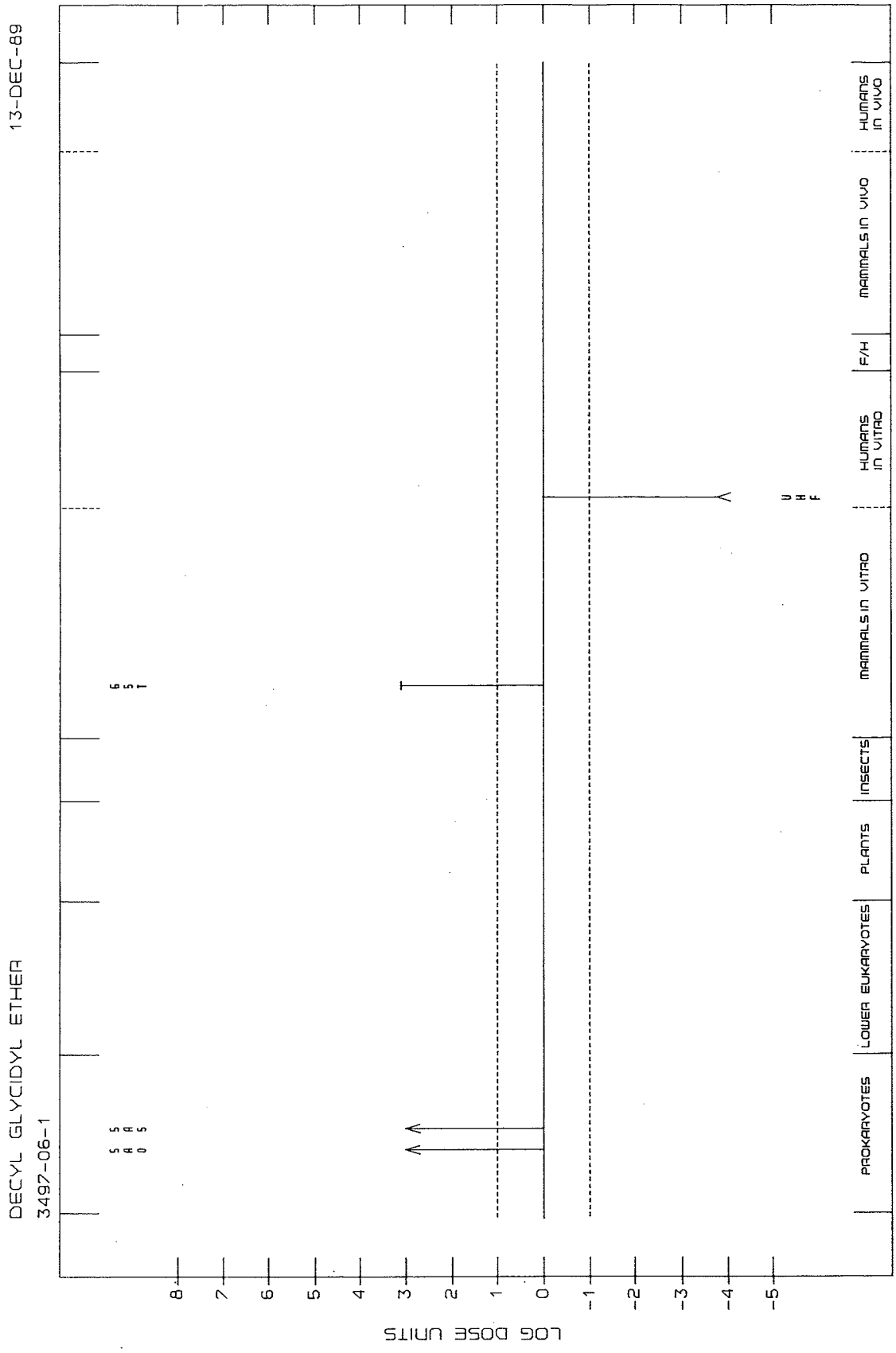
| END POINT | TEST CODE | TEST SYSTEM | RESULTS NM | RESULTS M | DOSE (LED OR HID) | REFERENCE |
|---|---|---|---|---|---|---|
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | - | + | 167.0000 | THOMPSON ET AL., 1981 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | - | + | 56.0000 | THOMPSON ET AL., 1981 |
| G | G5T | MUTATION, L5178Y CELLS, TK LOCUS | - | - | 225.0000 | THOMPSON ET AL., 1981 |
| D | UHF | UDS, HUMAN FIBROBLASTS IN VITRO | - | - | 1400.0000 | THOMPSON ET AL., 1981 |


OCTYL GLYCIDYL ETHER
3385-66-8
13-DEC-89
LOG DOSE UNITS
8
7
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
SAO
SAS
GST
UHF
PROKARYOTES
LOWER EUKARYOTES
PLANTS
INSECTS
MAMMALS IN VITRO
HUMANS IN VITRO
F/H
MAMMALS IN VIVO
HUMANS IN VIVO

# APPENDIX 2

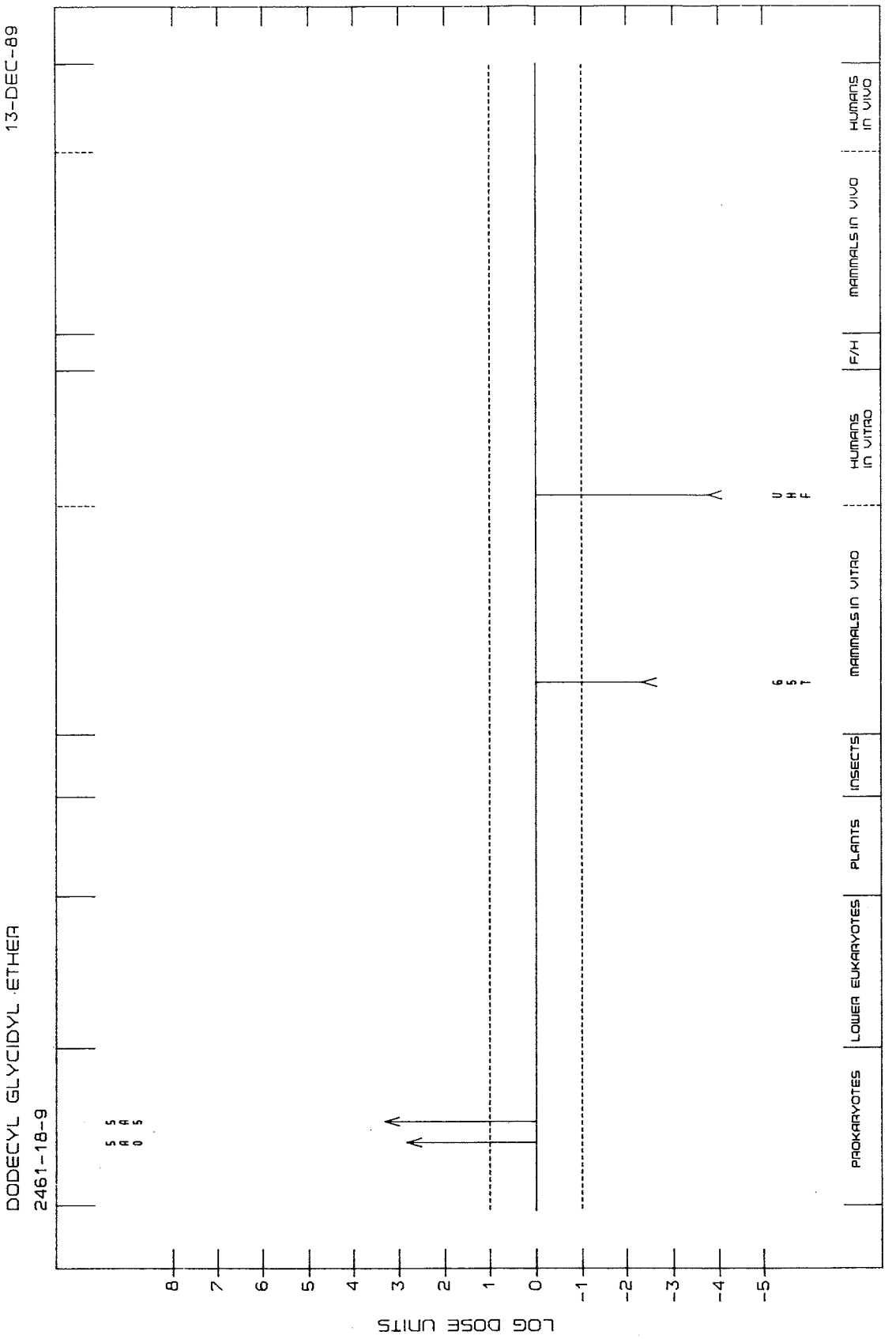
DECYL GLYCIDYL ETHER

| END POINT | TEST CODE | TEST SYSTEM | RESULTS NM | RESULTS M | DOSE (LED OR HID) | REFERENCE |
|---|---|---|---|---|---|---|
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | - | + | 100.0000 | THOMPSON ET AL., 1981 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | - | + | 100.0000 | THOMPSON ET AL., 1981 |
| G | G5T | MUTATION, L5178Y CELLS, TK LOCUS | + | - | 80.0000 | THOMPSON ET AL., 1981 |
| D | UHF | UDS, HUMAN FIBROBLASTS IN VITRO | - | - | 6000.0000 | THOMPSON ET AL., 1981 |


13-DEC-89
DECYL GLYCIDYL ETHER
3497-06-1
S S A O S
G S T
U H F
PROKARYOTES
LOWER EUKARYOTES
PLANTS
INSECTS
MAMMALS IN VITRO
HUMANS IN VITRO
F/H
MAMMALS IN VIVO
HUMANS IN VIVO
LOG DOSE UNITS
8
7
6
5
4
3
2
1
0
-1
-2
-3
-4
-5

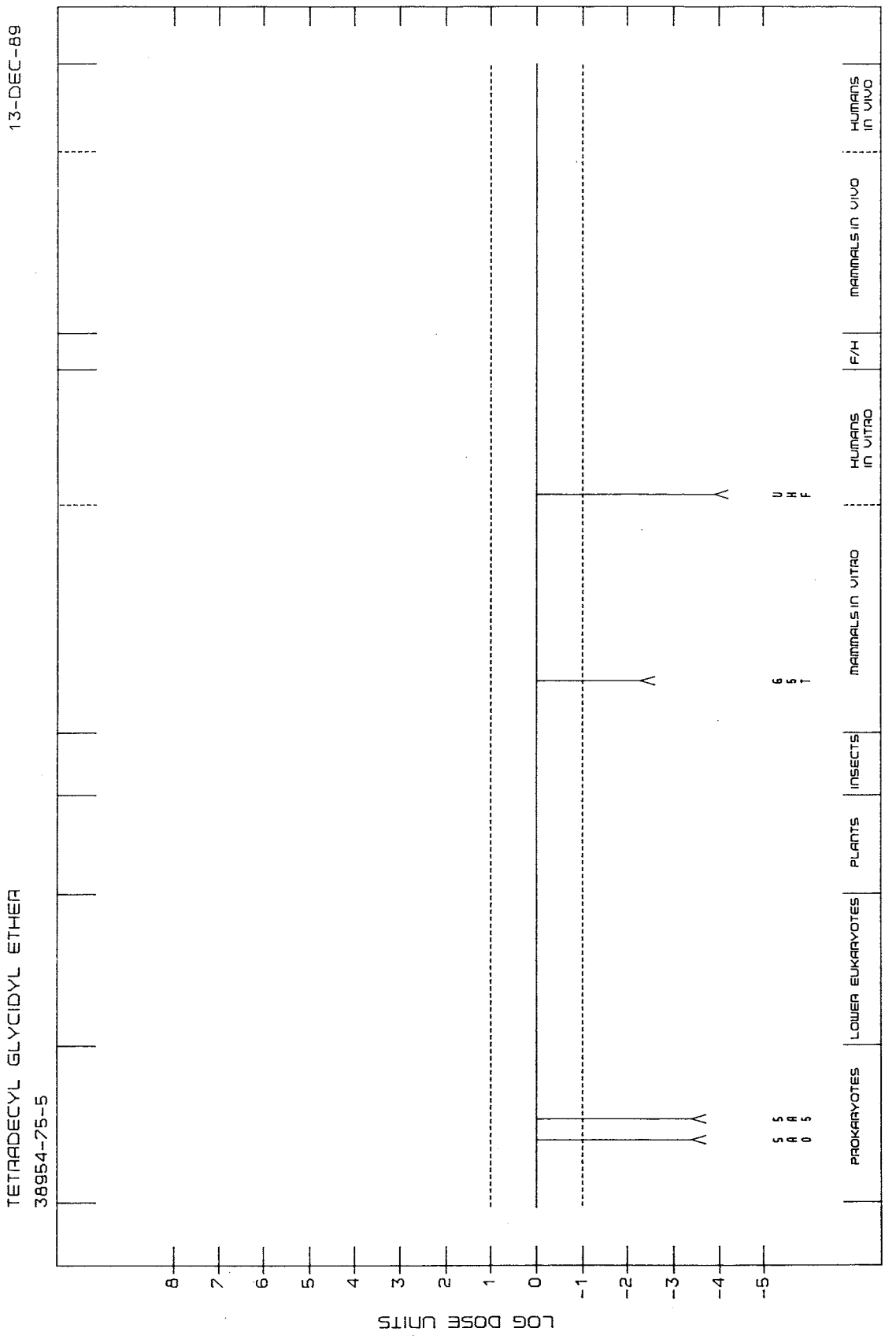
DODECYL GLYCIDYL ETHER

| END POINT | TEST CODE | TEST SYSTEM | RESULTS NM | RESULTS M | DOSE (LED OR HID) | REFERENCE |
|---|---|---|---|---|---|---|
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | - | + | 150.0000 | THOMPSON ET AL., 1981 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | - | + | 50.0000 | THOMPSON ET AL., 1981 |
| G | G5T | MUTATION, L5178Y CELLS, TK LOCUS | - | - | 225.0000 | THOMPSON ET AL., 1981 |
| D | UHF | UDS, HUMAN FIBROBLASTS IN VITRO | - | - | 6000.0000 | THOMPSON ET AL., 1981 |


13-DEC-89
DODECYL GLYCIDYL ETHER
2461-18-9
S S A O S
6 5 7
U H F
PROKARYOTES
LOWER EUKARYOTES
PLANTS
INSECTS
MAMMALS IN VITRO
HUMANS IN VITRO
F/H
MAMMALS IN VIVO
HUMANS IN VIVO
LOG DOSE UNITS
8
7
6
5
4
3
2
1
0
-1
-2
-3
-4
-5

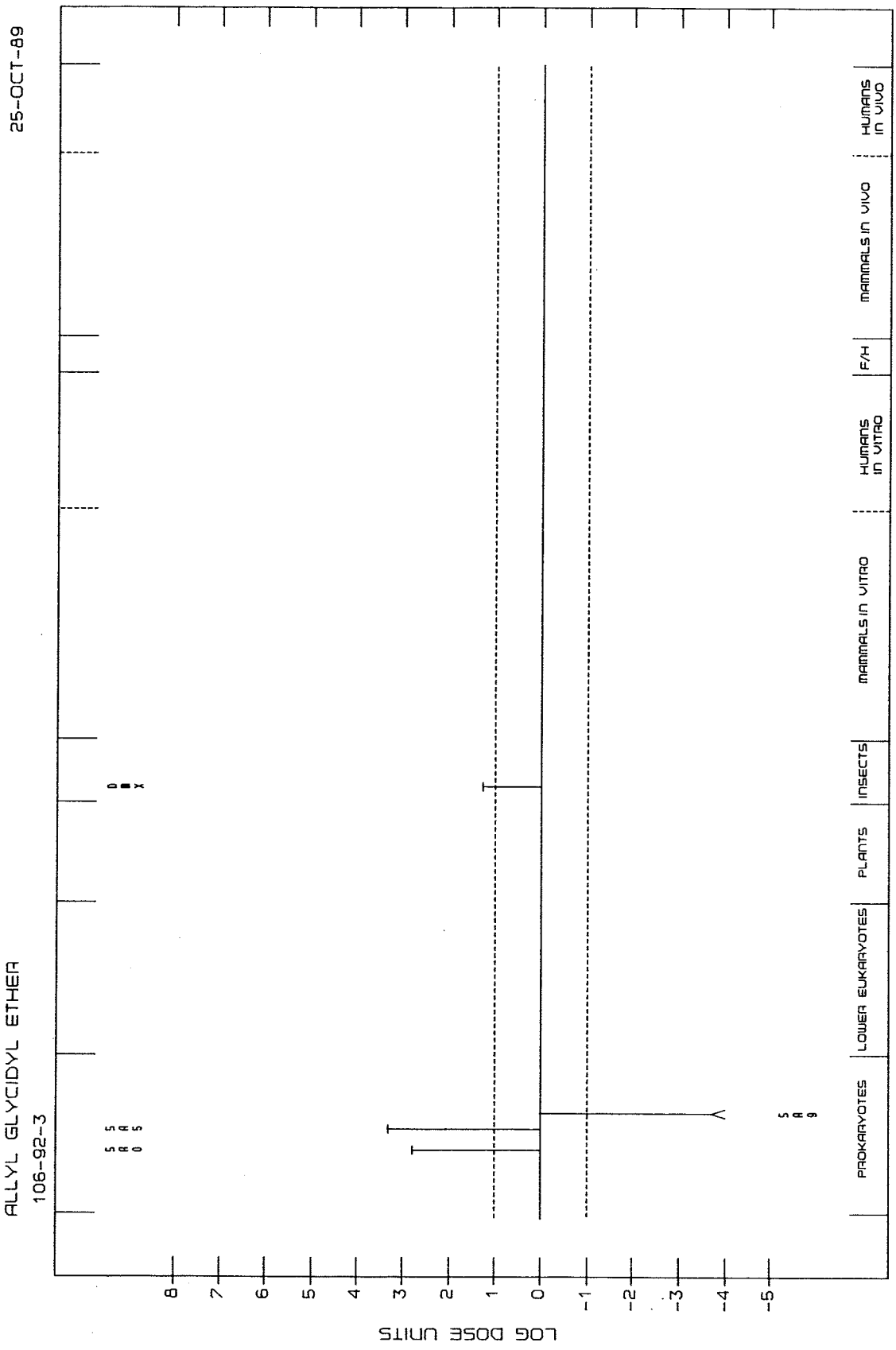
TETRADECYL GLYCIDYL ETHER

| END POINT | TEST CODE | TEST SYSTEM | RESULTS NM | RESULTS M | DOSE (LED OR HID) | REFERENCE |
|---|---|---|---|---|---|---|
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | - | - | 2500.0000 | THOMPSON ET AL., 1981 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | - | - | 2500.0000 | THOMPSON ET AL., 1981 |
| G | G5T | MUTATION, L5178Y CELLS, TK LOCUS | - | - | 200.0000 | THOMPSON ET AL., 1981 |
| D | UHF | UDS, HUMAN FIBROBLASTS IN VITRO | - | - | 8000.0000 | THOMPSON ET AL., 1981 |


TETRADECYL GLYCIDYL ETHER
38954-75-5
13-DEC-89
LOG DOSE UNITS
8
7
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
PROKARYOTES
LOWER EUKARYOTES
PLANTS
INSECTS
MAMMALS IN VITRO
HUMANS IN VITRO
F/H
MAMMALS IN VIVO
HUMANS IN VIVO
S S A O S
G S T
U H F

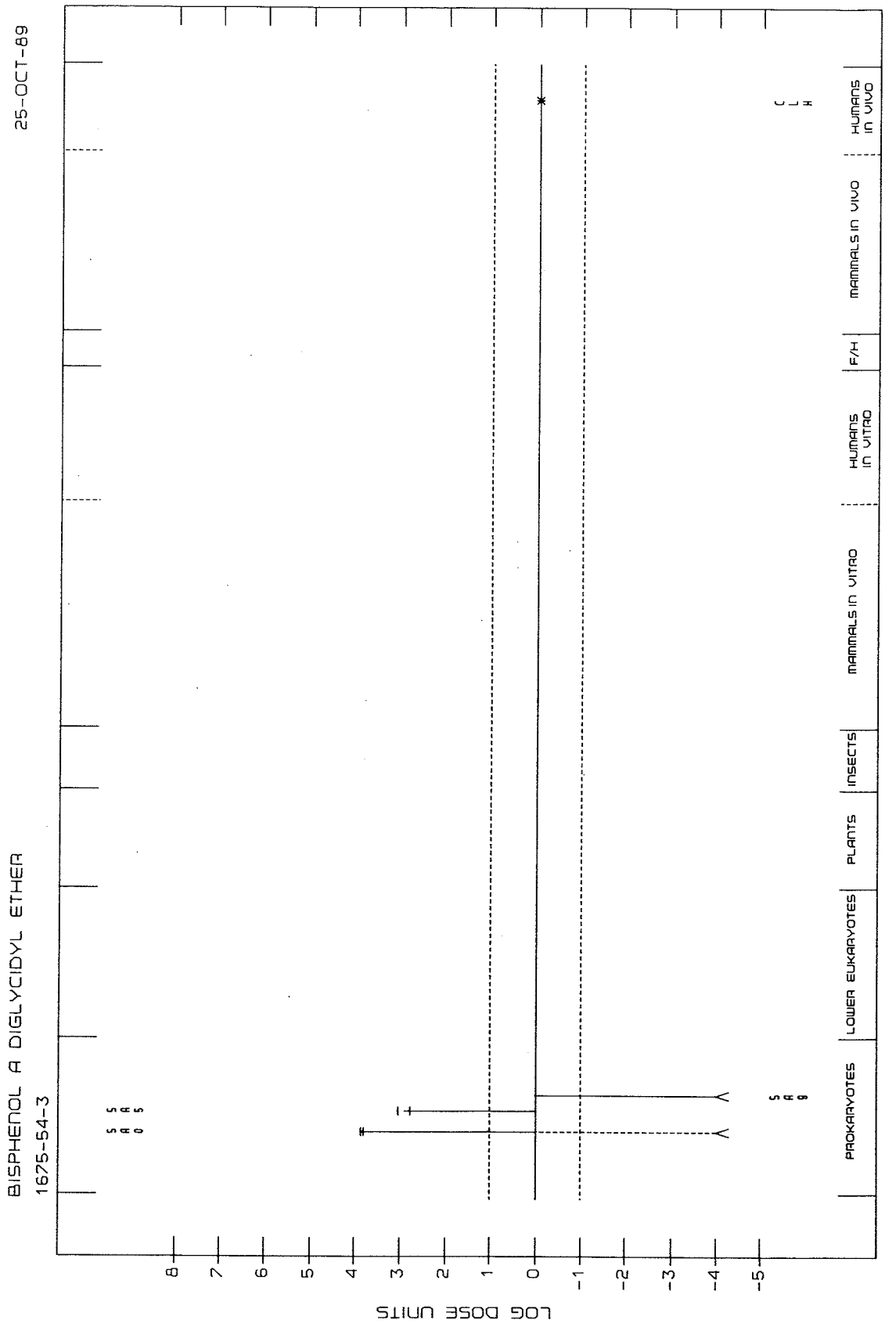
ALLYL GLYCIDYL ETHER

| END POINT | TEST CODE | TEST SYSTEM | RESULTS NM | RESULTS M | DOSE (LED OR HID) | REFERENCE |
|---|---|---|---|---|---|---|
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | + | + | 167.0000 | CANTER ET AL., 1986 |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | + | + | 0.0000 | WADE ET AL., 1979 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | + | + | 50.0000 | CANTER ET AL., 1986 |
| G | SA7 | S. TYPHIMURIUM TA1537, REVERSE MUTATION | - | - | 0.0000 | CANTER ET AL., 1986 |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | - | 0.0000 | CANTER ET AL., 1986 |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | - | 5000.0000 | WADE ET AL., 1979 |
| G | ECW | E. COLI WP2 UVRA, REVERSE MUTATION | + | 0 | 0.0000 | HEMMINKI ET AL., 1980 |
| G | DMX | D. MELANOGASTER, SEX-LINKED RECESSIVES | + | 0 | 5280.0000 | YOON ET AL., 1985 |


25-OCT-89
ALLYL GLYCIDYL ETHER
106-92-3
S S R A O S
D ■ X
S A G
PROKARYOTES
LOWER EUKARYOTES
PLANTS
INSECTS
MAMMALS IN VITRO
HUMANS IN VITRO
F/H
MAMMALS IN VIVO
HUMANS IN VIVO
LOG DOSE UNITS
8
7
6
5
4
3
2
1
0
-1
-2
-3
-4
-5

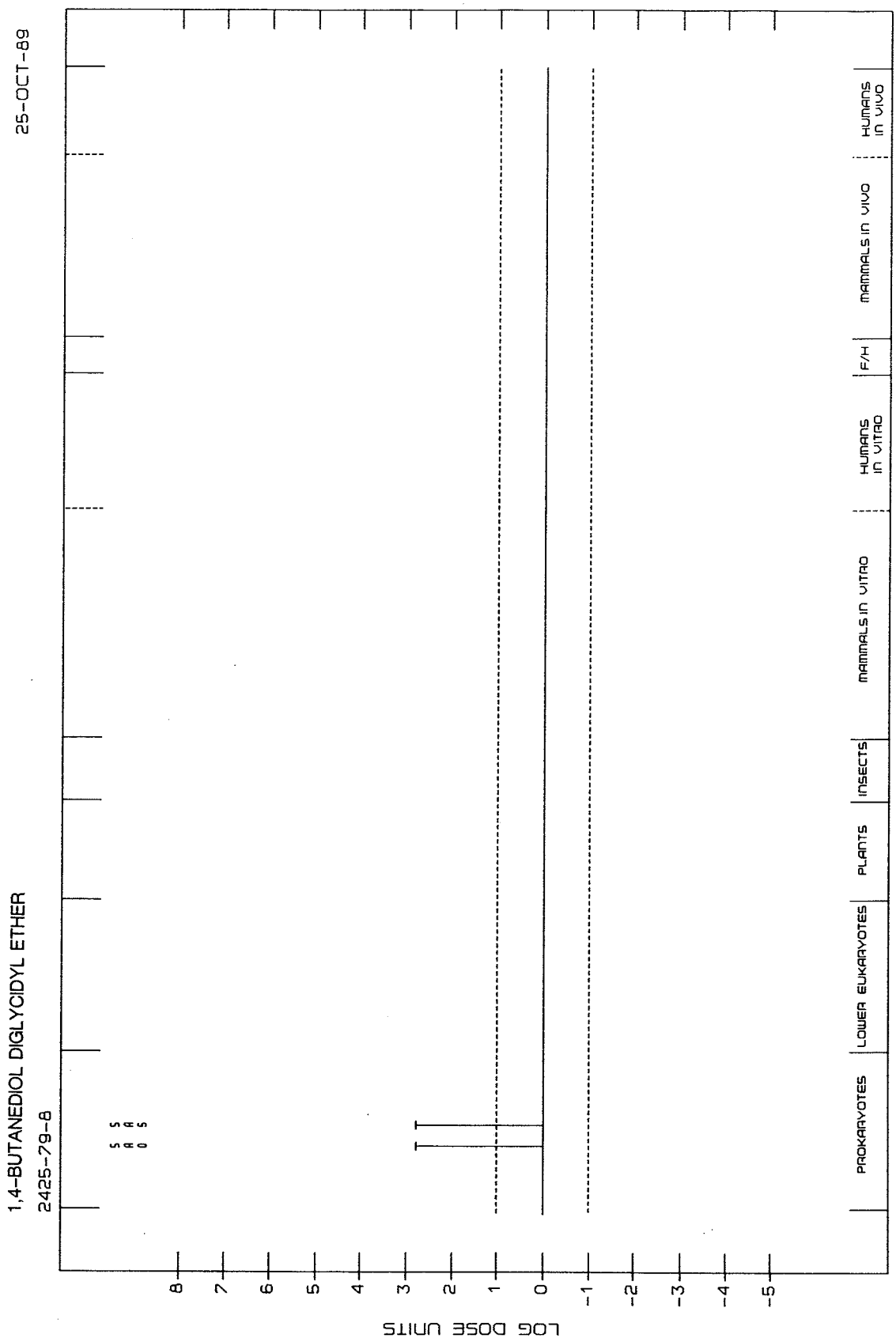
BISPHENOL A DIGLYCIDYL ETHER

| END POINT | TEST CODE | TEST SYSTEM | RESULTS NM | RESULTS M | DOSE (LED OR HID) | REFERENCE |
|---|---|---|---|---|---|---|
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | - | - | 10000.0000 | WADE ET AL., 1979 |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | + | 0 | 14.0000 | ANDERSEN ET AL., 1978 |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | + | + | 16.0000 | CANTER ET AL., 1986 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | + | + | 92.0000 | ANDERSEN ET AL., 1978 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | + | + | 167.0000 | CANTER ET AL., 1986 |
| G | SA7 | S. TYPHIMURIUM TA1537, REVERSE MUTATION | - | - | 0.0000 | CANTER ET AL., 1986 |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | - | 10000.0000 | WADE ET AL., 1979 |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | - | 0.0000 | CANTER ET AL., 1986 |
| G | ECW | E. COLI WP2 UVRA, REVERSE MUTATION | + | 0 | 0.0000 | HEMMINKI ET AL., 1980 |
| C | CLH | CHROM ABERR, HUMAN LYMPHOCYTES IN VIVO | - | 0 | 0.0000 | MITELMAN ET AL., 1980 |


25-OCT-89
BISPHENOL A DIGLYCIDYL ETHER
1675-54-3
S S A O S
S A B
C L H
LOG DOSE UNITS
8
7
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
PROKARYOTES
LOWER EUKARYOTES
PLANTS
INSECTS
MAMMALS IN VITRO
HUMANS IN VITRO
F/H
MAMMALS IN VIVO
HUMANS IN VIVO

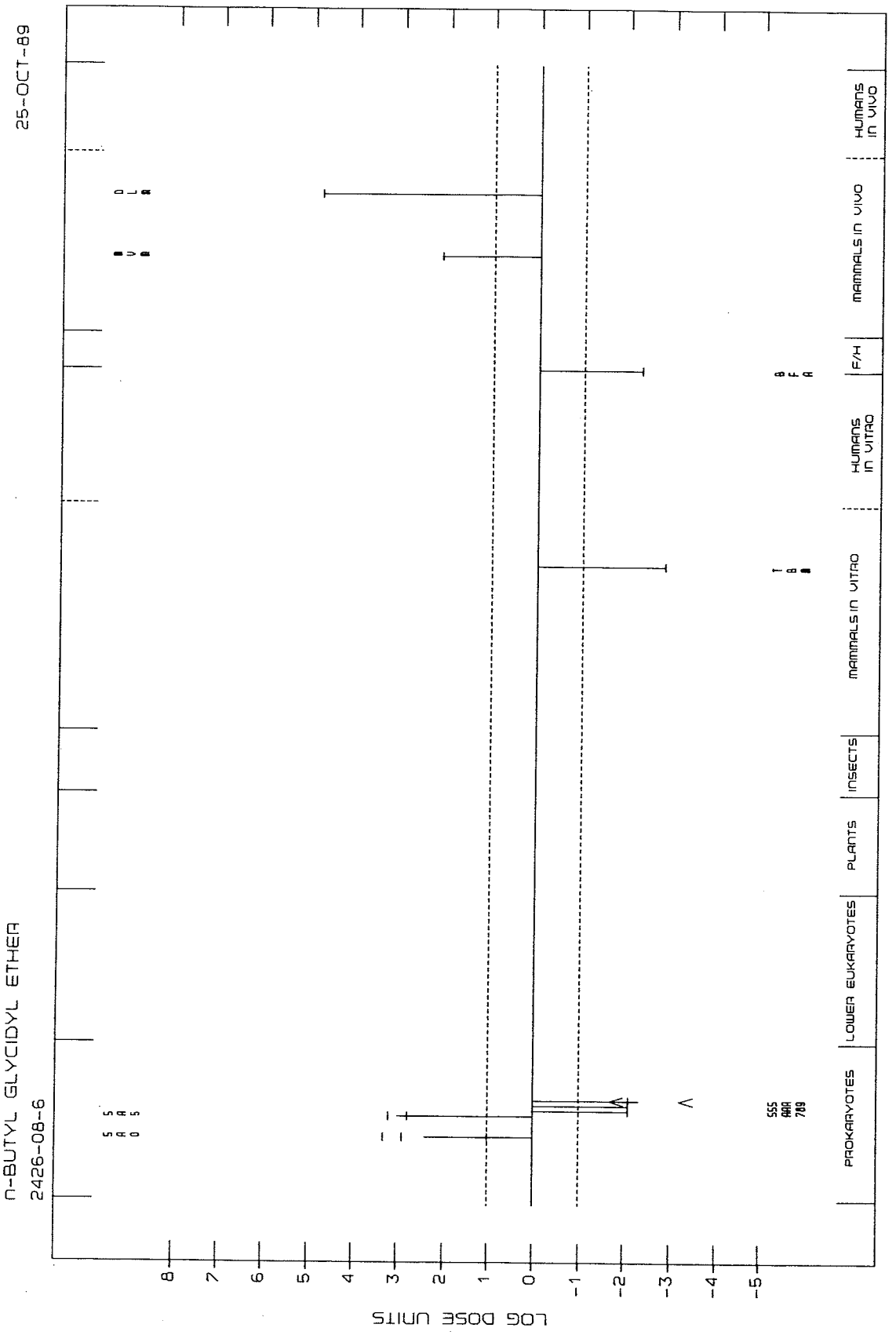
1,4-BUTANEDIOL DIGLYCIDYL ETHER

| END POINT | TEST CODE | TEST SYSTEM | RESULTS NM | RESULTS M | DOSE (LED OR HID) | REFERENCE |
|---|---|---|---|---|---|---|
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | + | + | 167.0000 | CANTER ET AL., 1986 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | + | + | 167.0000 | CANTER ET AL., 1986 |
| G | SA7 | S. TYPHIMURIUM TA1537, REVERSE MUTATION | ? | + | 0.0000 | CANTER ET AL., 1986 |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | + | + | 0.0000 | CANTER ET AL., 1986 |


25-OCT-89
1,4-BUTANEDIOL DIGLYCIDYL ETHER
2425-79-8
S S A A O S
LOG DOSE UNITS
8
7
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
PROKARYOTES
LOWER EUKARYOTES
PLANTS
INSECTS
MAMMALS IN VITRO
HUMANS IN VITRO
F/H
MAMMALS IN VIVO
HUMANS IN VIVO

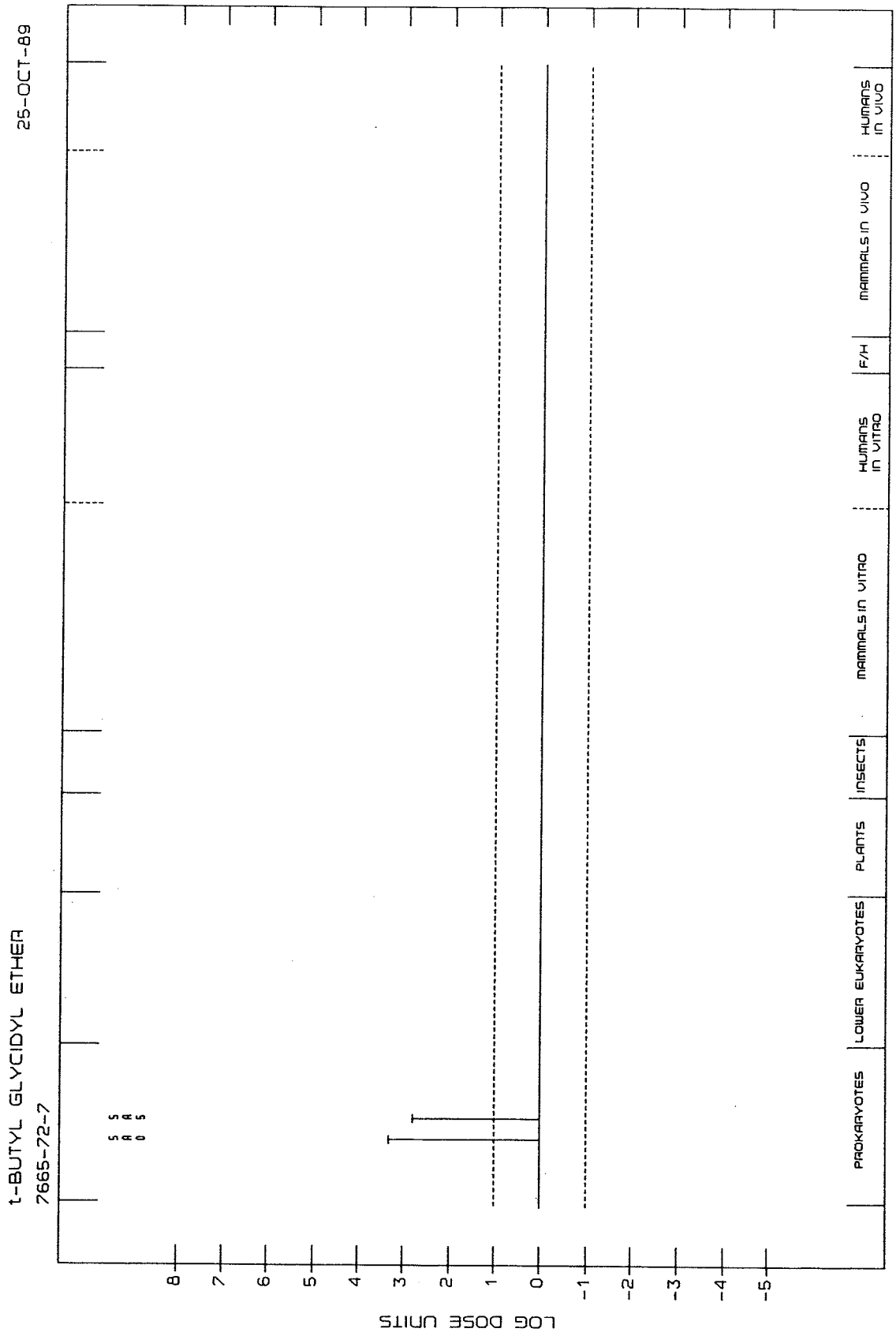
n-BUTYL GLYCIDYL ETHER

| END POINT | TEST CODE | TEST SYSTEM | RESULTS NM | RESULTS M | DOSE (LED OR HID) | REFERENCE |
|---|---|---|---|---|---|---|
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | + | + | 10000.0000 | WADE ET AL., 1979 |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | + | + | 50.0000 | CANTER ET AL., 1986 |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | + | 0 | 130.0000 | CONNOR ET AL., 1980b |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | + | + | 167.0000 | CANTER ET AL., 1986 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | + | 0 | 65.0000 | CONNOR ET AL., 1980b |
| G | SA7 | S. TYPHIMURIUM TA1537, REVERSE MUTATION | - | 0 | 130.0000 | CONNOR ET AL., 1980b |
| G | SA8 | S. TYPHIMURIUM TA1538, REVERSE MUTATION | - | 0 | 130.0000 | CONNOR ET AL., 1980b |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | - | 50.0000 | WADE ET AL., 1979 |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | - | 1667.0000 | CANTER ET AL., 1986 |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | 0 | 130.0000 | CONNOR ET AL., 1980b |
| G | SAS | S. TYPHIMURIUM (OTHER), REVERSE MUTATION | + | + | 0.0000 | CANTER ET AL., 1986 |
| T | TBM | CELL TRANSFORMATION, BALB/C3T3 CELLS | - | 0 | 670.0000 | CONNOR ET AL., 1980b |
| F | BFA | ANIMAL BODY FLUIDS, MICROBIAL MUTAGENICITY | - | 0 | 200.0000 | CONNOR ET AL., 1980b |
| M | MVM | MICRONUCLEUS TEST, MICE IN VIVO | + | 0 | 675.0000 | CONNOR ET AL., 1980b |
| C | DLM | DOMINANT LETHAL TEST, MICE | (+) | 0 | 1.5000 | WHORTON ET AL., 1983 |


25-OCT-89
n-BUTYL GLYCIDYL ETHER
2426-08-6
LOG DOSE UNITS
8
7
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
PROKARYOTES
LOWER EUKARYOTES
PLANTS
INSECTS
MAMMALS IN VITRO
HUMANS IN VITRO
F/H
MAMMALS IN VIVO
HUMANS IN VIVO

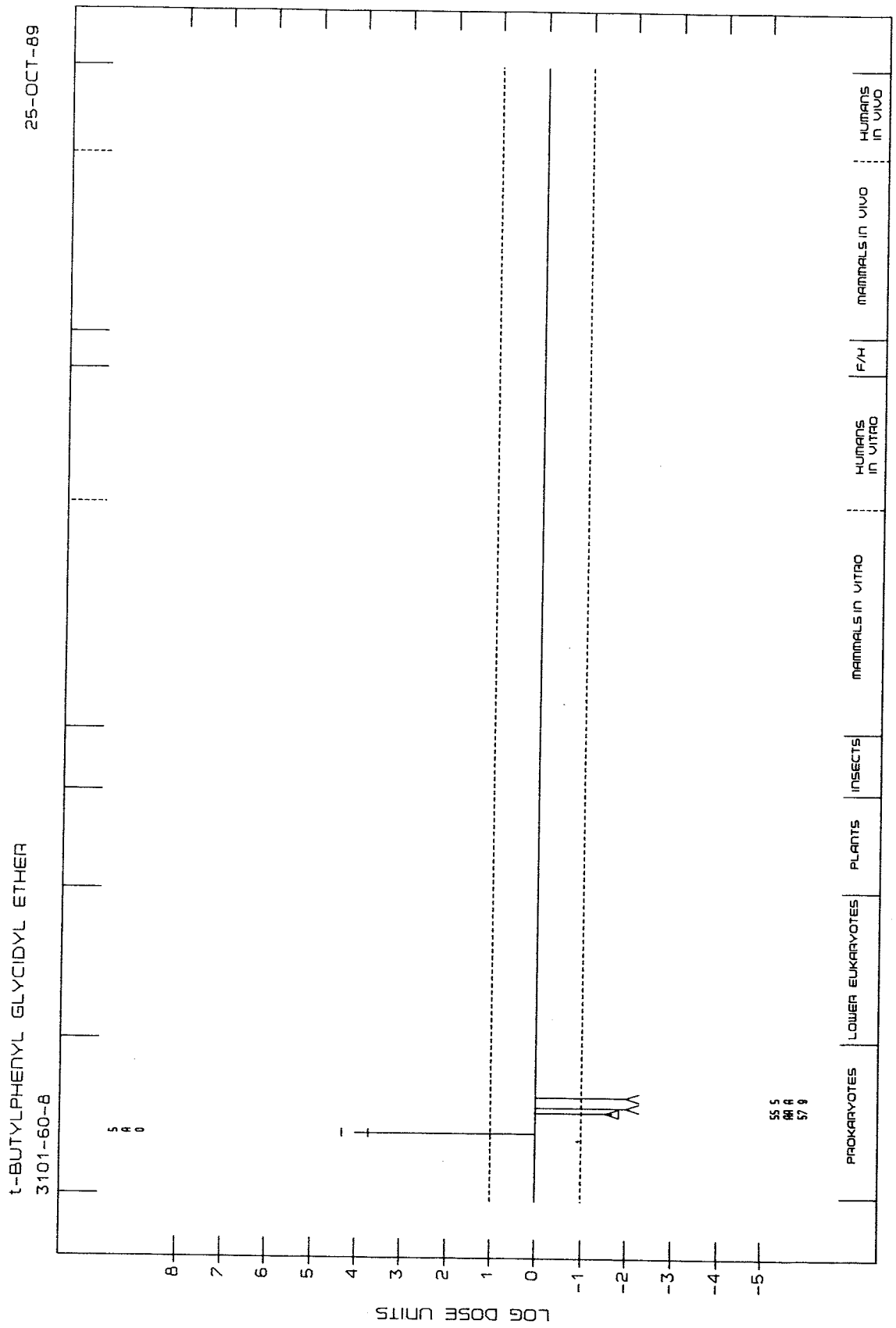
t-BUTYL GLYCIDYL ETHER

| END POINT | TEST CODE | TEST SYSTEM | RESULTS NM | RESULTS M | DOSE (LED OR HID) | REFERENCE |
|---|---|---|---|---|---|---|
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | + | + | 50.0000 | CANTER ET AL., 1986 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | + | + | 167.0000 | CANTER ET AL., 1986 |
| G | SA7 | S. TYPHIMURIUM TA1537, REVERSE MUTATION | - | (+) | 0.0000 | CANTER ET AL., 1986 |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | ? | (+) | 0.0000 | CANTER ET AL., 1986 |


25-OCT-89
t-BUTYL GLYCIDYL ETHER
7665-72-7
S S A A D S
LOG DOSE UNITS
8
7
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
PROKARYOTES
LOWER EUKARYOTES
PLANTS
INSECTS
MAMMALS IN VITRO
HUMANS IN VITRO
F/H
MAMMALS IN VIVO
HUMANS IN VIVO

t-BUTYLPHENYL GLYCIDYL ETHER

| END POINT | TEST CODE | TEST SYSTEM | RESULTS NM | RESULTS M | DOSE (LED OR HID) | REFERENCE |
|---|---|---|---|---|---|---|
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | + | - | 5.0000 | CANTER ET AL., 1986 |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | + | 0 | 20.0000 | NEAU ET AL., 1982 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | - | - | 34.0000 | CANTER ET AL., 1986 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | - | 0 | 70.0000 | NEAU ET AL., 1982 |
| G | SA7 | S. TYPHIMURIUM TA1537, REVERSE MUTATION | - | - | 100.0000 | CANTER ET AL., 1986 |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | - | 100.0000 | CANTER ET AL., 1986 |


25-OCT-89
t-BUTYLPHENYL GLYCIDYL ETHER
3101-60-8
LOG DOSE UNITS
8
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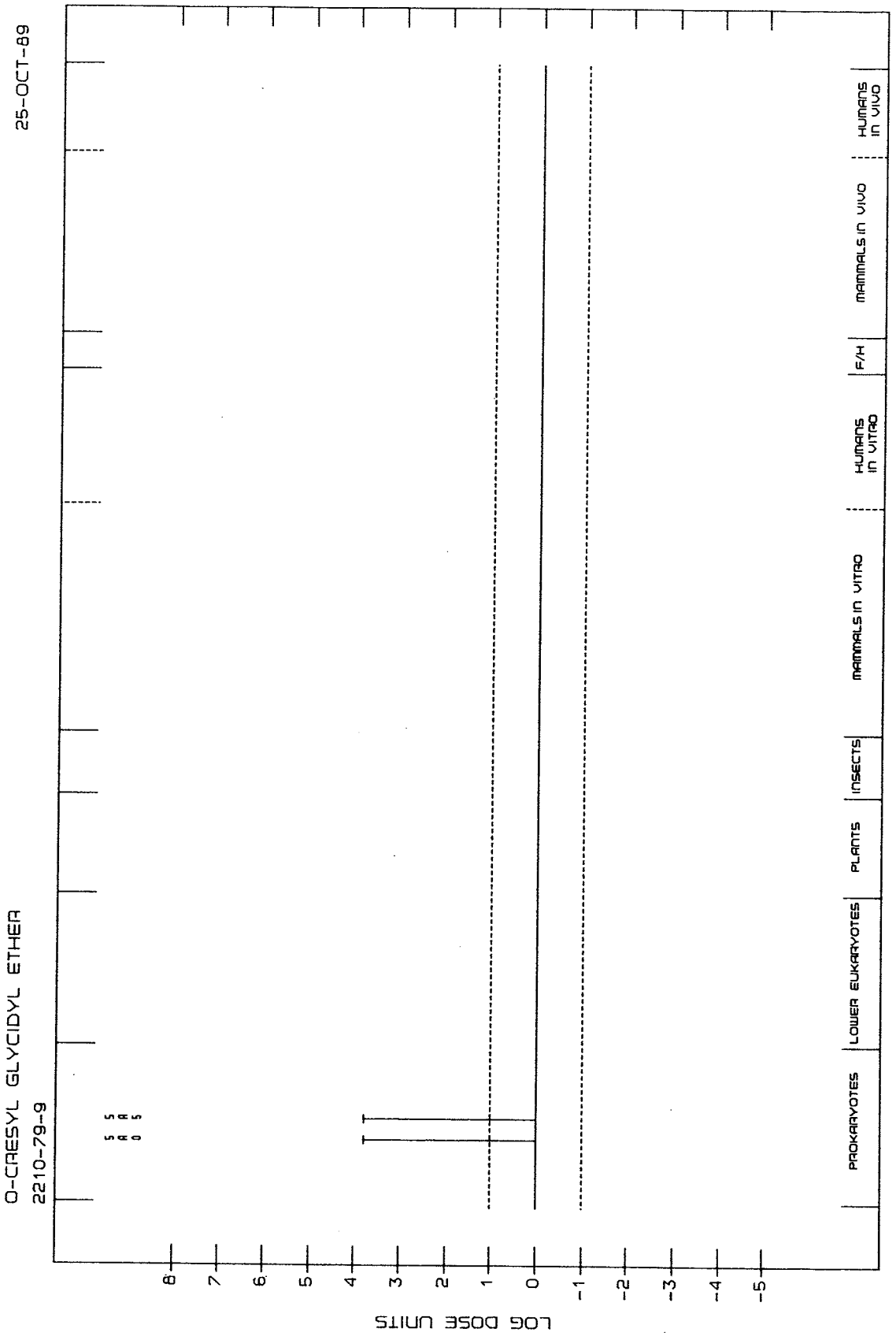
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
PROKARYOTES
LOWER EUKARYOTES
PLANTS
INSECTS
MAMMALS IN VITRO
HUMANS IN VITRO
F/H
MAMMALS IN VIVO
HUMANS IN VIVO

O-CRESYL GLYCIDYL ETHER

| END POINT | TEST CODE | TEST SYSTEM | RESULTS NM | RESULTS M | DOSE (LED OR HID) | REFERENCE |
|---|---|---|---|---|---|---|
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | + | + | 17.0000 | CANTER ET AL., 1986 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | + | - | 17.0000 | CANTER ET AL., 1986 |
| G | SA7 | S. TYPHIMURIUM TA1537, REVERSE MUTATION | - | - | 0.0000 | CANTER ET AL., 1986 |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | - | 0.0000 | CANTER ET AL., 1986 |


25-OCT-89
O-CRESYL GLYCIDYL ETHER
2210-79-9
S S A A D S
LOG DOSE UNITS
8
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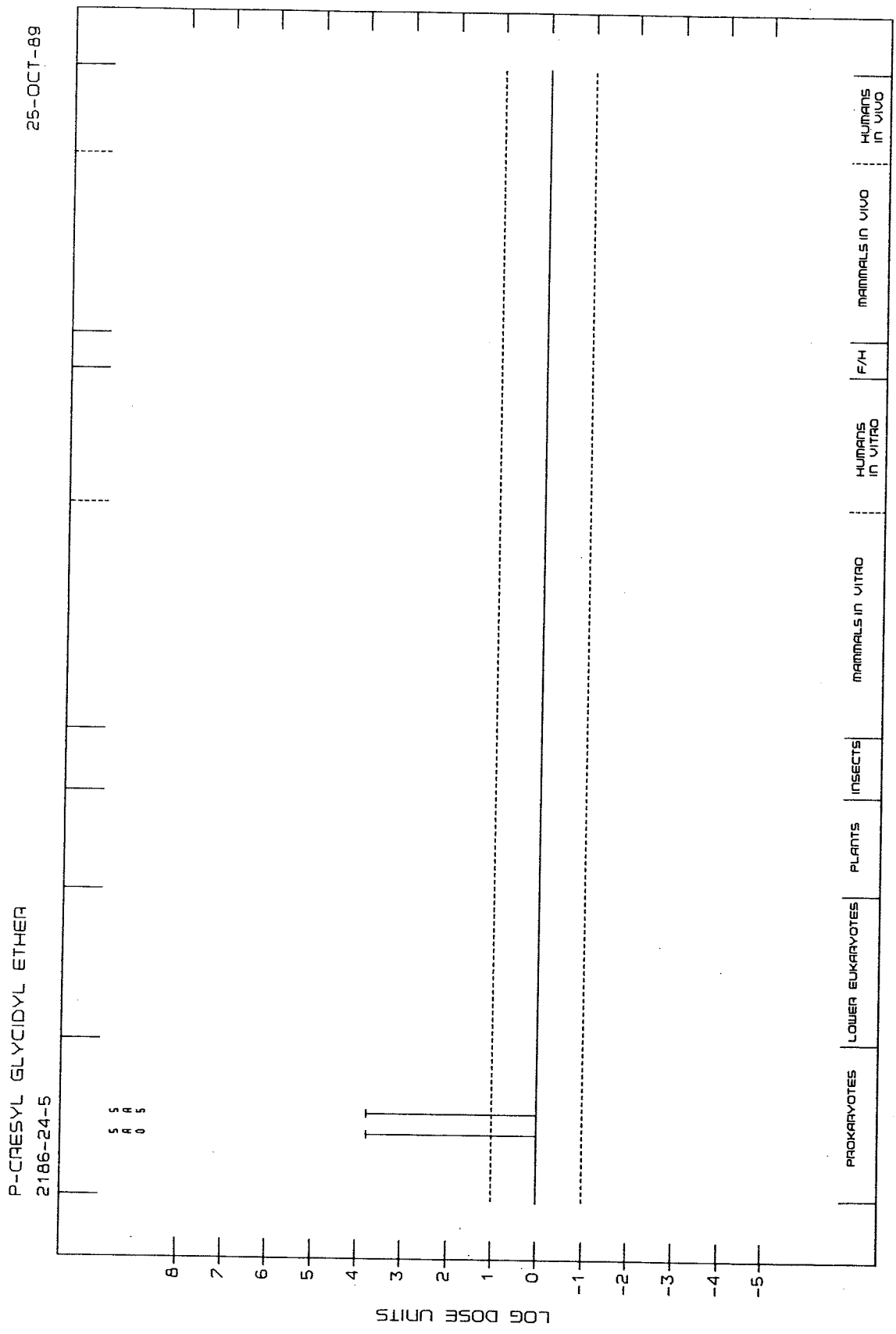
4
3
2
1
0
-1
-2
-3
-4
-5
PROKARYOTES
LOWER EUKARYOTES
PLANTS
INSECTS
MAMMALS IN VITRO
HUMANS IN VITRO
F/H
MAMMALS IN VIVO
HUMANS IN VIVO

P-CRESYL GLYCIDYL ETHER

| END POINT | TEST CODE | TEST SYSTEM | RESULTS NM | RESULTS M | DOSE (LED OR HID) | REFERENCE |
|---|---|---|---|---|---|---|
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | + | + | 17.0000 | CANTER ET AL., 1986 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | + | + | 17.0000 | CANTER ET AL., 1986 |
| G | SA7 | S. TYPHIMURIUM TA1537, REVERSE MUTATION | - | - | 0.0000 | CANTER ET AL., 1986 |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | - | 0.0000 | CANTER ET AL., 1986 |


25-OCT-89
P-CRESYL GLYCIDYL ETHER
2186-24-5
S S A A O S
LOG DOSE UNITS
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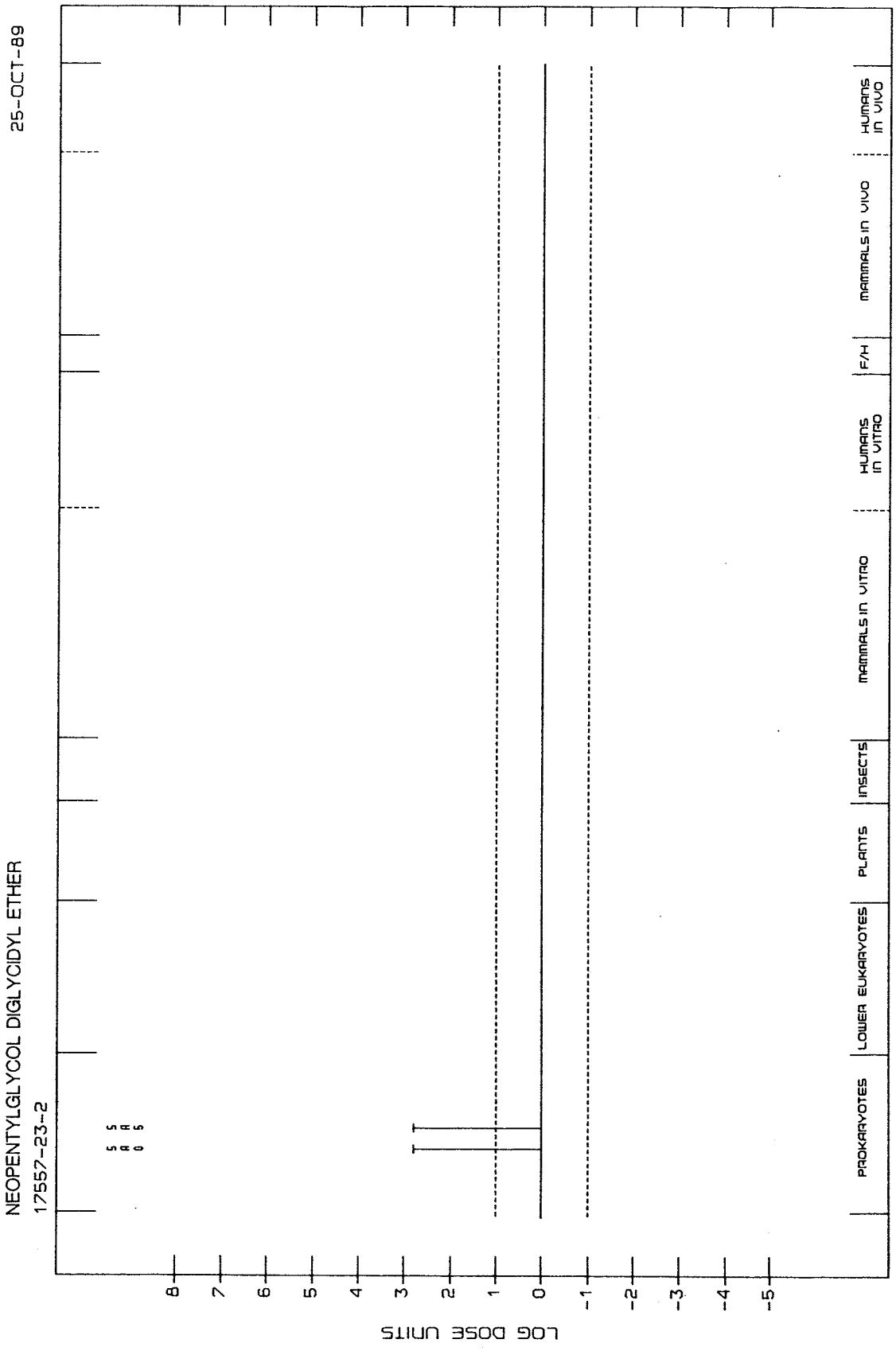
4
3
2
1
0
-1
-2
-3
-4
-5
PROKARYOTES
LOWER EUKARYOTES
PLANTS
INSECTS
MAMMALS IN VITRO
HUMANS IN VITRO
F/H
MAMMALS IN VIVO
HUMANS IN VIVO

NEOPENTYLGLYCOL DIGLYCIDYL ETHER

| END POINT | TEST CODE | TEST SYSTEM | RESULTS NM | RESULTS M | DOSE (LED OR HID) | REFERENCE |
|---|---|---|---|---|---|---|
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | + | + | 167.0000 | CANTER ET AL., 1986 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | + | + | 167.0000 | CANTER ET AL., 1986 |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | - | 0.0000 | CANTER ET AL., 1986 |
| G | SAS | S. TYPHIMURIUM (OTHER), REVERSE MUTATION | + | + | 0.0000 | CANTER ET AL., 1986 |


25-OCT-89
NEOPENTYLGLYCOL DIGLYCIDYL ETHER
17557-23-2
S S A O S
LOG DOSE UNITS
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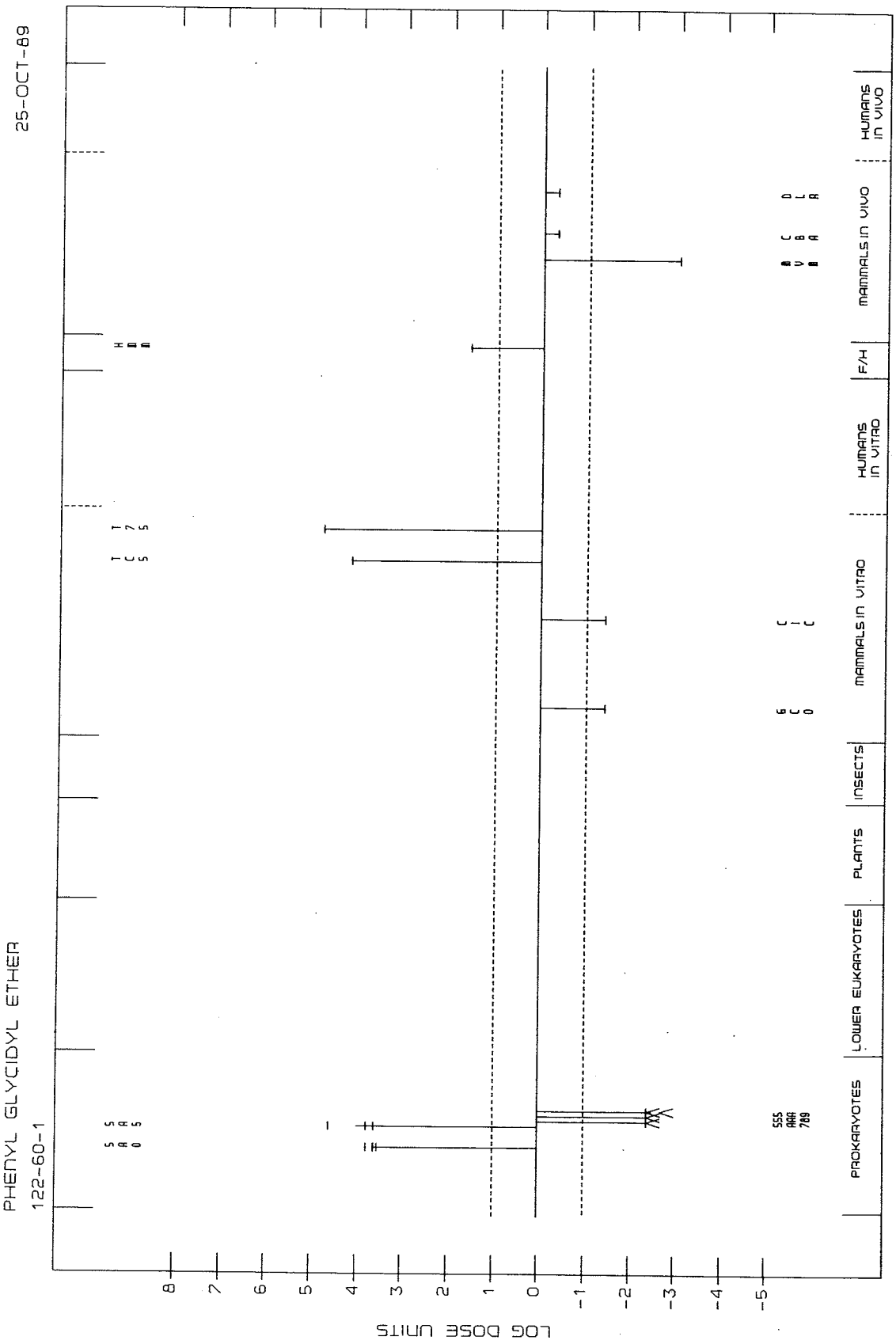
7
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
PROKARYOTES
LOWER EUKARYOTES
PLANTS
INSECTS
MAMMALS IN VITRO
HUMANS IN VITRO
F/H
MAMMALS IN VIVO
HUMANS IN VIVO

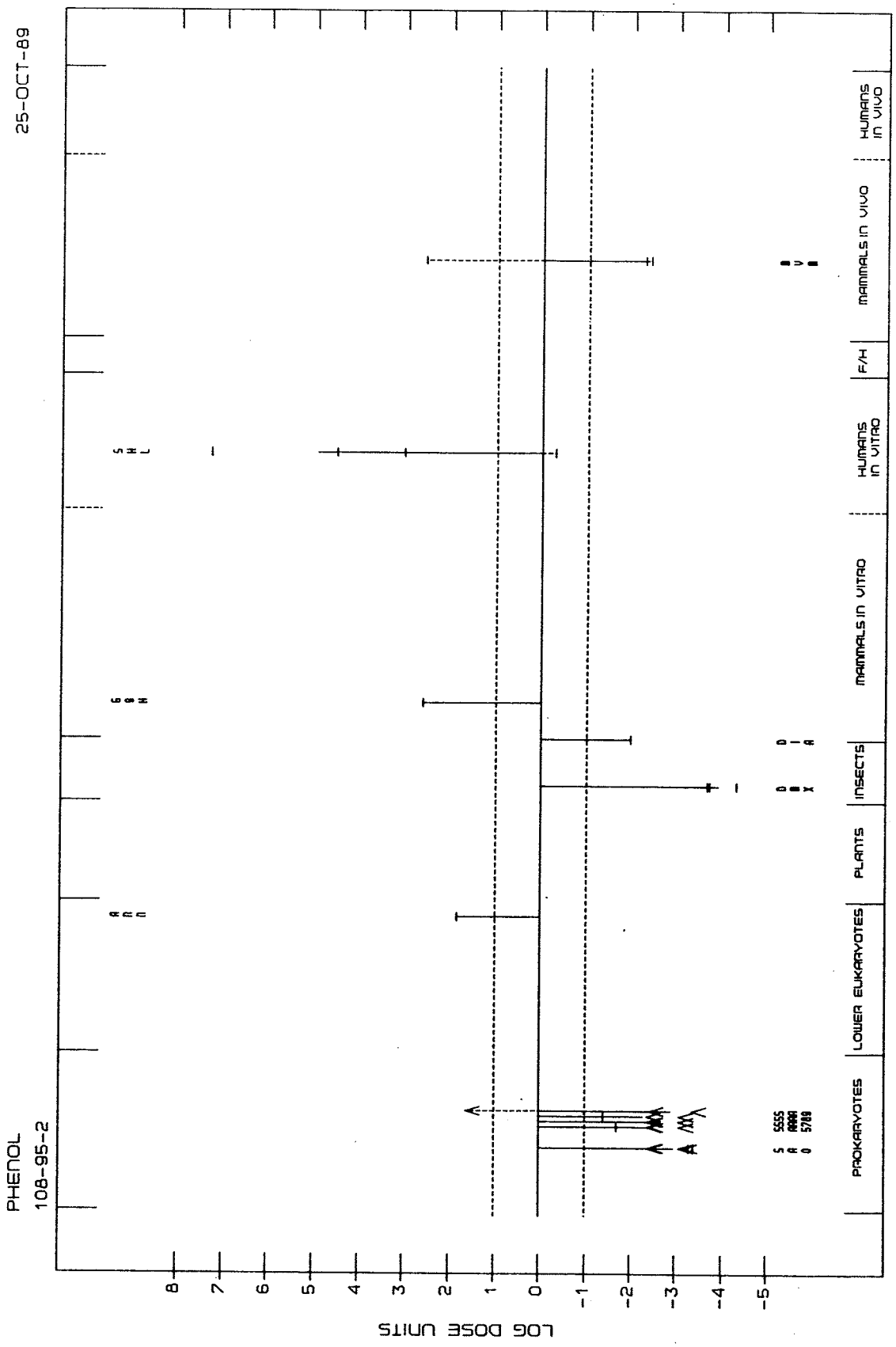
PHENYL GLYCIDYL ETHER

| END POINT | TEST CODE | TEST SYSTEM | RESULTS NM | RESULTS M | DOSE (LED OR HID) | REFERENCE |
|---|---|---|---|---|---|---|
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | + | + | 17.0000 | CANTER ET AL., 1986 |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | + | 0 | 30.0000 | IVIE ET AL., 1980 |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | + | 0 | 25.0000 | SEILER, 1984 |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | + | + | 25.0000 | GREENE ET AL., 1979 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | + | + | 17.0000 | CANTER ET AL., 1986 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | + | 0 | 25.0000 | IVIE ET AL., 1980 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | + | + | 2.5000 | GREENE ET AL., 1979 |
| G | SA7 | S. TYPHIMURIUM TA1537, REVERSE MUTATION | - | 0 | 250.0000 | IVIE ET AL., 1980 |
| G | SA7 | S. TYPHIMURIUM TA1537, REVERSE MUTATION | - | - | 250.0000 | GREENE ET AL., 1979 |
| G | SA8 | S. TYPHIMURIUM TA1538, REVERSE MUTATION | - | - | 250.0000 | GREENE ET AL., 1979 |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | - | 500.0000 | CANTER ET AL., 1986 |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | 0 | 250.0000 | IVIE ET AL., 1980 |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | - | 250.0000 | GREENE ET AL., 1979 |
| G | SAS | S. TYPHIMURIUM (OTHER), REVERSE MUTATION | + | + | 0.0000 | CANTER ET AL., 1986 |
| G | ECW | E. COLI WP2 UVRA, REVERSE MUTATION | + | 0 | 0.0000 | HEMMINKI ET AL., 1980 |
| G | GCO | MUTATION, CHO CELLS IN VITRO | - | 0 | 25.0000 | GREENE ET AL., 1979 |
| C | CIC | CHROM ABERR, CHINESE HAMSTER CELLS IN VITRO | - | 0 | 25.0000 | SEILER, 1984 |
| T | TCS | CELL TRANSFORMATION, SHE, CLONAL ASSAY | + | 0 | 6.5000 | GREENE ET AL., 1979 |
| T | T7S | CELL TRANSFORMATION, SA7/SHE CELLS | + | 0 | 1.6000 | GREENE ET AL., 1979 |
| H | HMM | HOST-MEDIATED ASSAY, MICROBIAL CELLS | + | 0 | 2500.0000 | GREENE ET AL., 1979 |
| M | MVM | MICRONUCLEUS TEST, MICE IN VIVO | - | 0 | 1000.0000 | SEILER, 1984 |
| C | CBA | CHROM ABERR, ANIMAL BONE MARROW IN VIVO | - | 0 | 2.0000 | TERRILL ET AL., 1982 |
| C | DLR | DOMINANT LETHAL TEST, RATS | - | 0 | 2.0000 | TERRILL ET AL., 1982 |


25-OCT-89
PHENYL GLYCIDYL ETHER
122-60-1
PROKARYOTES
LOWER EUKARYOTES
PLANTS
INSECTS
MAMMALS IN VITRO
HUMANS IN VITRO
F/H
MAMMALS IN VIVO
HUMANS IN VIVO
LOG DOSE UNITS
8
7
6
5
4
3
2
1
0
-1
-2
-3
-4
-5

PHENOL

| END POINT | TEST CODE | TEST SYSTEM | RESULTS NM | RESULTS M | DOSE (LED OR HID) | REFERENCE |
|---|---|---|---|---|---|---|
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | - | - | 250.0000 | POOL & LIN, 1982 |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | - | - | 282.0000 | FLORIN ET AL., 1980 |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | - | 0 | 2000.0000 | KINOSHITA ET AL., 1981 |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | - | - | 1500.0000 | KAZMER ET AL., 1983 |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | - | - | 0.0000 | COTRUVO ET AL., 1977 |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | - | 0 | 2500.0000 | THOMPSON & MELAMPY 453,1981 |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | - | - | 1250.0000 | HAWORTH ET AL., 1983 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | - | - | 250.0000 | POOL & LIN, 1982 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | - | - | 282.0000 | FLORIN ET AL., 1980 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | - | 0 | 50.0000 | GILBERT ET AL., 1980 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | - | - | 0.0000 | COTRUVO ET AL., 1977 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | - | - | 1250.0000 | HAWORTH ET AL., 1983 |
| G | SA7 | S. TYPHIMURIUM TA1537, REVERSE MUTATION | - | - | 250.0000 | POOL & LIN, 1982 |
| G | SA7 | S. TYPHIMURIUM TA1537, REVERSE MUTATION | - | - | 282.0000 | FLORIN ET AL., 1980 |
| G | SA7 | S. TYPHIMURIUM TA1537, REVERSE MUTATION | - | - | 0.0000 | COTRUVO ET AL., 1977 |
| G | SA7 | S. TYPHIMURIUM TA1537, REVERSE MUTATION | - | - | 1250.0000 | HAWORTH ET AL., 1983 |
| G | SA8 | S. TYPHIMURIUM TA1538, REVERSE MUTATION | - | - | 250.0000 | POOL & LIN, 1982 |
| G | SA8 | S. TYPHIMURIUM TA1538, REVERSE MUTATION | - | 0 | 25.0000 | GILBERT ET AL., 1980 |
| G | SA8 | S. TYPHIMURIUM TA1538, REVERSE MUTATION | - | - | 0.0000 | COTRUVO ET AL., 1977 |
| G | SA8 | S. TYPHIMURIUM TA1538, REVERSE MUTATION | - | - | 1250.0000 | HAWORTH ET AL., 1983 |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | - | 282.0000 | FLORIN ET AL., 1980 |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | - | 2350.0000 | POOL & LIN, 1982 |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | (+) | 2350.0000 | GOCKE ET AL., 1981 |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | - | 0.0000 | COTRUVO ET AL., 1977 |
| G | SA5 | S. TYPHIMURIUM (OTHER), REVERSE MUTATION | - | - | 0.0000 | COTRUVO ET AL., 1977 |
| A | ANN | A. NIDULANS, ANEUPLOIDY | (+) | 0 | 1412.0000 | CREBELLI ET AL., 1987 |
| G | DMX | D. MELANOGASTER, SEX-LINKED RECESSIVES | - | 0 | 4700.0000 | GOCKE ET AL., 1981 |
| G | DMX | D. MELANOGASTER, SEX-LINKED RECESSIVES | - | 0 | 20000.0000 | STURTEVANT, 1952 |
| G | DMX | D. MELANOGASTER, SEX-LINKED RECESSIVES | - | 0 | 5250.0000 | WOODRUFF ET AL., 1985 |
| D | DIA | STRAND BREAKS/X-LINKS, ANIMAL CELLS IN VITRO | - | 0 | 94.0000 | PELLACK-WALKER & BLUMER, 1986 |
| G | G9H | MUTATION, CHL V79 CELLS, HPRT | + | 0 | 250.0000 | PASCHIN & BAHITOVA, 1982 |
| S | SHL | SCE, HUMAN LYMPHOCYTES IN VITRO | (+) | 0 | 94.0000 | MORIMOTO & WOLFF, 1980b |
| S | SHL | SCE, HUMAN LYMPHOCYTES IN VITRO | - | 0 | 2.0000 | JANSSON ET AL., 1986 |
| S | SHL | SCE, HUMAN LYMPHOCYTES IN VITRO | + | 0 | 0.0050 | EREXSON ET AL., 1985a |
| S | SHL | SCE, HUMAN LYMPHOCYTES IN VITRO | + | + | 3.0000 | MORIMOTO ET AL., 1983 |
| M | MVM | MICRONUCLEUS TEST, MICE IN VIVO | - | 0 | 250.0000 | GAD-EL, SADA |
| M | MVM | MICRONUCLEUS TEST, MICE IN VIVO | + | 0 | 265.0000 | CIRANNI ET AL., 1988 |
| M | MVM | MICRONUCLEUS TEST, MICE IN VIVO | - | 0 | 188.0000 | GOCKE ET AL., 1981 |
| I | ICR | INHIBIT CELL COMMUNICATION, ANIMAL CELLS | - | 0 | 300.0000 | MALCOLM ET AL., 1985 |
| I | ICR | INHIBIT CELL COMMUNICATION, ANIMAL CELLS | - | 0 | 0.0000 | CHEN ET AL., 1984 |


25-OCT-89
PHENOL
108-95-2
LOG DOSE UNITS
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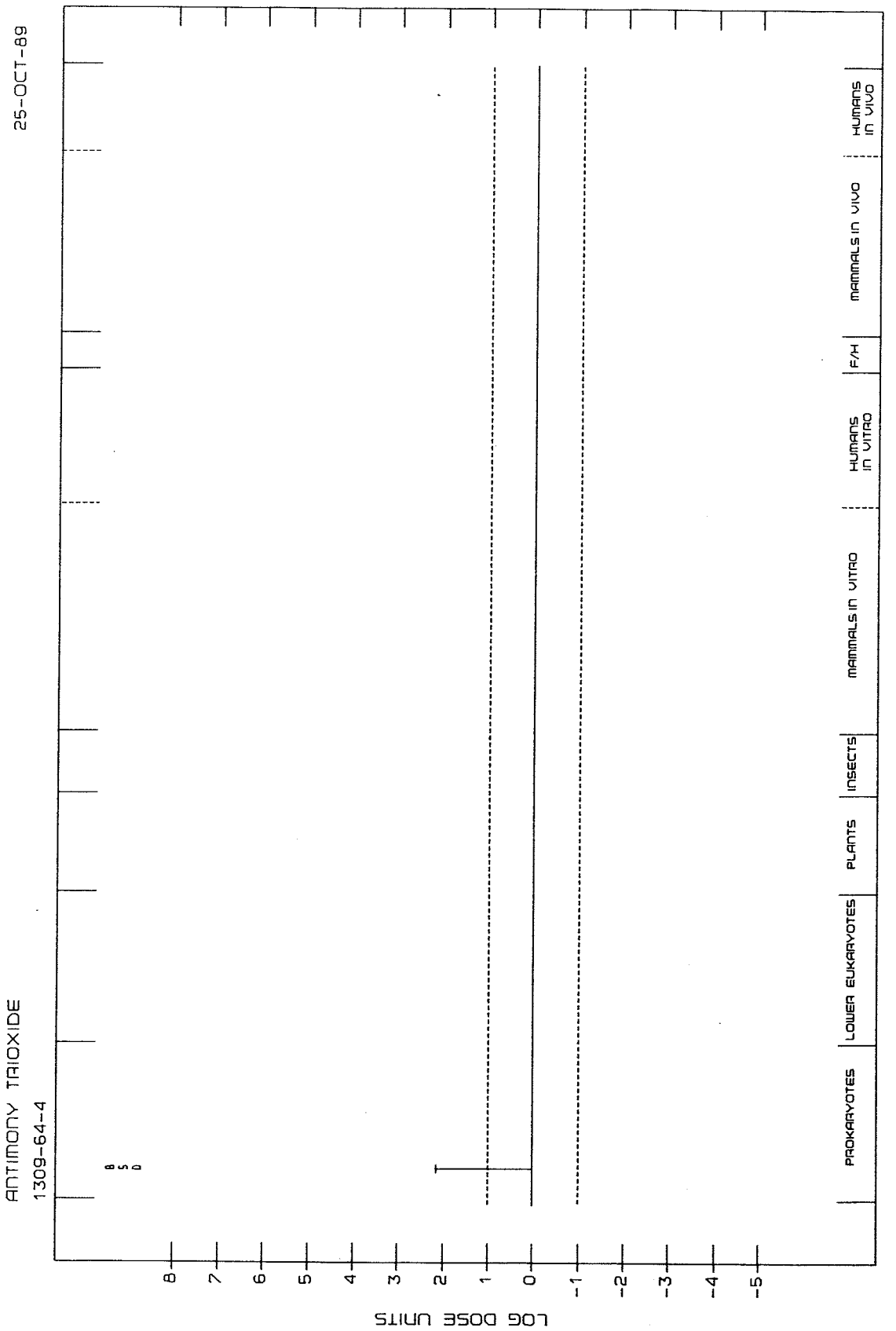
-2
-3
-4
-5
PROKARYOTES
LOWER EUKARYOTES
PLANTS
INSECTS
MAMMALS IN VITRO
HUMANS IN VITRO
F/H
MAMMALS IN VIVO
HUMANS IN VIVO

ANTIMONY TRIOXIDE

| END POINT | TEST CODE | TEST SYSTEM | RESULTS NM | RESULTS M | DOSE (LED OR HID) | REFERENCE |
|---|---|---|---|---|---|---|
| D | BSD | B. SUBTILIS REC, DIFFERENTIAL TOXICITY | + | 0 | 720.0000 | KANEMATSU ET AL., 1980 |


25-OCT-89
ANTIMONY TRIOXIDE
1309-64-4
BSD
LOG DOSE UNITS
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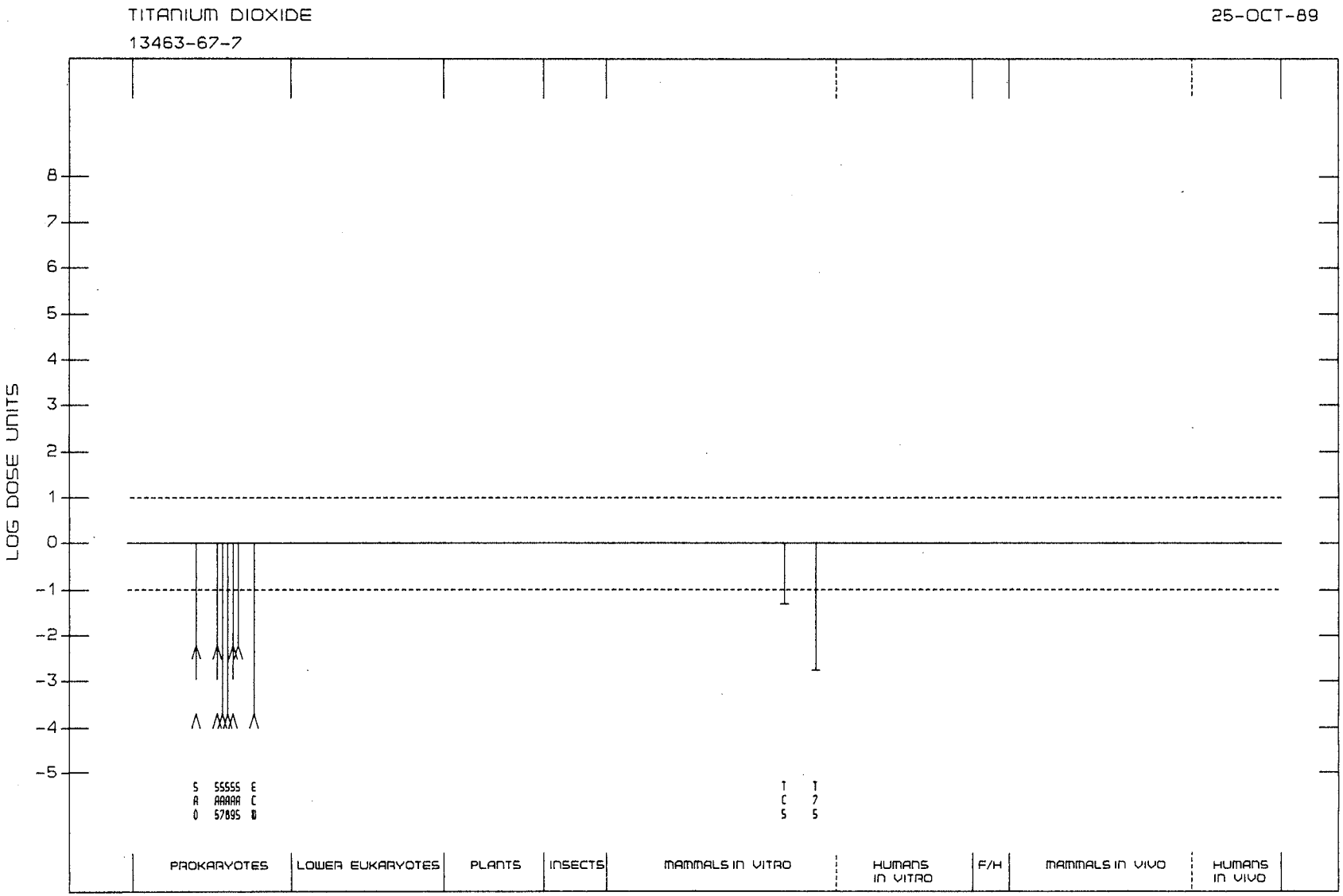
4
3
2
1
0
-1
-2
-3
-4
-5
PROKARYOTES
LOWER EUKARYOTES
PLANTS
INSECTS
MAMMALS IN VITRO
HUMANS IN VITRO
F/H
MAMMALS IN VIVO
HUMANS IN VIVO

TITANIUM DIOXIDE

| END POINT | TEST CODE | TEST SYSTEM | RESULTS NM | RESULTS M | DOSE (LED OR HID) | REFERENCE |
|---|---|---|---|---|---|---|
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | - | - | 167.0000 | ZEIGER ET AL., 1988 |
| G | SA0 | S. TYPHIMURIUM TA100, REVERSE MUTATION | - | - | 5000.0000 | DUNKEL ET AL., 1985 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | - | - | 5000.0000 | DUNKEL ET AL., 1985 |
| G | SA5 | S. TYPHIMURIUM TA1535, REVERSE MUTATION | - | - | 167.0000 | ZEIGER ET AL., 1988 |
| G | SA7 | S. TYPHIMURIUM TA1537, REVERSE MUTATION | - | - | 5000.0000 | DUNKEL ET AL., 1985 |
| G | SA8 | S. TYPHIMURIUM TA1538, REVERSE MUTATION | - | - | 5000.0000 | DUNKEL ET AL., 1985 |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | - | 5000.0000 | DUNKEL ET AL., 1985 |
| G | SA9 | S. TYPHIMURIUM TA98, REVERSE MUTATION | - | - | 167.0000 | ZEIGER ET AL., 1988 |
| G | SAS | S. TYPHIMURIUM (OTHER), REVERSE MUTATION | - | - | 167.0000 | ZEIGER ET AL., 1988 |
| G | ECW | E. COLI WP2 UVRA, REVERSE MUTATION | - | - | 5000.0000 | DUNKEL ET AL., 1985 |
| T | TCS | CELL TRANSFORMATION, SHE, CLONAL ASSAY | - | 0 | 20.0000 | DIPAOLO & CASTO, 1979 |
| T | T7S | CELL TRANSFORMATION, SA7/SHE CELLS | - | 0 | 600.0000 | CASTO ET AL., 1979 |


TITANIUM DIOXIDE
13463-67-7
25-OCT-89
LOG DOSE UNITS
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4
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-1
-2
-3
-4
-5
S SSSSS E
A AAAAA C
0 57895 0
T T
C 7
S 5
PROKARYOTES
LOWER EUKARYOTES
PLANTS
INSECTS
MAMMALS IN VITRO
HUMANS IN VITRO
F/H
MAMMALS IN VIVO
HUMANS IN VIVO