APPENDIX 1

ACTIVITY PROFILES FOR GENETIC AND RELATED TESTS

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

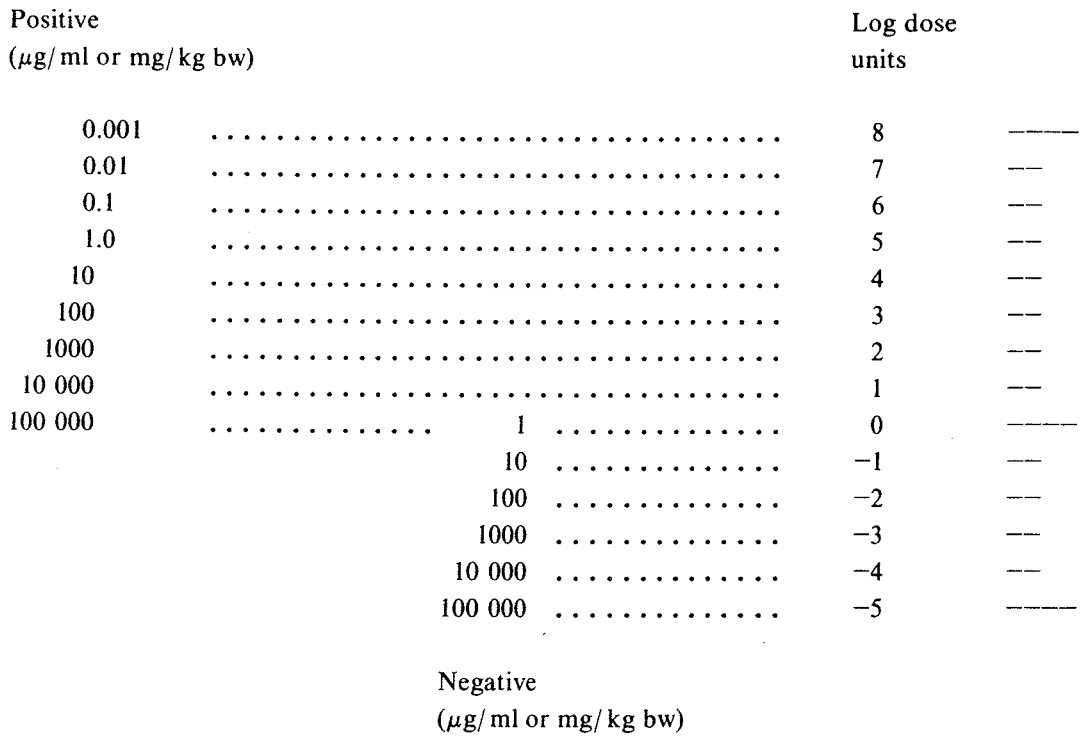
$$LDU_{ij} = -\log_{10}(\text{dose}), \text{ for HID values; } LDU \leqslant 0$$

and (1)

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

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 ≥100 000 or an HID value ≤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 ASCII) 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 × molecular weight = mg/ml = 10^3 μg/ml; mM concentration × 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 × molecular weight of the gas. Also, 1 ppm (v/v) = 4×10^{-5} μg/ml × 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 $\mu g/cm^2$ are based on the area (A) of the dish and the volume of medium per dish; i.e., for a 100-mm dish: $A = \pi R^2 = \pi \times (5\ cm)^2 = 78.5\ cm^2$. 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

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TABLE 1. ALPHABETICAL LIST OF TEST SYSTEM CODE WORDS

Endpoint	*Code*	*Definition*
C	ACC	*Allium cepa*, chromosomal aberrations
A	AIA	Aneuploidy, animal cells *in vitro*
A	AIH	Aneuploidy, human cells *in vitro*
G	ANF	*Aspergillus nidulans*, forward mutation
R	ANG	*Aspergillus nidulans*, genetic crossing-over
A	ANN	*Aspergillus nidulans*, aneuploidy
G	ANR	*Aspergillus nidulans*, reverse mutation
G	ASM	*Arabidopsis* species, mutation
A	AVA	Aneuploidy, animal cells *in vivo*
A	AVH	Aneuploidy, human cells *in vivo*
F	BFA	Body fluids from animals, microbial mutagenicity
F	BFH	Body fluids from humans, microbial mutagenicity
D	BHD	Binding (covalent) to DNA, human cells *in vivo*
D	BHP	Binding (covalent) to RNA or protein, human cells *in vivo*
D	BID	Binding (covalent) to DNA *in vitro*
D	BIP	Binding (covalent) to RNA or protein *in vitro*
G	BPF	Bacteriophage, forward mutation
G	BPR	Bacteriophage, reverse mutation
D	BRD	Other DNA repair-deficient bacteria, differential toxicity
D	BSD	*Bacillus subtilis rec* strains, differential toxicity
G	BSM	*Bacillus subtilis*, multigene test
D	BVD	Binding (covalent) to DNA, animal cells *in vivo*
D	BVP	Binding (covalent) to RNA or protein, animal cells *in vivo*
C	CBA	Chromosomal aberrations, animal bone-marrow cells *in vivo*
C	CBH	Chromosomal aberrations, human bone-marrow cells *in vivo*
C	CCC	Chromosomal aberrations, spermatocytes treated *in vivo*, spermatocytes observed
C	CGC	Chromosomal aberrations, spermatogonia treated *in vivo*, spermatocytes observed
C	CGG	Chromosomal aberrations, spermatogonia treated *in vivo*, spermatogonia observed
C	CHF	Chromosomal aberrations, human fibroblasts *in vitro*
C	CHL	Chromosomal aberrations, human lymphocytes *in vitro*
C	CHT	Chromosomal aberrations, transformed human cells *in vitro*
C	CIA	Chromosomal aberrations, other animal cells *in vitro*
C	CIC	Chromosomal aberrations, Chinese hamster cells *in vitro*
C	CIH	Chromosomal aberrations, other human cells *in vitro*
C	CIM	Chromosomal aberrations, mouse cells *in vitro*
C	CIR	Chromosomal aberrations, rat cells *in vitro*
C	CIS	Chromosomal aberrations, Syrian hamster cells *in vitro*
C	CIT	Chromosomal aberrations, transformed animal cells *in vitro*
C	CLA	Chromosomal aberrations, animal leucocytes *in vivo*
C	CLH	Chromosomal aberrations, human lymphocytes *in vivo*
C	COE	Chromosomal aberrations, oocytes or embryos treated *in vivo*
C	CVA	Chromosomal aberrations, other animal cells *in vivo*
C	CVH	Chromosomal aberrations, other human cells *in vivo*
D	DIA	DNA strand breaks, cross-links or related damage, animal cells *in vitro*
D	DIH	DNA strand breaks, cross-links or related damage, human cells *in vitro*
C	DLM	Dominant lethal test, mice
C	DLR	Dominant lethal test, rats
C	DMC	*Drosophila melanogaster*, chromosomal aberrations
R	DMG	*Drosophila melanogaster*, genetic crossing-over or recombination
C	DMH	*Drosophila melanogaster*, heritable translocation test
C	DML	*Drosophila melanogaster*, dominant lethal test
G	DMM	*Drosophila melanogaster*, somatic mutation (and recombination)
A	DMN	*Drosophila melanogaster*, aneuploidy
G	DMX	*Drosophila melanogaster*, sex-linked recessive lethal mutations
D	DVA	DNA strand breaks, cross-links or related damage, animal cells *in vivo*
D	DVH	DNA strand breaks, cross-links or related damage, human cells *in vivo*
G	EC2	*Escherichia coli* WP2, reverse mutation
D	ECB	*Escherichia coli* (or *E. coli* DNA), strand breaks, cross-links or related damage; DNA repair
D	ECD	*Escherichia coli pol* A/W3110-P3478 differential toxicity (spot test)
G	ECF	*Escherichia coli* exclusive of strain K12, forward mutation
G	ECK	*Escherichia coli* K12, forward or reverse mutation
D	ECL	*Escherichia coli pol* A/W3110-P3478, differential toxicity (liquid suspension test)
G	ECR	*Escherichia coli* (other miscellaneous strains), reverse mutation
G	ECW	*Escherichia coli* WP2 *uvr*A, reverse mutation
D	ERD	*Escherichia coli rec* strains, differential toxicity
G	G51	Gene mutation, mouse lymphoma L5178Y cells *in vitro*, all other loci

Table 1 (contd)

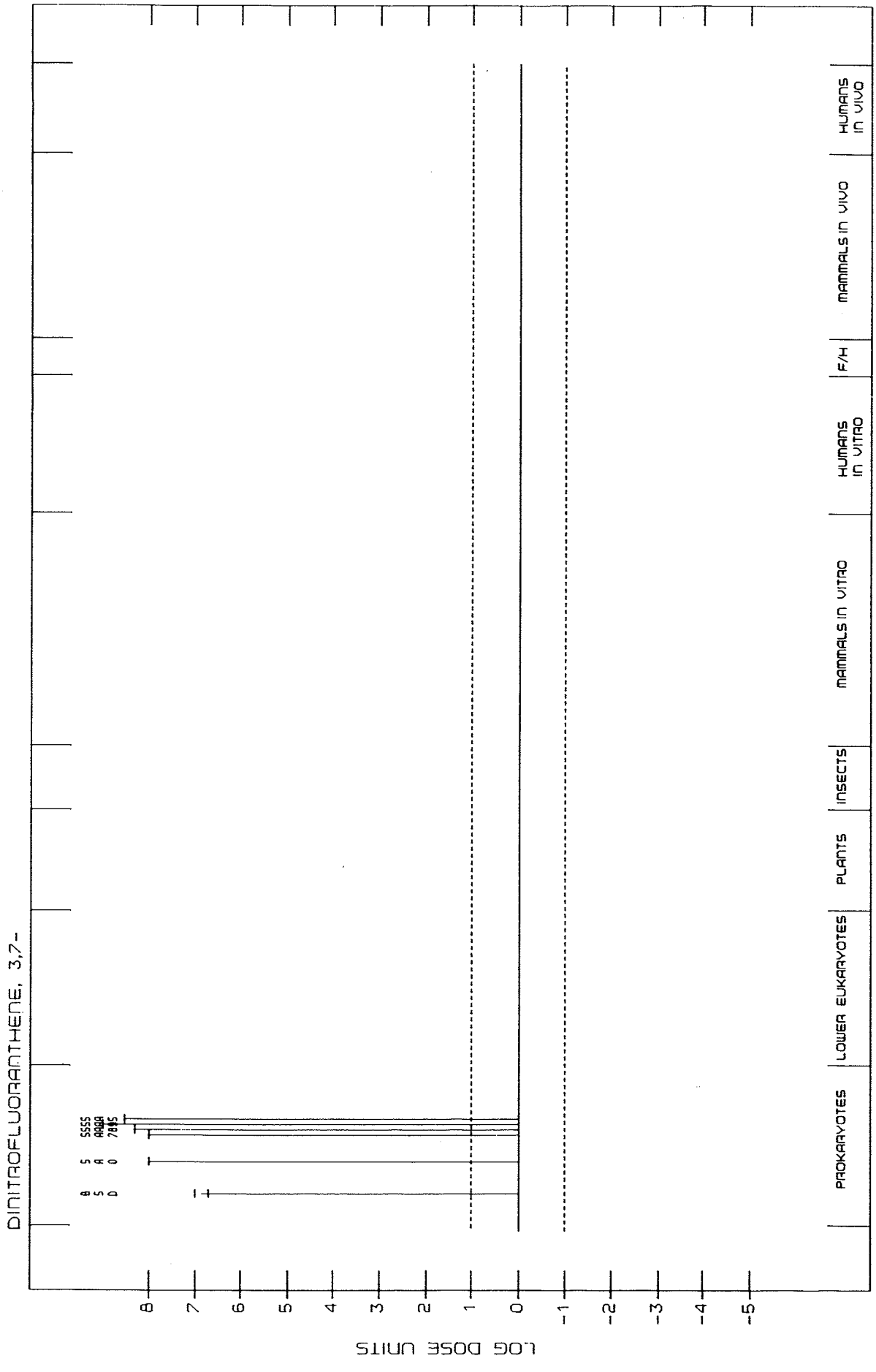
Endpoint	*Code*	*Definition*
G	G9O	Gene mutation, Chinese hamster lung V79 cells, ouabain resistance
G	GCL	Gene mutation, Chinese hamster lung cells exclusive of V79 *in vitro*
G	GCO	Gene mutation, Chinese hamster ovary cells *in vitro*
G	G9H	Gene mutation, Chinese hamster lung V79 cells, *hprt* locus
G	GHT	Gene mutation, transformed human cells
G	GIA	Gene mutation, other animal cells *in vitro*
G	GIH	Gene mutation, human cells *in vitro*
G	GML	Gene mutation, mouse lymphoma cells exclusive of L5178Y *in vitro*
G	G5T	Gene mutation, mouse lymphoma L5178Y cells *in vitro*, TK locus
G	GVA	Gene mutation, animal cells *in vivo*
H	HMA	Host-mediated assay, animal cells in animal hosts
H	HMH	Host-mediated assay, human cells in animal hosts
H	HMM	Host-mediated assay, microbial cells in animal hosts
C	HSC	*Hordeum* species, chromosomal aberrations
G	HSM	*Hordeum* species, mutation
I	ICH	Inhibition of intercellular communication, human cells *in vitro*
I	ICR	Inhibition of intercellular communication, animal cells *in vitro*
G	KPF	*Klebsiella pneumonia*, forward mutation
G	MAF	*Micrococcus aureus*, forward mutation
C	MHT	Mouse heritable translocation test
M	MIA	Micronucleus test, animal cells *in vitro*
M	MIH	Micronucleus test, human cells *in vitro*
G	MST	Mouse spot test
M	MVA	Micronucleus test, other animals *in vivo*
M	MVC	Micronucleus test, hamsters *in vivo*
M	MVH	Micronucleus test, human cells *in vivo*
M	MVM	Micronucleus test, mice *in vivo*
M	MVR	Micronucleus test, rats *in vivo*
G	NCF	*Neurospora crassa*, forward mutation
A	NCN	*Neurospora crassa*, aneuploidy
G	NCR	*Neurospora crassa*, reverse mutation
C	PLC	Plants (other), chromosomal aberrations
M	PLI	Plants (other), micronuclei
G	PLM	Plants (other), mutation
S	PLS	Plants (other), sister chromatid exchanges
D	PLU	Plants, unscheduled DNA synthesis
D	PRB	Prophage induction, SOS repair test or DNA strand breaks, cross-links or related damage
C	PSC	*Paramecium* species, chromosomal aberrations
G	PSM	*Paramecium* species, mutation
D	RIA	DNA repair exclusive of unscheduled DNA synthesis, animal cells *in vitro*
D	RIH	DNA repair exclusive of unscheduled DNA synthesis, human cells *in vitro*
D	RVA	DNA repair exclusive of unscheduled DNA synthesis, animal cells *in vivo*
G	SA0	*Salmonella typhimurium* TA100, reverse mutation
G	SA2	*Salmonella typhimurium* TA102, reverse mutation
G	SA3	*Salmonella typhimurium* TA1530, reverse mutation
G	SA4	*Salmonella typhimurium* TA104, reverse mutation
G	SA5	*Salmonella typhimurium* TA1535, reverse mutation
G	SA7	*Salmonella typhimurium* TA1537, reverse mutation
G	SA8	*Salmonella typhimurium* TA1538, reverse mutation
G	SA9	*Salmonella typhimurium* TA98, reverse mutation
D	SAD	*Salmonella typhimurium*, DNA repair-deficient strains, differential toxicity
G	SAF	*Salmonella typhimurium*, forward mutation
G	SAS	*Salmonella typhimurium* (other miscellaneous strains), reverse mutation
G	SCF	*Saccharomyces cerevisiae*, forward mutation
R	SCG	*Saccharomyces cerevisiae*, gene conversion
R	SCH	*Saccharomyces cerevisiae*, homozygosis by mitotic recombination or gene conversion
A	SCN	*Saccharomyces cerevisiae*, aneuploidy
G	SCR	*Saccharomyces cerevisiae*, reverse mutation
G	SGR	*Streptomyces griseoflavus*, reverse mutation
S	SHF	Sister chromatid exchange, human fibroblasts *in vitro*
S	SHL	Sister chromatid exchange, human lymphocytes *in vitro*
S	SHT	Sister chromatid exchange, transformed human cells *in vitro*
S	SIA	Sister chromatid exchange, other animal cells *in vitro*
S	SIC	Sister chromatid exchange, Chinese hamster cells *in vitro*
S	SIH	Sister chromatid exchange, other human cells *in vitro*
S	SIM	Sister chromatid exchange, mouse cells *in vitro*
S	SIR	Sister chromatid exchange, rat cells *in vitro*
S	SIS	Sister chromatid exchange, Syrian hamster cells *in vitro*
S	SIT	Sister chromatid exchange, transformed animal cells *in vitro*
S	SLH	Sister chromatid exchange, human lymphocytes *in vivo*
G	SLO	Mouse specific locus test, other stages
G	SLP	Mouse specific locus test, postspermatogonia
P	SPF	Sperm morphology, F1 mice
P	SPH	Sperm morphology, humans *in vivo*
P	SPM	Sperm morphology, mice
P	SPR	Sperm morphology, rats
D	SSB	*Saccharomyces* species, DNA strand breaks, cross-links or related damage
D	SSD	*Saccharomyces* species, DNA repair-deficient strains, differential toxicity
G	STF	*Streptomyces coelicolor*, forward mutation
G	STR	*Streptomyces coelicolor*, reverse mutation

Table 1 (contd)

Endpoint	*Code*	*Definition*
S	SVA	Sister chromatid exchange, animal cells *in vivo*
S	SVH	Sister chromatid exchange, other human cells *in vivo*
D	SZD	*Schizosaccharomyces pombe*, DNA repair-deficient strains, differential toxicity
G	SZF	*Schizosaccharomyces pombe*, forward mutation
R	SZG	*Schizosaccharomyces pombe*, gene conversion
G	SZR	*Schizosaccharomyces pombe*, reverse mutation
T	TBM	Cell transformation, BALB/c 3T3 mouse cells
T	TCL	Cell transformation, other established cell lines
T	TCM	Cell transformation, C3H 10T1/2 mouse cells
T	TCS	Cell transformation, Syrian hamster embryo cells, clonal assay
T	TEV	Cell transformation, other viral enhancement systems
T	TFS	Cell transformation, Syrian hamster embryo cells, focus assay
T	TIH	Cell transformation, human cells *in vitro*
T	TPM	Cell transformation, mouse prostate cells
T	T7R	Cell transformation, SA7/rat cells
T	TRR	Cell transformation, RLV/Fischer rat embryo cells
T	T7S	Cell transformation, SA7/Syrian hamster embryo cells
C	TSC	*Tradescantia* species, chromosomal aberrations
M	TSI	*Tradescantia* species, micronuclei
G	TSM	*Tradescantia* species, mutation
T	TVI	Cell transformation, treated *in vivo*, scored *in vitro*
D	UBH	Unscheduled DNA synthesis, human bone-marrow cells *in vivo*
D	UHF	Unscheduled DNA synthesis, human fibroblasts *in vitro*
D	UHL	Unscheduled DNA synthesis, human lymphocytes *in vitro*
D	UHT	Unscheduled DNA synthesis, transformed human cells *in vitro*
D	UIA	Unscheduled DNA synthesis, other animal cells *in vitro*
D	UIH	Unscheduled DNA synthesis, other human cells *in vitro*
D	UPR	Unscheduled DNA synthesis, rat hepatocytes *in vivo*
D	URP	Unscheduled DNA synthesis, rat primary hepatocytes
D	UVA	Unscheduled DNA synthesis, other animal cells *in vivo*
D	UVC	Unscheduled DNA synthesis, hamster cells *in vivo*
D	UVH	Unscheduled DNA synthesis, other human cells *in vivo*
D	UVM	Unscheduled DNA synthesis, mouse cells *in vivo*
D	UVR	Unscheduled DNA synthesis, other rat cells *in vivo*
C	VFC	*Vicia faba*, chromosomal aberrations
S	VFS	*Vicia faba*, sister chromatid exchange

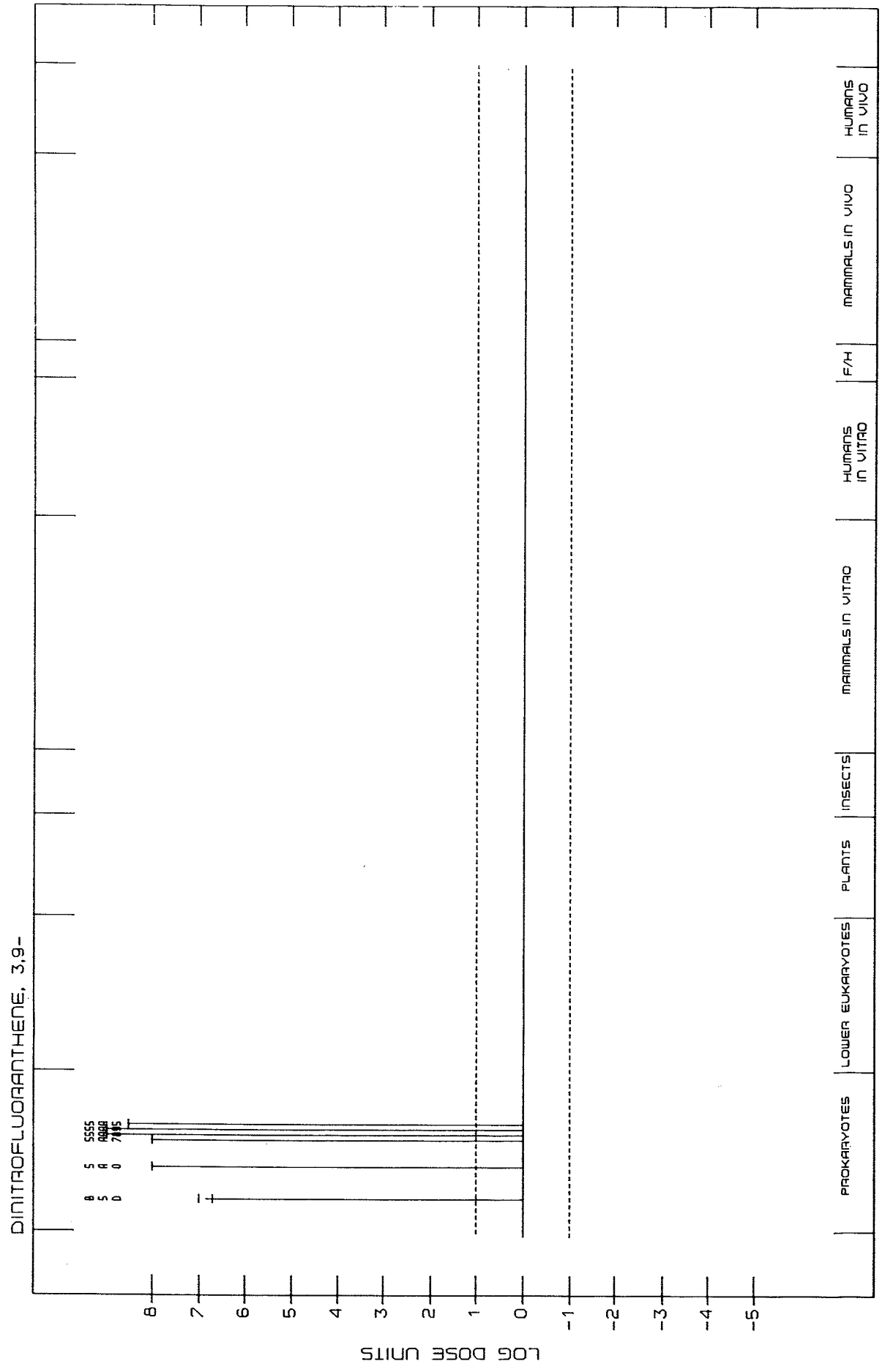
DINITROFLUORANTHENE, 3,7-
105735-71-5

	TEST CODE	END POINT	RESULTS NO ACT	RESULTS ACT	DOSE (LED OR HID)	SHORT CITATION
1	BSD	D	+	0	0.0200	TOKIWA ET AL., 1986
2	BSD	D	+	0	0.0100	NAKAGAWA ET AL., 1987
3	SA0	G	+	0	0.0010	NAKAGAWA ET AL., 1987
4	SA7	G	+	0	0.0010	NAKAGAWA ET AL., 1987
5	SA8	G	+	0	0.0005	NAKAGAWA ET AL., 1987
6	SA9	G	+	0	0.0001	NAKAGAWA ET AL., 1987
7	SAS	G	+	0	0.0003	NAKAGAWA ET AL., 1987


DINITROFLUORANTHENE, 3,7-
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

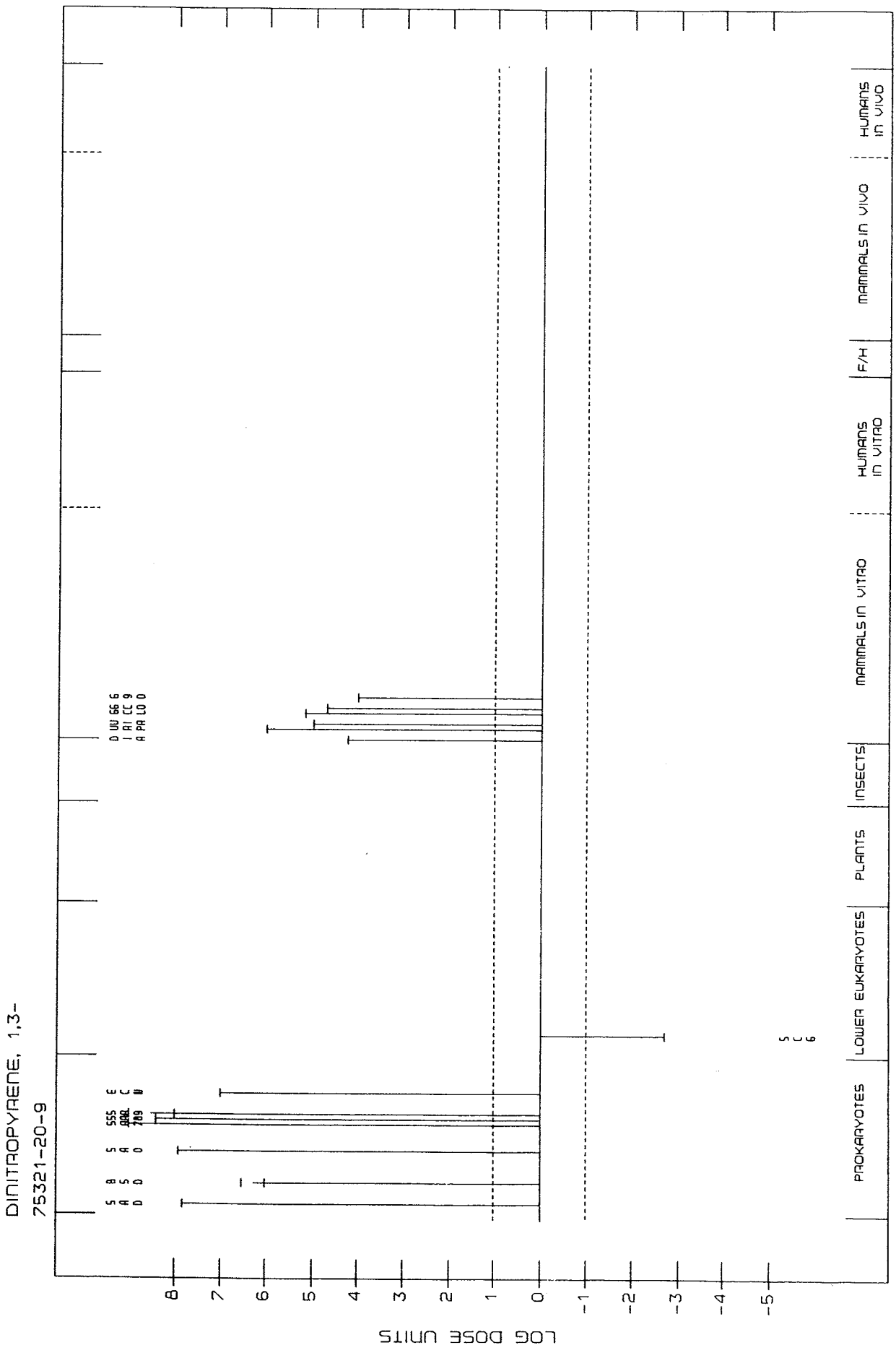
DINITROFLUORANTHENE, 3,9-
22506-53-2

	TEST CODE	END POINT	RESULTS NO ACT	RESULTS ACT	DOSE (LED OR HID)	SHORT CITATION
1	BSD	D	+	0	0.0200	TOKIWA ET AL., 1986
2	BSD	D	+	0	0.0100	NAKAGAWA ET AL., 1987
3	SA0	G	+	0	0.0010	NAKAGAWA ET AL., 1987
4	SA7	G	+	0	0.0010	NAKAGAWA ET AL., 1987
5	SA8	G	+	0	0.0001	NAKAGAWA ET AL., 1987
6	SA9	G	+	0	0.0001	NAKAGAWA ET AL., 1987
7	SAS	G	+	0	0.0003	NAKAGAWA ET AL., 1987


DINITROFLUORANTHENE, 3,9-
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

DINITROPYRENE, 1,3-
75321-20-9

	TEST CODE	END POINT	RESULTS NO ACT	RESULTS ACT	DOSE (LED OR HID)	SHORT CITATION
1	SAD	D	+	0	0.0015	NAKAMURA ET AL., 1987
2	BSD	D	+	0	0.0300	HORIKAWA ET AL., 1986
3	BSD	D	+	0	0.1000	TOKIWA ET AL., 1986
4	SA0	G	+	0	0.0012	MERMELSTEIN ET AL., 1981
5	SA0	G	+	0	0.0000	ROSENKRANZ ET AL., 1985
6	SA0	G	+	0	0.0000	MCCOY ET AL., 1985b
7	SA2	G	+	0	0.0000	MCCOY ET AL., 1985b
8	SA4	G	+	0	0.0000	MCCOY ET AL., 1985b
9	SA5	G	-	0	0.0125	MERMELSTEIN ET AL., 1981
10	SA7	G	+	0	0.0001	MERMELSTEIN ET AL., 1981
11	SA8	G	+	0	0.0004	MERMELSTEIN ET AL., 1981
12	SA9	G	+	0	0.0001	MERMELSTEIN ET AL., 1981
13	SA9	G	+	0	0.0000	PEDERSON & SIAK, 1981
14	SA9	G	+	0	0.0000	ROSENKRANZ ET AL., 1985
15	SA9	G	+	0	0.0000	TOKIWA ET AL., 1985
16	SA9	G	+	0	0.0000	LOFROTH, 1981
17	SA9	G	+	0	0.0010	MOROTOMI & WATANABE, 1984
18	SA9	G	+	0	0.0000	MCCOY ET AL., 1985b
19	SAS	G	+	0	0.0000	ROSENKRANZ ET AL., 1985
20	SAS	G	+	0	0.0000	MCCOY ET AL., 1985b
21	ECW	G	-	0	0.0125	MERMELSTEIN ET AL., 1981
22	ECW	G	+	0	0.0100	MCCOY ET AL., 1985a
23	SCG	R	-	0	500.0000	MCCOY ET AL., 1983
24	DIA	D	(+)	0	5.8000	MOLLER & THORGEIRSSON, 1985
25	URP	D	+	0	0.1000	MORI ET AL., 1987
26	UIA	D	+	0	1.0000	MORI ET AL., 1987
27	GCL	G	+	0	0.6700	NAKAYASU ET AL., 1982
28	GCO	G	(+)	+	2.0000	LI & DUTCHER, 1983
29	G9O	G	+	0	10.0000	TAKAYAMA ET AL., 1983
30	G9O	G	+	0	10.0000	KATOH ET AL., 1984
31	UHT	D	+	0	0.0000	EDDY ET AL., 1986
32	GIH	G	+	0	0.0000	EDDY ET AL., 1986
33	BID	*	(+)	0	1.0000	HSIEH ET AL.,1986


DINITROPYRENE, 1,3-
75321-20-9
LOG DOSE UNITS
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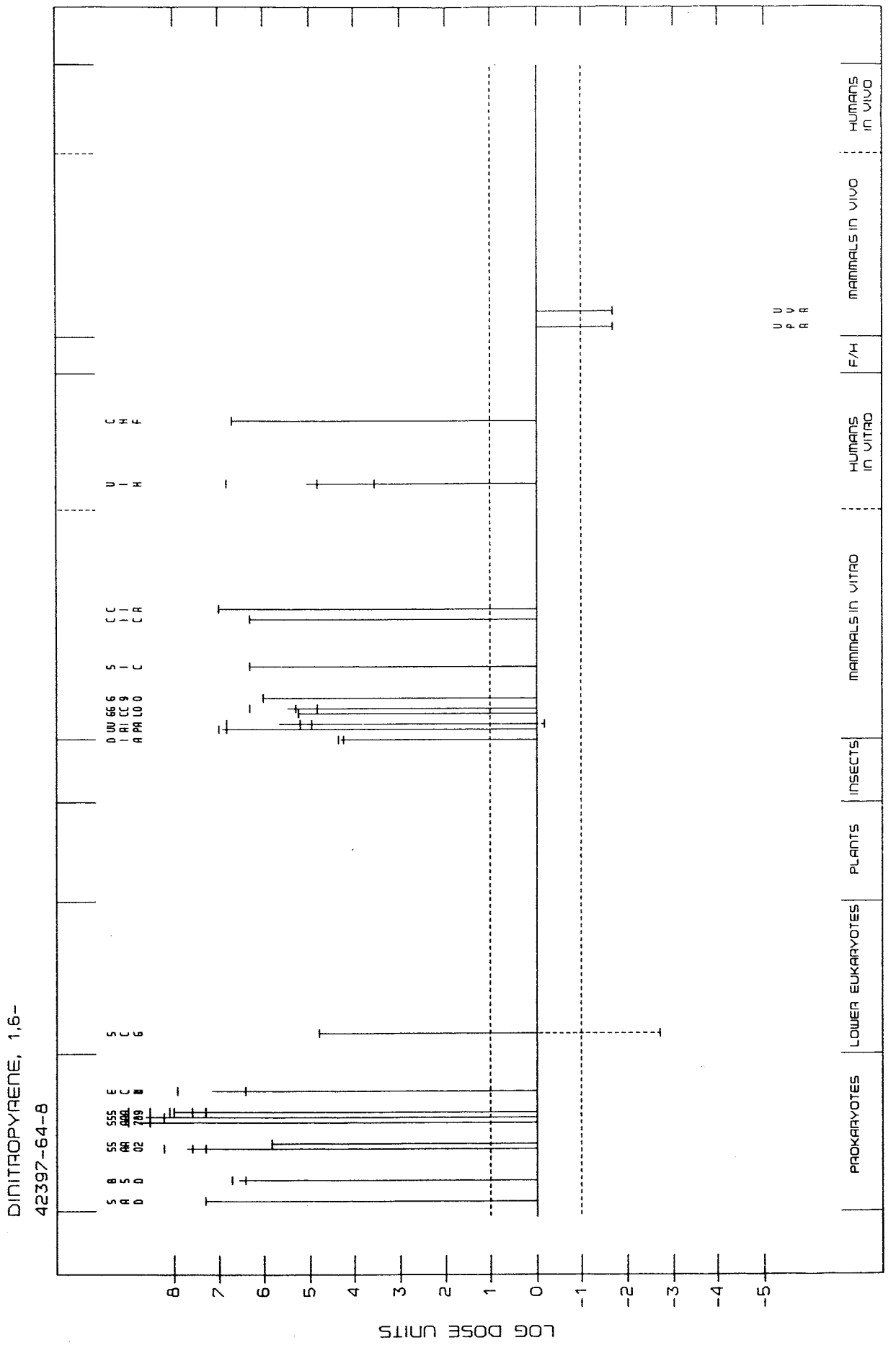
PROKARYOTES
LOWER EUKARYOTES
PLANTS
INSECTS
MAMMALS IN VITRO
HUMANS IN VITRO
F/H
MAMMALS IN VIVO
HUMANS IN VIVO

DINITROPYRENE, 1,6-
42397-64-8

	TEST CODE	END POINT	RESULTS NO ACT	RESULTS ACT	DOSE (LED OR HID)	SHORT CITATION
1	SAD	D	+	0	0.0050	NAKAMURA ET AL., 1987
2	BSD	D	+	0	0.0200	HORIKAWA ET AL., 1986
3	BSD	D	+	0	0.0400	TOKIWA ET AL., 1986
4	SA0	G	+	0	0.0006	TOKIWA ET AL., 1984
5	SA0	G	+	+	0.0025	EL-BAYOUMY & HECHT, 1986
6	SA0	G	+	+	0.0050	TOKIWA ET AL., 1981
7	SA0	G	+	0	0.0000	ROSENKRANZ ET AL., 1985
8	SA2	G	+	0	0.1500	MCCOY ET AL., 1985b
9	SA4	G	+	0	0.0000	MCCOY ET AL., 1985b
10	SA5	G	-	0	0.0125	MERMELSTEIN ET AL., 1981
11	SA7	G	+	0	0.0003	TOKIWA ET AL., 1984
12	SA7	G	+	0	0.0001	MERMELSTEIN ET AL., 1981
13	SA8	G	+	0	0.0006	TOKIWA ET AL., 1984
14	SA8	G	+	0	0.0001	MERMELSTEIN ET AL., 1981
15	SA9	G	+	0	0.0003	TOKIWA ET AL., 1984
16	SA9	G	+	0	0.0001	MERMELSTEIN ET AL., 1981
17	SA9	G	+	+	0.0050	TOKIWA ET AL., 1981
18	SA9	G	+	0	0.0050	ASHBY ET AL., 1983
19	SA9	G	+	+	0.0025	EL-BAYOUMY & HECHT, 1986
20	SA9	G	+	0	0.0008	FIFER ET AL., 1986
21	SA9	G	+	0	0.0000	LOFROTH, 1981
22	SA9	G	+	0	0.0000	ROSENKRANZ ET AL., 1985
23	SA9	G	+	0	0.0000	TOKIWA ET AL., 1985
24	SA9	G	+	0	0.0000	FU ET AL., 1986
25	SA9	G	+	0	0.0010	MOROTOMI & WATANABE, 1984
26	SA9	G	+	0	0.0000	NAKAYASU ET AL., 1982
27	SAS	G	+	0	0.0000	ROSENKRANZ ET AL., 1985
28	SAS	G	+	0	0.0000	MCCOY ET AL., 1985b
29	ECW	G	+	0	0.0012	TOKIWA ET AL., 1984
30	ECW	G	+	0	0.0400	MCCOY ET AL., 1985a
31	SCG	R	-	0	500.0000	MCCOY ET AL., 1983
32	SCG	R	+	0	1.6000	WILCOX & PARRY, 1981
33	SCG	R	+	+	0.0000	WILCOX ET AL., 1982
34	DIA	D	+	0	4.4000	SAITO ET AL., 1984b
35	DIA	D	(+)	0	5.8000	MOLLER & THORGEIRSSON, 1985
36	URP	D	+	0	0.0100	MORI ET AL., 1987
37	URP	D	+	0	0.0150	BUTTERWORTH ET AL., 1983
38	UIA	D	+	0	0.0150	DOOLITTLE & BUTTERWORTH, 1984
39	UIA	D	+	0	0.6300	HAUGEN ET AL., 1986
40	UIA	D	-	0	1.5000	WORKING & BUTTERWORTH, 1984
41	UIA	D	+	0	1.1000	MORI ET AL., 1987
42	GCL	G	+	0	0.5700	NAKAYASU ET AL., 1982
43	GCO	G	(+)	+	0.5000	LI & DUTCHER, 1983
44	GCO	G	+	0	0.0500	EDGAR & BROOKER, 1985
45	GCO	G	(+)	0	1.5000	FIFER ET AL., 1986
46	G9O	G	+	0	0.1000	KATOH ET AL., 1984
47	SIC	S	+	0	0.0500	EDGAR & BROOKER, 1985
48	CIC	C	+	0	0.0500	EDGAR & BROOKER, 1985
49	CIR	C	+	0	0.0100	DANFORD ET AL., 1982
50	CIR	C	+	0	0.0100	WILCOX ET AL., 1982

DINITROPYRENE, 1,6-
42397-64-8

	TEST CODE	END POINT	RESULTS NO ACT	RESULTS ACT	DOSE (LED OR HID)	SHORT CITATION
51	UHT	D	-	0	0.0000	EDDY ET AL., 1986
52	UIH	D	+	0	29.0000	SUGIMURA & TAKAYAMA, 1983
53	UIH	D	+	0	1.5000	DOOLITTLE ET AL., 1985
54	UIH	D	+	0	0.0150	BUTTERWORTH ET AL., 1983
55	GIH	G	-	0	0.0000	EDDY ET AL., 1986
56	CHF	C	+	0	0.0200	WILCOX ET AL., 1982
57	UPR	D	-	0	50.0000	BUTTERWORTH ET AL., 1983
58	UVR	D	-	0	50.0000	WORKING & BUTTERWORTH, 1984
59	BVD	*	+	0	0.2000	DJURIC ET AL., 1988
60	BID	*	0	+	5.9000	DJURIC ET AL., 1988
61	BID	*	+	0	1.0000	HSIEH ET AL.,1986
62	BVD	*	+	0	3.4000	DELCLOS ET AL., 1987


DINITROPYRENE, 1,6-
42397-64-8
LOG DOSE UNITS
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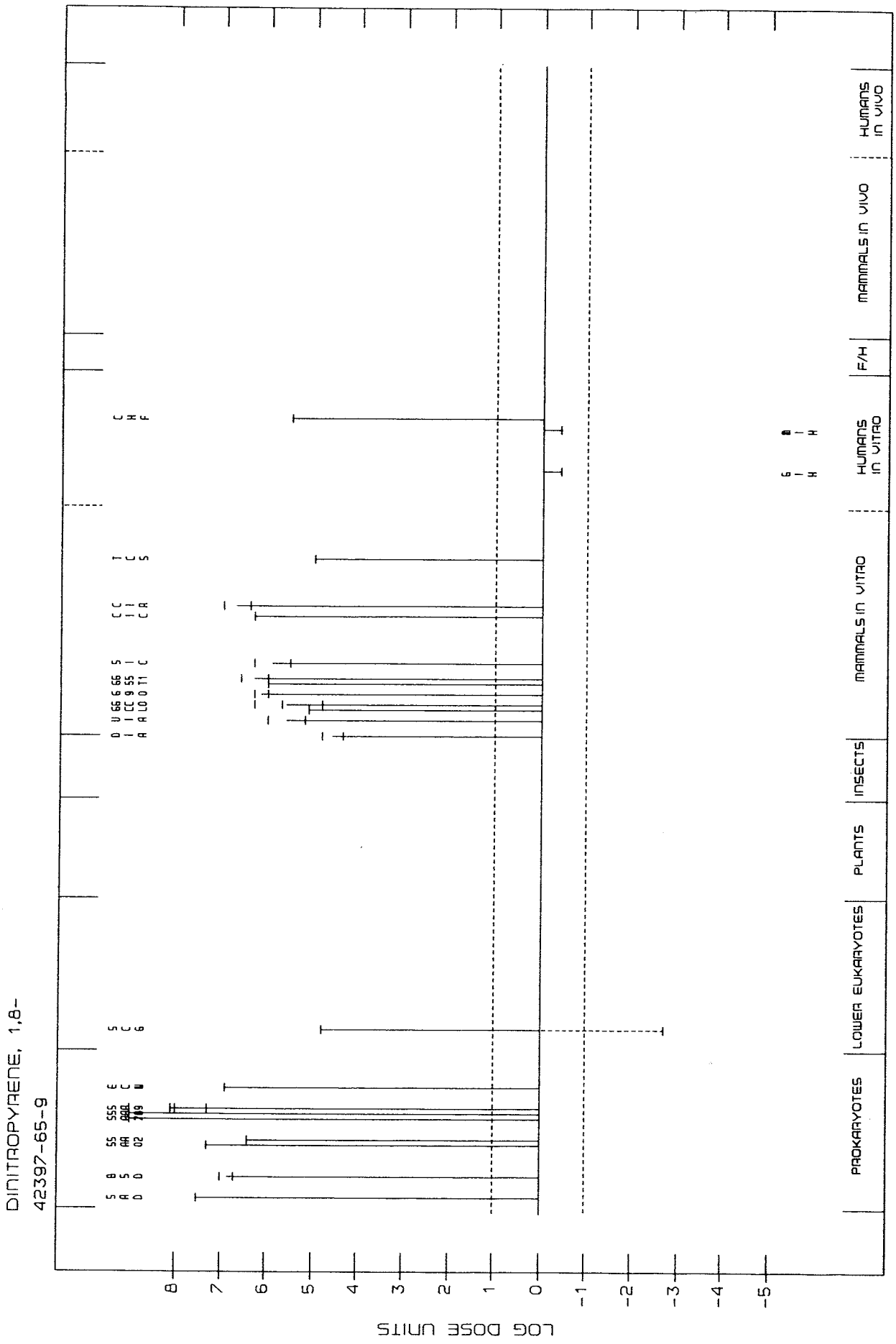
PROKARYOTES
LOWER EUKARYOTES
PLANTS
INSECTS
MAMMALS IN VITRO
HUMANS IN VITRO
F/H
MAMMALS IN VIVO
HUMANS IN VIVO

DINITROPYRENE, 1,8-
42397-65-9

	TEST CODE	END POINT	RESULTS NO ACT	RESULTS ACT	DOSE (LED OR HID)	SHORT CITATION
1	SAD	D	+	0	0.0030	NAKAMURA ET AL., 1987
2	BSD	D	+	0	0.0100	HORIKAWA ET AL., 1986
3	BSD	D	+	0	0.0200	TOKIWA ET AL., 1986
4	SA0	G	+	0	0.0000	ROSENKRANZ ET AL., 1985
5	SA0	G	+	+	0.0050	TOKIWA ET AL., 1981
6	SA2	G	+	0	0.0400	MCCOY ET AL., 1985b
7	SA4	G	+	0	0.0000	MCCOY ET AL., 1985b
8	SA5	G	-	0	0.0125	MERMELSTEIN ET AL., 1981
9	SA7	G	+	0	0.0001	MERMELSTEIN ET AL., 1981
10	SA8	G	+	0	0.0001	MERMELSTEIN ET AL., 1981
11	SA9	G	+	+	0.0050	TOKIWA ET AL., 1981
12	SA9	G	+	0	0.0008	FIFER ET AL., 1986
13	SA9	G	+	0	0.0001	MERMELSTEIN ET AL., 1981
14	SA9	G	+	0	0.0000	PEDERSON & SIAK, 1981
15	SA9	G	+	0	0.0000	ROSENKRANZ ET AL., 1985
16	SA9	G	+	0	0.0000	TOKIWA ET AL., 1985
17	SA9	G	+	0	0.0000	HOLLOWAY ET AL., 1987
18	SA9	G	+	0	0.0000	LOFROTH, 1981
19	SA9	G	+	0	0.0000	PITTS ET AL., 1984
20	SA9	G	+	0	0.0000	ZIELINSKA ET AL., 1987
21	SA9	G	+	0	0.0010	MOROTOMI & WATANABE, 1984
22	SA9	G	+	0	0.0000	NAKAYASU ET AL., 1982
23	SA9	G	+	0	0.0000	HEFLICH ET AL., 1985
24	SAS	G	+	0	0.0000	ROSENKRANZ ET AL., 1985
25	SAS	G	+	0	0.0000	HEFLICH ET AL., 1985
26	SAS	G	+	0	0.0000	MCCOY ET AL., 1985b
27	ECW	G	-	0	0.0300	MERMELSTEIN ET AL., 1981
28	ECW	G	+	0	0.0125	MCCOY ET AL., 1985a
29	SCG	R	+	0	1.6000	WILCOX & PARRY, 1981
30	SCG	R	-	0	500.0000	MCCOY ET AL., 1983
31	SCG	R	+	+	0.0000	WILCOX ET AL., 1982
32	DIA	D	(+)	0	4.4000	SAITO ET AL., 1984b
33	DIA	D	+	0	1.5000	MOLLER & THORGEIRSSON, 1985
34	UIA	D	+	0	0.1000	MORI ET AL., 1987
35	UIA	D	+	0	0.6300	HAUGEN ET AL., 1986
36	GCL	G	+	0	0.7500	NAKAYASU ET AL., 1982
37	GCO	G	+	0	0.0500	EDGAR & BROOKER, 1985
38	GCO	G	+	0	1.5000	HEFLICH ET AL., 1986b
39	GCO	G	(+)	+	0.2000	LI & DUTCHER, 1983
40	G9O	G	+	0	0.0500	TAKAYAMA ET AL., 1983
41	G9O	G	+	0	0.1000	KATOH ET AL., 1984
42	G5T	G	+	0	0.1000	EDGAR, 1985
43	G51	G	+	0	0.0250	COLE ET AL., 1982
44	G51	G	+	0	0.1000	ARLETT, 1984
45	SIC	S	+	0	0.0500	EDGAR & BROOKER, 1985
46	SIC	S	+	+	0.3000	NACHTMAN & WOLFF, 1982
47	CIC	C	+	0	0.0500	EDGAR & BROOKER, 1985
48	CIR	C	+	0	0.0100	WILCOX ET AL., 1982
49	CIR	C	+	0	0.0400	DANFORD ET AL., 1982
50	TCS	T	+	0	1.0000	DIPAOLO ET AL., 1983

DINITROPYRENE, 1,8-
42397-65-9

	TEST CODE	END POINT	RESULTS NO ACT	RESULTS ACT	DOSE (LED OR HID)	SHORT CITATION
51	UHT	D	-	0	0.0000	EDDY ET AL., 1986
52	GIH	G	-	0	0.0000	EDDY ET AL., 1986
53	GIH	G	-	0	2.5000	ARLETT, 1984
54	MIH	M	-	0	2.5000	ARLETT, 1984
55	CHF	C	+	0	0.3100	WILCOX ET AL., 1982
56	BVD	*	+	0	1.0000	HEFLICH ET AL., 1986a
57	BID	*	+	0	1.0000	HSIEH ET AL.,1986
58	BID	*	+	0	2.9000	HEFLICH ET AL., 1986b
59	BID	*	+	0	0.9000	HEFLICH ET AL., 1985
60	BID	*	+	0	0.0100	ANDREWS ET AL., 1986


DINITROPYRENE, 1,8-
42397-65-9
PROKARYOTES
LOWER EUKARYOTES
PLANTS
INSECTS
MAMMALS IN VITRO
HUMANS IN VITRO
F/H
MAMMALS IN VIVO
HUMANS IN VIVO
LOG DOSE UNITS
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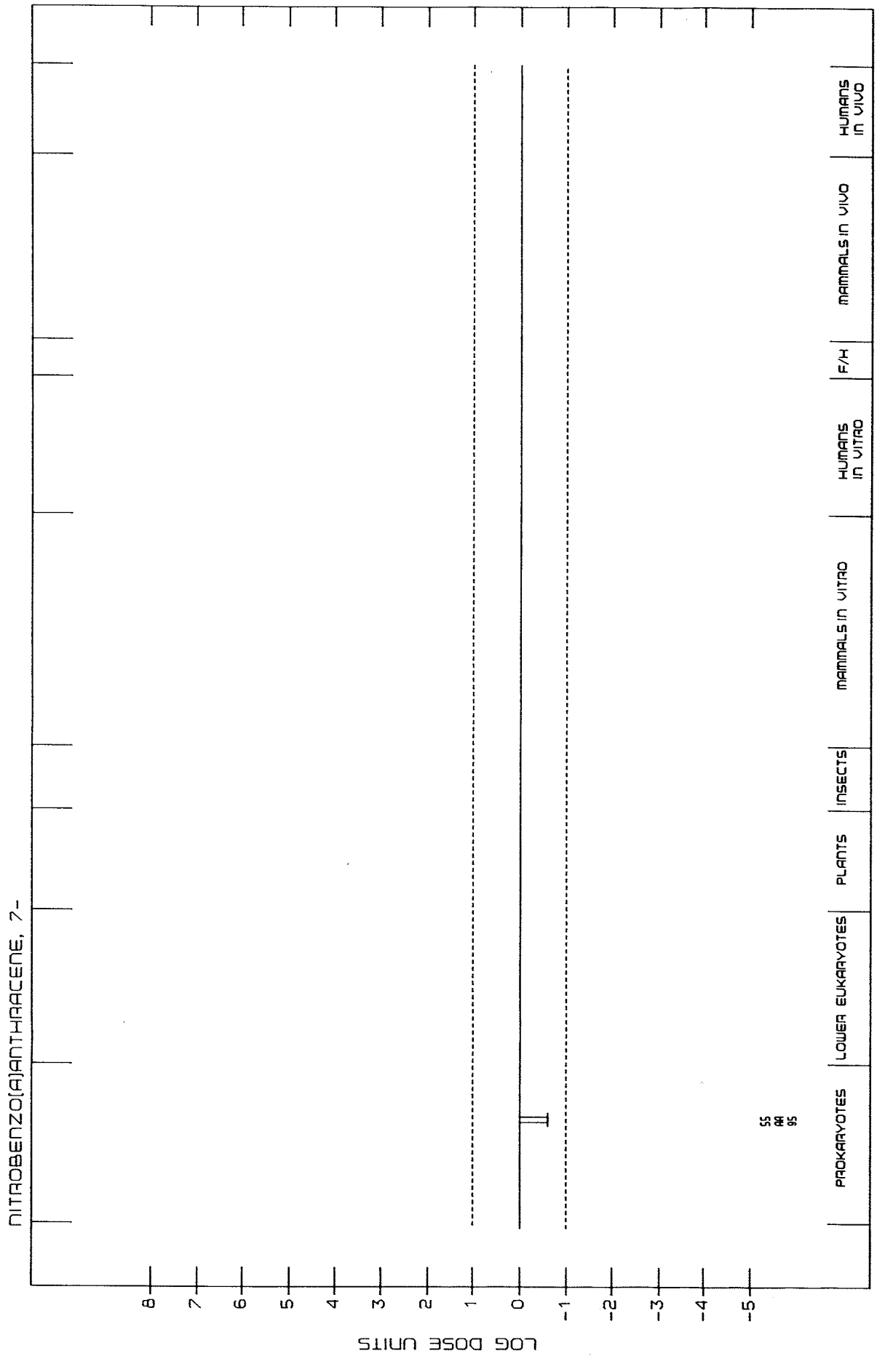
NITROBENZO[A]ANTHRACENE, 7-
20268-51-3

	TEST CODE	END POINT	RESULTS NO ACT	RESULTS ACT	DOSE (LED OR HID)	SHORT CITATION
1	SA0	G	-	-	0.0000	GREIBROKK ET AL., 1984
2	SA9	G	-	-	0.0000	GREIBROKK ET AL., 1984
3	SA9	G	-	0	4.0000	WHITE ET AL., 1985
4	SAS	G	-	0	4.0000	WHITE ET AL., 1985


NITROBENZO[A]ANTHRACENE, 7-
LOG DOSE UNITS
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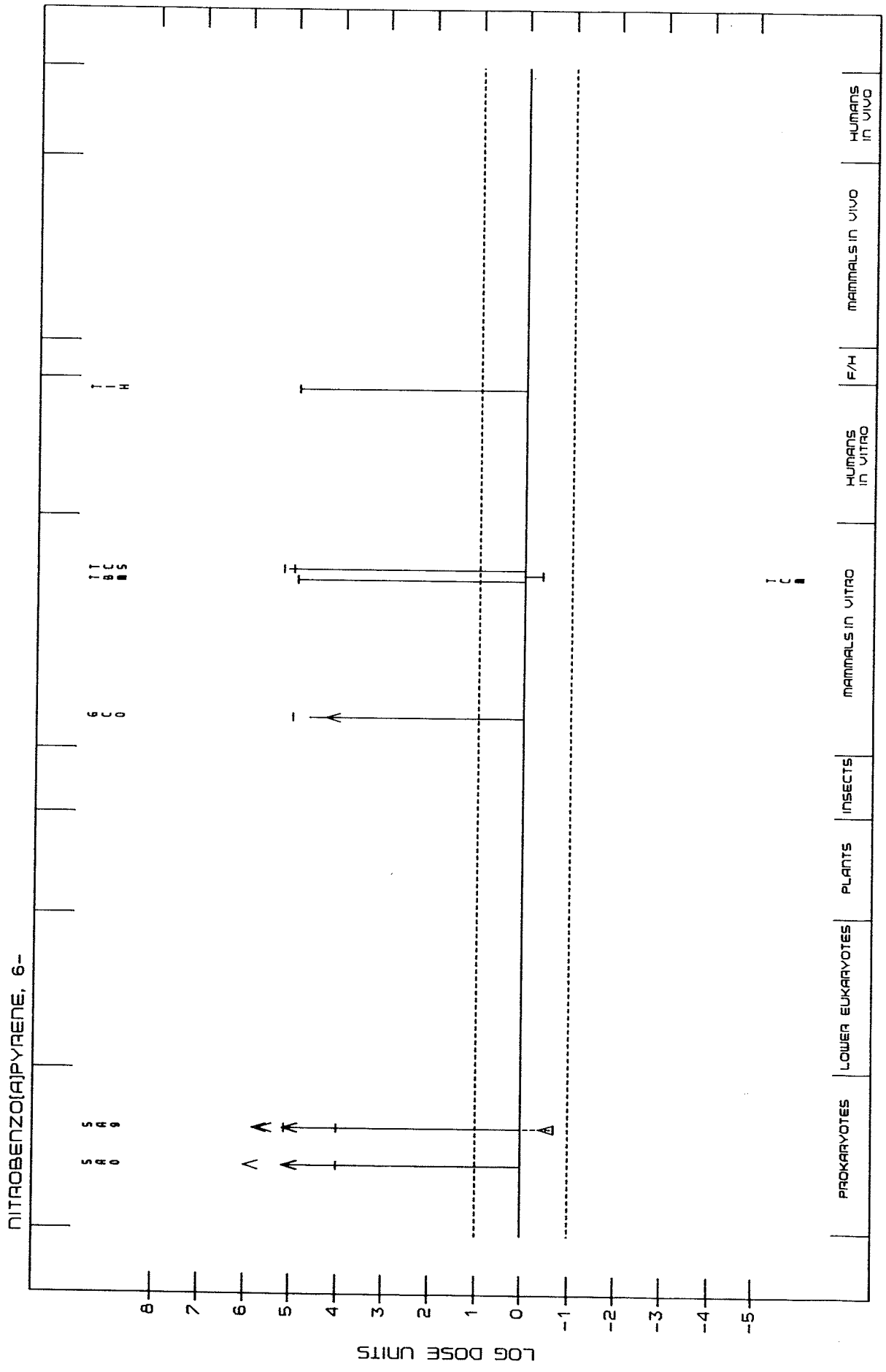
PROKARYOTES
LOWER EUKARYOTES
PLANTS
INSECTS
MAMMALS IN VITRO
HUMANS IN VITRO
F/H
MAMMALS IN VIVO
HUMANS IN VIVO
SS
AA
95

NITROBENZO[A]PYRENE, 6-
63041-90-7

	TEST CODE	END POINT	RESULTS NO ACT	RESULTS ACT	DOSE (LED OR HID)	SHORT CITATION
1	SA0	G	-	+	0.7000	FU ET AL., 1982a
2	SA0	G	-	+	0.7500	CHOU ET AL., 1984
3	SA0	G	+	+	10.0000	TOKIWA ET AL., 1981
4	SA0	G	-	+	0.1000	LOFROTH ET AL., 1984
5	SA9	G	-	+	0.7000	FU ET AL., 1982a
6	SA9	G	-	+	0.7500	CHOU ET AL., 1984
7	SA9	G	+	+	10.0000	TOKIWA ET AL., 1981
8	SA9	G	-	+	0.2000	LOFROTH ET AL., 1984
9	SA9	G	-	+	0.1500	ANDERSON ET AL., 1987
10	SA9	G	-	-	2.5000	HASS ET AL., 1986a
11	SA9	G	+	+	0.7500	WANG ET AL., 1978
12	SA9	G	-	+	0.0000	PITTS ET AL., 1982
13	SA9	G	-	0	5.0000	WHITE ET AL., 1985
14	SAS	G	-	+	0.0000	PITTS ET AL., 1982
15	GCO	G	+	0	1.0000	CHOU ET AL., 1984
16	GCO	G	-	+	5.0000	HASS ET AL., 1986b
17	TBM	T	+	0	1.2000	SALA ET AL., 1987
18	TCM	T	-	0	2.4000	SALA ET AL., 1987
19	TCS	T	+	0	1.0000	DIPAOLO ET AL., 1983
20	TCS	T	+	0	0.6000	SALA ET AL., 1987
21	TIH	T	+	0	1.2000	HOWARD ET AL., 1983b
22	BVD	*	+	0	2.0000	GARNER ET AL., 1985
23	BID	*	+	0	0.5000	GARNER ET AL., 1985


NITROBENZO[A]PYRENE, 6-
LOG DOSE UNITS
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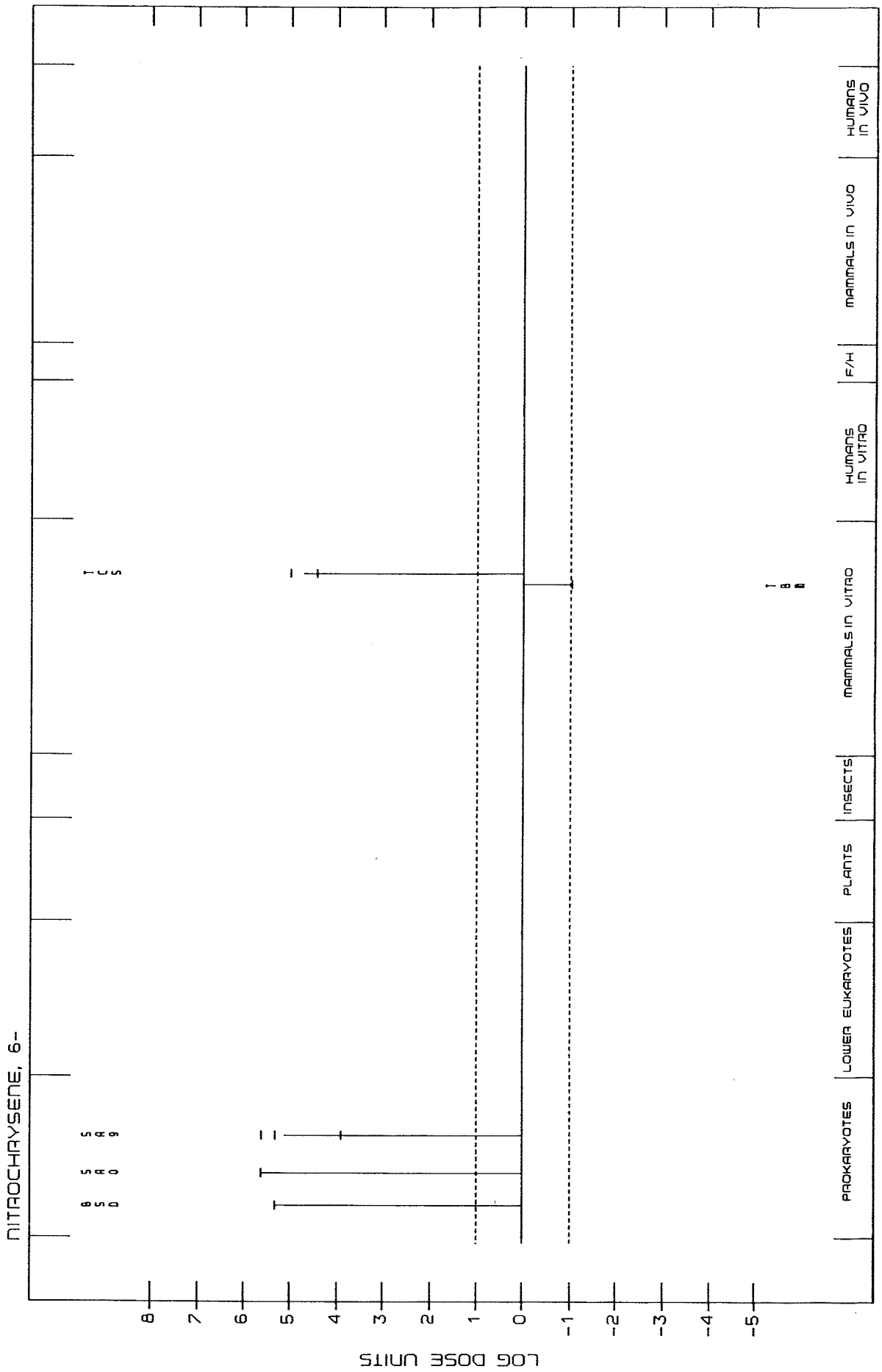
PROKARYOTES
LOWER EUKARYOTES
PLANTS
INSECTS
MAMMALS IN VITRO
HUMANS IN VITRO
F/H
MAMMALS IN VIVO
HUMANS IN VIVO

NITROCHRYSENE, 6-
7496-02-8

	TEST CODE	END POINT	RESULTS NO ACT	RESULTS ACT	DOSE (LED OR HID)	SHORT CITATION
1	BSD	D	+	0	0.5000	TOKIWA ET AL., 1987
2	SA0	G	+	+	0.0000	GREIBROKK ET AL., 1984
3	SA0	G	+	+	0.0000	SUGIMURA & TAKAYAMA, 1983
4	SA0	G	+	+	0.2500	TOKIWA ET AL., 1981b
5	SA0	G	+	+	0.2500	EL-BAYOUMY & HECHT, 1984
6	SA9	G	+	0	0.0000	PEDERSON & SIAK, 1981
7	SA9	G	+	+	12.5000	TOKIWA ET AL., 1981a
8	SA9	G	+	+	0.5000	GREIBROKK ET AL., 1984
9	SA9	G	+	+	0.0000	SUGIMURA & TAKAYAMA, 1983
10	SA9	G	+	+	0.2500	TOKIWA ET AL., 1981b
11	SA9	G	+	+	0.2500	EL-BAYOUMY & HECHT, 1984
12	TBM	T	-	0	10.8000	SALA ET AL., 1987
13	TCS	T	+	0	1.0000	DIPAOLO ET AL., 1983
14	TCS	T	+	0	3.6000	SALA ET AL., 1987
15	BVD	*	+	0	11.0000	DELCLOS ET AL., 1988
16	BID	*	+	0	2.7000	DELCLOS ET AL., 1987a


NITROCHRYSENE, 6-
LOG DOSE UNITS
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PROKARYOTES
LOWER EUKARYOTES
PLANTS
INSECTS
MAMMALS IN VITRO
HUMANS IN VITRO
F/H
MAMMALS IN VIVO
HUMANS IN VIVO

NITROFLUORENE, 2-
607-57-8

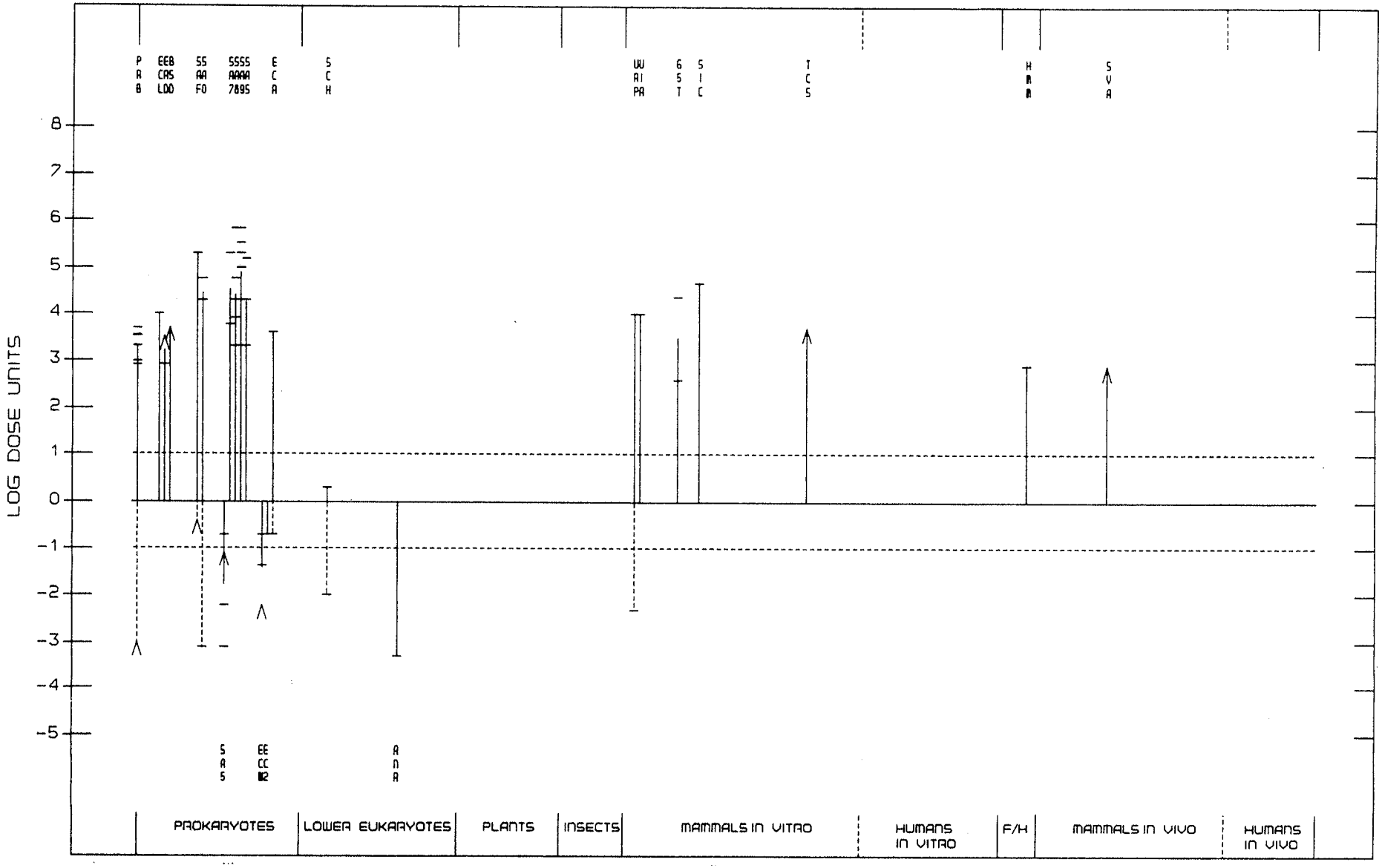
	TEST CODE	END POINT	RESULTS NO ACT	RESULTS ACT	DOSE (LED OR HID)	SHORT CITATION
1	PRB	D	+	0	31.0000	NAKAMURA ET AL., 1987
2	PRB	D	+	0	30.0000	MAMBER ET AL., 1986
3	PRB	D	+	0	50.0000	OHTA ET AL., 1984
4	PRB	D	+	0	21.0000	QUILLARDET ET AL., 1985
5	PRB	D	+	0	105.0000	MARZIN ET AL., 1986
6	PRB	D	+	+	125.0000	HO & HO, 1981
7	PRB	D	-	-	1000.0000	MAMBER ET AL., 1984
8	ECL	D	+	0	10.0000	ROSENKRANZ & POIRIER, 1979
9	ERD	D	0	+	31.0000	MCCARROLL ET AL., 1981a
10	ERD	D	+	0	120.0000	MAMBER ET AL., 1983
11	ERD	D	+	0	0.0000	DOUDNEY ET AL., 1981
12	BSD	D	0	+	20.0000	MCCARROLL ET AL., 1981b
13	BSD	D	+	0	0.0000	SUTER & JAEGER, 1982
14	SAF	G	-	-	2.5000	XU ET AL., 1984
15	SAF	G	+	0	0.5000	HERA & PUEYO, 1986
16	SA0	G	-	0	1250.0000	PURCHASE ET AL., 1978
17	SA0	G	+	0	5.0000	MCCOY ET AL., 1981
18	SA0	G	+	+	1.7000	DUNKEL ET AL., 1984
19	SA0	G	+	0	5.0000	SAKAMOTO ET AL., 1980
20	SA5	G	-	0	1250.0000	PURCHASE ET AL., 1978
21	SA5	G	-	?	167.0000	DUNKEL ET AL., 1984
22	SA5	G	-	0	5.0000	SAKAMOTO ET AL., 1980
23	SA5	G	-	-	12.5000	ROSENKRANZ & POIRIER, 1979
24	SA5	G	-	0	167.0000	MCCOY ET AL., 1981
25	SA7	G	+	0	17.0000	MCCOY ET AL., 1981
26	SA7	G	+	+	0.5000	DUNKEL ET AL., 1984
27	SA8	G	+	0	50.0000	PURCHASE ET AL., 1978
28	SA8	G	+	0	1.7000	MCCOY ET AL., 1981
29	SA8	G	+	+	0.1500	DUNKEL ET AL., 1984
30	SA8	G	+	0	5.0000	SAKAMOTO ET AL., 1980
31	SA8	G	+	+	12.5000	ROSENKRANZ & POIRIER, 1979
32	SA8	G	+	0	0.0000	VANCE ET AL., 1987
33	SA9	G	+	0	50.0000	PURCHASE ET AL., 1978
34	SA9	G	+	0	0.5000	MCCOY ET AL., 1981
35	SA9	G	+	+	0.1500	DUNKEL ET AL., 1984
36	SA9	G	+	0	5.0000	SAKAMOTO ET AL., 1980
37	SA9	G	+	0	0.3000	XU ET AL., 1984
38	SA9	G	+	+	0.0000	PITTS ET AL., 1982
39	SA9	G	+	+	0.0000	VANCE ET AL., 1987
40	SA9	G	+	0	1.0000	ROSENKRANZ & MERMELSTEIN, 1983
41	SA9	G	+	0	0.0000	PEDERSON & SIAK, 1981
42	SA9	G	+	0	1.0000	WANG ET AL., 1980
43	SAS	G	+	0	50.0000	MCCOY ET AL., 1981
44	SAS	G	+	0	0.6500	RUIZ-RUBIO ET AL., 1984
45	SAS	G	+	0	5.0000	SAKAMOTO ET AL., 1980
46	SAS	G	+	+	0.0000	PITTS ET AL., 1982
47	ECW	G	-	0	25.0000	MITCHELL & GILBERT, 1985
48	ECW	G	-	-	167.0000	DUNKEL ET AL., 1984
49	ECW	G	-	0	5.0000	SAKAMOTO ET AL., 1980
50	EC2	G	-	0	5.0000	SAKAMOTO ET AL., 1980

NITROFLUORENE, 2-
607-57-8

	TEST CODE	END POINT	RESULTS NO ACT	RESULTS ACT	DOSE (LED OR HID)	SHORT CITATION
51	ECR	G	(+)	0	25.0000	MITCHELL & GILBERT, 1984
52	ECR	G	+	0	25.0000	MITCHELL & GILBERT, 1985
53	ECR	G	-	0	5.0000	SAKAMOTO ET AL., 1980
54	SCH	R	+	+	50000.0000	SIMMON, 1979
55	SCH	R	-	0	100.0000	MITCHELL, 1980
56	ANR	G	-	0	2000.0000	BIGNAMI ET AL., 1982
57	TSM	G	+	0	0.0000	SCHAIRER & SAUTKULIS, 1982
58	URP	D	-	0	211.0000	PROBST ET AL., 1981
59	URP	D	+	0	10.0000	MORI ET AL., 1987
60	UIA	D	+	0	10.0000	MORI ET AL., 1987
61	G5T	G	+	0	4.2000	AMACHER ET AL., 1979
62	G5T	G	+	0	250.0000	OBERLY ET AL., 1984
63	SIC	S	+	+	2.1000	NACHTMAN & WOLFF, 1982
64	TCS	T	0	+	20.0000	POILEY ET AL., 1979
65	BFA	F	+	0	0.0000	BEIJE & MOLLER, 1988
66	HMM	H	+	0	125.0000	SIMMON ET AL., 1979
67	SVA	S	-	+	125.0000	NEAL & PROBST, 1983

NITROFLUORENE, 2-

607-57-8

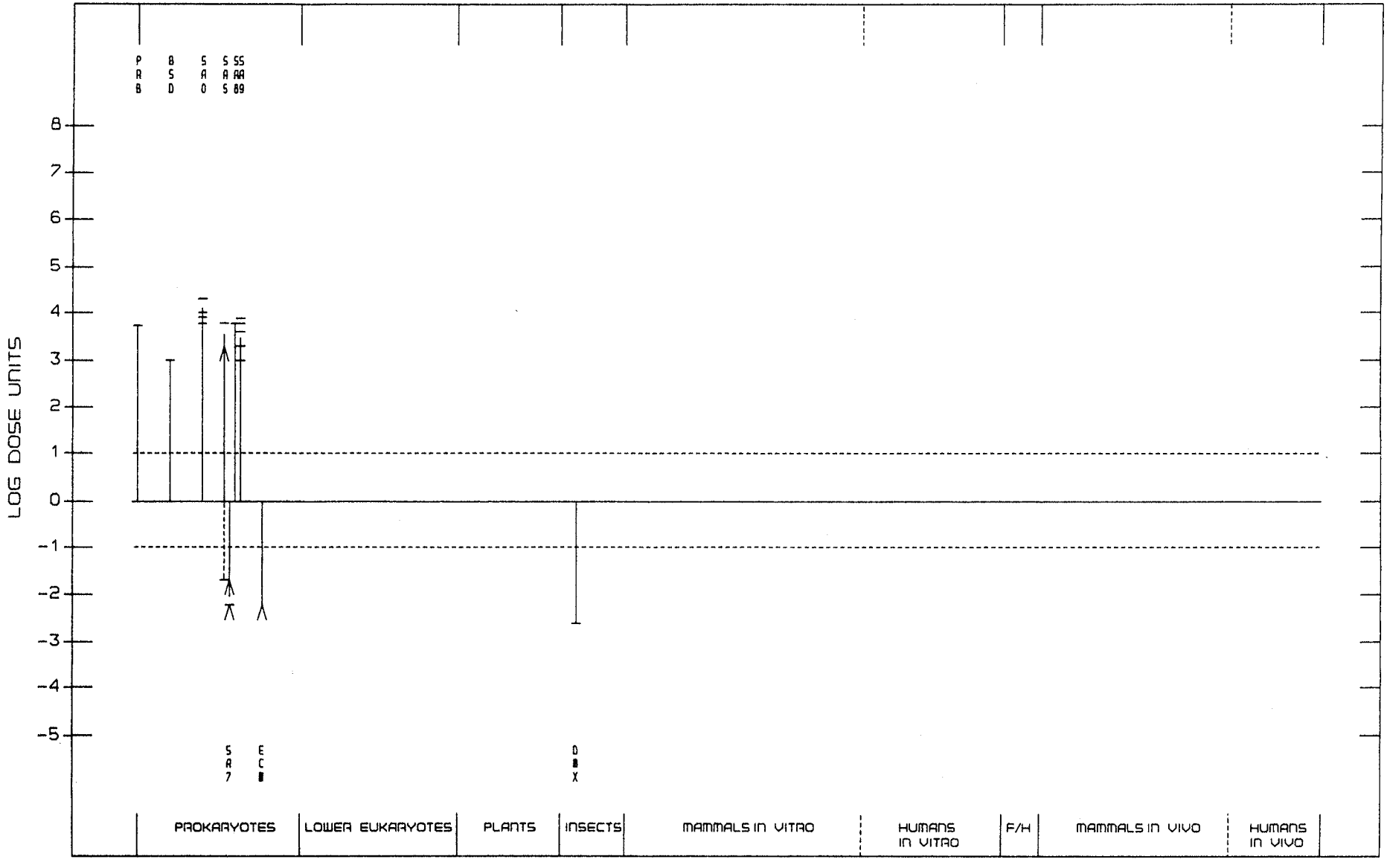


NITRONAPHTHALENE, 1-
86-57-7

	TEST CODE	END POINT	RESULTS NO ACT	RESULTS ACT	DOSE (LED OR HID)	SHORT CITATION
1	PRB	D	(+)	0	19.0000	NAKAMURA ET AL., 1987
2	BSD	D	+	0	100.0000	TOKIWA ET AL., 1987
3	SA0	G	+	+	5.0000	DUNKEL ET AL., 1985
4	SA0	G	+	+	5.0000	TOKIWA ET AL., 1981
5	SA0	G	+	0	17.0000	MCCOY ET AL., 1981
6	SA0	G	+	+	12.5000	EL-BAYOUMI ET AL., 1981
7	SA0	G	+	0	10.0000	LOFROTH ET AL., 1984
8	SA0	G	+	+	5.0000	MORTELMANS ET AL., 1986
9	SA0	G	+	+	0.0000	MATSUDA, 1981
10	SA5	G	(+)	+	16.7000	DUNKEL ET AL., 1985
11	SA5	G	-	0	50.0000	MCCOY ET AL., 1981
12	SA5	G	-	(+)	50.0000	MORTELMANS ET AL., 1986
13	SA7	G	-	-	167.0000	DUNKEL ET AL., 1985
14	SA7	G	-	0	167.0000	MCCOY ET AL., 1981
15	SA7	G	-	-	50.0000	MORTELMANS ET AL., 1986
16	SA8	G	(+)	+	16.7000	DUNKEL ET AL., 1985
17	SA9	G	+	+	16.7000	DUNKEL ET AL., 1985
18	SA9	G	+	(+)	100.0000	TOKIWA ET AL., 1981
19	SA9	G	(+)	0	50.0000	MCCOY ET AL., 1981
20	SA9	G	+	0	13.0000	VANCE & LEVIN, 1984
21	SA9	G	+	+	25.0000	EL-BAYOUMI ET AL., 1981
22	SA9	G	(+)	+	50.0000	MORTELMANS ET AL., 1986
23	SA9	G	(+)	+	0.0000	MATSUDA, 1981
24	SA9	G	+	0	0.0000	SCRIBNER ET AL., 1979
25	SAS	G	-	0	0.0000	ROSENKRANZ ET AL., 1985
26	ECW	G	-	-	167.0000	DUNKEL ET AL., 1985
27	DMX	G	-	0	400.0000	VALENCIA ET AL., 1985
28	SIC	S	-	0	0.0000	SHELBY & STASIEWICZ, 1984
29	CIC	C	+	0	0.0000	SHELBY & STASIEWICZ, 1984

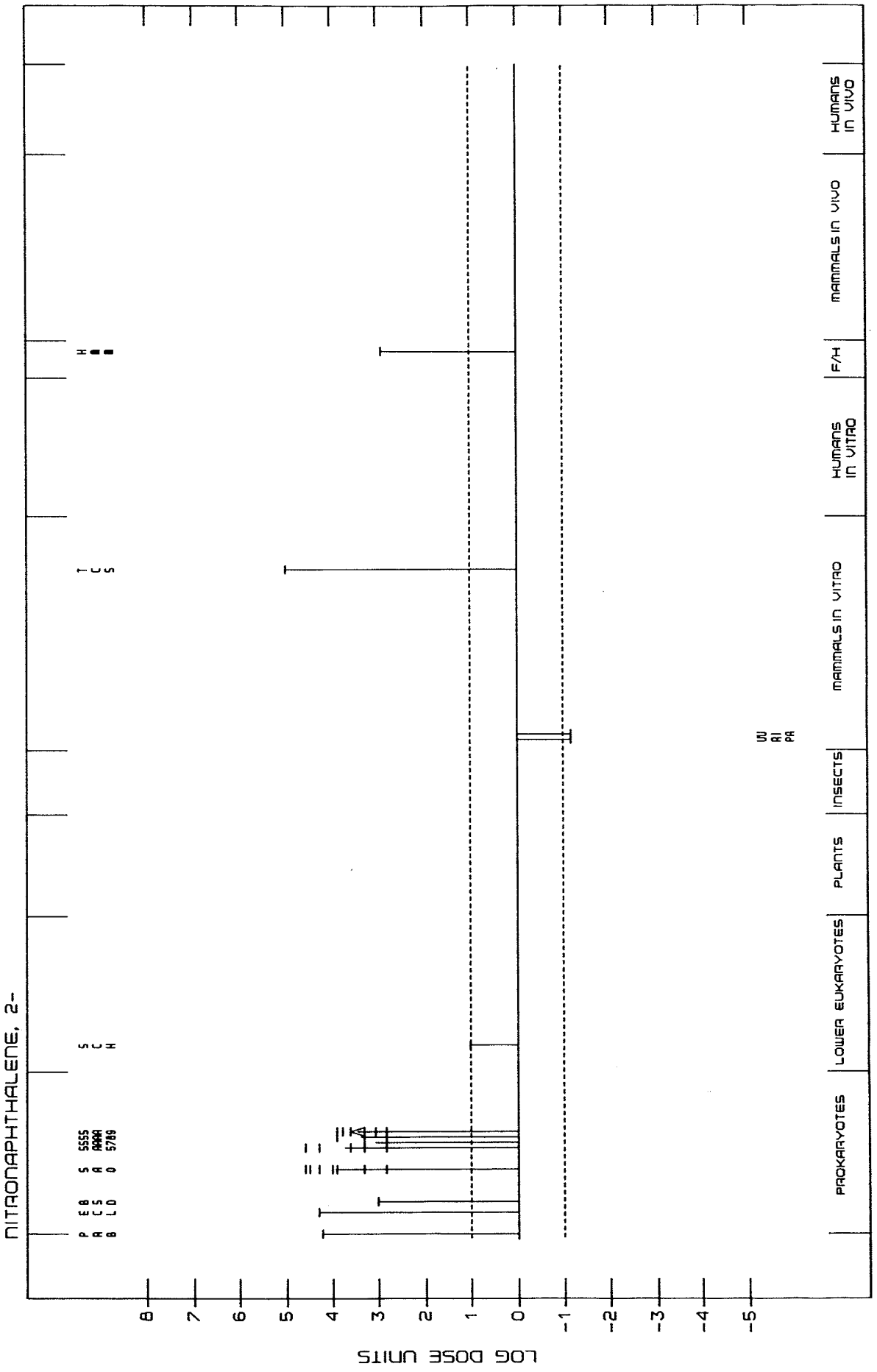
NITRONAPHTHALENE, 1-

86-57-7



NITRONAPHTHALENE, 2-
581-89-5

	TEST CODE	END POINT	RESULTS NO ACT	RESULTS ACT	DOSE (LED OR HID)	SHORT CITATION
1	PRB	D	+	0	6.0000	NAKAMURA ET AL., 1987
2	ECL	D	+	0	5.0000	ROSENKRANZ & POIRIER, 1979
3	ECL	D	+	+	0.0000	DE FLORA ET AL., 1984
4	BSD	D	+	0	100.0000	TOKIWA ET AL., 1987
5	SA0	G	+	+	3.1200	DE FLORA, 1979
6	SA0	G	+	0	2.5000	SCRIBNER ET AL., 1979
7	SA0	G	+	0	150.0000	SIMMON, 1979a
8	SA0	G	+	+	12.5000	EL-BAYOUMI ET AL., 1981
9	SA0	G	+	0	5.0000	MCCOY ET AL., 1981
10	SA0	G	+	0	50.0000	MCCANN ET AL., 1975
11	SA0	G	+	+	0.0000	DE FLORA ET AL., 1984
12	SA0	G	+	0	10.0000	MOROTOMI & WATANABE, 1984
13	SA0	G	+	+	0.0000	DE FLORA, 1981
14	SA5	G	+	+	25.0000	ROSENKRANZ & POIRIER, 1979
15	SA5	G	+	0	2.5000	SCRIBNER ET AL., 1979
16	SA5	G	+	0	150.0000	SIMMON, 1979a
17	SA5	G	+	0	5.0000	MCCOY ET AL., 1981
18	SA5	G	+	0	50.0000	MCCANN ET AL., 1975
19	SA5	G	+	-	0.0000	DE FLORA ET AL., 1984
20	SA5	G	+	+	0.0000	DE FLORA, 1981
21	SA7	G	+	0	150.0000	SIMMON, 1979a
22	SA7	G	+	0	50.0000	MCCOY ET AL., 1981
23	SA7	G	+	+	0.0000	DE FLORA ET AL., 1984
24	SA8	G	+	0	12.5000	SCRIBNER ET AL., 1979
25	SA8	G	+	0	150.0000	SIMMON, 1979a
26	SA8	G	+	+	0.0000	DE FLORA ET AL., 1984
27	SA9	G	+	0	25.0000	WANG ET AL., 1978
28	SA9	G	+	0	12.5000	SCRIBNER ET AL., 1979
29	SA9	G	+	0	150.0000	SIMMON, 1979a
30	SA9	G	0	+	25.0000	HO ET AL., 1981
31	SA9	G	+	0	50.0000	LOFROTH, 1981
32	SA9	G	+	0	16.7000	MCCOY ET AL., 1981
33	SA9	G	+	+	0.0000	DE FLORA ET AL., 1984
34	SA9	G	+	0	87.0000	WANG ET AL., 1980
35	SAS	G	-	0	0.0000	ROSENKRANZ ET AL., 1985
36	SCH	R	+	+	10000.0000	SIMMON, 1979b
37	URP	D	-	0	15.0000	MORI ET AL., 1987
38	UIA	D	-	0	15.0000	MORI ET AL., 1987
39	TCS	T	+	0	1.0000	PIENTA, 1980
40	HMM	H	+	0	125.0000	SIMMON ET AL., 1979


NITRONAPHTHALENE, 2-
LOG DOSE UNITS
8
7
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-1
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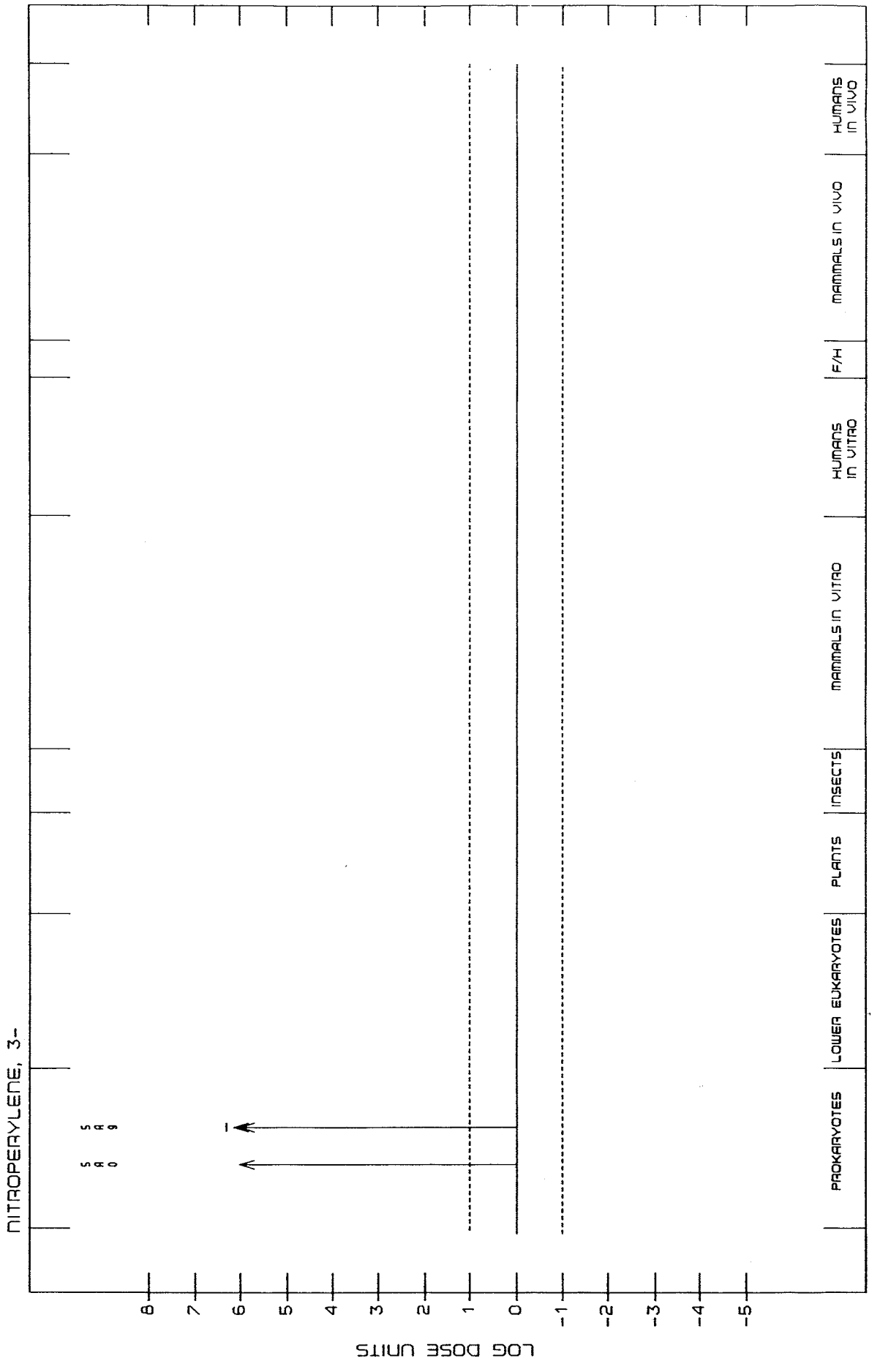
-3
-4
-5
PROKARYOTES
LOWER EUKARYOTES
PLANTS
INSECTS
MAMMALS IN VITRO
HUMANS IN VITRO
F/H
MAMMALS IN VIVO
HUMANS IN VIVO

NITROPERYLENE, 3-
20589-63-3

	TEST CODE	END POINT	RESULTS NO ACT	RESULTS ACT	DOSE (LED OR HID)	SHORT CITATION
1	SA0	G	-	+	0.0000	GREIBROKK ET AL., 1984
2	SA0	G	-	+	0.1000	LOFROTH ET AL., 1984
3	SA9	G	0	+	0.1000	HO ET AL., 1981
4	SA9	G	-	+	0.0000	GREIBROKK ET AL., 1984
5	SA9	G	-	+	0.0750	ANDERSON ET AL., 1987
6	SA9	G	-	+	0.0000	PITTS, 1983
7	SA9	G	(+)	+	0.0500	LOFROTH ET AL., 1984


NITROPERYLENE, 3-
S. AUREUS
PROKARYOTES
LOWER EUKARYOTES
PLANTS
INSECTS
MAMMALS IN VITRO
HUMANS IN VITRO
F/H
MAMMALS IN VIVO
HUMANS IN VIVO
LOG DOSE UNITS
8
7
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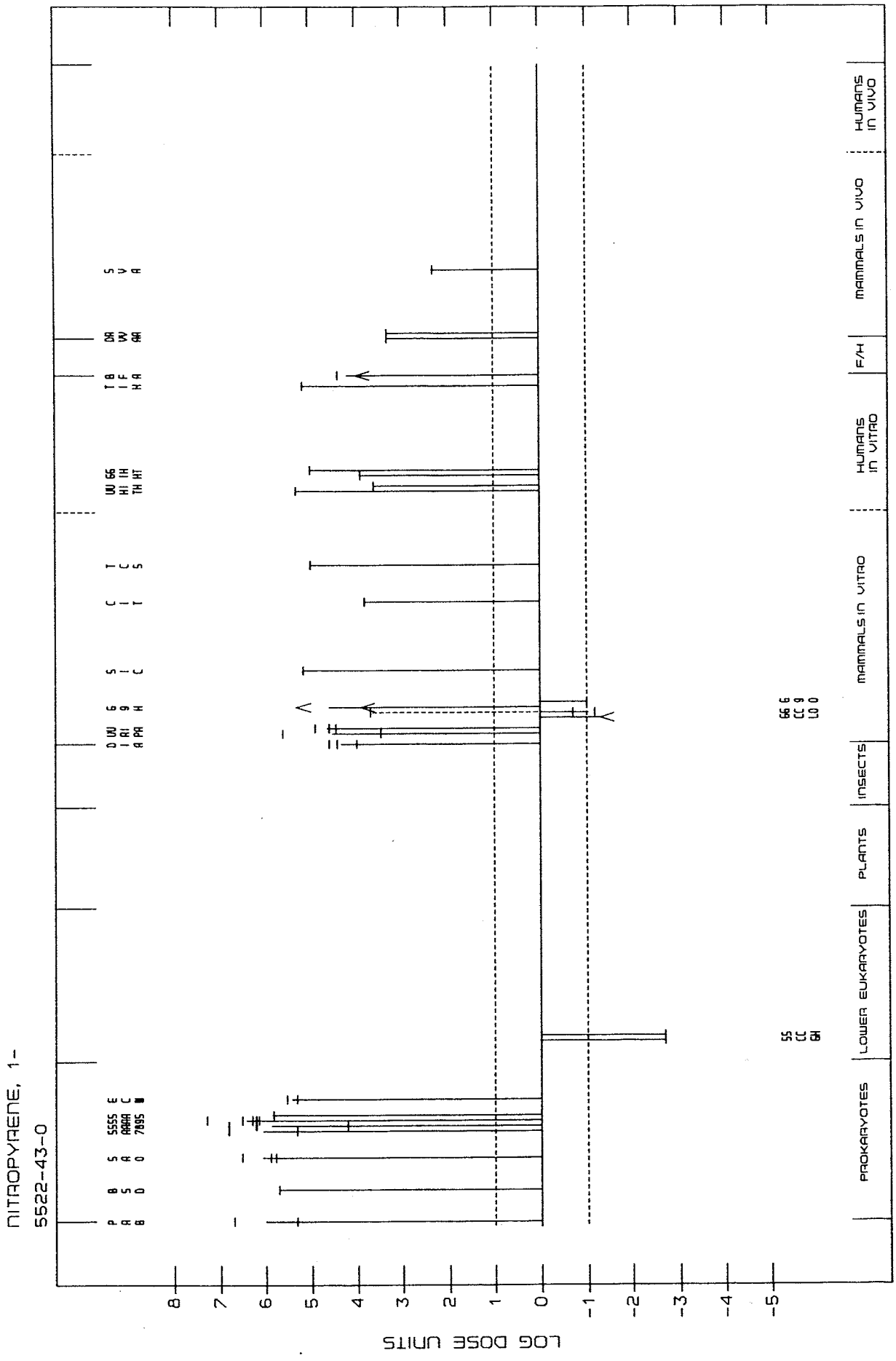
-5

NITROPYRENE, 1-
5522-43-0

	TEST CODE	END POINT	RESULTS NO ACT	RESULTS ACT	DOSE (LED OR HID)	SHORT CITATION
1	PRB	D	+	0	0.5000	OHTA ET AL., 1984
2	PRB	D	+	0	0.0200	NAKAMURA ET AL., 1987
3	BSD	D	+	0	0.2000	HORIKAWA ET AL., 1986
4	SA0	G	+	0	0.1300	TOKIWA ET AL., 1984
5	SA0	G	+	0	0.0000	ROSENKRANZ ET AL., 1980
6	SA0	G	+	0	0.1700	MERMELSTEIN ET AL., 1981
7	SA0	G	+	0	0.0000	MCCOY ET AL., 1985b
8	SA0	G	+	0	0.0000	MCCOY ET AL., 1983a
9	SA0	G	+	0	0.0000	ROSENKRANZ ET AL., 1985
10	SA0	G	+	+	0.0300	TOKIWA ET AL., 1981
11	SA2	G	+	0	0.0000	MCCOY ET AL., 1985b
12	SA4	G	+	0	0.0000	MCCOY ET AL., 1985b
13	SA7	G	+	0	0.5000	TOKIWA ET AL., 1984
14	SA7	G	+	0	0.0000	ROSENKRANZ ET AL., 1980
15	SA7	G	+	0	0.0150	MERMELSTEIN ET AL., 1981
16	SA8	G	+	0	0.0620	TOKIWA ET AL., 1984
17	SA8	G	+	0	0.0000	ROSENKRANZ ET AL., 1980
18	SA8	G	+	0	0.0150	MERMELSTEIN ET AL., 1981
19	SA8	G	+	-	0.0600	TOKIWA ET AL., 1981a
20	SA8	G	+	0	6.0000	HEFLICH ET AL., 1985a
21	SA9	G	+	0	0.0620	TOKIWA ET AL., 1984
22	SA9	G	+	0	0.0000	ROSENKRANZ ET AL., 1980
23	SA9	G	+	0	0.0050	MERMELSTEIN ET AL., 1981
24	SA9	G	+	0	0.0000	MCCOY ET AL., 1985b
25	SA9	G	+	+	0.0500	TOKIWA ET AL., 1981a
26	SA9	G	+	0	0.0000	LOFROTH, 1981
27	SA9	G	+	0	0.0000	HEFLICH ET AL., 1985
28	SA9	G	+	0	0.0000	TOKIWA ET AL., 1985
29	SA9	G	+	0	0.0000	MCCOY ET AL., 1983a
30	SA9	G	+	+	0.0300	BALL, LM ET AL., 1984b
31	SA9	G	+	0	0.0000	ROSENKRANZ ET AL., 1985
32	SA9	G	+	0	0.0500	PEDERSON & SIAK, 1981
33	SA9	G	+	+	0.0000	PITTS ET AL., 1982
34	SA9	G	+	0	0.0600	WANG ET AL., 1980
35	SA9	G	+	+	0.0700	TOKIWA ET AL., 1981
36	SAS	G	+	0	0.0000	HEFLICH ET AL., 1985
37	SAS	G	+	+	0.1500	BALL, LM ET AL., 1984b
38	SAS	G	+	0	0.0000	ROSENKRANZ ET AL., 1985
39	ECW	G	(+)	0	0.3000	MCCOY ET AL., 1985a
40	ECW	G	(+)	0	0.5000	TOKIWA ET AL., 1984
41	SCG	R	-	0	500.0000	MCCOY ET AL., 1983
42	SCH	R	-	0	500.0000	MCCOY ET AL., 1984
43	DIA	D	+	0	2.5000	MOLLER & THORGEIRSSON, 1985
44	DIA	D	+	-	10.0000	EDWARDS ET AL., 1986b
45	DIA	D	+	0	3.7000	SAITO ET AL., 1984b
46	URP	D	+	0	0.2500	KORNBRUST & BARFKNECHT, 1984
47	URP	D	+	0	35.0000	MORI ET AL., 1987
48	UIA	D	+	0	3.5000	MORI ET AL., 1987
49	UIA	D	+	0	2.5000	KORNBRUST & BARFKNECHT, 1984
50	UIA	D	+	0	2.5000	DOOLITTLE & BUTTERWORTH, 1984

NITROPYRENE, 1-
5522-43-0

	TEST CODE	END POINT	RESULTS NO ACT	RESULTS ACT	DOSE (LED OR HID)	SHORT CITATION
51	UIA	D	+	0	1.2500	HAUGEN ET AL., 1986
52	GCL	G	–	–	20.0000	NAKAYASU ET AL., 1982
53	GCO	G	(+)	(+)	0.0000	MARSHALL ET AL., 1982
54	GCO	G	–	0	15.0000	HEFLICH ET AL., 1986a
55	GCO	G	–	0	5.0000	HEFLICH ET AL., 1986b
56	GCO	G	(+)	+	20.0000	LI & DUTCHER, 1983
57	GCO	G	–	0	15.0000	HEFLICH ET AL., 1985
58	G9H	G	–	+	0.5000	BALL, JC ET AL., 1984
59	G9H	G	–	+	12.4000	BERRY ET AL., 1985
60	G9O	G	–	0	10.0000	TAKAYAMA ET AL., 1983
61	G5T	G	–	+	0.0000	LEWTAS, 1982
62	SIC	S	(+)	+	0.7000	NACHTMAN & WOLFF, 1982
63	SIC	S	(+)	–	0.0000	LEWTAS, 1982
64	CIT	C	+	0	15.0000	LAFI & PARRY, 1987
65	TCS	T	+	0	1.0000	DIPAOLO ET AL., 1983
66	UHT	D	+	0	0.0000	EDDY ET AL., 1986
67	UHT	D	+	0	0.5000	EDDY ET AL., 1987
68	UIH	D	+	0	24.7000	SUGIMURA & TAKAYAMA, 1983
69	GIH	G	+	0	12.4000	PATTON ET AL., 1986
70	TIH	T	+	0	0.7000	HOWARD ET AL., 1983b
71	TIH	T	+	0	0.0000	KUMARI ET AL., 1984
72	BFA	F	–	+	10.0000	BALL, LM ET AL., 1984a
73	BFA	F	+	+	4.0000	MOROTOMI ET AL., 1985
74	DVA	D	+	0	50.0000	MITCHELL, 1984
75	RVA	D	+	0	50.0000	MITCHELL, 1984
76	SVA	S	+	0	500.0000	MARSHALL ET AL., 1982
77	GHT	G	+	0	0.0000	EDDY ET AL., 1986
78	GHT	G	+	0	1.0000	EDDY ET AL., 1987
79	BID	*	+	0	4.9000	HOWARD & BELAND, 1982
80	BVD	*	+	0	10.0000	HOWARD ET AL., 1986
81	BID	*	+	0	15.0000	HEFLICH ET AL., 1985
82	BVD	*	+	0	25.0000	HASHIMOTO & SHUDO,1985
83	BVD	*	+	0	25.0000	STANTON ET AL., 1985
84	BVD	*	+	0	1.0000	MITCHELL, 1988
85	BVD	*	–	0	30.0000	DJURIC ET AL., 1988
86	BID	*	0	(+)	5.0000	DJURIC ET AL., 1988
87	BID	*	+	0	2.0000	JACKSON ET AL., 1985
88	BID	*	+	0	12.0000	PATTON ET AL., 1986
89	BID	*	+	0	2.0000	BELAND ET AL., 1986
90	BID	*	+	0	2.5000	GALLAGHER ET AL., 1988
91	BID	*	(+)	0	14.8000	HEFLICH ET AL., 1986a
92	BID	*	+	0	0.5000	HOWARD ET AL., 1983a


NITROPYRENE, 1-
5522-43-0
LOG DOSE UNITS
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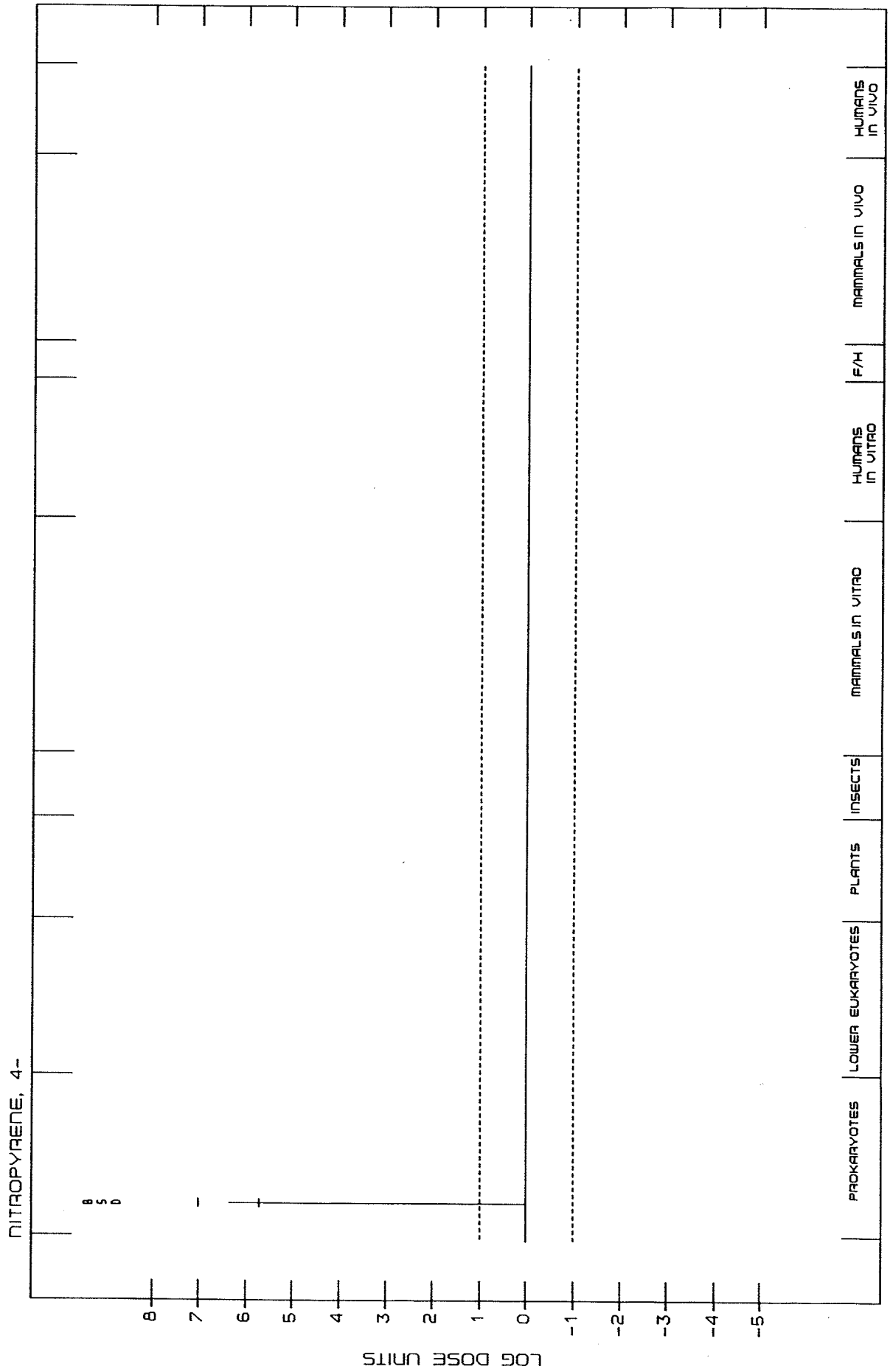
PROKARYOTES
LOWER EUKARYOTES
PLANTS
INSECTS
MAMMALS IN VITRO
HUMANS IN VITRO
F/H
MAMMALS IN VIVO
HUMANS IN VIVO

NITROPYRENE, 2-
789-07-1

	TEST CODE	END POINT	RESULTS NO ACT	RESULTS ACT	DOSE (LED OR HID)	SHORT CITATION
1	SA0	G	+	0	0.0000	GREIBROKK ET AL., 1984
2	SA9	G	+	0	0.0000	GREIBROKK ET AL., 1984

NITROPYRENE, 4-
57835-92-4

	TEST CODE	END POINT	RESULTS NO ACT	RESULTS ACT	DOSE (LED OR HID)	SHORT CITATION
1	BSD	D	+	0	0.2000	TOKIWA ET AL., 1987
2	BSD	D	+	0	0.0100	HORIKAWA ET AL., 1986
3	SA0	G	+	0	0.0000	FU ET AL., 1985
4	SA9	G	+	0	0.0000	FU ET AL., 1985


NITROPYRENE, 4-
PROKARYOTES
LOWER EUKARYOTES
PLANTS
INSECTS
MAMMALS IN VITRO
HUMANS IN VITRO
F/H
MAMMALS IN VIVO
HUMANS IN VIVO
LOG DOSE UNITS
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