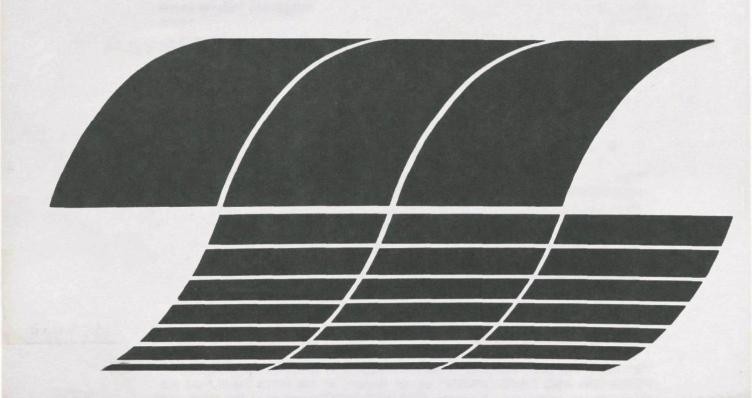


Level 1 Biological Testing Assessment and Data Formatting

Interagency Energy/Environment R&D Program Report



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Level 1 Biological Testing Assessment and Data Formatting

by

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Contract No. 68-02-2681 Task No. 401 Program Element No. INE623

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ABSTRACT

A scheme was developed for the comparison of Health Effect and Ecological Bioassay Assessment Data. The scheme was based on the assumption that each test method had a maximum dose (concentration) which could be reliably applied and that effects based on fractions of the maximum applicable dose (MAD) can be designated as degrees of toxicity. The levels of toxicity based on fractions of the MAD are given as high, moderate, low, and nondetectable (i.e no effect detected at the MAD).

Employing this scheme, data from three pilot studies including water effluent samples, fluidized bed combusion samples, and coal gasification samples were examined.

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I. INTRODUCTION

This report presents a system to convert results from Level 1 health effects, bioassays, and selected Level 1 ecological bioassays into a uniform format. This format is structured so that data can be converted from original study reports into nondetectable, low, moderate, and high designations. The evaluation of raw data and development of the final toxicity definitions require a set of talber and data transition sheets that provide a uniform method of data summarization.

The approach is based on the following rationale:

- Biological activity measured by lethality has sufficient, common phenomena to produce meaningful comparisons. The Ames <u>Salmonella</u> assay measures gene revertants rather than toxicity, but its results can be grouped in a similar fashion.
- Each assay, regardless of the type of response measured, has a maximum applicable dose above which the test data are virtually impossible to interpret because of nonspecific responses of the test organisms.
- A structure is needed for data assessment that can categorize toxicity data from diverse sources into a series of similar comparative categories. Without this, the comparison of these diverse assays would be difficult, and subject to variable interpretations.
- The categories low, moderate, and high are sufficiently broad to encompass normal variability and species differences, yet are narrow enough to provide meaningful categories for decision making.
- Level 1 testing is designed to rank sampling sites for further studies and is not intended for making human risk estimates.

Environmental assessment requires evaluation of data derived from chemistry, engineering, and biology. This data formatting program was developed to permit biological data to easily fit into the evaluation process without requiring the user to be an expert in numerous biological disciplines.

The data forms suggested here will be revised as Level 1 procedures are changed. Consult the most recent revision of "IERL-RTP Procedures Manual: Level 1 Biological Tests for Environmental Assessment" for current forms.

II. DEFINITION OF HIGH, MEDIUM, LOW, AND NONDETECTABLE TOXICITY

Definition of the above classes of toxicity would be as follows:

<u>Nondetectable</u>--no significant response as determined by a preestablished set of criteria. Toxicants could be present in a sample below the level of detectability (MDC) for the assay.

Low--a significant response or an LD50, LC50, or EC50 value ranging from the maximum dose applicable to the assay system (defined as MAD and established in advance) to one-tenth of that value. For example, if it is established that 10 g/kg will define the upper limit of sample application to rats in the acute rodent toxicity test, then any sample which has an LD50 value of 10 g/kg down to a concentration of 1 g/kg will be defined as having low toxicity.

Medium—a significant response or an LD50, LC50, or EC50 value ranging from a concentration less than the lower limit of the "low" toxicity (1/10 of the MAD) to 1/100 of the MAD. Using the same illustration, an LD50 (EC50) obtained at a concentration ranging from 0.1 g/kg to 1.0 g/kg in the rodent toxicity assay will be considered as moderate.

High—a significant response or an LD50 (EC50) value less than 1/100 of the MAD for the particular assay. Thus, any sample with an LD50 less than 0.1 g/kg in the rodent assay will be considered to have high toxicity. A summary of the toxicity levels and their associated definitions are shown in Table 1.

The degree of sample concentration will be factored into the calculation procedure and will reduce the level of toxicity accordingly.

Figures 1 to 3 illustrate the relationship of critical data (e.g. LD50) to high, moderate, low and nondectable designations.

The MAD values are taken from current protocols used in conducting these studies. The values proposed for MAD in Level 1 screening were established from:

- pilot study data developed from Level 1 testing,
- scientific publications dealing with uniform testing methods (Science, 203:563, 1979), and
- standard operating procedures defined by testing laboratories experienced in conducting Level 1 bioassays.

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TABLE 1 DEFINITION OF EFFECTIVENESS CATEGORIES

					RANGE OF C	ONCENTRATI	ON OR DOSAGE
ASSAY	ACTIVITY MEASURED	UNITS	MAD	HIGH	MODERATE	LOW	NOT DETECTABLE
Ames Test	Mutagenesis*	mg/plate	5	<0.05	0.05-0.5	0.5-5	ND at >5
		μl/plate	50	<0.5	0.5-5.0	5-50	ND at >50
RAM/WI-38 and	Lethality EC50	mg/m1	1	<0.01	0.01-0.1	0.1-1	ND at >1
CHO TOXICITY		μl/ml	600	< 6.0	6.0-60	60-600	ND at >600
		μl/ml	20 **	r		•	ND at >20
RODENT TOXICITY	Lethality LD50	gm/kg	10	<0.1	0.1 -1	1 -10	ND at >10
Aquatic Tests							
Algae	Growth Inhibi- tion EC50	gm/liter %	1 100	<0.01 <20	0.01-0.1 20 -7 5	0.1-1 75-100	ND at >1 ND at >100
Fish	Lethality LC50	gm/liter %	1 100	<0.01 <20	0.01-0.1 20-75	0.1-1 75-100	ND at >1 ND at >100
Inverte- brate	Lethality LC50	gm/liter	1 100	<0.01 <20	0.01-0.1 20-75	0.1-1 75-100	ND at >1 ND at >100

Abbreviations:

MAD = Maximum Applicable Dose (Technical Limitations)

LD50 = Calculated Dosage Expected to Kill 50% of Population

LC 50 = Calculated Concentration Expected to Kill 50% of Population EC50 = Calculated Concentration Expected to Produce Effect in 50% of Population

ND = Not Detectable

*Negative response at 5 mg/plate or at level of toxicity is given as ND.

Positive response requires calculation of minimum effective concentration (MEC) to produce a positive mutagenic response. H, M and L designations are made from MEC values of positive agents.

^{**}Volumes used for solvent exchange samples (This maximum keeps DMSO below level of toxicity).

III. DATA TRANSITION FORMS

In order to ensure uniform translation of raw data to definitions of toxicity, three intermediate forms were developed.

The Primary Data Transition Form (Table 2) records the basic information from a test by sample. The type of test, is respective MAD, and the calculated active dose are recorded on this table. Since the Ames Salmonella assay is a special case, the LC50 value is not directly applicable. The Ames test is evaluated as either positive (+) or negative (-). If it is (-), the level of activity is not as significant a the fact that the sample was not mutagenic. If the sample was (+), however, it is possible to assess the level of activity by defining the lowest concentration of the test sample at which mutagenicity could be detected (activity is defined by the preestablished criteria suggested in Appendix A).

The primary form is also used to record testing methods which concentrate a sample after receipt, such as solvent exchange. The concentration factor is the ratio of the total volume sampled to the final sample volume. There is also a place to record comments regarding the assay that provide backup documentation or explanations. In several tests (e.g., RAM), several parameters indicative of cell lethality are measured. Each of these should be recorded in the primary data transition form (Table 2) and the most sensitive parameter used to determine "Level of toxicity" for the Bioassay Summary (Table 6). Without some method of ranking each parameter, this is considered an adequate approach to uniform data interpretation.

The Primary Data Transition Forms are often used when results are submitted by more than one biological contractor. It is designed to provide a uniform base for assimilating data for transition to subsequent Level 1 formats.

Health and Ecological Effects Critical Data Summary Forms, (Tables 3, 4, and 5) combine the data from Level 1 tests conducted on samples from a single site. Tables 3 and 4 summarize reponses from health effects tests and Table 5 summarizes the response from aquatic tests.

Tables 2 to 5 contain the responses which are finally summarized for all Level 1 tests in Table 6. It is a summary of the various tests using only ND, L, M, and H response designations. Table 6 allows rapid ranking of the streams evaluated by the variety of tests used in Level 1.

S

Table 2 PRIMARY DATA TRANSITION FORM

Assay:	Sample:	
MAD:	Date Processers Name:	
Results:		
LD50 [EC50] Value ^a		[or] Ames Respons
		месь
Approximate Concentration Factor		
evel of Toxicity ^c		
Comments: ^d		
For the RAM assay the EC50 for the	most responsive parameter wil	l be listed.
MEC = Minimum effective concentra	ation (if response is positive).	
See Table 1 for definition of toxicity	levels.	
May include; Salmonella strains responding to a Deviations from standard protocols Toxic signs in rodent assay		

Procedural problems.

TABLE 3

HEALTH EFFECTS CRITICAL DATA SUMMARY FORM: MUTAGENICITY

Contract No.	s	ite Sampled	i							
echnical Directive or F	roject No									
Sample dentification		Salmonella Plate Assay Response ^a LRPC ^b								
										
	 									
	 									
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agiven as + or - based on criteria in Section VII. bLRPC = lowest recorded positive concentration

TABLE 4

	HEALTH E	FFECTS CRI	TICAL DAT	A SUMMARY	FORM: T	OXICITY			
Contract ID.			_Technica	1 Directi	ve or Pro	ject ID.			Site ID.
Sample Identification	CHO Toxicity LC50	RAM Cell Viability	Toxicity ATPb	Protein ^c	WI-38 C	ell Toxici v ^a ATP ^b	ity Protein ^C	Roder LD50	nt Toxicity Toxic Sians ^d
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dViability Index (see EPA 600/7-77-043)
bATP (see EPA 600/7-77-043 for derivation)
CProtein (see EPA 600/7-77-043 for derivation)
dToxic signs are identified in a numbered list in EPA 600/7-77-043. Only the number is reported here

TABLE 5

ntract No.	**************************************	lech	nical Directive o	or Project N	0		Site sample
		Fres	h Water Toxicity	ine Toxicity Tests ^a			
	Sample Identification	lish LC50	Invertebrate LC50	ALGAL EC50	Fish LC50	Invertebrate LC50	ALGAL EC50
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The derivations of all test values are explained in the text of the report of the Level 1 manual.

TABLE 6

BIOASSAY SUMMARY

								F	resh	Water		Mar	ine	
	/	Real Party	W. Choloxi	Choo.	Chologia Signatura	List of the College	*/	Alcobalo	/es / 3/1		4/ Olegon	/*************************************	In Stress F	Notes
iample Identification	/ vs	<u> </u>	3	<u> </u>	/ &	<u> </u>	\ \sqrt{\sq}\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sq}\sqrt{\sq}}\sqrt{\sq}}}}}}\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sq}}}}}}\sqrt{\sqrt{\sqrt{\sq}}}}}}}\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sq}}}}}}}}\sqit{\sqrt{\sqrt{\sq}}}}}}}\sqit{\sqrt{\sqrt{\sq}}}}}}}\sqit{\sqrt{\sqrt{\sq}\sq}}}}}\signightimed{\sq}\sq\sintitex{\sq}\sq}\sq}}}}}}}}}}}}}}}}}}}}}}}}}}}}	4	1	18	/ 8	_ ব	/ 5	Notes
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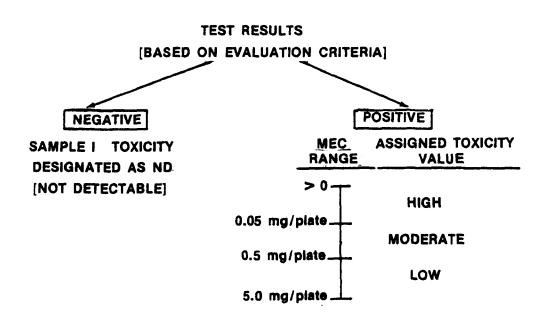
ND = No Detectable Toxicity

L = Low Toxicity

M = Moderate Toxicity

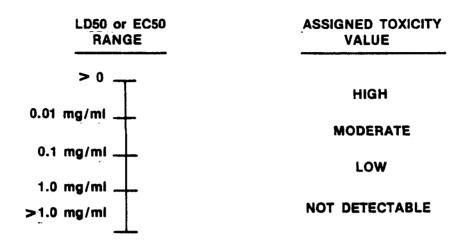
H = High Toxicity

LS:-0458 3/79



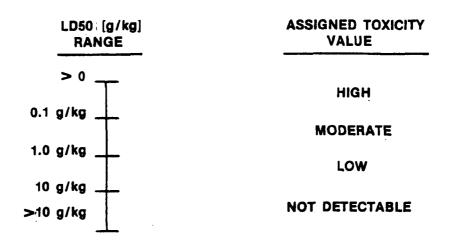
The Maximum Applicable Dose [MAD] is set at 5 mg of substance per plate.

Figure 7.1 AMES TEST



- 1. CHO cells use viability index [EC50].
- 2. For RAM or WI-38 assays use the EC50 value from the most sensitive parameter [viability, ATP, Protein].

Figure 7.2 IN VITRO CYTOTOXICITY ASSAYS



The Maximum Applicable Dose [MAD] is set at 10 grams of substance per kilogram of rat body weight.

Figure 7.3 RODENT TOXICITY ASSAY

IV. ABBREVIATIONS USED

MDC = Minimum Detectable Concentration

MAD = Maximum Applied Dose

LD50 = Lethal Dose to 50% of the Test Organisms

LC50 = Lethal Concentration for 50% of the Test Organisms EC50 = Effective Concentration for 50% of the Test Organisms

MEC = Minimum Effective Concentration

LRPC = Lowest Recorded Positive Concentration

V. APPLICATION OF THE MAXIMUM APPLIED DOSE CONCEPT FOR ASSIGNMENT OF TOXIC LEVELS

By examination of already existing pilot study reports (supplied by EPA), test results were formatted using the methods described in this report. Numerous parameters could be considered in this data transfer, but we proposed a simple route relying primarily on LD50, LC50, EC50, or MEC. The data analyses given in reports submitted to EPA by various testing laboratories were amenable to this approach, and data conversion into toxic levels was accomplished readily.

Summaries of results from the application of this approach are shown in Tables 7, 11, and 15.

Legend to Tables 7, 11, and 15

These tables are a summary of EPA submitted data for Level 1 Pilot Study Bioassays.

The data were obtained from bioassays of various water effluents (Table 7), fluidized bed combustion samples (Table 11), and coal gasification procedures (Table 15).

Toxicity is defined as:

H = High

M = Moderate

L = Low

ND = Nondetectable

Tables 8, 9, 10, and 12, 13, 14, and 16, 17, 18 are intermediate summary tables. Reported values are given as concentration based on Table 1.

TABLE 7 BIOASSAY SUMMARY

Technical Directive of	r Project	No		Wat	er E	fflue	nt_S	tudy					
Contract No.	ilot Stu	idy F	Resul	ts									
									Fresh	Water		Marine	
Sample Identificat	an s	A. A.	Choo	The Choice	AC Stoloy	Lie, Totic,	4. 4	4v object	/ Par. File.		Wilebiele 4.	Pan Pan Sie	real los
A2	ND				ND	Н	14	L	M	M			
B2	ND.		<u> </u>	ļ	ND	ND	ND	M	ND	ND	ND		
C2	ND	M	· -	}	ND	M	M	ND	M	L	1	<u> </u>	
D2	ND	<u> </u>	1		ND	<u> </u>			<u> </u>	<u> </u>		<u> </u>	
E2	ND				ND	ND	Н	Н	<u> </u>		M	1	
F2	ND				ND	ND	L		ND	ND	М		
G 2	ND				ND	М	М	ND	ND	ND	М		
H2	ND				ND			L					
J2	ND				ND	ND	ND	ND					
K2	ND				ND	ND	ND	ND	ND	ND	L		
L2	ND	L	L	М	ND	М	M	M	L	ND	Н		<u>.</u>
M2	ND	L	ND	ND	ND	ND	М	ND					CHO >200 n
N2	ND	Н	L	L	ND	М	Н	Н	M	М	Н		
P2	ND				ND	ND	ND	М			. н		
R2	ND	ND	ND	М	ND	Н	Н	L		İ			
S2	ND				ND	ND		ND	ND	ND	ND		;
T2	ND				ND	М	ND	ND	М		L		
U2	ND			Ī	ND	ND	Н	ND	ND	ND	ND		
V2	ND			i	ND	М	Н	ND			L.		
W2	ND				ND	М	Н	L	М	М	М		į
X2	ND				ND	ND	ND	ND.	ND	ND	ND		1
1 2	ND			i	ND	ND	ND	ND					
72	ND				ND	ND	М	Н				i	1
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Data transition sheets for all results not shown in Section VIII.

ND = No Detectable Toxicity

L = Low Toxicity

M = Moderate Toxicity

H = High Toxicity

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TABLE 8
HEALTH EFFECTS CRITICAL DATA
SUMMARY FORM: MUTAGENICITY

Contract No. Pilot		ite Sampled	WE	_
Technical Directive or	Project No	. NA		
Sample		ilmonella Plate		
<u>Identification</u>	Re	sponse	LRPCD	
A2		-	NA	
B2			NA	
C2		-	NA NA	
· D2		-	NA	
E2		-	NA .	
F2		-	NA	
G2		-	NA .	
H2	i	-	NA	
J2		-	NA	
K2		-	NA NA	
L2		-	NA.	
M2		-	i NA	
N2		-	NA NA	
P2	}	•	NA	
R2		-	NA NA	
\$2		-	NA NA	
T2			NA.	
U2		-	NA.	
V2		-	NA	
W2		-	NA NA	
X2		•	NA NA	
Y2			NA NA	
72		<u> </u>	NA NA	
			<u>l</u>	
			1	

agiven as + or - based on criteria in Appendix A DLRPC = lowest recorded positive concentration (NA for negative data)

TABLE 9

Contract No. Pilot Technical Directive or Project No. NA Site sampled WE

oxicity Tests ^a brate ALGA 0 EC50 3 76% 3 30% 3 100%	6 60% 5 >100% 70%	Invertebrat LC50 25% >100% >100%	**************************************
30%	>100%	>100% >100%	>100%
>100%	70%	>100%	>100% 90%
2%	70%	>100%	90%
		1 .	
			25%
S	>100%	>100%	70%
	>100%	>100%	59%
96	%		
>100	%		
>100	% >100%	>100%	77%
42.09	% >100%	>100%	2%
>100	2		
2'	% 40%	25%	2%
43	%		9%
93	1%		
		>>100%	>100%
			70%
		>100%	>100%
			94%
			50%
		>100%	>100%
	43 93 >100	43% 93% >100% >100% >100% >100% >100% >100% >100% >100% >100% >100% >100% >100% >100% >100% >100% >100% >100%	43% 93% >100% >100% >>100% 5 >100% >100% >>100% 6 >100% >100% >100% 70% >100% >100% >100% 6 94% 56% 25% 7 >100% >100% >100% >100%

^aThe derivations of all test values are explained in the test of the report of the Level I manual.

TABLE 10 HEALTH EFFECTS CRITICAL DATA SUMMARY FORM. TOYICITY

ontract ID. <u>P</u>		_Technica	l Directi	ve or Pro	ject ID.	NA		Site ID. WE	
Sample Identification	CHO						Rodent Toxicity LD50 Toxic Signs		
A2								10g/kg	None
B2								10g/kg	None
C2			33.5 ul			· · · · · ·	1	10g/kg	None
D2		1						10g/kg	None
F2								10q/kq	None
F2								10g/kg	None
G2								10g/kg	None
H2								10g/kg	None
J2								10g/kg	None
K2		1						10g/kg	None
L2	60 u l		357 ₁₁]			300 µ1	-	10g/kg	None
M2	>200 µ1	400 µ1			>600 µ1	>600 µ1	>600 ul	10g/kg	None
N2	75 µ1	13.3 µ1	175 µ1			200 µ1		10g/kg	None
P2								10g/kg	None
R2	37 _u 1	>600 ц1	600 µ1	>600 µ1	>600 µ1	>600 µ1	>600 µ1	10g/kg	None
S2	1							10g/kg	None
T2						1		10g/kg	None
U2								10g/kg	None
y2		1						10g/kg	None
W2								10g/kg	None
X2								10g/kg	None
У2								10g/kg	None
Z2		<u> </u>					1	10g/kg	None

aviability Index (see EPA 600/7-77-043)
bATP (see EPA 600/7-77-043 for derivation)
CProtein (see EPA 600/7-77-043 for derivation)
dToxic signs are identified in a numbered list in EPA 600/7-77-043. Only the number is reported here

TABLE 11 BIOASSAY SUMMARY

Technical Directive or Project No. Fluidized Bed Combustion (FBC)														
Contract No. Pilot S													_	
								ş	resh	Wate	•	Mari	ine	
Sample identification	\\\ \frac{\gamma_{\text{s}}^2}{3}	Real Parts	W. Choos.	Chop Chop	A CYTOLOGY, A CHOLOGY,	John Toule		Transporting 1	/pg/		Open of the state	Neg.	Soul Stress F.	Notes
Spent Bed Leachate		ND			ND	М	М	М	ND	ND	ND			
Dolomite Leachate	ND	ND			ND	ND	ND	ND	ND	L	ND	i		
Flyash Leachate		ND			ND	ND	ND	ND	ND	M	ND	(
Coal Leachate	ND					L	М	Н	M	M	ND			
3µ Cyclone Particles	L	ND												
lμ Cyclone Particles	L	L												
Dolomite	ND	ND			ND							1		
Flyash	ND	ND			ND				·					
Spent Bed	ND	ND			ND									
Slurry		L			ND	М	М	Н	М	Н	M			
Cyclone Discard			,			ND	ND	ND						
Leachate							-							
													į	
				ĺ						i			,	,
													. !	
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											!		-	
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												1	1	
												l		

ND = No Detectable Toxicity

L = Low Toxicity
M = Moderate Toxicity
H = High Toxicity
L8:-0468 3/79

TABLE 12

HEALTH EFFECTS CRITICAL DATA SUMMARY FORM: MUTAGENICITY

Contract No	Pilot	\$1	ite Sampled	FBC
Technical Dire	ctive or P	roject No.	. NA	
Sample		Sa	lmonella Plat	
Identification		Res	sponse	<u>LRPC^b</u>
lμ Cyclone			+	2 mg/plate
3μ Cyclone			+	2 mg/plate
Dolomite			-	NA NA
Flyash			-	NA NA
Spent Bed D	olomite		•	NA NA
Dolomite Le	achate		•	NA
Coal Leacha	te		-	NA
		İ		
		1		
		İ	· · · · · · · · · · · · · · · · · · ·	
		I	'	
				† · · · · · · · · · · · · · · · · · · ·
				
			 	
				-

 $\frac{a}{g}$ given as + or - based on criteria in Appendix A $\frac{a}{b}$ LRPC = lowest recorded positive concentration (Negative data = NA) -

TABLE 13

HEALTH	EFFECTS CRI	TICAL DAT	A SUMMARY	FORM: TO	XICITY				
Contract ID. <u>Pilot</u>		_Technica	NA	Site ID. FBC					
CIHO Sample Toxicity Identification LC50	RAM Cell	Toxicity a ATDD) Duada i C	W1-38 Ce	ell Toxici	i <u>ty</u>	Rodent Toxicity		
2 Cualana	>1000 _u g	1000 0	1000 c	VIADILITY	/ AIP	Protein	LUSH	TOXIC Stons	
3u Cyclone Fly Ash	>1000µg					 	>10g/kg	NONE	
Dolomite	>1000µg	>1000.0	>1000µg	 			>10g/kg	NONE	
Fly Ash Leachate	> 600µ1	> 600µ1	> 600µ1				>10m1/kg	NONE	
Slurry	> 600թ1	> 146µq	>_600µ1				>10m1/kg	NONE	
Spent Bed Leachate	> 600u î	> 600µ1	> 600u1				>10m1/kg	NONE	
1 Cyclone	>1000ug	> 596ug	>1000uq						
Spent Bed Dolomite		>1000µa	>1000ua				>10g/kg	NONE	
Dolomite Leachate	> 600µ1	> 600u1	> 600u1				>10m1/kg	NONE	
			-						
	_	ļ	 	 		 	<u> </u>		
		 -	 	 	<u>'</u> -	 	 		
		 	 	 	 	 			
			 	 		 	 		
 			 	 		 	 		

dViability Index (see EPA 600/7-77-043)
bATP (see EPA 600/7-77-043 for derivation)
cProtein (see EPA 600/7-77-043 for derivation)
dToxic signs are identified in a numbered list in EPA 600/7-77-043. Only the number is reported here

TABLE 14

tract No.	Pilot Technical Directive or Project No. NA Site sampled												
crace no.	77700	Fresh Water Toxicity Tests ^a Marine Toxicity Tests ^a											
	Sample Identification	Fish LC50	Invertebrate LC50	ALGAL EC50	Fish LC50	Invertebrate LC50	ALGAL EC50						
	Spent Bed Leachate	25%	40.9%	45%	>100%	>100%	>100%						
	Dolomite Leachate	>100%	>100%	>100%	>100%	74.8%	56%						
	Flyash Leachate	>100%	>100%	>100%	>100%	72.5%	>100%						
	Coal Leachate	92%	70.9%	19%	11.5%	66%	>100%						
	Slurry	67.9%	13.6%	9%	70.5%	18%_	62%						
	Cyclone Discard	>100%	>100%	>100%									
	Leachate			<u> </u>									
				T									
				†									

^aThe derivations of all test values are explained in the text of the report of the Level 1 manual.

TABLE 15 BIOASSAY SUMMARY

Technical Directive or Project No. Coal Gasification (CG)														
Contract No. Pilot	Study	Dat	<u>a</u>						, _					
								,	Fresh	Wate	r	Mai	rine	
Sample Identification	1	R. A.	Tology W	Chole Chole	Allah Colon Soll	Fig. Tours!		The state of the s	/ / / / / / / / / / / / / / / / / / /		operion 1	// // // // // // // // // // // // //	S. S. S. S. S. S. S. S. S. S. S. S. S. S	Notes
Separator Liquor*	ND	М	М			Н	Н	Н	Н	Н	Н			
590-3 (XAD-2)	L	Н				<u> </u>			<u> </u>	!	1		<u> </u>	
655-3 (XAD-2)	ND	M	<u> </u>	-	<u> </u>			ì	<u> </u>	<u> </u>	<u> </u>	<u> </u>		
655-5/6 (XAD-2)		Н	Н	-			<u> </u>	<u> </u>		!	1	<u> </u>	 	
590-5/6 (XAD-2)		Н	Н	<u> </u>			<u> </u>	<u> </u>	<u> </u>	<u> </u>	1	<u> </u>	!	
Coal	ND	ND	<u> </u>	<u> </u>	ND	-	<u> </u>	!	į	<u> </u>	<u> </u>	<u> </u>	<u> </u>	!
Coal Dust		ND		1	<u>!</u>	!		<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	 	
Cyclone Dust	ND	ND	 	 	ND	 	 	,	<u> </u>	1	 	 	<u> </u>	!
Separator Tar	M	<u>L</u>	M	 	ND	<u> </u>			ļ	 -	<u> </u>	 		Ļ
Ash	ND	<u> </u>	1	ļ	ND			<u> </u>	-	├		<u> </u>	!	<u> </u>
				 	-		<u>}</u>	<u> </u>	-	 -		 	1	
				!	<u> </u>	<u> </u>	<u> </u>	ļ	!		1	 	 	!
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	-			 	!				<u> </u>	<u> </u>	 	<u> </u>	!	<u> </u>
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				!						:			:	

ND = No Detectable Toxicity

L = Low Toxicity

M = Moderate Toxicity

H = High Toxicity

*Data from all samples designated Separator Liquor combined.

TABLE 16 HEALTH EFFECTS CRITICAL DATA SUMMARY FORM: MUTAGENICITY

Contract No. Pilot	Site Sampled	CG
echnical Directive or P	roject No. <u>NA</u>	
Samp1e	Salmonella Plat	
dentification	Response	LRPCb
590	+	l mg/plate
655	-	NA NA
Coal	-	NA NA
Ash	-	NA NA
Cyclone		NA NA
Separator Tar Separator Liquor	-	0.01 mg/plate
Separator Liquor	<u> </u>	- NA
		
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		1

 $^{a}_{b}$ given as + or - based on criteria in Appendix λ LRPC = lowest recorded positive concentration (Negative data = NA)

TABLE 17

				Site ID. CG					
Sample 1	CHO Toxicity	RAM Cell	Toxicity	Rodent Toxicity LD50 Toxic Signs					
Identification l	.C50	Viability	ATP	Protein	Viability	a ATPO	<u>Protein^c</u>	L D50	Toxic Signs
655-3		21.2 µ1	-	_					
Coal		-1000 μl	>1000 µl	>1000µ1				>10g/kg	NONE
655-5/6		$< 6.0 \mu 1$	•	-	<6.0 μ1	-	-		
590-5/6		< 6.0 µ1	1	<6.0 µ1	<6.0 µ1				
Coal Dust		>1000 µg	>1000 µg	>1000 µg					
Separator Tar		350 µg	-	-					
·Cyclone Dust		>1000 µg	>1000 µg	>1000 µg				>10g/kg	NONE
Separator Liquor		12 μ1	-	_	7.4 µ1	-	_	>10g/kg	NONE
Separator Liquor Ash		>300 µg	>300 µg	>300 µg				>10g/kg	NONE
		<u> </u>							
		1							
	 	ļ						ļ	
	1	1							ļ

dViability Index (see EPA 600/7-77-043)
bATP (see EPA 600/7-77-043 for derivation)
cProtein (see EPA 600/7-77-043 for derivation)
dToxic signs are identified in a numbered list in EPA 600/7-77-043. Only the number is reported here

Contract

TABLE 18

_Pilot	Te	echnical Directiv	e or Proj	ect No	NA Site	sampled
Sample Identification	Fres Fish LC50		ALGAL	Mari Fish LC50	ine Toxicity Tes Invertebrate LC50	ALGAL EC50
Separator Liquor	<1.0%	<1.0%	<1.0%	<1.0%	< 1.0%	<1.0%

^aThe derivations of all test values are explained in the text of the report of the Level 1 manual.

VI. <u>DATA ORIGIN</u>

SOURCE	CONTRACT #	DATE
Northrop Services, Inc.	68-02-2566	1978
EG&G Bionomics	-	1977
SRI	68-01-2458	1977
SRI	-	1978
Battelle	68-02-2138	1977
Litton Bionetics, Inc.	-	1977
Monsanto Res. Corp.	68-02-1874	1978

VII. AMES TEST DATA INTERPRETATION CRITERIA

A. Evaluation Criteria

Plate test data consist of direct revertant colony counts obtained from a set of selective agar plates seeded with populations of mutant cells suspended in a semisolid overlay (Ames et al., 1975). Because the test chemical and the cells are incubated in the overlay for 2 days, and a few cell divisions occur during the incubation period, the test is semi-quantitative in nature. Although these features of the assay reduce the quantitation of results, they provide certain advantages not contained in a quantitative suspension test:

- The small number of cell divisions permits potential mutagens to act on replicating DNA, which is often more sensitive than nonreplicating DNA.
- The combined incubation of the compound and the cells in the overlay permits constant exposure of the indicator cells for 2 days.

1. Surviving Populations

Plate test procedures do not permit exact quantitation of the number of cells surviving chemical treatment. At low concentrations of the test chemical, the surviving population on the treatment plate is essentially the same as that on the negative control plate. At high concentrations, the surviving population is usually reduced by some fraction. Our protocol normally employs several doses ranging over 2 or 3 log concentrations, the highest of these doses being selected to show slight toxicity as determined by subjective criteria.

2. Dose-Response Phenomena

The demonstration of dose-related increases in mutant counts is an important criterion in establishing mutagenicity. A factor that might modify dose-response results for a mutagen would be the selection of doses that are too low (usually mutagenicity and toxicity are related). If the highest dose if far lower than a toxic concentration, no increases may be observed over the dose range selected. Conversely, if the lowest dose employed is highly cytotoxic, the test chemical may kill any mutants that are induced, and the compound will not appear to be mutagenic.

Control Tests

Positive and negative control assays are conducted with each experiment and consist of direct-acting mutagens for nonactivation assays and mutagens that require metabolic biotransformation in activation assay. Negative controls consist of the test compound solvent in the overlay agar together with the other essential components. The negative control plate for each strain gives a reference point to which the test data are compared. The positive control assay is conducted to demonstrate that the test systems are functional with known mutagens.

4. Evaluation Criteria for Ames Assay

Because the procedures used to evaluate the mutagenicity of the test chemical are semiquantitative, the criteria used to determine positive effects are inherently subjective and are based primarily on a historical data base. Most data sets are evaluated using the following criteria:

a. Strains TA-1535, TA-1537, and TA-1538

If the solvent control value is within the normal range, a chemical that produces a positive dose response over three concentrations with the lowest increase equal to twice the solvent control value is considered to be mutagenic.

b. Strains TA-98 and TA-100

If the solvent control value is within the normal range, a chemical that produces a positive dose response over three concentrations with the highest increase equal to twice the solvent control value for TA-100 and two to three times the solvent control value for strain TA-98 is considered to be mutagenic. For these strains, the dose-response increase should start at approximately the solvent control value.

c. Pattern

Because TA-1535 and TA-100 are both derived from the same parental strain (G-46) and because TA-1538 and TA-98 are both derived from the same parental strain (D3052), there is a built-in redundancy in the microbial assay. In general, the two strains of a set respond to the same mutagen and such a pattern is sought. It is also anticipated that if a given strain, e.g., TA-1537, responds to a mutagen in nonactivation tests, it will generally do so in activation tests. (The converse of this relationship is not expected). While similar response patterns are not required for all mutagens, they can be used to enhance the reliability of an evaluation decision.

d. Reproducibility

If a chemical produces a response in a single test that cannot be reproduced in one or more additional runs, the initial positive data lose significance.

The preceding criteria are not absolute, and other extenuating factors may enter into a final evaluation decision. However, these criteria are applied to the majority of situations and are presented to aid those individuals not familiar with this procedure. As the data base is increased, the criteral for evaluation can be more firmly established.

5. Relationship Between Mutagenicity and Carcinogenicity

It must be emphasized that the Ames <u>Salmonella/Microsome Plate Test is</u> not a definitive test for chemical carcinogens. It is recognized, however, that correlative and functional relationships have been demonstrated between these two end points. The results of comparative tests on 300 chemicals by McCann et al. (1975) show an extremely good correlation between results of microbial mutagenesis tests and in vivo rodent carcinogenesis assays.

B. References

Ames, B.N., McCann, J. and Yamasaki, E. (1975). Methods for detecting carcinogens and mutagens with the <u>Salmonella</u>/mammalian-microsome mutagenicity test. <u>Mutation Res</u>. 31, 347-364.

McCann, J., Choi, E., Yamasaki, E. and Ames, B.N. (1975). Detection of carcinogens as mutagens in the <u>Salmonella/microsome</u> test: Assay of 300 chemicals. Proc. Nat. Acad. Sci. 72, 5135-5139.

VIII. DATA CONVERSION SHEETS FOR TABLES 7, 11, AND 15

Abbreviations of Sample Source

FBC = Fluidized Bed Combustion

CG = Coal Gasification

WE = Water Effluent Samples

Organisms Employed in Aquatic Tests

Freshwater

Fish Fathead Minnow (Pimephates promelas)

Algae Selenastrum capricornutum

Invertebrate Daphnia Magna

Marine

Fish Sheepshead Minnow (Cyprinodon variegatus)

Algae <u>Skeletonema costatum</u>

Invertebrate Grass Shrimp (Palaemonetes pugio)

FBC

MAD:	100%	SAMPLE: Coal leachate	-
ESULTS:			
LD5	0 (EC60) VALUE9	6 hour LC50 = 66%	
			MEC ^b
IPPROXIM CONCENT	ATE TRATION FACTOR	0	
		Moderate	_
	-		_
OMMENT	s :		
	hr toxicity = 75	3 effluent	
		2.5% effluent. Diss. $0_2 = 42\%$ of s	
		or the most responsive perameter will be its	led.
		centration (II response le positive).	
See Table	1 for definition of to	exicity levels.	
		PRIMARY	
		PRIMARY DATA TRANSITION FORM	FBC
			FBC
	Grass shrimp	DATA TRANSITION FORM	
ASSAY: _	Grass shrimp	DATA TRANSITION FORM	
ASSAY: _	· · · · · · · · · · · · · · · · · · ·	DATA TRANSITION FORM	
	100%	DATA TRANSITION FORM	
MAD: _	100%	DATA TRANSITION FORM	
MAD: _	100%	DATA TRANSITION FORM SAMPLE: Flyash leachate	jori AMES RESPONSE
MAD: _	100%	DATA TRANSITION FORM SAMPLE: Flyash leachate	
MAD: RESULTS LE APPROXI	100%	DATA TRANSITION FORM SAMPLE: Flyash leachate LC50 = 72.5% E at 96 hr.	jori AMES RESPONSE
MAD:	100% : : : : : : : : : : : : : : : : : :	DATA TRANSITION FORM SAMPLE: Flyash leachate LC50 = 72.5% E at 96 hr.	jori AMES RESPONSE
MAD:	100% 100% 1000 JECSON VALUE MATE MATE MATEMATION FACTOR	DATA TRANSITION FORM SAMPLE: Flyash leachate LC50 = 72.5% E at 96 hr.	jori AMES RESPONSE
MAD:	100% 100%	DATA TRANSITION FORM SAMPLE: Flyash leachate LC50 = 72.5% E at 96 hr.	jori AMES RESPONSE
MAD:	100% 100%	DATA TRANSITION FORM SAMPLE: Flyash leachate LC50 = 72.5% E at 96 hr. O Moderate	jori AMES RESPONSE

FBC

	Grass Shrimp	ONMITTE:	
_	100% E		
L78:			
LD6	D [EC60] VALUE	LC50 = 74.8% E at 96 hr.	
			MEC
OXIM/	ATE NATION FACTOR	0	_
			-
MENTS	8: and 48 hr. LC50'	la a loov s	
	and 46 nr. 1050 Effluent	5 - 1004 E.	
		or the most responsive parameter will be He	sted.
		entration (if response is positive).	
Table	1 for definition of tox	dcity levels.	
		PRIMARY	
		PRIMARY DATA TRANSITION FORM	FBC
1Y :	Grass Shrimp	DATA TRANSITION FORM	-
_	Grass Shrimp	DATA TRANSITION FORM	-
:		DATA TRANSITION FORM	-
;	100% E	DATA TRANSITION FORM SAMPLE: N 9661 (Slurry)	
):	100% E	DATA TRANSITION FORM	
JLTS: LD56	100% E D (ECSO) VALUE L	SAMPLE: N 9661 (Slurry)	(or) AMES RESPONSE
LDS:	100% E D (ECSO) VALUE L	DATA TRANSITION FORM SAMPLE: N 9661 (Slurry) LC50 = 18% at 96 hr.	(or) AMES RESPONSE
LDS:	100% E D JECSOJ VALUE L ATE RATION FACTOR	DATA TRANSITION FORM SAMPLE: N 9661 (Slurry) LC50 = 18% at 96 hr.	(or) AMES RESPONSE
LDSG ROXIMA NCENTI	100% E D (ECSO) VALUE ATE RATION FACTOR TOXICITY ^C	DATA TRANSITION FORM SAMPLE: N 9661 (Slurry) LC50 = 18% at 96 hr.	(or) AMES RESPONSE
ULTS: LD60 ROXIM/ NCENTI	100% E D (ECSO) VALUE ATE RATION FACTOR TOXICITY ^C	SAMPLE: N 9661 (Slurry) LC50 = 18% at 96 hr. O	(or) AMES RESPONSE

 $^{\mathbf{G}}\mathbf{See}$ Table 1 for definition of texicity levels.

FBC

ASSAY: Grass shrimp MAD: 100% Effluent	SAMPLE: Spentbed	leachate
RESULTS:	Not Toxic >100%	or ames response
APPROXIMATE		MEC _p
CONCENTRATION FACTOR LEVEL OF TOXICITY		
COMMENTS: Not detectable Diss, $\theta_2 = 55\%$ of sa	e turation at all test levels	s.
^a For the RAM assay the EC50 for bMEC = Minimum effective conce	•	

FBC

[or] AMES RESPONSE MEC ^b hrs. ranged from 26% of saturation to 48% of saturation in the control
MEC ^b hrs. ranged from 26% of saturation to 48% of saturation in the contro
MEC ^b hrs. ranged from 26% of saturation to 48% of saturation in the contro
MEC ^b hrs. ranged from 26% of saturation to 48% of saturation in the contro
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t to 48% of saturation in the control.
ed.
FBC
4)
<u>') </u>
[or] AMES RESPONSE
MEC

isted.

Marine ' SAMPLE: __Coal leachate ASSAY: Fish toxicity 100% MAD: RESULTS: LD50 [EC50] VALUE LC50 = 71,5% effluent [or] AMES RESPONSE MEC APPROXIMATE CONCENTRATION FACTOR LEVEL OF TOXICITY Moderate COMMENTS: All three time periods: 24-, 48- and 96 hrs. gave LC50's of 71.5% effluent. Diss. θ_2 = 39% - 62% of saturation. ^aFor the RAM assay the EC60 for the most responsive parameter wiff be fisted. bMEC - Minimum ellective concentration (if response is positive). ^CSee Table 1 for definition of toxicity levels. PRIMARY DATA TRANSITION FORM FBC Marine SAMPLE: Flyash leachate Fish toxicity 100% MAD: RESULTS: LD60 [EC60] VALUE Not toxic at 96 hrs. (>100%) | Int AMES RESPONSE _____ MEC APPROXIMATE CONCENTRATION FACTOR 0 LEVEL OF TOXICITY NB COMMENTS: Not detectable Diss θ_2 = 48% of saturation in all tests. *For the RAM assay the EC50 for the most responsive parameter will be listed.

bMEC - Minimum effective concentration (if response is positive).

⁸See Table 1 for definition of toxicity levels.

FBC

Marine Fish toxicity	BAMPLE:	Spent bed	leachate	_
MAD: 100%				-
RESULTS:				
LD50 [EC50] VALUE	Not toxic at 100%		(or)	AMES RESPONSE
			(MEC ^b
APPROXIMATE CONCENTRATION FACTOR	0			
LEVEL OF TOXICITY	ND		,	
COMMENTS: Not detected	ı			
No mortality afte	r 96 hr. exposure.	Diss. $0_2 \ge 1$ in all test	57% of satu t levels.	ration
*For the RAM assay the EC66) for the most responsive	parameter w	III be Nated.	
Dage - Manhaum alfacellas a		le coelline		

Freshwater ASSAY: Algal/DAPHNIA/Fish SAMPLE: Dolomite Leachate	
MAD: 100%	L
RESULTS:	
LD50 [EC50] VALUE > 100%/> 100%/ > 100%	[or] AMES RESPONSE
	MEC
APPROXIMATE CONCENTRATION FACTOR 0 / 0 / 0	_
LEVEL OF TOXICITY ^C ND / ND / ND	-
COMMENTS: Not detectable	
^B For the RAM assay the EC50 for the most responsive parameter will be that MEC — Minimum effective concentration (11 response is positive). See Table 1 for definition of toxicity levels.	ed.
Bee I Bole I for definition of toxicity fevels.	
PRIMARY	
DATA TRANSITION FORM	FBC
Freshwater ASSAY: Algal/DAPHNIA/Fish SAMPLE: Spent Bed Leachate MAD: 100%	
RESULTS:	
LDS0 (ECS0) VALUE - 45%/40.9/25	IAN AMES DESDONSE
[D90 EC90) VALUE	_ loi Ames Restonse
	MEC p
APPROXIMATE CONCENTRATION FACTOR 0 / 0 / 0	WEC _p
CONCENTRATION FACTOR 0 / 0 / 0	_
APPROXIMATE CONCENTRATION FACTOR 0 / 0 / 0 LEVEL OF TOXICITY Moderate/Moderate COMMENTS:	_
CONCENTRATION FACTOR 0 / 0 / 0 LEVEL OF TOXICITY Moderate/Moderate	

FBC

ASSAY.	Freshwater Algal/DAPHNIA/Fish	SAMPI F	Flyash Leachate	
MAD:	100%			
		•		
RESULTS:			1000	
LD	60 [EC60] VALUE" > 100	%/ > 100%/ >	100%	
				MEC ^b
APPROXIM CONCENT	IATE IRATION FACTOR 0	/ 0 / 0		_
	TOXICITY ^C ND			_
				_
COMMENT	s: Not detectable			
Eas the D	AM assay the EC50 for the		a maramata, will be their	_
	nm assay ine ECSU for the Inimum effective concentra	•		u.
	1 for definition of loxicity	•		
		P	RIMARY	
		DATA TR	ANSITION FORM	FBC
	Freshwater Algal/DAPHNIA/Fish		Coal Leachate	
ASSAY: _ MAD:	100%	_ SAMPLE:		
MAU.		-		
RESULTS	:			
LO	SO [ECSO] VALUE	9% / 70.9 / 9	2%	orj AMES RESPONSE
				MEC ^b
APPROXI	ITRATION FACTOR			_
FEAET OI	TOXICITY ^e	High / Mode	rate / Low	-
COMMEN	ts:			
1				
_	RAM sassy the EC50 for th Minimum effective concent	•	•	led.

*See Table 1 for definition of texicity levels.

FBC

	SAMPLE: Scrubber Slurry		
MAD: 100%	· ·		
RESULTS:	9% / 31.6% / 67.9%	And AMER BERRONES	
FROM LECON ANCOE	78 / 31.0% / 01.32	• •	
		MEC ^b	-
APPROXIMATE CONCENTRATION FACTOR	0/0/0		
LEVEL OF TOXICITY	High / Moderate / Moderate	_	
COMMENTS:			
*For the RAM assay the EC50 for t	he most responsive parameter will be Net	led.	
bMEC = Minimum effective concen	tration (II response la positive).		
See Table 1 for definition of toxici	ily fevela.		

FBC

AD: 100%		
	-	
ESULTS:		
LD50 [EC50] VALUE	ot Toxic >100%	(or) AMES RESPONSE
		MEC
PROXIMATE ONCENTRATION FACTOR		
VEL OF TOXICITY ^C	NO.	
MMENTS:		
Optical density increas	sed by effluent.	
	most responsive parameter will be it	sted.
EC - Minimum effective concentr		
ee Table 1 for definition of loxicity	Avois.	
	PRIMARY	ERC
	PRIMARY DATA TRANSITION FORM	FBC
Manian Alos	DATA TRANSITION FORM	
ASSAY: <u>Marine Alga</u> MAD: <u>100%</u>	DATA TRANSITION FORM	
MAD: 100%	DATA TRANSITION FORM	
MAD: 100% RESULTS:	DATA TRANSITION FORM SAMPLE: Coal leachate naltered effluent	
MAD: 100% RESULTS: U	DATA TRANSITION FORM SAMPLE: Coal leachate naltered effluent	or) AMES RESPONSE
MAD: 100% RESULTS:	DATA TRANSITION FORM SAMPLE: Coal leachate naltered effluent	
MAD: 100% RESULTS: LD60 (EC50) VALUE N	DATA TRANSITION FORM SAMPLE:Coal leachate naltered effluent ot toxic	or AMES RESPONSE MEC ^b
MAD: 100% RESULTS: LD50 [EC50] VALUE N APPROXIMATE CONCENTRATION FACTOR	DATA TRANSITION FORM SAMPLE:Coal leachate naltered effluent ot toxic	or AMES RESPONSE MEC ^b
MAD: 100% RESULTS: LD60 (EC50) VALUE N	DATA TRANSITION FORM SAMPLE:Coal leachate naltered effluent ot toxic	or AMES RESPONSE MEC ^b
MAD: 100% RESULTS: LD60 [EC50] VALUE N APPROXIMATE CONCENTRATION FACTOR	DATA TRANSITION FORM SAMPLE:Coal leachate naltered effluent ot toxic	or AMES RESPONSE MEC ^b
RESULTS: LD60 (EC50) VALUE N APPROXIMATE CONCENTRATION FACTOR LEVEL OF TOXICITY C	DATA TRANSITION FORM SAMPLE:Coal leachate naltered effluent ot toxic 0ND	(or) AMES RESPONSE MEC ^b
RESULTS: LD60 (EC50) VALUE N APPROXIMATE CONCENTRATION FACTOR LEVEL OF TOXICITY C	DATA TRANSITION FORM SAMPLE:Coal leachate naltered effluent ot toxic 0MD e EC50's at 98, 39 and 38% eff	(or) AMES RESPONSE MEC ^b

FBC

ASSAY: Marine Alga	SAMPLE: N 9661	
MAD: 100%		-
RESULTS:		
LD50 [EC60] VALUE	EC50 62% of effluent at 4 days (or	
		MEC,
APPROXIMATE CONCENTRATION FACTOR	0	
	Moderate	
12 days exposure. with EC50's of 22	ed for unaltered effluent were 62% for 4 Filtered effluent was more active that and 15% for 4 and 12 days. for the most responsive parameter will be listed.	days and 66% for unaltered effluent
	oncentration (if response to positive).	
CSee Table 1 for definition of	•	
	PRIMARY	
	DATA TRANSITION FORM	FBC
ASSAY:Marine alga	SAMPLE: Dolomite leachate	
MAD: 100%		
RESULTS:	EC50 = 56% effluent 10	LAMES SESSIONS
EDRO JECROS ANTRE "	Loso - Soa errinenc	
APPROXIMATE		MEC
CONCENTRATION FACTOR		
LEVEL OF TOXICITY	Moderate	
COMMENTS:		
Filtered effluen	t gave EC50's a5 19% and 24% for 8 and 1:	2 days respectively.
*For the RAM assay the EC5	O for the most responsive parameter will be listed.	
bMEC - Minimum effective (concentration (if response is positive).	
^Q See Table 1 for definition of	toxicity levels.	

FBC

SSAY: Harine Alga IAD: 100% effluent	SAMPLE: Flyash leach	ite
SULTS:		
LD50 [EC60] VALUE	Not toxic >100%	or AMES RESPONSE
		MEC ^b
PPROXIMATÉ CONCENTRATION FACTOR		
EVEL OF TOXICITY	NO	
OMMENTS: Not detecta	•	

⁶See Table 1 for definition of toxicity levels.

FBC

ASSAY: Rodent toxicity SAMPLE: Fly Ash	
MAD: 10 g/kg	
RESULTS: LD50 (EC50) VALUE® > 10 g/kg	
APPROXIMATE CONCENTRATION FACTOR	MEC ^b
LEVEL OF TOXICITY ^C Nondetectable	-
COMMENTS: No toxic sign reported.	
^B For the RAM assay the EC60 for the most responsive parameter will be list ^B MEC = Minimum effective concentration [If response is positive]. ^C See Table 1 for definition of toxicity levels.	ed.
PRIMARY DATA TRANSITION FORM	FBC
ASSAY: Rodent toxicity SAMPLE: Dolomite	
RESULTS: LD50 EC50 VALUE 10 g/kg	
FD60 [EC60] VALUE	[or] AMES RESPONSE
APPROXIMATE CONCENTRATION FACTOR 0	_
LEVEL OF TOXICITY Nondetectable	_
COMMENTS: No toxic sign reported.	
*For the RAM assay the EC60 for the most responsive parameter will be its back to Minimum effective concentration (II response is positive).	led.

FBC

ASSAY: Rodent Toxicity SAMPLE: Spent Bed Dolomi	<u>te</u>
MAD: 10 g/kg	
RESULTS:	
LDSO (ECSU) VALUE > 10 g/kg	
APPROXIMATE	MEC ^b
CONCENTRATION FACTOR 0	
LEVEL OF TOXICITY Nondetectable	
COMMENTS:	
No toxic signs reported.	
*For the RAM assay the EC50 for the most responsive parameter will be liste	d.
^b MEC ≈ Minimum effective concentration (II response is positive).	
^C Sea Table 1 for definition of toxicity levels.	
	1
PRIMARY	FBC
DATA TRANSITION FORM	roc
Descrit Touristan	_
ASSAY: Rodent Toxicity SAMPLE: Spent Bed Leachat	<u>e</u>
MAD: 10 g/kg or 10 ml/kg	
RESULTS:	
LDSO [ECSO] VALUE > 10 m3/kg	jorj AMES RESPONSE
	MEC
APPROXIMATE CONCENTRATION FACTOR	
LEVEL OF TOXICITY Nondetectable	
COMMENTS:	
No toxic signs reported.	
a. For the RAM assay the ECS0 for the most responsive parameter will be Reter	1.
bMEC = Minimum effective concentration [If response is positive].	••
Gee Table 1 for definition of toxicity levels.	

FBC

ASSAY: Rodent Toxicity SAMPLE: Fly Ash Slurry Samp	ile
MAD: 10 g/kg or 10 ml/kg	
RESULTS:	
LDSO [ECSO] VALUE > 10 ml/kg	
APPROXIMATE CONCENTRATION FACTOR	MEC ^b
LEVEL OF TOXICITY Nondetectable	•
COMMENTS:	
No toxic signs reported.	
^a For the RAM assay the EC50 for the most responsive parameter will be liste bMEC = Minimum effective concentration [11 response is positive]	rd.
See Table 1 for definition of toxicity levels.	
PRIMARY DATA TRANSITION FORM	FBC
Rodent toxicity SAMPLE: Fly Ash Leachate	
MAD: 10 g/kg (10 m1/kg)	
RESULTS: LD50 (EC50) VALUE > 10 ml/kg	(a.) AMES BESDONSE
LDSO (ECSO) VALUE	MEC _p
APPROXIMATE CONCENTRATION FACTOR 0	
LEVEL OF TOXICITY Nondetectable	-
COMMENTS: No toxic sign reported.	
⁸ For the RAM assay the EC50 for the most responsive parameter will be ited	ed.

FBC

ASSAY:RAM	· · · · · · · · · · · · · · · · · · ·	SAMPLE: Slurry (Fly)	Ash)
MAD: 600	μ 1/m 1		
RESULTS:			
LD50 [E	C60] VALUE	146 μ1/ml (ATP fg/cell)	or AMES RESPONSE
			MEC ^b
APPROXIMATE CONCENTRATI	ION FACTOR	0	
LEVEL OF TOXI	CITY	<u>lou</u>	
COMMENTS:			
-		11 parameters = 146 - > 1000 μ1	
	•	the most responsive parameter will be	Meled.
	un effective conce definition of toxi	nitation (II response le positive).	
		•	
		· .PRIMARY	
		PRIMARY DATA TRANSITION FORM	FBC
			FBC
IAY:RAM			
	/m1	DATA TRANSITION FORM SAMPLE: #7 - 3 μ Cyclon	
D: <u>1000 и</u> ди		DATA TRANSITION FORM SAMPLE: #7 - 3 μ Cyclon	
D: <u>1000 ug</u> u	/m)	DATA TRANSITION FORM SAMPLE: #7 - 3 μ Cyclon	ne
D: <u>1000 ug</u> u	/m)	DATA TRANSITION FORM SAMPLE: #7 - 3 μ Cyclon	e [or] AMES RESPONSE
D: 1000 mg/ BULT8: LD50 (EC50)	/m}	DATA TRANSITION FORM SAMPLE: #7 - 3 μ Cyclon	ne
D: 1000 µg/ SULT8: LD50 (EC60) PROXIMATE DICENTRATION	/m} VALUE®	BAMPLE: #7 - 3 \(\nu\) Cyclon - >1000 UG/ML	e [or] AMES RESPONSE
D: 1000 µg/ SULT8: LD50 (EC60) PROXIMATE DICENTRATION	/m}	BAMPLE: #7 - 3 \(\nu\) Cyclon - >1000 UG/ML	e [or] AMES RESPONSE
D: 1000 ug/ BULT8: LD50 (EC50) PROXIMATE DICENTRATION PEL OF TOXICIT	VALUE®	BAMPLE: #7 - 3 \(\nu\) Cyclon - >1000 UG/ML	e [or] AMES RESPONSE
D: 1000 ug/ BULT8: LD50 (EC50) PROXIMATE DICENTRATION PEL OF TOXICIT	VALUE®	BAMPLE: #7 - 3 \(\nu\) Cyclon - >1000 UG/ML	e [or] AMES RESPONSE

ASSAY: RAM	SAMPLE: #6 - lu filter	Cyclone
MAD: 1000 µg/ml		
RESULTS: LD50 [EC50] VALUE [®] 596 µg	/ml (ATP fg/cell)	(or) AMES RESPONSE
APPROXIMATE		WECp
CONCENTRATION FACTOR LEVEL OF TOXICITY LOW		
COMMENTS: ND in other parame	eters	
^a For the RAM assay the ECSO for the		listed.
^D MEC = Minimum effective concentrat ^O See Table 1 for definition of toxicity	• • •	
	PRIMARY DATA TRANSITION FORM	FBC
ASSAY: RAM	SAMPLE: Dolomite	
MAD: 600 µl or 1000 µg/ml		
RESULTS:		
**	1000 μg/ml	[or] AMES RESPONSE
		WECp
APPROXIMATE CONCENTRATION FACTOR		
LEVEL OF TOXICITY	detectable	
COMMENTS: All parameters		
An an annual transfer to the		lated.
*For the RAM assay the EC60 for the state of	•	181 9 G.

ASSAY. RAM	SAMPLE: Spent bed Dol	omfte
AD: 600 pl or 1000		
SULTS:		
LD50 [EC50] VALUE	>1000 µg/ml	or AMES RESPONSE
		MEC
PROXIMATE ONCENTRATION FACTOR	0	
VEL OF TOXICITY	Mondetectable	· · · · · · · · · · · · · · · · · · ·
OMMENTS: All paramete	ers	
EC = Minimum ellective co	for the most responsive parameter will be incentration fill response la positivej. toxicity levels.	Hsted.
EC = Minimum ellective ca	incentration fil response la positive).	Heted.
EC = Minimum ellective ca	incentration fil response la positive).	Heted.
EC = Minimum ellective ca	incentration (il response la positive). Ioxicity levels.	Moted.
EC = Minimum elfective co le Table 1 for definition of f	primary DATA TRANSITION FORM	FBC
EC = Minimum elfective constants to the Table 1 for definition of	PRIMARY DATA TRANSITION FORM (3) SAMPLES: Spenthed leach	FBC
SAY: RAM 600 µ1 or 1000	PRIMARY DATA TRANSITION FORM (3) SAMPLES: Spenthed leach	FBC
SAY: RAM 600 µl or 1000	PRIMARY DATA TRANSITION FORM (3) SAMPLES: Spenthed leacher Flyash leacher Flyash	FBC bate te loc AMES RESPONSE
SAY: RAM 600 µl or 1000	PRIMARY DATA TRANSITION FORM (3) SAMPLES: Spenthed leacher Flyash leacher Flyash	FBC bate te loc AMES RESPONSE
SSAY: RAM AD: 600 µl or 1000 SULTS: LD50 [EC50] VALUE	PRIMARY DATA TRANSITION FORM (3) SAMPLES: Spenthed leacher Flyash leacher Flyash	FBC bate te [or] AMES RESPONSE MEC ^b

⁸For the RAM assay the EC50 for the most responsive parameter will be Nated.

bMEC = Minimum effective concentration (If response is positive).

COMMENTS: All parameters'

⁰See Table 1 for definition of toxicity levels.

FBC

ASSAY: Salmonella SAMPLE: Spent Bed Dolgmin	· Le
ASSAY: SAMPLE: SAMPLE: MAD: 5 mg/plate	
MAD: J mg/proce	
RESULTS:	
LD60 [EC60] VALUE	for AMES RESPONSE Negative
	MEC ^b
APPROXIMATE CONCENTRATION FACTOR 0	
LEVEL OF TOXICITY Nondetectable	-
COMMENTS: Maximum concentration tested was 5 mg/plate.	•
0 For the RAM assay the EC50 for the most responsive parameter will be list 0 MEC = Minimum effective concentration [II response is positive].	ed.
⁶ See Table 1 for definition of toxicity levels.	
DD1144.5v	
PRIMARY DATA TRANSITION FORM	FBC
	rac
ASSAY: Salmonella SAMPLE: Fly Ash	Marayan garangen
MAD: 5 mg/plate	
RESULTS:	
LD60 (EC50) VALUE	In AMES DESPONSE NEGATIVE
	MEC b
APPROXIMATE	MEC
CONCENTRATION FACTOR 0	
LEVEL OF TOXICITY Nondetectable	
COMMENTS:	
Maximum concentration used was 5 mg/plate.	
*For the RAM assay the ECSO for the most responsive parameter will be its	led.
BMEC - Minimum effective concentration (III response is positive).	
See Table 1 for definition of toxicity levels.	

SSAY:	Salmonella	SAMPLE:	Dolamite		
	5 mg/plate				
ESULTS:					
	(EC60) VALUE			(or) AMES RESPO	NSE <u>Negative</u>
PROXIMA CONCENTI	ATE RATION FACTOR				
VEL OF 1	TOXICITY [©]	Mondetectable			
MMENTS	i :				
Max	cimum concentratio	n tested was 5 mg	g/plate.		
EC - MI	M assay the EC60 for inimum effective conce 1 for definition of toxi-	mustion [if response		ligled.	
re (SDIG	i iur demnillon di loxi	CHY IEVELS.			
		PR	IMARY		
			IMARY NSITION FORM		FBC
SSAY:	Salmonella	DATA TRA	NSITION FORM	oarse Particulate	FBC
	Salmonella 5 mg/plate	DATA TRA	NSITION FORM	oarse Particulate	FBC
IAD: _		DATA TRA	NSITION FORM	oarse Particulate	FBC
IAD: ESULT8:	5 mg/plate	DATA TRA SAMPLE: _	NSITION FORM 3µ Cyclone Co		
IAD:	5 mg/plate	DATA TRA SAMPLE: _	NSITION FORM 3µ Cyclone Co	(or) AMES RESPO	NSE <u>Positive</u>
AAD: BESULTS: LDS	5 mg/plate so (ECSO) VALUE	DATA TRA SAMPLE: _	NSITION FORM 3µ Cyclone Co	(or) AMES RESPO	NSE <u>Positive</u>
AAD: ESULTS: LDS LPPROXIM CONCENT	5 mg/plate 50 (ECGO) VALUE 10 (ATE 11 (ATE)	DATA TRA SAMPLE: _	NSITION FORM 3µ Cyclone Co	(or) AMES RESPO	
ESULTS: LDS	5 mg/plate so (ECSO) VALUE	DATA TRA SAMPLE:	NSITION FORM 3µ Cyclone Co	(or) AMES RESPO	NSE <u>Positive</u>
ESULTS: LDS PPROXIM	5 mg/plate se lectel value sale matie mation factor toxicity 10xicity	DATA TRA SAMPLE:	NSITION FORM 3µ Cyclone Co	(or) AMES RESPO	NBE <u>Positive</u>
ESULTS: LDS PPROXIM CONCENT EVEL OF	5 mg/plate se lectel value sale matie mation factor toxicity 10xicity	DATA TRA SAMPLE: 0 Low A-1538 and TA-98.	NSITION FORM 3μ Cyclone Co	(or) AMES RESPO MEC ^b 2	NSE <u>Positive</u>

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FBC

ASSAY:	Sa Imone I I a		lμ Cyclone	Fine Particul	ate	
	5 mg/plate		•			
RESULT	S :					
ι	D50 [EC50] VALUE			(or) AMI	S RESPONSE	Positive
				MEC	,b	2 mg/plate
APPROX	CIMATE ENTRATION FACTOR					
LEVEL (OF TOXICITY [©]	Low				
COMME	:NTS:					
1	The sample was action More activity was obthe than in activation	otained in <mark>nona</mark> ct	ivation test	s (-S9)		
For the	RAM susay the EC50 fo	r the most responsiv	e parameter will	be Heled.		
MEC -	. Minimum effective con	entration (If respons	e ie positivel.			

CG

ASSAV: Marine Algal As	•	<u>İston Separator Liq</u> uor	
RESULTS:	0.89% (4 days), 0.53%	(8 days), for AMES RESPONSE	
	0.41% (12 days)	MEC _p	
APPROXIMATE CONCENTRATION FACTOR	Filtered		
LEVEL OF TOXICITY	High		
COMMENTS:			
^a For the RAM essay the EC50 DMEC = Minimum effective co	•		

 $^{\mathbf{d}}\mathbf{See}$ Table 1 for definition of toxicity levels.

ASSAY:FW Algal Assays	RAMDIE. Radian Separato	r Liquor	
MAD: 100 mg/liter or 100%	VANIFES.		
RESULTS:			
LD50 [EC50] VALUE 0,1	- 1%	[or] AMES RESPONSE	
		MEC _p	-
APPROXIMATE CONCENTRATION FACTOR	0		
LEVEL OF TOXICITY			
COMMENTS:			
^a For the RAM assay the EC50 for the m	nost responsive perameter will be if	isted.	
MEC = Minimum effective concentration	on [If response is positive).		
⁶ See Table 1 for definition of toxicity te	vels.		
	MINISA A DV		
	PRIMARY DATA TRANSITION FORM		CG
ABBAY:FW Algal Assays	Malatan Carana	Name A Associate	
MAD: 100 mg/liter or 100%	SAMPLE:HOISTON Separat	or Liqu or	
RESULTS:			
LD50 EC50 VALUE 1.9% (4	days), 0.57% (8 days).	or AMES RESPONSE	
0.005 (it days;	MEC ^b	
APPROXIMATE CONCENTRATION FACTOR Un	filtered		
LEVEL OF TOXICITY	gh		
COMMENTS:			
⁸ For the RAM sessy the EC60 for the s	mani responsive personaler will be	Materi	
PMEC = Minimum effective concentrati	• •		
See Table 1 for definition of textolly is	evols.		

ASSAY: WI-38		
MAD: 600 μl or 1000 μg/m		***************************************
RESULTS:	x 10 ⁻⁴ % (Viability Index)	(or) AMES RESPONSE
EDSO (ECSO) VALUE	x 10 s (visorite) mack)	MEC ^b
APPROXIMATE	•	· · · · · · · · · · · · · · · · · · ·
	0	
LEVEL OF TOXICITY	(High)	
COMMENTS:		
	ntration relative to establish	ed MAD.
For the RAM essay the EC50 for the	e mast responsive parameter will be it ation (if response le positive).	işled.
^G See Table 1 for definition of toxicity	•	
	PRIMARY	
	DATA TRANSITION FORM	CG
ASSAY: WI-38	SAMPLE: 590 = 5/6	
MAD: 600 pl or 1000 pg/m	L	
RESULTS:		
_	w 10-98 (Nambilian, tudon)	or) AMES RESPONSE
and lead these	A IN A UTIONITIES INGEX	MEC.
APPROXIMATE		
	<u> </u>	
LEVEL OF TOXICITY	(High)	
COMMENTS:		
••	tration relative to establishe	d MAD.
•		
For the RAM assay the ECSO for the	e most responsive parameter will be II	leled.
⁶ See Table 1 for definition of loxicity	• • • •	

ÇG

ASSAY:WI-38	SAMPLE:	Separator Liquor HB - 013		
MAD: 600 μ]/m] or 1000 μg/m]			-	
RESULTS:				
LDSO JECSOJ VALUE 7.4 ul/	ml (Viabili	ty Index)	or AMES RESPONSE	
			MEC _p	
APPROXIMATE CONCENTRATION FACTOR				
LEVEL OF TOXICITYE MO	derate			
COMMENTS:				
MAD was 60 µ1/m1 for this	sample.			
For the RAM assay the ECSO for the m	ost responsive	parameter will be that	nd.	
MEC - Minimum elfective concentratio	a H response	is positivej.		

MAD: 100 mg/1 or 100% RESULTS: LDSO IECSO VALUE* 0.23% [24 hrs], 0.20% [48 hrs],	ASSAY: FW Fish Test	SAMPLE: Holston S	Separator Liquor
LDSO ECBO VALUE D. 23% 24 hrs.). D. 20% 48 hrs.). Oot AMES RESPONSE APPROXIMATE CONCENTRATION FACTOR D. LEVEL OF TOXICITY High. "For the RAM assay the ECSO for the most responsive parameter will be Nated." "PMEC - Minimum effective concentration if it response is positive). "PSSO Table 1 for definition of toxicity levels. PRIMARY DATA TRANSITION FORM CG ISAY: Freshwater Fish Test SAMPLE: Radian Separator Liquor AD: 100 mg/liter or 100% ISULTS: LDSO ECBO VALUE D. 02% (96 hrs.) Oot AMES RESPONSE PROXIMATE ONCENTRATION FACTOR D. VEL OF TOXICITY High.	MAD: 100 mg/1 or 100%		
APPROXIMATE CONCENTRATION FACTOR	RESULTS:		
APPROXIMATE CONCENTRATION FACTOR	LD50 [EC50] VALUE 0.23%	124 hrs). D.20% (48 hr	(S).
APPROXIMATE CONCENTRATION FACTOR O High COMMENTS: Pror the RAM assay the EC50 for the most responsive parameter with be listed. Pror the RAM assay the EC50 for the most responsive parameter with be listed. Provided the RAM assay the EC50 for the most response is positive). See Table 1 for definition of toxicity levels. PRIMARY DATA TRANSITION FORM CG SAY: Freshwater Fish Test 100 mg/liter or 100% SULTS: LD50 [EC50] VALUE 0.02% (96 hrs) MEC PROXIMATE ONCENTRATION FACTOR VEL OF TOXICITY High.	0.102	(30 11.2)	MEC
PRIMARY DATA TRANSITION FORM CG SAY: Freshwater Fish Test 100 mg/liter or 100% SULTS: LD50 [EC50] VALUE 0.02% (96 hrs) 6 mg/liter of 100% PROXIMATE ONCENTRATION FACTOR 0.02% (96 hrs) 6 mg/liter of 100% SULTS: MEC 0.02% (96 hrs) 6 mg/liter or 100% PROXIMATE ONCENTRATION FACTOR 0.02% (96 hrs) 6 mg/liter or 100%	APPROXIMATE CONCENTRATION FACTOR	0	
PRIMARY DATA TRANSITION FORM CG SAY: Freshwater Fish Test AD: 100 mg/liter or 100% SULTS: LD60 [EC60] VALUE 0.02% (96 hrs) [or] AMEB RESPONSE MEC ^b PROXIMATE ONCENTRATION FACTOR 0.00% VEL OF TOXICIIY MIGH.			
PRIMARY DATA TRANSITION FORM CG SAY: Freshwater Fish Test sample: Radian Separator Liquor DI 100 mg/liter or 100% SULTS: LD60 EC80 VALUE 0.02% (96 hrs) [or] AMEB RESPONSE MEC ^b PROXIMATE ONCENTRATION FACTOR ON High with the positive parameter will be listed. PRIMARY DATA TRANSITION FORM CG SAMPLE: Radian Separator Liquor MEC ^b MEC ^c MEC ^c MEC ^c NOT TOXICITY MET AND AMEB RESPONSE MEC ^c MEC ^c MEC ^c MIGh	COMMENTS:		
PRIMARY DATA TRANSITION FORM CG SAY: Freshwater Fish Test AD: 100 mg/liter or 100% SULTS: LD50 [EC50] VALUE 0.02% (95 hrs) PROXIMATE ONCENTRATION FACTOR O. Migh. CG PROXIMATE ONCENTRATION FACTOR O. Migh.			
PRIMARY DATA TRANSITION FORM CG SAY: Freshwater Fish Test SAMPLE: Radian Separator Liquor 100 mg/liter or 100% SULTS: LD50 [EC50] VALUE 0.02% (96 hrs) [or] AMES RESPONSE MEC 0.02%		·	
PRIMARY DATA TRANSITION FORM CG SAY: Freshwater Fish Test AD: 100 mg/liter or 100% SULTS: LD60 EC60 VALUE 0.02% (96 hrs) orl AMEB RESPONSE MEC PROXIMATE ONCENTRATION FACTOR 0.00%			ill be listed.
PRIMARY DATA TRANSITION FORM CG SAY: Freshwater Fish Test 100 mg/liter or 100% SULTS: LD50 [EC50] VALUE 0.02% (96 hrs) [or] AMES RESPONSE MEC PROXIMATE ONCENTRATION FACTOR 100% VEL OF TOXICITY High.			
DATA TRANSITION FORM CG SAY: Freshwater Fish Test	tubio i italia de inicia d		
DATA TRANSITION FORM CG SAY: Freshwater Fish Test			
DATA TRANSITION FORM CG SAY: Freshwater Fish Test AD: 100 mg/liter or 100% SULTS: LDS0 [EC50] VALUE 0.02% (96 hrs) [or] AMEB RESPONSE MEC PROXIMATE ONCENTRATION FACTOR 0.000 VEL OF TOXICITY High WEL OF TOXICITY High DATA TRANSITION FORM Radian Separator Liquor Radian Separator Liquor AMEB RESPONSE MEC			
DATA TRANSITION FORM CG SAY: Freshwater Fish Test AD: 100 mg/liter or 100% SULTS: LDS0 [EC50] VALUE 0.02% (96 hrs) [or] AMEB RESPONSE MEC PROXIMATE ONCENTRATION FACTOR 0.000 VEL OF TOXICITY High WEL OF TOXICITY High DATA TRANSITION FORM Radian Separator Liquor Radian Separator Liquor AMEB RESPONSE MEC			
DATA TRANSITION FORM CG USAY: Freshwater Fish Test AD: 100 mg/liter or 100% SULTS: LD50 [EC50] VALUE 0.02% (96 hrs) [ov] AMEB RESPONSE MECb PPROXIMATE ONCENTRATION FACTOR 0.00% VEL OF TOXICITY Lightham			
DATA TRANSITION FORM CG USAY: Freshwater Fish Test AD: 100 mg/liter or 100% SULTS: LD50 [EC50] VALUE 0.02% (96 hrs) [ov] AMEB RESPONSE MECb PPROXIMATE ONCENTRATION FACTOR 0.00% VEL OF TOXICITY Light			
DATA TRANSITION FORM CG USAY: Freshwater Fish Test AD: 100 mg/liter or 100% SULTS: LD50 [EC50] VALUE 0.02% (96 hrs) [ov] AMEB RESPONSE MECb PPROXIMATE ONCENTRATION FACTOR 0.00% VEL OF TOXICITY Lightham			
SAY: Freshwater Fish Test AD: 100 mg/liter or 100% SULTS: LD50 [EC50] VALUE 0.02% (96 hrs) [or] AMEB RESPONSE MEC PROXIMATE ONCENTRATION FACTOR 0.00% VEL OF TOXICITY Lightham 1.00%			an
SULTS: LD50 [EC50] VALUE 0.02% (96 hrs) [or] AMES RESPONSE MECb PROXIMATE ONCENTRATION FACTOR 0.00000000000000000000000000000000000		DATA THANSITION FORM	
SULTS: LD50 [EC50] VALUE 0.02% (96 hrs) [or] AMES RESPONSE MECb PROXIMATE ONCENTRATION FACTOR 0.00000000000000000000000000000000000	Freshwater Fish Test	Radian Sepi	arator Liquor
ESULTS: LD50 [EC50] VALUE 0.02% (96 hrs) [or] AMES RESPONSE MEC PROXIMATE ONCENTRATION FACTOR 0 VEL OF TOXICITY High		OAMITE,	
LD60 [EC60] VALUE 0.02% (96 hrs) [or] AMES RESPONSE MEC ^b PROXIMATE ONCENTRATION FACTOR VEL OF TOXICITY High			
PROXIMATE ONCENTRATION FACTOR ONCE OF TOXICITY High			
PROXIMATE ONCENTRATION FACTOR ONCENTRATION FACTOR High	LD60 [EC60] VALUE 0.02% (96 hrs)	
ONCENTRATION FACTOR 0 High			MEC ^b
MMENTS:	VEL OF TOXICITY ^C Hig	h	
IMMEN 12:			
	JMMEN13:		
or the RAM assay the EC60 for the most responsive parameter will be Hated.	EC = Minimum eliective concentration	• •	

CG

ASSAY: Daphnia Assay MAD: 100 mg/liter or	SAMPLE: Radian Separat	or Liquor
RESULTS:	0.51% (24 hrs) - 0.11% (48 hrs)	(or) AMES RESPONSE
		MECp
APPROXIMATE CONCENTRATION FACTOR	0	·
LEVEL OF TOXICITY	High	
COMMENTS:		
•	for the most responsive parameter will be noontrollon (II response is positive).	Meted.

Goe Table 1 for definition of toxicity levels.

CG

ASSAY: Salmonella	SAMPLE: HB-019 (HAAP cyc	clone dust)
MAD: 5 mg/plate		
RESULTS:		
		_ or AMES RESPONSE <u>Negative</u>
		WECp
APPROXIMATE		
	0	
LEVEL OF TOXICITY	Nondetectable	
COMMENTS:	n tested was 5 mg/plate.	
rex mun concentration	n tested was 5 mg/proce.	
*For the RAM assay the EC50 for	the most responsive parameter will be its	iled.
bMEC - Minimum ellective conce		
CSee Table 1 for definition of toxi	city levels.	
	PRIMARY DATA TRANSITION FORM	CG
		ou ou
Salmonolla	BAMPLE:HB - 018 (HAAP as	h)
		,
MAD: 5 mg/plate		
RESULTS:		
LD60 (EC60) VALUE		[or] AMES RESPONSE Negative
		MEC b
APPROXIMATE		
CONCENTRATION FACTOR	0	-
LEVEL OF TOXICITY	Mondetectable	
COMMENTS:		
Maximum concentrate te	sted was 5 mg/plate.	
.		
"For the NAM assay the EC50 for II "MEC ~ Minimum effective concent	ne most responsive parameter will be fiste	d.
See Table 1 for definition of toxicit		
	,	

CG

Salmonell	SAMPLE: Coal	
AD: 5 mg/plat	<u> </u>	
ESULTS:		
	.ue*	[or] AMES RESPONSE Negative
		MEC ^b
PPROXIMATE CONCENTRATION FA	CTOR0	
EVEL OF TOXICITY	Mondetectable	
DMMENTS: Maximum cond	centration tested was 5 mg/plate.	
	e ECSO for the most responsive parameter	
	ctive concentration (II response la positiva Ilon of taxicity levels.).
90 (BDIC) NO OCIUM	The state of the s	
	PRIMARY	
	DATA TRANSITION FO	DRM CG
	-	•
Salmonel	SAMPLE: HB - 02	O (HAAP Coal)
5 ma/mla		
AD: 5 mg/pla		
ESULTS:		
LDSO (ECSO) VA	LUE	
		MEC ^b
PPROXIMATE		met
ONCENTRATION FA	CTOR 0	
EVEL OF TOXICITY	Nondetectable	
indicated t concentrati	t preestablished criteria for muta his sample was weakly mutagenic for on of 10 mg/plate produced less th trebacom but matralls which personals	or strains TA-98 and TA-100. A man 2-fold increases over the

IAD: 5 mg/plate			
ESULTS:			
LD60 (EC50) VALUE			
		MEC ⁶ 1 mg/p1	ate
PPROXIMATE CONCENTRATION FACTOR	0	··········	
EVEL OF TOXICITY	J nu		
OMMENTS:			
This sample was muta conditions of activa	genic for TA-1537, TA-1538, TA-1 tion (+S9).	98 and TA-100 only under	
or the RAM assay the EC50 for	the most responsive parameter will be	fisied.	
IEC - Minimum effective conce	entration [if response is positive].		
iee Table 1 for definition of toxi	city levels.		
	PRIMARY DATA TRANSITION FORM		ce
	DATA TRANSITION FORM		CG
			CG
55AY:	DATA TRANSITION FORM	·····	CG
AD: 5 mg/plate	DATA TRANSITION FORM		CG
SSAY:	DATA TRANSITION FORM	[or] AMES RESPONSE	
AD: 5 mg/plate	DATA TRANSITION FORM SAMPLE: 655	(or) AMES RESPONSE	
SSAY: SAY: 5 mg/plate ESULTS: LDSO (ECSO) VALUE PPROXIMATE	DATA TRANSITION FORM SAMPLE: 655		
ISSAY: S mg/plate	DATA TRANSITION FORM SAMPLE: 655		

The sample was tested at a maximum concentration of 5 mg/plate. The submitter's report indicated marginal activity in strain TA-100; however, the increase was less than 1.5 times the spontaneous background and did not meet preestablished criteria for mutagenesis.

^{*}For the RAM assay the EC68 for the most responsive parameter will be liefed.

bMEC = Minimum effective concentration (if response is positive).

^GSee Table 1 for definition of texicity levels.

SAY:Salmonella	SAMPLE: HB-017 (HAAP Se	parator liquor)	
o: 5 mg/plate			
SULTS:			
LDSO (EC50) VALUE		(or) AMES RESPONSE _	Negative
		MEC b	
PROXIMATE ONCENTRATION FACTOR	0		
VEL OF TOXICITY	Mondetectable		
MAMENIS: The maximum concentra	tion tested was 5 mg/plate.		
• •	the most responsive parameter will be I	Heled.	
EC = Minimum effective concer se Table 1 for definition of toxic			
SA LEGIS . IO. GRINNING. O. JOYIC			
	PRIMARY		
	DATA TRANSITION FORM		CG
SSAY: Salmonella	SAMPLE: H-032 (HAAP Se	eparator tar)	
MAD: 5 mg/plate			
<u>-</u>			
RESULTS:			
LD50 [EC60] VALUE			
		MEC ^b 0.01	mg/plate
APPROXIMATE CONCENTRATION FACTOR	0		
LEVEL OF TOXICITY			

COMMENTS: The sample was mutag	enic for strains TA-1537, TA-15	38,	
And Adviday, was also amount	TA-98 and TA-1 red only with S9 activation.	100.	
ACITIVITY WAS DOSETY	ED DILL MICH 33 BELIABEIDH.		

CG

FAD: 10 g/kg	
AD	
ESULTS:	
LD60 [EC50] VALUE > 10 g/kg	
	MEC ^b
PPROXIMATE CONCENTRATION FACTOR 0	
VEL OF TOXICITY Nondetectable	
DMMENTS: No toxic sign reported.	
or the RAM assay the ECSO for the most responsive parameter w	III be Rstad.
IEC - Minimum effective concentration (if response to positive).	
ee Table 1 for definition of toxicity levels.	
PRIMARY	
DATA TRANSITION FO	ORM CG
DATA TRANSITION FO	DRM CG
ASSAY: Rodent toxicity SAMPLE: HAAP co.	
ASSAY: Rodent toxicity SAMPLE: HAAP co.	
ASSAY: Rodent toxicity SAMPLE: HAAP com	
ASSAY: Rodent toxicity SAMPLE: HAAP com	al .
ASSAY: Rodent toxicity SAMPLE: HAAP com MAD: 10 g/kg MESULTS:	al .
ASSAY: Rodent toxicity SAMPLE: HAAP com MAD: 10 g/kg RESULTS: LD60 [EC50] VALUE > 10 g/kg APPROXIMATE	(or) AMES RESPONSE
ASSAY: Rodent toxicity SAMPLE: HAAP command: 10 g/kg RESULTS: LD60 (EC50) VALUE > 10 g/kg APPROXIMATE CONCENTRATION FACTOR 0	or) AMES RESPONSE
ASSAY: Rodent toxicity SAMPLE: HAAP com MAD: 10 g/kg RESULTS: LD60 [EC50] VALUE > 10 g/kg APPROXIMATE	(or) AMES RESPONSE
ASSAY: Rodent toxicity SAMPLE: HAAP command: 10 g/kg MAD: 10 g/kg MESULTS: LD60 (EC50) VALUE > 10 g/kg APPROXIMATE CONCENTRATION FACTOR 0	(or) AMES RESPONSE
ASSAY: Rodent toxicity SAMPLE: HAAP command: 10 g/kg RESULTS: LD60 (EC50) VALUE > 10 g/kg APPROXIMATE CONCENTRATION FACTOR 0 LEVEL OF TOXICITY Nondetectable	lori AMES RESPONSE

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10 g/kg			
LTS:			
	> 10 g/kg		
FDP0 FCP0 AVENE	> 10 g/kg		
AM184 A T#		WECp	
OXIMATE CENTRATION FACTOR	0	_	
L OF TOXICITY ^C	Mondetectable.	_	
MENTS:			
No toxic signs repo	rted.		
	or the most responsive parameter will be No	led.	
	centration (II response is positive).		
Table 1 for definition of to:	xicity levels.		
	PRIMARY		
	PRIMARY DATA TRANSITION FORM	Се	
	• • • • • • • • • • • • • • • • • • • •	Се	
y: Rodent Toxicity	DATA TRANSITION FORM		
	DATA TRANSITION FORM BAMPLE: HAAP Cyclone Dus		
	DATA TRANSITION FORM BAMPLE: HAAP Cyclone Dus		
10 g/kg	DATA TRANSITION FORM BAMPLE: HAAP Cyclone Dus		
. 10 g/kg	DATA TRANSITION FORM BAMPLE: HAAP Cyclone Dus	<u>t</u>	
: <u>10 g/kg</u> sLTS:	DATA TRANSITION FORM BAMPLE: HAAP Cyclone Dus	<u>t</u>	
: 10 g/kg JLTS: LDSO [ECSO] VALUE BOXIMATE	DATA TRANSITION FORM BAMPLE: HAAP Cyclone Dus > 10 g/kg	ttor) AMES RESPONSE	
: 10 g/kg ULT8: LD50 [EC50] VALUE ROXIMATE NCENTRATION FACTOR	DATA TRANSITION FORM SAMPLE: HAAP Cyclone Dus > 10 g/kg	ttor) AMES RESPONSE	
: 10 g/kg JLT8: LD50 [EC50] VALUE ROXIMATE NCENTRATION FACTOR	DATA TRANSITION FORM SAMPLE: HAAP Cyclone Dus > 10 g/kg	ttor) AMES RESPONSE	
: 10 g/kg JLT8: LD50 [EC50] VALUE ROXIMATE NCENTRATION FACTOR	DATA TRANSITION FORM BAMPLE: HAAP Cyclone Dus > 10 g/kg	ttor) AMES RESPONSE	
. 10 g/kg DITS: LDSO [ECSO] VALUE ROXIMATE NCENTRATION FACTOR EL OF TOXICITY	DATA TRANSITION FORM SAMPLE: HAAP Cyclone Dus > 10 g/kg	ttor) AMES RESPONSE	
: 10 g/kg JLT8: LD50 [EC50] VALUE ROXIMATE NCENTRATION FACTOR	DATA TRANSITION FORM BAMPLE: HAAP Cyclone Dus > 10 g/kg Nondetectable	ttor) AMES RESPONSE	

*See Table 1 for definition of toxicity levels.

CG

ASSAY: Rodent Toxicity MAD: 10 g/kg		HAAP Separator Li	quor	
RESULTS:	> 10 g/kg		(or) AMES RESPONSE	
			MEC	_
APPROXIMATE CONCENTRATION FACTOR	0			
LEVEL OF TOXICITY	Nondetectable			
COMMENTS: No toxic signs repo	orted.			
*For the fIAM assay the ECSO f	or the most responsive	parameter will be Nate	d.	
Dusc _ Nichery alleating age		te mostificat		

 $^{^{}G}\mathbf{See}$ Table 1 for definition of toxicity levels.

CG

ASSAY:	RAM	SAMPLE:	·····
MAD:	600 µ1/m1		
	. .		
MESULT		5.3 ul/ml (ATP fg/cell)	(or) AMES RESPONSE
•	Then lected avenue T		MEC D
APPRO)	(IMATE		
	ENTRATION FACTOR		
FEAET (OF TOXICITY	High	
COMME	Several parameter (5.3 - 13.5 for a	s showed toxicity in this range 11 parameters). for the most responsive parameter will be	· Naied.
•	•	oncentration (il response la positive).	
⁰ See Ta	ble 1 for definition of	toxicity levels.	
		PRIMARY	
		DATA TRANSITION FORM	ce
ASSAY:	RAM	SAMPLE:655-3	
	600 µl/ml		-
RESULT			
1	TDE0 [EC20] AVENE_"	21.2 ul/ml (Viab. Index)	[or] AMES RESPONSE
			MEC .
CONCI	KIMATE ENTRATION FACTOR	0	
LEVEL	OF TOXICITY	Moderate	
COMME	:NTB: Range of EC50 for	all parameters = 21.2 - 101.7.	
) for the most responsive parameter will b	• Neted.
		oncentration (il response la positive).	
"See Ta	ble 1 for delinition of	TORICITY TOVOIS.	

ASSAY: RAM SAMPLE: Coal	
MAD:600 μ1 or 1000 μg/ml	
RESULTS:	
LDSO [ECSO] VALUE > 1000 µg/m]	
AAAAAN/MAAYE	MEC _p
APPROXIMATE CONCENTRATION FACTOR	-
LEVEL OF TOXICITY Nondetectable	
COMMENTS: All parameters	
^a For the RAM assay the EC50 for the most responsive parameter will be Hate ^b MEC = Minimum effective concentration (If response is positive).	d.
^a See Table 1 for definition of toxicity levels.	
PRIMARY	
DATA TRANSITION FORM	CG
ASSAY:	
MAD: 600 ul or 1000 ug/ml	
RESULTS:	
LDSO [ECSO] VALUE 1.9 x 10-4% viability	[or] AMES RESPONSE
	MEC _p
APPROXIMATE CONCENTRATION FACTOR 0	
LEVEL OF TOXICITY	•
птуп	•
COMMENTS:	
Cannot interpret data relative to established MAD.	
*For the RAM assay the ECSO for the most responsive parameter will be field	d.
bMEC - Minimum effective concentration [If response is positive].	

⁶See Table 1 for definition of loxicity levels.

ASSAY: _	RAM	SAMPLE: 590 - 5/6	
	600 µ1 or 1000 µg/m1		
RESULTS:			
		10 ⁻³ % (Cell count and protein)	or AMES RESPONSE
			MEC ^b
APPROXI	MATE	0	
		(High)	_
CEVEL O		(nvjn)	_
COMMEN		relative to established MAD.	
*For the	RAM sassy the EC50 for th	e most responsive parameter will be Hs	led.
	Minimum effective concent e 1 for definition of toxicit	ration (if response is positive).	
-500 IBD	e i for delibition of toxicit	y Mileton.	
		PRIMARY DATA TRANSITION FORM	CG
		DATA HARIOTOTA TOTAL	Cb
ASSAY: _	RAM	SAMPLE: Coal dust	
	1000 µg/m]		
RESULTS:		1000 ()	4-4 44-5
LO	SO (ECSO) VALUE>	ן#/pu 000]	[or] AMES RESPONSE MEC ^b
. CBBOY!	WATE		
	ITRATION FACTOR		-
FEAET OF	F TOXICITY ⁶		_
COMMEN	IIS: All parameters r	not detectable toxicity	
⁴ For the	RAM sessy the ECSO for ti	he most responsive parameter will be No	led.
		iration (if response is positive).	

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*See Table 1 for definition of toxicity levels.

HAAP ASH ASSAY: RAM SAMPLE: HB - 014	
MAD: 600 µ1 or 1000 µg/m1	- 1
RESULTS:	
LD50 [EC50] VALUE > 300 µg/ml (all parameters)	in AMES RESDONSE
tene irone autor	MEC ^b
APPROXIMATE CONCENTRATION FACTOR 0	
CONCENTRATION FACTOR 0 LEVEL OF TOXICITY LOW	
LEAST OL LOVICHA	**************************************
COMMENTS:	
No data > $300 \mu g/ml$; thus cannot interpret.	
*For the RAM assay the EC50 for the most responsive parameter will be i	He led.
b _{MEC} Minimum effective concentration (if response is positive).	
⁶ See Table 1 for definition of toxicity levels.	
PAIMARY	
DATA TRANSITION FORM	
	CG
ASSAY: RAM SAMPLE: HB - 016	
MAD: 600 µl or 1000 µg/ml	
RESULTS: LD60 EC60 VALUE > 1000 µg/ml (al!)	4-4 AMER BEARING
FD00 5C00 AVEOF > 1000 101m1 [81:]	MECP MES MESPONSE
APPROXIMATE	mec
CONCENTRATION FACTOR 0	_
LEVEL OF TOXICITY® Nondetectable	_
COMMENTS:	
BEAR the MAM seems the MASS for the most recovering accounts will be the	A-A

bMEC = Minimum effective concentration (If response is positive).

⁴See Table 1 for definition of texticity levels.

CG

ASSAY: RAM	SAMPLE:	HAAP Cyclone Dust HB - 015		
MAD:600 ul or 1000 ug/ml				
RESULTS:				
LD50 (EC50) VALUE > 100	0 μg/ml (all)		(or) AMES RESPONS	Æ
			MEC ^b	
APPROXIMATE CONCENTRATION FACTOR			_	
LEVEL OF TOXICITY	Nondetectab)	е		
COMMENTS:				
For the RAM assay the EC60 for the bMEC - Minimum effective concentral		•	ed.	
See Table 1 for definition of toxicity	•	is positive.		
	PRI	MARY		
		NSITION FORM		CG
		Separater Tar		
ASSAY: RAM	SAMPLE: _	HB - 026		
MAD: 600 µ1/1000 µg/ml				
nesults:				
LD50 (EC50) VALUE	uo/ml/Viah	Index)	fort 20000 Day	
	naturi (1.40.	111467)	, [or] ames respon: Mec ^b	SE
APPROXIMATE			MEC	
CONCENTRATION FACTOR) 		_	
LEVEL OF TOXICITY	.OW		_	
COMMENTS:				
*For the RAM assay the EC50 for the	most responsive	parameter will be Net	ed.	

bMEC = Minimum effective concentration (if response to positive).

See Table 1 for definition of loxicity levels.

Separator Liquor ASSAY: RAM SAMPLE: HB - 013 MAD: 600 µl or 1000 µg/ml RESULTS: LDSO (ECSO) VALUE 12 µ1/m1 (Viability Index) | orl AMES RESPONSE MEC_p APPROXIMATE CONCENTRATION FACTOR 0 LEVEL OF TOXICITY Moderate COMMENTS: *For the RAM assay the ECSO for the most responsive parameter will be fisted. bMEC = Minimum effective concentration (If response is positive). ^CSee Table 1 for definition of texicity levels. PRIMARY DATA TRANSITION FORM CG ASSAY: RAM SAMPLE: Cyclone Dust MAD: ___1000 µg/ml RESULTS: LD60 (EC60) VALUE > 1000 µg/m] [W] AMES RESPONSE MEC APPROXIMATE CONCENTRATION FACTOR 0 LEVEL OF TOXICITY MD

*For the RAM sessy the ECSS for the most responsive parameter will be listed.

COMMENTS: Non detectable toxicity all parameters

bMEC - Minimum effective concentration (it response to positive).

⁶See Table 1 for definition of texicity levels.

CG

ASSAY: Grass shrimp test	BAMPLE: Holston separator	liquor
MAD: 100 mg/liter or 100%	•	
RESULTS: LD50 (EC50) VALUE 0.41% (48	hrs), 0.25% (96 hrs)	for AMES RESPONSE
		MECP
APPROXIMATE CONCENTRATION FACTOR 0	····	<u>-</u>
LEVEL OF TOXICITY	lah	-
COMMENTS:		
*For the RAM assay the EC50 for the m	•	ed.

bMEC - Minimum effective concentration (II response is positive).

Gee Table 1 for definition of toxicity levels.

SAY: _		SAMPLE:R-2-15		
.o:	600 ul or 1000 ug/ml	-		
SULTS:				
	0 IECEDI VALIDE	- 600 m1/m1	fool AMES IN	ESPONSE
LDS	O (ECSO) ANTOE	000 p1/m1		
PROXIM	ATE			
ONCENT	RATION FACTOR	0		
VEL OF	TOXICITY [©]	Nondetectable		
MMENTS	s: All parameters			
or the RA	M assay the EC50 for the	most responsive parameter	will be Hated.	
		ition Il response la positiva		
e Teble	l for definition of loxicity	levels.		
		PRIMAR	Y	
		PRIMARY DATA YRANSITIO		WE
				WE
	. RAM	DATA TRANSITIO	N FORM	WE
ASSAY	: RAM 600 ul or 1000 u	DATA YRANSITIO SAMPLE: M-2	N FORM	WE
ASSAY MAD:	: RAM 600 μ1 or 1000 μ	DATA YRANSITIO SAMPLE: M-2	N FORM	WE
ASSAY MAD: RESUL	600 μ1 or 1000 μ	DATA YRANSITIO SAMPLE: M-2	N FORM	WE
MAD:	600 μ1 or 1000 μ	DATA YRANSITIO SAMPLE: M-2- g/m1	-15	
MAD:	600 μ1 or 1000 μ	DATA YRANSITIO SAMPLE: M-2- g/m1	-15 Index) orl AM	ES RESPONSE
MAD:	600 µ1 or 1000 µ TB: LD60 [EC60] VALUE	DATA YRANSITIO SAMPLE: M-2- g/m1	-15	ES RESPONSE
MAD: RESUL	TB: LDSO JECSO) VALUE	DATA YRANSITIO SAMPLE: M-2- g/m1	Index) jorj AM	ES RESPONSE
MAD: RESUL	T9: LD60 [EC60] VALUE EXIMATE ENTRATION FACTOR	SAMPLE: M-2- g/m1 - 400 µ1/m1 (Ytab.	Index) for AM	ES RESPONSE
MAD: RESUL	T9: LD60 [EC60] VALUE EXIMATE ENTRATION FACTOR	SAMPLE: M-2. g/m1 ~ 400 µ1/m1 (Ytab.	Index) for AM	ES RESPONSE
MAD: RESUL APPROCONC	TB: LD60 EC60 VALUE EXIMATE ENTRATION FACTOR OF TOXICITY	SAMPLE: M-2- g/m1 - 400 µ1/m1 (Ytab.	Index) for AM	ES RESPONSE
MAD: RESUL	TB: LD60 EC60 VALUE EXIMATE ENTRATION FACTOR OF TOXICITY	SAMPLE: M-2. g/ml ~ 400 µl/ml (Ytab.	Index) for AM	ES RESPONSE
MAD: RESUL APPROCONC	TB: LD60 JECSON VALUE EXIMATE CENTRATION FACTOR OF TOXICITY ENTS:	SAMPLE: M-2. g/ml ~ 400 µl/ml (Ytab.	Index) for AM	ES RESPONSE

⁶See Table 1 for definition of texicity levels.

ASSAY: RA	iM	SAMPLE: _	N-2-15		
	00 µ1 or 1000 µg/п	_			•
MAU:	, o p . o o . p 3/	<u></u>			
RESULTS:					
LD50 [EC60) VALUE	175 µ1/m1 (AT	P)	(or) #	MES RESPONSE
					4EC ^b
APPROXIMATI	E				
				-	
LEVEL OF TO	XICITY	_Low		•	
COMMENTS:					
EC50	estimated from ra	aw data showing	EC50 >60 and <200.		
Sear the DAM	assay the ECSA for t	he mad terment	e parameter will be liste		
	mum elfective concer			rJ.	
	for definition of toxici	•	•		
					·
		PR	HMARY		
		DATA TRA	INSITION FORM		WE
R/	AM	SAMPLE: .	L-2-15		
ASSAT:	00 ular 1000 ug/n				-
MAD:	30 p 1 0r 1000 pg/s	n i			
RESULTS:					
1 050 1	EC50I VALUE	300 µl/ml (ATP)	lari	AMEC BERRANGE
1500			<u> </u>		MEC ^b
APPROXIMAT	=				MEC
CONCENTRA	TION FACTOR			_	
LEVEL OF TO					
				-	
COMMENTS:					
	50 Estimated from	raw data.			
⁸ For the RAN	assay the EC60 for	the most responsi	ve parameter will be Hal	ed.	
bMEC - Min	imum effective conce	ntration (II respons	se is positive).		
⁰ See Table 1	for definition of toxic	ity levels.			

ASSAY:CHO	SAMPLE:R-2-15	
MAD: 600 ul/ml		
RESULTS:		
LD60 (EC60) VALUE	37_u1/m1	OF AMES RESPONSE
		MEC ^b
APPROXIMATE CONCENTRATION FACTOR	0	
LEVEL OF TOXICITY	Moderate	
COMMENTS:		
EC50 estimated from	raw data.	
Oras the MAN acces the ECER for	r the most responsive parameter will be	Market
bMEC = Minimum elective conc	• •	- WS-15-U.
Cae Table 1 for definition of tos	. , , , , , , , , , , , , , , , , , , ,	
	/ .PRIMARY	
	DATA TRANSITION FORM	WE
CHO	M_2_15	
	SAMPLE: N-2-15	
MAD: 600 µ1/m1		
Draw Ta		
RESULTS:		
TDPO (ECPO) ANTRE	- 75 µ1/m1	jer) AMES RESPONSE
		MEC ^b
APPROXIMATE		
_	0	
LEVEL OF TOXICITY	Low	
COMMENTS:		
EC50 estimated from	raw data.	
*For the RAM assay the EC56 for	the most responsive parameter will be	tisted.
bMEC - Minimum effective conc	-	
See Table 1 for definition of loss		

ABBAY: CHO		
MAD: 600 µ1/m1		
	_	
RESULTS:		
LDSO [EC60] VALUE	200 µ1/m1	(or) AMES RESPONSE
		MEC ^b
APPROXIMATE CONCENTRATION FACTOR	0	
	LOW	_
LEVEL OF TOXICITY		
COMMENTS: 200 µl/ml was highest ED50 in context of MA	concentration used. Thus could D.	not determine
Bear the DAM seems the ECSO Inc.	the most responsive parameter will be th	alad
MEC = Minimum effective concer	· · · · · · · · · · · · · · · · · · ·	
See Table 1 for definition of toxic		
	PRIMARY	
	DATA TRANSITION FORM	WE
СНО	L-2-15	
ASSAY:	OAMPLE:	
MAD: GOO #17##		
RESULTS:		
LDSO [ECSO] VALUE	- 60 µl/ml	[or] AMES RESPONSE
		MEC
APPROXIMATE CONCENTRATION FACTOR	0	
	Low	
<u></u>		
COMMENTE		
COMMENTS: EC50 estimated from	raw data. Value slightly > 60 μ	n]/m].
Sem the NAM sees the SPEA for	the most responsive parameter will be	Matad
PMEC - Minimum elective conc		R310G.
CSee Table 1 for definition of lox	• • •	

ASSAY:	Marine Algae	SAMPLE:F-2		
MAD: _	100%			
RESULTS:				
LD	60 [EC60] VALUE	56 - 75%	_ ar AMES RESPONSE	
			MEC ^b	
APPROXING CONCEN	IATE TRATION FACTOR	0	_	
LEVEL OF	TOXICITY	Moderate		
COMMENT	'S:			
LC	50 - 70%	90% mortality with 100% effluent.		
⁸ For the R	AM assay the EC60	for the most responsive parameter will be its	led.	

bMEC - Minimum effective concentration (N response is positive).

⁰See Table 1 for definition of texicity levels.

BSAY:WI-38	SAMPLE: R-2-15		
D: 600 µl/ml	_		
SULTS:			
LD50 JEC60) VALUE	> 600 µl/ml	[or] AMES RESPONSE	
		WEC _p	
PROXIMATE ONCENTRATION FACTOR	_0		
VEL OF TOXICITY	Nondetectable.		
DMMENTS: All parameters			
or the RAM assay the EC50 for it	he most responsive perameter will b	e Naled.	
ee Table 1 for definition of toxici	• • • •		
	BDISSADV		
	PRIMARY DATA TRANSITION FORM		WE
	• • • • • • • • • • • • • • • • • • • •		WE
SSAY: WI-38	DATA TRANSITION FORM		WE
ISSAT:	• • • • • • • • • • • • • • • • • • • •		WE
MAD: 600 u 1/ml	DATA TRANSITION FORM		WE
MAD: 600 µ1/ml	DATA TRANSITION FORM SAMPLE: M-2-15	leri AMES SESSONES	
MAD: 600 u 1/ml	DATA TRANSITION FORM SAMPLE: M-2-15	[or] AMES RESPONSE	
MAD: 600 µ 1/m1 RESULTS: LD50 [EC50] VALUE >	DATA TRANSITION FORM SAMPLE: M-2-15	[or] AMES RESPONSE	
MAD: 600 µ 1/m1 RESULTS: LD50 [EC50] VALUE > 6 APPROXIMATE CONCENTRATION FACTOR	DATA TRANSITION FORM SAMPLE: M-2-15 600 μ1/m1	MEC _p	
MAD: 600 + 1/m1 RESULTS: LD50 [ECS0] VALUE > 6 APPROXIMATE CONCENTRATION FACTOR	DATA TRANSITION FORM SAMPLE: M-2-15 M-2-15	MEC _p	
MAD: 600 u 1/m1 RESULTS: LD50 [EC50] VALUE > 6 APPROXIMATE CONCENTRATION FACTOR	DATA TRANSITION FORM SAMPLE: M-2-15 600 μ1/m1	MEC _p	
MAD: 600 u 1/m1 RESULTS: LD50 [EC50] VALUE > 6 APPROXIMATE CONCENTRATION FACTOR	DATA TRANSITION FORM SAMPLE: M-2-15 600 μ1/m1	MEC _p	

See Table 1 for definition of toxicity levels.

WE

ASSAY: _		N-2-15		
MAD: _	600 µl/ml			
RESULT8				
		• - 200 µl/ml (ATP)	loci AM	EE BEEDANCE
	DOD IECON ANTOE		(W) AM	
APPROXI				
		PR 0 Low		
FEAEF OF	T TOXICITY	LOW	_	
COMMEN	Te.			
COMMEN		from raw data.		
	·	C60 for the most responsive parameter will be He	ited.	
		concentration (if response is positive).		
^C See Table	e 1 for definition	of toxicity levels.		
		PRIMARY		
		PRIMARY DATA TRANSITION FORM		WE
	20	DATA TRANSITION FORM		WE
ıy: <u>WI−</u> :	38	DATA TRANSITION FORM	_	WE
500	38 ν1/m1			WE
500		DATA TRANSITION FORM	_	WE
:600		DATA TRANSITION FORM	-	WE
: 600 JLTS:	ν l/ml	DATA TRANSITION FORM L-2-15		
: 600 JLTS:	ν l/ml	DATA TRANSITION FORM		
: 600 JLTS:	ν l/ml	DATA TRANSITION FORM L-2-15	AMES RES	
: 600 ULTS: LDS0 EC	u 1/m1	SAMPLE: L-2-15		
E 600 LD50 (EC ROXIMATE ICENTRATE	u 1/m1	DATA TRANSITION FORM L-2-15		
E 600 LD50 (EC ROXIMATE ICENTRATE	u 1/m1	DATA TRANSITION FORM SAMPLE:		
E 600 JLTS: LD50 [EC	u 1/m1	SAMPLE: L-2-15		
LDSO (EC ROXIMATE NCENTRATIK	u 1/m1	DATA TRANSITION FORM SAMPLE:		
E 600 JUTS: LD50 [EC ROXIMATE NCENTRATIO LL OF TOXIC MENTS:	u 1/m1 Sooj VALUE [®] ON FACTOR CITY [©]	DATA TRANSITION FORM L-2-15 SAMPLE: L-2-15 - 300 µ1/m1 (ATP) for!	MEC ^b	
E 600 LDS0 [EC ROXIMATE ICENTRATIO LD TOXIC	u 1/m1 Sooj VALUE [®] ON FACTOR CITY [©]	DATA TRANSITION FORM SAMPLE:	MEC ^b	

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⁰See Table 1 for definition of toxicity levels.

WE

Grass shrimp	BAMPLE: L-2	
D: 100%		
SULTS:		
LDS0 JECSOJ VALUE	_ >100%	[or] AMES RESPONSE
		MEC b
PROXIMATE ONCENTRATION FACTOR	0	
	ND	
MMEN18:		
Nontoxic at 100%.		
r the RAM assay the EC50 fo	r the most responsive parameter wil	N be Naled.
	contration (II response is positive).	
e Table 1 for definition of to:	delty levels.	
	BRILLIA	
	PRIMARY DATA TRANSITION FORM	WE
	DATA TIMITOTI TOTAL	
	SAMPLE: N-2	
:		
ULTS:		
LDSO JECSOJ VALUE	10 - 32%	or AMES RESPONSE
		WECp
ROXIMATE		
NCENTRATION FACTOR		
EL OF TOXICITY MO	derate	
AMENTS:		
LC50 about 25%		
r the RAM messy the EC50 for	the most responsive parameter will	l be Nated.

*See Table 1 for definition of texicity levels.

WE

	SAMPLE: S-2	
MAD: 100%		
RESULTS:		
FDP0 (ECRO) AVENE	_ >100%	[or] AMES RESPONSE
		wec ^b
APPROXIMATE		
LEVEL OF TOXICITY	MO	
COMMENTS:		
20% toxicity at 10	0% effluent	
	or the mact responsive parameter will (controllen (il response la positive).	be Noted.
_		
See Table 1 for definition of to	stary totals.	
·	PRIMARY	
·	PRIMARY BATA TRANSITION FORM	WE
·	*	WE
w: Grass shrimp	*	
	BATA TRANSITION FORM	
	BATA TRANSITION FORM	
. 100% N.TS:	BATA TRANSITION FORM SAMPLE: U - 2	
. 100% N.TS:	BATA TRANSITION FORM SAMPLE: U - 2	
. 100% N.TS:	BATA TRANSITION FORM SAMPLE: U - 2	ini Ames response
LDSO (ECSO) VALUE	BATA TRANSITION FORM SAMPLE: U - 2	
LDSO JECSOS VALUE	BATA TRANSITION FORM SAMPLE: U - 2	ini Ames response
. 100% PLTS: LDSO [ECIO] VALUE IOXIMATE ICENTRATION FACTOR	BATA TRANSITION FORM BAMPLE: U - 2 - >100%	ini Ames response
LDSO (ECIO) VALUE	BATA TRANSITION FORM SAMPLE: U - 2 - >100%	ini Ames response
I DOX LDSO [ECSO] VALUE LDSO [ECSO] VALUE LOXIMATE ICENTRATION FACTOR L OF TOXICITY	BATA TRANSITION FORM BAMPLE: U - 2 - >100%	ini Ames response
I 100% PLTS: LDSO [ECSO] VALUE MOXIMATE ICENTRATION FACTOR L OF TOXICITY MENTS:	BATA TRANSITION FORM BAMPLE: U - 2 - >100%	ini Ames response
100% PLTS: LDS0 [ECS0] VALUE COXIMATE CENTRATION FACTOR L OF TOXICITY	BATA TRANSITION FORM BAMPLE: U - 2 - >100%	ini Ames response

*See Table 1 for definition of texicity levels.

W22W1:	SAMPLE: W-2	
MAD: 100%		
nesults:		
LD60 (EC60) VALUE	18 - 32%	w AMES RESPONSE
		MEC ^b
APPROXIMATE CONCENTRATION FACTOR	0	
LEVEL OF TOXICITY	erate	
COMMENTS: LC50 ~ 25% effluent.		
*For the RAM sessy the ECSO for the	•	n Meted.
See Table 1 for definition of toxicity		
	·.PRIMARY	
	· PRIMARY DATA TRANSITION FORM	WE
	DATA TRANSITION FORM	
ssay: <u>Grass shrimo</u>	DATA TRANSITION FORM	
	DATA TRANSITION FORM	
AD:	DATA TRANSITION FORM	
AD:	DATA TRANSITION FORM SAMPLE: X-2	
AD: <u>100x</u>	DATA TRANSITION FORM SAMPLE: X-2	
AD:	DATA TRANSITION FORM SAMPLE: X-2	
AD: 100% EQULTS: LD50 [EC50] VALUE	DATA TRANSITION FORM SAMPLE: X-2.	iori AMES RESPONSE
AD: 100X ESULTS: LD50 [EC50] VALUE PPROXIMATE CONCENTRATION FACTOR 0	DATA TRANSITION FORM SAMPLE: X-2. ≥100%	iori AMES RESPONSE MEC ^b
BSAY: Grass shrimp AD: 100X ESULTS: LD60 [ECS0] VALUE PPROXIMATE CONCENTRATION FACTOR 0 EVEL OF TOXICITY NO	DATA TRANSITION FORM SAMPLE: X-2. ≥100%	iori AMES RESPONSE MEC ^b
AD: 100X ESULTS: LD50 [EC50] VALUE PPROXIMATE CONCENTRATION FACTOR 0	DATA TRANSITION FORM SAMPLE: X-2. ≥100%	iori AMES RESPONSE MEC ^b
AD: 100X EQULTB: LD60 [ECIO] VALUE PPROXIMATE CONCENTRATION FACTOR O NO	DATA TRANSITION FORM SAMPLE: X-2. ≥100%	iori AMES RESPONSE MEC ^b

⁶See Table 1 for definition of toxicity levels.

MAD: 100% RESULTS: LDB0 [ECB0] VALUE 32 - 18% [6 APPROXIMATE CONCENTRATION FACTOR	/ AMES RESPONSE
LD60 (EC60) VALUE	
APPROXIMATE CONCENTRATION FACTOR LEVEL OF TOXICITY Moderate COMMENTS: LC50 at about 25% effuent conc. For the RAM assay the ECSO for the most responsive parameter will be fisted. MEC — Minimum effective concentration (M response is positive). PRIMARY DATA TRANSITION FORM AY: Grass shrimp — SAMPLE: B-2 D: 100% — SAMPLE: B-2 WUTS: LD50 (EC50) VALUE — >100% — MD ROXIMATE NCENTRATION FACTOR — 0 EL OF TOXICITY — MD	
CONCENTRATION FACTOR LEVEL OF TOXICITY Moderate COMMENTS: LC50 at about 25% effluent conc. Per the RAM assay the ECSe for the most responsive parameter will be listed. MEC = Minimum effective concentration [H response to positive]. Page Table 1 for definition of texticity levels. PRIMARY DATA TRANSITION FORM AY: Grass shrimp	wec _p
CONCENTRATION FACTOR LEVEL OF TOXICITY Moderate COMMENTS: LC50 at about 25% effluent conc. Per the RAM assay the ECSe for the most responsive parameter will be listed. MEC = Minimum effective concentration [H response to positive]. Page Table 1 for definition of texticity levels. PRIMARY DATA TRANSITION FORM AY: Grass shrimp	
COMMENTS: LC50 at about 25% effluent conc. For the RAM assay the ECS0 for the most responsive parameter will be listed. MEC = Minimum effective concentration [18 response is positive]. See Table 1 for definition of testicity levels. PRIMARY DATA TRANSITION FORM AY: Grass shrimp	
LC50 at about 25% effuent conc. For the RAM essay the EC60 for the most responsive parameter will be Noted. MEC = Minimum effective concentration (H response to positive). See Table 1 for delimition of texticity levels. PRIMARY DATA TRANSITION FORM Ay: Grass shrimp	
LC50 at about 25% effuent conc. For the RAM essay the EC60 for the most responsive parameter will be Noted. MEC = Minimum effective concentration (H response to positive). See Table 1 for delimition of texticity levels. PRIMARY DATA TRANSITION FORM Ay: Grass shrimp	
Pri No RAM assay the ECSE for the most responsive parameter will be Nated. MEC = Minimum effective concentration (N response is positive). Primary DATA TRANSITION FORM Ay: Grass shrimp	
PRIMARY DATA TRANSITION FORM AY: Grass shrimp SAMPLE: B-2 ULTS: LD50 (EC50) VALUE SAMPLE: >100% (ecf.) ROXIMATE NCENTRATION FACTOR BL OF YOXICITY MD	
PRIMARY DATA TRANSITION FORM AY: Grass shrimp SAMPLE: B-2 ULTS: LD50 (EC50) VALUE SAMPLE: >100% (ecf.) ROXIMATE NCENTRATION FACTOR BL OF YOXICITY MD	
PRIMARY DATA TRANSITION FORM AY: Grass shrimp SAMPLE: B-2 D: 100% ULTS: LDS0 (ECS0) VALUE >100% ROXIMATE NCENTRATION FACTOR BL OF YOXICITY MO	
PRIMARY DATA TRANSITION FORM AY: Grass shrimp SAMPLE: B-2 D: 100% ULTB: LD60 (EC60) VALUE >100% MO ROXIMATE NCENTRATION FACTOR	
DATA TRANSITION FORM AY: Grass shrimp	
DATA TRANSITION FORM AY: Grass shrimp	
DATA TRANSITION FORM AY: Grass shrimp	
DATA TRANSITION FORM AY: Grass shrimp	
DATA TRANSITION FORM AY: Grass shrimp	
DATA TRANSITION FORM AY: Grass shrimp	
DATA TRANSITION FORM AY: Grass shrimp	
DATA TRANSITION FORM AY: Grass shrimp	
DATA TRANSITION FORM AY: Grass shrimp	
AY: Grass shrimp BAMPLE: B-2 D:100% ULTB: LD60 (EC60) VALUE	
D:	WE
D:	
ULTS: LDS0 (ECS0) VALUE	
LDS0 (ECS0) VALUE >100% [or] A MOXIMATE NCENTRATION FACTOR EL OF TOXICITY	
ROXIMATE NCENTRATION FACTOR O EL OF TOXICITY [®] MD	
NOXIMATE NCENTRATION FACTORO EL OF TOXICITY [©]	
ROXIMATE NCENTRATION FACTOR	NES RESPONSE
NCENTRATION FACTOR 0	
	MES RESPONSE
IMENTS:	
No toxicity at 100%.	
•	
the RAM assay the EC54 for the most responsive parameter will be lieted.	
C = Minimum effective concentration (II response le positive). Table 1 for definition et texicity levels.	

WE

ssay: Grass shrimp	SAMPLE: C-2	
IAD: 100%		
ESULTS:	f00x	4- 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4
FD90 (EC90) AVEGE		•
	0	
VEL OF TOXICITY	TOM	
DMMENTS: 100% = only 56% mort	ality.	
· ·	r the most responsive perameter will entration (it response la poetityo). Icity tevels.	be Noted.
	PRIMARY	
	DATA TRANSITION FORM	WE
	SAMPLE: F-2	
D: 100%		
SULTS:		
LD50 [EC50] VALUE	>100%	Jul AMES RESPONSE
		MEC ^b
PROXIMATE ONCENTRATION FACTOR	0	
VEL OF TOXICITY	ND	
DMMENTS: No toxicity at 100%,		
for the RAM seesy the ECSA fo	r the most responsive parameter will	be Noted.

*See Table 1 for definition of texicity tevels.

ASSAY: Grass shrimp	SAMPLE;	
MAD: 100%		
RESULTS:		
LD50 [EC50] VALUE	- >100%	or AMES RESPONSE
		MEC ^b
APPROXIMATE CONCENTRATION FACTOR	0	
	NO.	
COMMENTS:		
Only 20% mortality	at look efficient.	
⁰ For the RAM exces the SCEA I	for the most responsive parameter will	l he Maled
	ncentration (II response is positive).	, we maded.
⁰ See Table 1 for definition of to	• • •	
	PRMARY	
	PRIMARY DATA YRANGIJOM SORM	WE
	PRIMARY DATA TRANSITION FORM	WE
		WE
nay: Grass shrimp		
	DATA TRANSITION FORM BAMPLE: K-2	
SAY: Grass shrimp D: 100%	DATA TRANSITION FORM BAMPLE: K-2	
	DATA TRANSITION FORM BAMPLE: K-2	
D:	DATA TRANSITION FORM SAMPLE: K-2	
D:	DATA TRANSITION FORM SAMPLE: K-2	or AMES RESPONSE
D:	DATA TRANSITION FORM SAMPLE: K-2	
D:BULTS: LD60 EC60 VALUE	DATA TRANSITION FORM SAMPLE: K-2 - >1003	or AMES RESPONSE
D: 1002 BULTS: LD60 EC60 VALUE PROXIMATE INCENTRATION FACTOR	DATA TRANSITION FORM SAMPLE:K-2 >1003	or AMES RESPONSE
D:BULTS: LD60 EC60 VALUE	DATA TRANSITION FORM SAMPLE:K-2 >1003	or AMES RESPONSE
D: 1002 BULTS: LD60 EC60 VALUE PROXIMATE INCENTRATION FACTOR	DATA TRANSITION FORM SAMPLE:K-2 >1003	or AMES RESPONSE
D: 1002 BULTS: LD60 EC60 VALUE PROXIMATE INCENTRATION FACTOR	DATA TRANSITION FORM SAMPLE:K-2 >1003	or AMES RESPONSE
D:	DATA TRANSITION FORM SAMPLE:K-2 >1003	or AMES RESPONSE

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bMEC = Minimum effective concentration (II response to positive).

⁶See Table 1 for definition of texicity levels.

ASSAV: _Marine Fish	SAMPLE: <u>X-2</u>	
MAD:		
RESULTS:		
LDSO JECSOJ VALUE	- >100% /	jerj AMES RESPONSE
APPROXIMATE		MEC [®]
CONCENTRATION FACTOR	0	
LEVEL OF TOXICITY	ND	
COMMENTS: Not detectabl	e 1 t.	
Nontoxic at 100%.		
MONEOXIC EL 100A.		
⁸ For the RAM nessy the EC60 fo	r the most responsive parameter will	be Noted.
PMEC - Minimum effective conc	• • • • • • • • • • • • • • • • • • • •	
See Table 1 for definition of to:	icity levels.	
	:PRIMARY	
	DATA TRANSITION FORM	WE
sav:Harine Fish	BANNE. W-2	
	ONMYLE:	
AD:100%		
esults:		
LD40 (EC50) VALUE	32 - 561	leri AMES RESPONSE
FD86 (SC20) AVERS	<u> </u>	
		wec,
PPROXIMATE	0	
EVEL OF TOXICITY		
EAET OL LOWICH	nderate :	
DESMENTS:		
56% effluent produced	00% lethality.	
		m.a. a
i _{ef} the RAM secay the ECSS for th NEC = Minimum effective concentr	o most responsive parameter will be (Roled.
NGC - SHIPPING SHOPPING SHIPPING		

	SAMPLE: U-2	
MAD: 100%		
RESULTS:		
LD60 (EC50) VALUE	- >100%	(or) AMES RESPONSE
		MEC
APPROXIMATE CONCENTRATION FACTOR	0	
LEVEL OF TOXICITY		,
Nontoxic at 100%		
COMMENTS: Not detectable	• · · · ·	
_		
· · · · · · · · · · · · · · · · · · ·	r the most responsive parameter will	l be lieted.
'MEC = Minimum effective cond Bee Table 1 for definition of to:	entretion (if response le positive).	
see imple 1 lot delayillou of for	icity levels.	
	DD144A DV	
	PRIMARY DATA TRANSITION FORM	WE
	PRIMARY DATA TRANSITION FORM	WE
Martina Etch	DATA TRANSITION FORM	
	* *************************************	
	DATA TRANSITION FORM	
: 100%	DATA TRANSITION FORM	
: 100%	DATA TRANSITION FORM SAMPLE: C-2	
: 100%	DATA TRANSITION FORM SAMPLE: C-2	or AMES RESPONSE
: 100%	DATA TRANSITION FORM SAMPLE: C-2	or} AMES RESPONSE
: 100% ULTS: LD60 [EC50] VALUE ROXIMATE NCENTRATION FACTOR	DATA TRANSITION FORM SAMPLE: C-2 56 - 75%	w AMES RESPONSE MEC ^b
: 100% ULTS: LD60 [EC50] VALUE ROXIMATE NCENTRATION FACTOR	DATA TRANSITION FORM SAMPLE: C-2 56 - 75%	w AMES RESPONSE MEC ^b
: 100% ULTS: LD60 [EC50] VALUE ROXIMATE NCENTRATION FACTOR	DATA TRANSITION FORM SAMPLE: C-2 56 - 75%	w AMES RESPONSE MEC ^b
: 100% ULTS: LD60 [EC50] VALUE ROXIMATE NCENTRATION FACTOR	DATA TRANSITION FORM SAMPLE: C-2 56 - 75%	w AMES RESPONSE MEC ^b
I 100% LD60 (EC50) VALUE ROXIMATE NCENTRATION FACTOR LDF TOXICITY	SAMPLE: C-2 SAMPLE: 0 Oderate	wr} AMES RESPONSE MEC ^b
ILDSO (ECSO) VALUE CONTRATION FACTOR LOF TOXICITY CONTRATION MENTS:	SAMPLE: C-2 SAMPLE: 0 Oderate	wr} AMES RESPONSE MEC ^b

⁶Bee Table 1 for delimition of lexicity levels.

MAD: 100%	SAMPLE: F-2	
MAD: 100%		
RESULTS:		
LD50 [EC50] VALUE	- >100%	(or) AMES RESPONSE
		MEC ^b
APPROXIMATE CONCENTRATION FACTOR	0	
LEVEL OF TOXICITY	ND	
COMMENTS:		
Nontoxic at 100%		
*For the RAM sersy the EC50	for the most responsive parameter will b	pe Hated.
• • • • • • •	ncentration H response is positive).	
⁰ See Table 1 for definition of to	oxicity levels.	
	.	
	/:PRIMARY	UF.
	/:PRIMARY DATA TRANSITION FORM	WE
	DATA TRANSITION FORM	
	DATA TRANSITION FORM SAMPLE: <u>G-2</u>	
SAY: <u>Marine Fish</u> D: <u>100%</u>	DATA TRANSITION FORM SAMPLE: <u>G-2</u>	
	DATA TRANSITION FORM SAMPLE: <u>G-2</u>	
D: <u>100%</u>	DATA TRANSITION FORM SAMPLE: <u>G-2</u>	
D: <u>100%</u>	DATA TRANSITION FORM SAMPLE: <u>G-2</u>	
D: <u>100%</u> Bult8:	DATA TRANSITION FORM SAMPLE: <u>G-2</u>	
D: 100% BULTS: LD60 (EC50) VALUE	DATA TRANSITION FORM SAMPLE: <u>G-2</u>	
D: <u>100%</u> Bult8:	DATA TRANSITION FORM SAMPLE: G-2 >100%	
D: 100% BULTB: LD60 (ECS0) VALUE PROXIMATE DISCENTISATION FACTOR	DATA TRANSITION FORM SAMPLE: G-2 >100%	
D: 100% BULTB: LD60 (ECS0) VALUE PROXIMATE DICENTRATION FACTOR	DATA TRANSITION FORM SAMPLE: G-2 >100%	
D: 100% BULTS: LD60 (EC50) VALUE PROXIMATE DICENTRATION FACTOR	DATA TRANSITION FORM SAMPLE: G-2 >100%	
D:BULTS: LD60 [ECS0] VALUE PROXIMATE DISCENTRATION FACTOR	DATA TRANSITION FORM SAMPLE: G-2 >100%	

*See Table 1 for definition of toxicity levels.

IAD: 100%		
EBULTS:	,	
LD60 [EC50] VALUE	- >100%	
		MEC.
PPROXIMATE	0	
_	NO	
EVEL OF TOXICITY		
OMMENIS:		
Nontoxic		
for the RAM grant the ECSO	for the most responsive parameter will be	Heted.
	ncontration (H response is positive).	
ice Table 1 for delinition of te		
	•	
	· PRIMARY	
	· PRIMARY DATA TRANSITION FORM	WE
	***************************************	WE
BAY:Marine Fish	DATA TRANSITION FORM	
BAY: Marine Fish D: 100%	***************************************	
BAY: <u>Marine Fish</u> D: 100%	DATA TRANSITION FORM	
D:	DATA TRANSITION FORM	
D:	BAMPLE: L-2	
D: 100%	BAMPLE: L-2	(or) AMES RESPONSE
D: 100% ULTS: LDS0 [ECS0] VALUE	BAMPLE: L-2	
D: 100X LDS0 (ECSO) VALUE*	SAMPLE: L-2	(or) AMES RESPONSE
D: 100% BULTS: LD60 (ECS0) VALUE PROXIMATE NCENTRATION FACTOR	SAMPLE: L-2	(or) AMES RESPONSE
D: 1003 BULTS: LD60 [EC60] VALUE* POXIMATE NCENTRATION FACTOR	SAMPLE: L-2 100%	(or) AMES RESPONSE
D: 100% BULTS: LD50 (ECS0) VALUE ROXIMATE NCENTRATION FACTOR	SAMPLE: L-2 100%	(or) AMES RESPONSE
D: 100% BULTS: LD60 (ECGO VALUE POXIMATE NCENTRATION FACTOR EL OF TOXICITY	SAMPLE: L-2 100%	(or) AMES RESPONSE
BULTS: LD60 (ECS0) VALUE PROXIMATE NICENTRATION FACTOR	SAMPLE: L-2 100%	(or) AMES RESPONSE

		•
	SAMPLE: N-2	
MAD: 100%		,
RESULTS:		
LDS0 IEC501 VALUE	32 - 56%	fort AMES RESPONSE
		MEC
APPROXIMATE		_
LEVEL OF TOXICITY	Moderate	
COMMENTS:		
_	Complete lethality at 100% effluen	•
	the state of the s	. .
• • • • • • • • • • • • • • • • • • • •	for the most responsive parameter will be it	eted.
	oncentration (If response is positive).	
See Table 1 for definition of	texicity levels.	
	/:PRIMARY	
	DATA TRANSITION FORM	WE
aaw. Marina Fich	SAMPLE: S-2	
		
1002		
SULTS:		
LD60 JECSOJ VALUE	>100%	ori AMES RESPONSE
		MEC
PROXIMATE ONCENTRATION FACTOR	0	
VEL OF TOXICITY	ND	
		•
MAMENTS: Not detectable	11.	
20% mortality at 1009	· · ·	
or the RAM assay the ECSO los	the most responsive parameter will be liste	d.
Attalum alleatin asses	entration I M recognes to modifical	

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⁶See Table 1 for definition of toxicity levels.

MAD:			MSE
APPROXIMATE CONCENTRATION FACTOR LEVEL OF TOXICITY NO			
APPROXIMATE CONCENTRATION FACTOR LEVEL OF TOXICITY NO			
CONCENTRATION FACTOR 0 LEVEL OF TOXICITY® NO		MEC ^b	
CONCENTRATION FACTOR 0			
COMMENTAL			
COMMENTS: Nontoxic at 100%,			
^B For the RAM assay the ECSS for the most responsive parameter will be ^B MEC = Minimum effective concentration (If response is positive).	oe Halad.		
*See Table 1 for definition of texicity levels.			
			-
, PRIMARY			
DATA TRANSITION FORM			WE
BSAY: Marine Fish BAMPLE: A-2			
AD: 100%			
ESULTS:			
LDS0 (ECS0) VALUE® 56 - 75%	teri At	IES RESPONSE	
PPROXIMATE			
ONCENTRATION FACTOR 0			
EVEL OF TOXICITY [©] Moderate	_		
DMMENTS:			
LC50 ~ 60% effluent			

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⁶See Table 1 for definition of texisity levels.

	Salmonella	GAMDIE.	L-2-5	R-2-5	U-2-!	5 X-2-5	
A35A1: _	Salmonella 5 mg/plate	34#FLE	M-2-5 N-2-5	5-2-5 T-2-5			
MAD: _	J mg/proce		M-2-3	1-2-5	W 2-!	5 Z-2-5	
RESULTS	:						
	50 [EC50] VALUE				inel (MEG BEGGNOP	Nogativo
	TOO TOO TAKE						
					•	MEC _p	····
APPROXII CONCEN	MATE ITRATION FACTOR	0					
LEVEL OF	TOXICITY ^C	Nondetectable			,		
COMMEN A	75: 11 samples were test	ed at a maximum v	value of	1.0 ml/s	pl a te.		
	RAM assay the EC50 for t	-	•		ited.		
	• 1 for definition of toxic	•	is positiv	- j.			
		•					
			MARY				
		DATA TRAN	ISITION F	ORM			WE
ASSAY: _	Salmonella	SAMPLE:	P-2-5				
MAD:	5 mg/plate					-	

RESULTS	:						
	50 (EC50) VALUE				lari	AMES RESPONSE	Negative
	on least these		*******				
						MECp	
APPROXII CONCEN	MATE ITRATION FACTOR						
LEVEL OF	F TOXICITY ^C	Nondetectable_					
		THE PLANTE			_		
	TS: ample was tested at : er plate of 500 µl.	a maximum concen	tration	(volume)			
^a For the l	RAM sessy the EC50 for	the most responsive	paramete	r will be B	sted.		
	Minimum effective conce	·	-		***		
****	e 1 for definition of toxic	•					

ASSAY: Salmonella MAD: 5 mg/plate		C-2-5 D-2-5 E-2-5 F-2-5	J-2-5	
RESULTS:				
LDSO [ECSO] VALUE				[or] AMES RESPONSE Negative Megative
APPROXIMATE CONCENTRATION FACTOR	0			_
LEVEL OF TOXICITY	Mondetectable	<u>!</u>		_
COMMENTS: All samples employed	1.0 ml as the m	aximum co	oncentrati	ion/plate.
For the RAM nessy the EC50 for	the most responsive	s parameter	will be its	led.

bMEC = Minimum effective concentration (H response to positive).

GSes Table 1 for definition of toxicity levels.

ASSAY: Salmonella	SAMPLE:B2	
MAD: 5 mg/plate		
DESULTS:		
LDSO (ECSO) VALUE		or AMES RESPONSE Negative
		MEC
PPROXIMATE CONCENTRATION FACTOR	0	
EVEL OF TOXICITY	Nondetectable	
DMMENTS: Maximum amount applie	ed per plate was 1.0 ml.	
EC - Minimum effective concer	•	isted.
se Table 1 for definition of loxic	ily terels.	
	•	
	PRIMARY DATA TRANSITION FORM	WE
		WL.
BSAY: Salmonella	SAMPLE: A-2-	
AD: 5 mg/kg		
ESULTS:		
LDSO JECSOJ VALUE		[or] AMES RESPONSE Negative
		MEC
PPROXIMATE CONCENTRATION FACTOR	0	
EVEL OF TOXICITY		
:DammENTS: Maximum amount added	per plate was 1.0 ml.	
For the NAM sessy the EC60 for	the most responsive parameter will be	Moled.

*See Table 1 for definition of toxicity levels.

TECHNICAL REPORT DATA (Please read Instructions on the reverse before completing)				
1. REPORT NO. E PA-600/7-80-079	2.	3. RECIPIENT'S ACCESSION NO.		
4. TITLE AND SUBTITLE Level 1 Biological Testing Assessment and Data Formatting		5. REPORT DATE April 1980		
		6. PERFORMING ORGANIZATION CODE		
7. AUTHOR(S)		8. PERFORMING ORGANIZATION REPORT NO.		
David J. Brusick				
9. PERFORMING ORGANIZATION NAME AND ADDRESS		10. PROGRAM ELEMENT NO.		
Litton Bionetics, Inc.	INE623			
5516 Nicholson Lane	11. CONTRACT/GRANT NO.			
Kensington, Maryland 20795		68-02-2681, Task 401		
12. SPONSORING AGENCY NAME AND ADDRESS EPA, Office of Research and Development Industrial Environmental Research Laboratory Research Triangle Park, NC 27711		Task Final; 5/78-1/80		
		14. SPONSORING AGENCY CODE		
		EPA/600/13		

15. SUPPLEMENTARY NOTES IERL-RTP project officer is Raymond G. Merrill, Mail Drop 62, 919/541-2557.

16. ABSTRACT The report gives results of an examination of data from three pilot studies including water effluent, fluidized-bed combustion, and coal gasification samples, using a scheme to compare health effects and ecological bioassay assessment data. The scheme is based on the assumption that each test method has a maximum dose (concentration) which can be reliably applied and that effects based on fractions of the maximum applicable dose (MAD) can be designated as degrees of toxicity. The levels of toxicity based on fractions of the MAD are given as high, moderate, low, and nondetectable (i.e., no effect detected at the MAD).

17. KEY WORDS AND DOCUMENT ANALYSIS						
a .	DESCRIPTORS	b.IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group			
Pollution	Coal Gasification	Pollution Control	13B			
Bioassay		Stationary Sources	06A			
Toxicity			06T			
Waste Water						
Combustion		1	21B			
Fluidized Bed	Processing		13H,07A			
18. DISTRIBUTION STAT	EMENT	19. SECURITY CLASS (This Report)	21. NO. OF PAGES			
		Unclassified	100			
Release to Public		20. SECURITY CLASS (This page) Unclassified	22. PRICE			