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INSTALLATION RESTORATION PROGRAM PHASE II - CONFIRMATION/QUANTIFICATION STAGE 1

VOLUME II - APPENDICES

FOR

Mather Air Force Base Sacramento, California

PREPARED BY:

Roy F. Weston, Inc. West Chester, Pennsylvania 19380

JUNE, 1986

FINAL REPORT FOR PERIOD SEPTEMBER 1983 TO JUNE 1986

Approved for Public Release; distribution is unlimited

PREPARED FOR:

HEADQUARTERS AIR TRAINING COMMAND COMMAND SURGEON'S OFFICE (HQATC/SGPB) BIOENVIRONMENTAL ENGINEERING DIVISION RANDOLPH AIR FORCE BASE, TEXAS



UNITED STATES AIR FORCE OCCUPATIONAL & ENVIRONMENTAL HEALTH LABORATORY (USAF OEHL) TECHNICAL SERVICES DIVISION (TS) BROOKS AIR FORCE BASE, TEXAS 78235-5501

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INSTALLATION RESTORATION PROGRAM PHASE II - CONFIRMATION/QUANTIFICATION

STAGE 1

VOLUME II

FINAL REPORT

FOR

Mather Air Force Base Sacramento, California

USAF Air Training Command Randolph Air Force Base, Texas

June, 1986

Prepared by

ROY F. WESTON, INC. Weston Way West Chester, Pennsylvania 19380

USAF Contract No. F33615-80-D-4006, Delivery Order 0026 Contractor Contract No. F33615-80-D-4006, Delivery Order No. 26

USAFOEHL Technical Program Manager - LTC Edward Barnes

Prepared for

UNITED STATES AIR FORCE OCCUPATIONAL AND ENVIRONMENTAL HEALTH LABORATORY (USAFOEHL) BROOKS AIR FORCE BASE, TEXAS 78235-5501

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	APPENDIX A
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APPENDIX A

ACRONYMS, DEFINITIONS, NOMENCLATURE, UNITS OF MEASUREMENT

ACW	Air Command and Warning
AFFF	Aqueous film forming foam
ASTM	American Society for Testing and Mate- rials
ATC	Air Training Command
alluvium	Unconsolidated deposits laid down by relatively recent rivers
andesite	Crystalline volcanic rock type
aquifer	Zone beneath the earth's surface capa- ble of producing water for a well
artesian	Groundwater condition in which pres- sure within an aquifer causes ground- water to rise in a well above the top of the aquifer, and sometimes above ground surface
AVGAS	Aviation gas (fuel)
BES	Bioenvironmental Engineering Services
B.G.S.	Below ground surface
breccia	A rock made up of highly angular coarse fragments
CDHS	California Department of Health Services (also referred to as DOHS)
CDWR	California Department of Water Resources
CERCLA	Comprehensive Environmental Response Compensation and Liability Act of 1980

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cm/s	Centimeters per second
confined	An aquifer condition in which the more permeable aquifer materials are confined between two less permeable strata, and in which artesian pres- sures cause water to rise in wells to levels above the base of the upper confining stratum
connate water	Interstitial water trapped in sedi- mentary rock at the time it was deposited
Cretaceous	The third and last period of the Mes- ozoic Era, occurring approximately 144 to 66 million years ago
CRWQB	California Regional Water Quality Board
DEQPPM	Defense Environmental Quality Program Policy Memorandum
detritus	Material produced from disintegration or weathering of rocks that has been moved from its site of origin
DMN	Dimethylnitrosamine
DoD	Department of Defense
ephemeral	Describes a surface water body (stream or pond) which only has water in it during the season(s). Opposite of perennial
escarpment	A geomorphic feature represented by a steep slope or face at the edge of a highland
fault block	A mass of earth materials bounded on at least two sides by structural faults
feet/day	Feet per day

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groundwater divide	A theoretical dividing line in the water table on each side of which the water table slopes away, forming a boundary between separate groundwater basins
GC	Gas chromatographic analytical instru- ment or method
gpm	Gallons per minute
gpd	Gallons per day
GPR	Ground-penetrating radar
HARM	Hazard Assessment Rating Methodology
HNu	A brand name for a volatile organic vapor photoionization detection meter
hydraulic conductivity	Ratio of flow velocity to driving force for viscous flow of water under saturated conditions in a porous medium, or volume of water moving through a unit area of aquifer under a unit hydraulic gradient
hydraulic gradient	Rate of change in pressure or hy- draulic head in groundwater over a given distance of flow
igneous	Describes crystalline rocks formed by solidification from a molten magma either beneath the surface or on the surface
IRP	Installation Restoration Program
JP-4	Jet fuel
ĸ	Common symbol for hydraulic conduc- tivity
lens	A body of sediment or rock thick in the middle and thin at the edges
lenticular	Lens-shaped

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mafic	Pertaining to or composed primarily of "dark minerals" (iron magnesium silicates)
metamorphic	Describes rocks which have formed in the solid state in response to pro- nounced changes in temperature, pres- sure, and/or chemical environment
ug/g	Micrograms per gram (equal to mg/kg and equivalent to parts per million in solids)
ug/L	Micrograms per liter (equivalent to parts per billion in water)
mg/g	Milligrams per grams (equivalent to parts per thousand)
mg/L	Milligrams per liter (equivalent to parts per million in water)
mgd	Million gallons per day
MSL	Mean sea level datum
N	North
MAFB	Mather Air Force Base
O&G	Oil and grease
OEHL	Occupational and Environmental Health Laboratory
PCB	Polychlorinated biphenyl compound
perched	A saturated zone above the main satu- rated groundwater flow zone or aqui- fer, and separated from the main aqui- fer by a zone of low permeability
P.G.	Registered Professional Geologist
Ph.D.	Doctor of Philosophy degree
POL	Petroleum oil and lubricants

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potentiometric (piezometric) surface	Surface defined by the levels to which water will rise in wells penetrating a single aquifer, caused by hydrostatic pressure
ppb	Parts per billion (equivalent to ug/L in water)
ppm	Parts per million (equivalent to mg/L in water)
Quaternary	The last of two periods in the Cen- ozoic Era, subdivided in Pleistocene and Holocene (or Recent) epochs, oc- curring approximately 1.6 million years ago to the present
RCRA	Resource Conservation and Recovery Act of 1976
Recent	The second epoch of the Quaternary, including modern time and the period of time (approximately 10,000 years) since the last ice age (synonymous with Holocene)
SAC	Strategic Air Command
sedimentary	Describes rocks resulting from depo- sition of transported material that has accumulated in layers
semi-confined	An aquifer condition in which the con- fining strata above the aquifer are not laterally continuous
specific capacity	The sustained yield of a well divided by the drawdown in that well after a stabilized pumping condition is ob- tained (reported in gpm/foot)
specific yield	Volume of water yielded by gravity per unit volume of saturated aquifer materials (corresponds to storativity in an unconfined aquifer)
square feet/day	Square feet per day

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Volume of water than an aquifer re-

leases from or takes into storage per unit surface area of aquifer per unit

change in hydraulic head

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TCE Trichloroethylene Deposited in or on the earth's crust, terrigenous not in a marine environment The first of two periods in the Centertiary ozoic Era, occurring approximately 66 to 1.6 million years ago TOC Total organic carbon The volume of water moving per unit transmissivity time per unit width of a saturated layer under a unit hydraulic gradient tuff-breccia Indurated volcanic rock, formed from coarse angular volcanic fragments in a matrix of finer volcanic particles An aquifer in which the water table unconfined forms the upper boundary unconsolidated sediments Sediments that are uncemented and thus include interconnected void space (primary porosity) that allows storage and transmission of significant volumes of groundwater USAF United States Air Force U.S. EPA United States Environmental Protection Agency VOA Volatile organic and aromatic hydro-

water table The level below which earth materials are saturated with water

carbon compounds

storativity

(storage coefficient)

APPENDIX B

SCOPE OF WORK

TASK ORDER 0026-02

STAGED

INSTALLATION RESTORATION PROGRAM

21 FEB 1984

Phase IIB Field Evaluation

Mather AFB, California*

I. Description of Work

The purpose of this task is to determine if environmental contamination has resulted from waste disposal practices at Mather AFB CA; to provide estimates of the magnitude and extent of contamination, should contamination be found; to identify potential environmental consequences of migrating pollutants; to identify any additional investigations and their attendant costs necessary to properly evaluate the magnitude, extent and direction of movement of discovered contaminants.

The presurvey report (mailed under separate cover) and Phase I IRP report (mailed under separate cover), incorporated background and description of the sites for this task. To accomplish the survey effort, the contractor shall take the following steps:

A. <u>General</u>

1. The areal extent of each site shall be determined by reviewing available aerial photos of the base, and by field reconnaissance.

2. Each location where surface water, sediment, or core samples are collected shall be marked with a permanent marker (where practical), and the location recorded on a project map for the site.

3. Three rounds of sampling shall be performed on the monitoring wells installed during this task. The rounds shall be performed at three different aquifer level conditions. Exact dates shall be determined by the contractor in the field.

B. AC&W Area

1. Install three downgradient monitoring wells at the AC&W site. Wells shall be installed according to procedures outlined in paragraph H below.

2. <u>Collect one sample per well during each sampling round</u>. Analyze the samples for <u>VOC</u>, TOC, oils and greases (IR method) and PCBs.

C. "7100" Area Disposal Site

1. Install three downgradient monitoring wells along the perimeter road west and south of the disposal site. The wells shall be installed according to procedures outlined in paragraph H below.

*Highlights of modification underscored

2. <u>Collect one sample per well during each sampling round</u>. Analyze samples for oils and greases (IR), TCC, <u>VCC</u>, phenol, cyanide; Cr, Pb, Cd, Ni, Ag.

>

D. <u>West Ditch Area</u>

1. Install two downgradient monitoring wells west of the ditch near the base perimeter. The wells shall be installed according to procedures outlined in paragraph H below.

2. Collect two sediment samples from the ditch, one north and one south of the west ditch skimmer.

3. <u>Collect one sample per well during each sampling round</u>. Analyze groundwater and sediment samples for oils and greases (IR), TOC, <u>VCC</u>, phenol, cyanide; Pb, Cr, Cd, Ni, Ag.

E. Northeast and East Base Perizeter

1. Install three monitoring wells along the northeast and east base perimeter. The wells shall be installed according to procedures outlined in paragraph H below.

2. <u>Collect cre sample per well during each sampling round</u>. Analyze samples for dimethylmitrosamine (DMN); oil and greases (IR), TOC, <u>VOC</u>, Cr, Pb, Cd, Ni, Ag, DDT, Chloriane, 2,4-D.

F. Base Production Wells

1. All 15 base production wells shall be sampled one time, and analyses performed for TOC, V_{0C} , and oils and greases (IR) on each sample.

2. In addition to the parameters specified in I.F.1. above, analyze specific well water samples for:

AC&W well PCB

MB-1,2,3,4 (4 total)DMN, Cr, Pb, Cd, Ni, Ag, DDT, Chlordane, 2,4-DEngine Test Cell wellPhenol, Cyanide, Cr, Pb, Cd, Ni, Ag

G. Sampling and Analysis

Sampling, maximum holding time and preservation of samples shall strictly comply with the following references: <u>Standard Methods for The</u> <u>Examination of Water and Wastewater</u>, 15th Ed., (1980), pp 35-42; <u>ASTM</u>, Part 31, pp 72-82, (1976), Method D-3370; and <u>Methods for Chemical Inalysis of Waters</u> <u>and Wastes</u>, EPA Manual 600/4-79-020, pp xiii to xix (1979). Minimum detection limit for analyses are shown in Attachment 1.

H. <u>Well Installation and Cleanup</u>

1. All wells installed during this survey shall be constructed of black iron materials, and shall be grout-sealed in accordance with State of

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California requirements. Wells shall average 120 feet in depth and shall be logged in accordance with U.S. Army Toxic and Hazardous Materials Agency procedures (furnished under separate cover). Location and elevation of eacwell shall be surveyed, and recorded on the project map. Total well footage installed shall not exceed 1320 feet.

2. Each well installation shall be cleaned following the completized of the well. Drill cuttings shall be removed and the general area cleaned.....

I. Data Review

1

Results of <u>each round of</u> sampling and analysis shall be tabulated ______ Informal Technical Information report (Sequence 3 as reflected in Item VI below) and forwarded to USAF OEHL/CVT for review.

J. <u>Report Preparation</u>

1. A draft final report delineating the findings of this field investigation shall be prepared and forwarded to the USAF OEHL as specified Item VI below. This report shall include a discussion of the regional hydrace geology, well logs of all project wells, data from water level surveys, water quality analysis results, available geohydrologic cross sections, groundwater surface and gradient vector maps, vertical and horizontal flow vectors and Laboratory quality assurance information. The report shall follow the USAF OEHL supplied format (main formation formation).

2. Estimates shall be made of the magnitude, extent and direction _______ movement of contaminants discovered. Potential environmental consequences _______ discovered contamination must be identified. Where survey data are insuffi-______ cient to properly determine or estimate the magnitude, extent and direction_______ movement of discovered contaminants, specific recommendations, fully justif_______ shall be made for additional efforts required to properly evaluate contamin_______ tion migration and included in a separately bound appendix to the draft fi_______ report (see X below).

3. Specific requirements for future groundwater and surface water monitoring must be identified.

K. <u>Cost Estimates</u>

The contractor shall provide estimates for all additional work recommended to permit proper determination of contaminants. The recommendation tions provided shall include all efforts required to determine the magnitute and direction of movement of discovered contaminants along with an estimatation the time required to accomplish the proposed effort. This information shall be provided in a separately bound appendix to the draft final report.

L. Meetings

The contractor's project leader shall attend two meetings, to be held at Mather AFB to discuss project status at dates and times to be specified later. Each meeting shall last 12 hours. II. Site Location and Dates:

Mather AFB CA Building, Time & Dates to be established

III. Base Support: None

IV. Government Furnished Property: None

V. Government Points of Contact:

1.	Dr Dee Ann Sanders	2.	Capt Dennis Korycinski
	USAF OEHL/CVT		USAF Hospital Mather/SGP3
	Brooks AFB TX 78235		Mather AFB CA 95655
	(512) 536-2158		(916) 364-2284
	AV 240-2158		AV 828-2284

VI. In addition to sequence numbers 1, 5 and 11 listed in Atch 1 to the contract, which are applicable to all orders, the reference numbers below are applicable to this order. Also shown are data applicable to this order.

Sequence No.	Block 10	Block 11	Block 12	Block 13	Block 14
		15 MAC	16 MAC		
4	CNE/R	12- MAC	15- VAC	21 MAC	4
3	AS REQ	**	**		

*A minimum of two draft reports will be required. After incorporating Air Force comments concerning the first draft report, the contractor shall supply the USAF OEHL with a second draft report. The report shall be forwaried to the applicable regulatory agencies for their comments. Contractor shall supply the USAF OEHL with 25 copies of each draft report and 50 copies plus the original camera ready copy of the final report.

##Upon completion of analyses.

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Attachment 1 Required Sample Detection Limits

Parameter	Soil/Sediment	<u>Water</u>
*Total Crganic Carbon (TOC) Oils and Greases (IR Method 412.3) Phenol Cyanide Lead Chromium Cadmium Nickel	 1.0 milligram/gram 100 micrograms/gram 1 microgram/gram 1 microgram/gram 2 micrograms/gram 5 micrograms/gram 1 microgram/gram 10 micrograms/gram 	1.0 milligram/L 10 micrograms/L 1.0 micrograms/L 10 micrograms/L 20 micrograms/L 50 micrograms/L 10 micrograms/L
Silver	1 microgram/gram	10 micrograms/L
PCB's		0.25 micrograms/L
Dimethylnitrosamine (DMN)		1.0 microgram/L
DDT isomers		0.02 micrograms/L
Chlordane		0.02 micrograms/L
2,4-D	ay 66 ag	0.06 microgram/L
Volatile Organic Compounds (VCC)	**	**

*Detection levels for TOC must be 3 times the noise level of the instrument. Laboratory distilled water must show no response; if it shows a response, corrections of positive results must be made.

**Detection limits for VCCs shall be as specified for those compounds listed in EPA Methods 601 and 602.

Method: Federal Register, Vol 44, No. 233, pp 69468-69473.

This method should be strictly followed including these items:

Item 1.4 - This method is recommended by EPA for use only by <u>experienced</u> residue analysts or under the <u>close</u> supervision of such qualified persons.

Item 2.2 - This is <u>most important</u>. If interferences are encountered (as in early peaks such as vinyl chloride), the method provides a secondary gas chromatographic column that will be helpful in resolving the compounds of interest from interferences. This <u>must</u> be done in the case of vinyl chloride and so noted in analysis report.

Items 3.3, 7.1-7.3 - These sections on interferences, contamination and QC should be <u>strictly</u> followed.

Items 8.3 - All samples must be analyzed within the recommended holding times. This <u>must</u> be followed without exception.

If questions are encountered about certain contrminants you may be asked to show both chromatograms used to rule out possible interferences.

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SUMMARY OF ANALYTICAL REQUIREMENTS Table 3:

VOAWater9969151058VOASoil0020013VOASoil0020013TUCWater9969151056TUCWater990013UCWater990013U U USoil00013U U U USoil00013U U U USoil00013U U U USoil00013U U U USoil00013U U U USoil00013U U U USoil00013U U USoil00013U U USoil000013U U UWater000013U U USoil000013U U USoil000013U UU U0000013U UU UU U000013<		Analyte	Sampled Medium	ACGW	7100	W. Ditch	Perimeter	Base Wells	OA	Total Samples
VOASoil002001TUCWater99691510TUCWater996915100 b GWater996915100 b GWater9002010 b GWater9002010 b GSoil000201VEBWater096012PhenolWater096012PhenolSoil020012VanideWater020012VanideSoil020012VanideSoil020012VanideSoil020012Metals ¹ Water020012Metals ¹ Soil0202012Metals ¹ Soil000012Metals ¹ Water000012Metals ¹ Water000012Metals ¹ Water000012Metals ¹ Water000<		VOA	Water	6	6	9	6	15	10	58
TUC Water 9 9 6 9 15 10 $0 \models G$ Water 9 9 6 9 15 10 $0 \models G$ Soil 0 0 2 0 1 2 $v \models G$ Soil 0 0 2 0 1 2 $v Ė G$ Water 9 0 2 0 1 2 $v Ė Houol Water 0 9 6 0 1 2 v Ė Houol Soil 0 2 0 1 2 v Ė Houol Soil 0 2 0 1 2 v Ė Houol Soil 0 2 0 1 2 v I = 1 >^1 Water 0 2 0 1 2 v I = 1 >^1 Soil 0 2 0 1 2 v I = 1 >^1 Soil 0 2 0 1 2 v I = 1 >^1 Soil 0 2 2 2 $		VUA	Soil	0	0	2	0	0	1	ſ
$ 0 \bullet G $		TUC	Water	6	6	9	6	15	10	58
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	B-6	РСВ	Water	6	0	0	0	l	7	12
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Soll 0 2 0 0 1 Water 0 9 6 9 5 6 Soil 0 0 2 0 0 1 Water 0 0 2 0 1 1 Water 0 0 2 0 1 1 Water 0 0 0 9 4 3		Cyanide	Water	0	6	9	0	1	5	18
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Soil 0 2 0 1 Water 0 0 0 9 4 3 Mater 0 0 0 0 9 4 3		Metals ¹	Water	0	6	9	6	5	9	35
Water 0 0 0 9 4 3 cides ³ Water 0 0 0 9 4 3		Metals ¹	Soil	0	0	2	0	0	I	٣
Water 0 0 0 9 4 3		DMN ²		0	0	0	6	4	٣	16
		Pesticides ³		0	0	0	6	4	m	16

Metals - Cr, Pb, Cd, Ni, Ag DMN = Dimethylnitrosamine Pesticides - DDT, chlordane, 2,4-D н. Э.

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Revision No. 2 to Description of Work INSTALLATION RESTORATION PROGRAM 84 Feb 21

Phase IIB Field Evaluation

Mather AFE, California*

I. Description of Work

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The purpose of this task is to determine if environmental contamination has resulted from waste disposal practices at Mather AFB CA; to provide estimates of the magnitude and extent of contamination, should contamination be found; to identify potential environmental consequences of migrating pollutants; to identify any additional investigations and their attendant costs necessary to properly evaluate the magnitude, extent and direction of movement of discovered contaminants.

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3. Three rounds of sampling shall be performed on the monitoring wells installed during this task. The rounds shall be performed at three different aquifer level conditions. Exact dates shall be determined by the contractor in the field.

B. ACSN Area

1. Install three downgradient monitoring wells at the AC&V site. Wells shall be installed according to procedure: outlined in paragraph H below.

2. <u>Collect one sample per well during each sampling round</u>. Analyze the samples for <u>VCC</u>, TOC, oils and greased (IR method) and PCEs.

C. "7100" Area Distoral Site

1. Install three downgradient monitoring wells along the peripeter road west and south of the disposal site. The wells shall be installed according to procedures outlined in paragraph H below.

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2. Collect one sample for well during each sampling round. Analyze samples for oils and groupes (lk), TOC, <u>VOC</u>, phenol, cyanice; Cr, Pb, Cd, Ni, Ag.

D. <u>West Ditch Area</u>

1. Install two downgradient monitoring wells west of the ditch near the tase perimeter. The wells shall be installed according to procedures outlined in paragraph H below.

2. Collect two setiment camples from the ditch, one north and one south of the west ditch skinner.

3. Collect one sample per well during each sampling round. Analyze groundwater and sediment samples for oils and greases (IR), TOC, VOC, phenol, cyanide; Pb, Cr, Cd, Ni, Ag.

E. Northeast and East Base Perireter

1. Install three monitoring wells along the northeast and east base perimeter. The wells shall be installed according to procedures outlined in paragraph H below.

2. <u>Collect one sample per well during each sampling round</u>. Analyze samples for direthylnitrosamine (DMM); oil and greases (DR), TOC, <u>VOC</u>, Cr, Pb, Cd, Ni, Ag, DDT, Chlordane, 2,4-D.

F. <u>Esse Production Wells</u>

1. All 15 base production wells shall be sampled one time, and analyses performed for TOC, <u>VOC</u>, and oils and greases (IR) on each sample.

2. In addition to the parameters specified in I.F.1. above, analyze specific well water samples for:

<u>AC&V well</u>	PCB
ME-1,2,3,4 (4 total)	DMN, Cr, Pb, Cd, Ni, Ag, DDT, Chlordane, 2,4-D
Engine Test Cell well	Phenol, Cyanide, Cr, Pb, Cd, Ni, Ag

G. Sampling and Analysis

Sampling, maximum holding time and preservation of samples shall strictly comply with the following references: <u>Standard Methods for The</u> <u>Examination of Water and Wastewater</u>, 15th Ed., (1960), pp 35-42; <u>ASTM</u>, Fart 31, pp 72-82, (1976), Method D-3370; and <u>Mathods for Cherical Analysis of Waters</u> <u>and Wastes</u>, EPA Manual 600/4-79-020, pp xill to xix (1979). Minimum detection limit for analyses are shown in Attachment 1.

H. <u>Well Installation and Cleanup</u>

1. All wells installed during this survey shall be constructed of black iron materials, and shall be grout-scaled in accordance with State of

F33515-80-0-4006/002602

Oblefinnia requirements. Wells shall also julips from in depth and shall be legged in accordance with U.S. arey Texic and Paravir . Materials Agency precedures (furnished under separate cover). Location and elevation of each well shall be surveyed, and recorded on the project pap. Total well footage installed shall not exceed 1920 feet.

2. Each well installation shall be cleaved following the ourpletion of the well. Drill outtings shall be removed and the general area cleared.

I. Dete Berley

Feally of <u>each round of</u> sampling and analysis shall be tabulated in <u>en</u> Informal Technical Information report (Sequence 3 as reflected in Item VI balow) and flow unded to USAF GrBU/OVE for proview.

J. Els +t Englandtica

1. A draft final report delireating the finances of this field invistigation shall be propared and forw-risit to the USAP CFUL as specified in Item VI below. This report shall include a discussion of the regional hydrogeology, well logs of all project wells, data find which level surveys, water quality analysis results, available geolyicalized cross sections, groundwater surface and gravient vector maps, vertical and horizontal flow vectors and Lab report, quality courance information. The report shall follow the USAF CEAL supplied facat (miled unfor objects outer).

2. Estimates shall be made of the mugnitude, entot and direction of movement of contaminants discovered. Fournial environ ental consequences of discovered contamination must be identified. Where survey data are insufficient to properly determine on estimate the magnitude, estent and direction of movement of discovered contaminants, specific recommendations, fully justified, shall be made for additional efforts required to properly evaluate contamination in a separately turn apportiant to the draft final report (see K below).

3. Specific requirements for future groundwitter and surface water monitoring multiple in our field.

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The control of the project leaf month of the start to the protocol, to be bold at Mithem 452 to do not project at the track of the trac

frage states and

II. Site Location and Fates:

Mather AFE CA Euilding, Tire & Dates to be established

111. Fase Support: None

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- IV. Government Furnished Property: None
- V. Government Points of Contact:

1.	Dr Dee Ann Sanders	2.	Capt Dennis Korycinski
	USAF DEHL/CVT		USAF Hospital Mather/S3FB
	Brooks AFB TX 78235		Mather AFE CA 95655
	(512) 536-2158		(916) 364-2284
	AV 240-2158		AV 828-2284

VI. In addition to sequence numbers 1, 5 and 11 listed in Atch 1 to the contract, which are applicable to all orders, the reference numbers below are applicable to this order. Also shown are data applicable to this order.

Sequence No.	Elock 10	Block 11	Plock 12	Elock 13	Elock 14
4	ONE/R AS REQ	<u>54N042</u> 6 **	<u>920203</u> 1	SEMAY27	ŧ

*A minimum of two draft reports will be required. After interporting Fir Force comments concerning the first draft report, the contractor shall supply the USAF OFHL with a second draft report. The report shall be forwarded to the applicable regulatory agencies for their comments. Contractor shall supply the USAF OFHL with 25 copies of each draft report and 50 copies plus the original camera ready copy of the final report.

******Upon completion of analyses.

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Attachment 1 Required Sample Detection Limits

Parateter	<u>Soil/Sediment</u>	Water
<pre>*Total Organic Carbon (TOC) Oils and Greases (IR Method 412.3) Phenol Cyanide Lead Chromium Cadmium Nickel Silver</pre>	<pre>1.0 milligram/gram 100 microgram/gram 1 microgram/gram 2 microgram/gram 5 micrograms/gram 1 micrograms/gram 10 micrograms/gram 1 micrograms/gram</pre>	1.0 milligram/L 10 micrograms/L 1.0 micrograms/L 10 micrograms/L 20 micrograms/L 50 micrograms/L 10 micrograms/L 10 micrograms/L
PCB's		0.25 micrograms/L
Dimethylnitrosamine (DMN) DDT isomers Chlordane 2,4-D Volatile Organic Compounds (VCC)	 **	1.0 microgram/1 0.02 micrograms/1 0.02 micrograms/1 0.06 microgram/1

*Detection levels for TOC must be 3 times the noise level of the instrument. Laboratory distilled water must show no response; if it shows a response, corrections of positive results must be made.

**Detection limits for VCCs shall be as specified for those compounds listed in EPA Methods 601 and 602.

Method: Federal Register, Vol 44, No. 233, pp 69468-69473.

This method should be strictly followed including these items:

- Item 1.4 This method is recommended by EPA for use only by <u>experienced</u> recidue analysts or under the <u>close</u> supervision of such qualified persons.
- Item 2.2 This is most important. If interferences are encountered (as in early peaks such as vinyl chloride), the method provides a sectiony gas chromatographic column that will be helpful in resolving the compounds of interest from interferences. This <u>must</u> be done in the case of vinyl chloride and so noted in analysis report.

Itezs 3.3, 7.1-7.3 - These sections on interferences, contamination and Q: should be <u>strictly</u> followed.

Items 8.3 - All samples must be analyzed within the recommended holding times. This <u>must</u> be followed without exception.

If questions are encountered about certain contaminants you may be asked to show both chromatograms used to rule out possible interferences.

F33615-PM-0.4076/501602

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APPENDIX C

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BIOGRAPHIES OF KEY PERSONNEL



Peter J. Marks

Education

B.S. Biology, Franklin and Marshall College (1963)

M.S. Environmental Engineering and Science, Drexel University (1965)

Employment History

1965-Present	Weston
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1963-1964	Lancaster County General Hospital
	Research laboratory for analytical
	methods development

Relevant Experience

Mr. Marks has 15 years experience in environmental laboratory and engineering activities as a Project Scientist. Project Engineer. Project Manager, and Vice President of Weston's environmental laboratory. He has analytical laboratory experience, supervision of source emission testing projects, and was the Project Manager on numerous source testing and ambient air monitoring projects, including a major contract with EPA for source sampling and analysis. He also has experience in field testing to determine efficiencies of control equipment, and chemical analysis of atmospheric emissions from various industries

Mr. Marks was the Project Manager for a major corporate (65 plants) air testing contract (\$350.000 year). The plants included glass, wood, textiles, and asphalt production.

Mr. Marks industry experience in source emissions testing includes fossil-fuel-fired steam generators, municipal incinerators, cement plants, nitric acid plants, petroleum refineries and petrochemical plants, iron and steel plants (basic oxygen and electric arc furnaces), wet process phosphoric acid plants: superphosphoric acid plants: diammonium phosphate plants; triple superphosphate plants: granular triple superphosphate storate facilities; intermediate size steam boilers (10-250 x 10⁶ Btu); mercury plants: solvent degreasing facilities; steel foundries; synthetic organic chemical plants; pulp and paper mills; chlor-alkali plants; glass manufacturing facilities; stone crushing facilities; plastic plants, clay and ore processing operations.

Mr. Marks' air contaminant testing experience includes particulates, NO_x, fluorides, SO₂:SO₃:H₂SO₄, chlorides, hydrocarbons, aldehydes, organic acids, total reduced sulfur, permanent gases, odor, mercury, particle size, resistivity, hydrogen sulfide, chloride, ozone, metals, sulfates, vinylchloride, solvents, TSP, and asbestos.

His field instrumentation experience includes: Orsat apparatus, Teledyne combustible instrument. Lira nondispersive infrared instrument, Servomex oxygen analyzer, Lear-Siegler transmissometer, duPont sulfur dioxide monitoring instrumentation. Anderson cascade impactor, Omega pyrometer, Meloy ozone analyzer, thermoelectron SO₂ analyzer, RAC Hi Vol Samplers, and RAC Nutech control console.

Mr. Marks has the following laboratory instrumentation experience: infrared, ultraviolet, and atomic absorption spectrophotometry; dissolved oxygen analyzer, gas chromatography; and total oxygen demand and total organic carbon analyzers.

Mr. Marks is a member of the Air Pollution Control Association, the American Society for Testing and Materials, the Water Pollution Control Federation, and the Water Pollution Control Association of Pennsylvania.

Projession la Projes



Registration

Registered Professional Geologist in the State of Indiana

Fields of Competence

Groundwater resources evaluation; hydrogeologic evaluation of sanitary landfills and other waste disposal sites; detection and abatement of groundwater pollution; digital modeling of groundwater flow and solute transport; statistical analysis of geological and geochemical data; geochemical prospecting; estuarine geology and geochemistry; trace metal and aqueous geochemistry.

Experience Summary

Seven years experience in hydrogeology and geochemistry, involving such activities as: assessment of subsurface water and soil contamination; development of contamination profiles; evaluation of remediation actions for groundwater quality restoration; quantitative chemical analysis of water and soil; ore assay and ore body evaluation; drilling supervisor; hydrogeologic assessment; pollution detection and abatement; estuarine pollution analysis; application of flow and solute transport computer models; computer programming; project management; teaching environmental geology and geochemistry.

Credentials

B.A., Geology-Brown University (1966)

M.S., Geology-University of Delaware (1973)

Ph.D., Geology-University of Delaware (1979)

Sigma Xi, The Scientific Research Society of North America

Geological Society of America, Hydrology Division

National Water Well Association. Technical Division

American Association for the Advancement of Science

Estuarine Research Federation: Atlantic Estuarine Research Society

Frederick Bopp III, Ph.D., P.G.

Employment History

1979-Present	WESTON
1977-1979	U.S. Army Corps of Engineers Waterways Experiment Station
1976-1977	University of South Florida Department of Geology
1970-1976	University of Delaware Department of Geology
1974-1976	Earth Quest Associates President and Principal Partner
1974 (Summer)	WESTON
1966-1970	United States Navy Commissioned Officer

Key Projects

Project manager on seven task orders for environmental assessment services at United States Air Force facilities in nine states.

Task manager for a Superfund site evaluation in Ohio.

Site manager for drum recovery operations in Pennsylvania and New Jersey.

Project manager for site assessments of oil and fuel spills in four states.

Project manager for closure plan development at a hazardous waste landfill in New Jersey.

Definition and abatement of groundwater contamination from chemical manufacturing in Delaware.

Flow and solute transport digital model of a heavilypumped regional aquifer in southern New Jersey.

Definition and abatement of groundwater contamination from chemical manufacturing in the Denver area

Hydrogeologic impact assessment of on-land dredge spoil disposal in coastal North Carolina.

Geochemical prospecting and ore body analysis in Arizona.

Definition and abatement of groundwater contamination from a hazardous waste site in northern New England.

Definition and abatement of groundwater contamination from plating and foundry wastes in eastern Pennsylvania.

Operational test and evaluation of new naval mine ordinances in southern Florida.

Publications

"Metals in Estuarine Sediments: Factor Analysis and Its Environmental Significance". *Science*, 214 (1981): 441-443.

"The Remobilization of Trace Metals from Suspended Sediments Entering the Delaware Estuary". Presented at the 27th Annual Meeting, Southeastern Section, Geological Society of America, Chattanooga, Tennessee, April 1978.

"Trace Metals in Delaware Bay Sediments and Oysters". Presented at the International Conference on Heavy Metals in the Environment, Toronto, Canada, October 1975.



Fields of Competence

Geologic investigation and site evaluation; environmental impact assessment, quantitative and qualitative groundwater analysis, design of groundwater monitoring systems.

Experience Summary

Nine years experience in geological investigations including environmental impact analysis in geology. groundwater, and soils: hydrogeologic investigations of hazardous waste sites, preparation and delivery of expert testimony; assessment and mitigation of low-level radioactive contamination of groundwater and soils; migration of low-level radioactive contamination of groundwater and soils; migration of radionuclides in groundwater: site stability in limestone terrains: development of evaluation criteria for site search and selection projects; pre-mine opening hydrologic investigations for surface and underground coal mines: development of clean-up strategies for hazardous and radioactive waste disposal sites: Environmental Impact Statement preparation and review: site suitability investigations of waste disposal facilities for industrial and residential developments.

Credentials

B.A.-Queens College, CUNY (1969)

M.S., Geology-University of Delaware (1975)

American Geophysical Union

Geological Society of America

National Water Well Association, Technical Division

Employment History

1974-Present WESTON 1972-1974

University of Delaware

Key Projects

Preparation of RCRA Part B permit application for facilities in the Midwest and on the West coast

Katherine A. Sheedy

Initial Assessment Studies to identify possible contamination resulting from past practices at military installations.

Assessment of groundwater contamination from a municipal landfill in the Atlantic Coastal Plain including aguifer simulation to determine migration 10, 20 and 30 years in the future

Hydrogeologic assessment of a multi-source military installation. The project includes groundwater modeling for the installation and for areas outside the installation in conjunction with State and Federal agencies

Design of monitoring systems for a large industrial complex in Montana.

Assessment of regulatory requirements for hazardous waste lagoon closure in over forty states

Assessment and analysis of emerging trends in groundwater research as applied to the utility industry

Preparation of EPA Remedial Action Master Plans for five uncontrolled hazardous waste sites

Principal investigator for geology, soils and groundwater portion of an Environmental Impact Statement for the decontamination of a radioactive waste disposar site in Canonsburg, Pennsylvania

Project manager and principal investigator on clean-up of a site contaminated by pharmaceutical wastes in New Jersev

Project manager and principal investigator for assistance in EIS preparation for five synthetic fuel plants in east-central United States.

Evaluation of environmental impact and operation of 23 municipal landfills in the Atlantic Coastal Plain

Hydrogeologic investigations at mine sites prior to, during and after mining operations in Illinois

Hydrogeologic investigations to determine site suitability for landfills, sewage sludge disposal, spray inrigation and industrial waste disposal

Principal investigator on a dredge material disposal site feasibility study for Interstate Division for Baltimore City. This project was conducted to evaluate the feasibility. of specific sites for disposal of 5 million cubic yards of

Professional Profile

material dredged from the Fort McHenry Tunnel in Baltimore. The evaluation included examination of costs, engineering feasibility, site stability, impact on biology and groundwater and ultimate use of the site as an inner-city park.

Supervision of an investigation to determine groundwater quality, delineate the extent of groundwater pollution and develop a groundwater-quality management program for a six-county area. Evaluated the adequacy of existing groundwater-quality standards and interacted with regulatory agencies.

Evaluation of groundwater quality, quantity and facilities; impact on groundwater for sites in semi-arctic environments and within the Columbia River Basin Project area.

Environmental assessment for a 200,000-BPCD refinery on a semi-arid island with extensive groundwater use in the West Indies.

Evaluation of structural stability problems in limestone solution area in Pennsylvania.

Supervision of a leachate collection system and groundwater monitoring program for an industrial landfill.

Investigation of potential sources of petroleum product found to be discharging through the subsurface, at the shore of Lake Erie. Development of a state-of-the-art study and environmental analysis of the geothermal steam industry.

Publications

Sheedy, K. A., 1979, "Three-Phase Approach to Determination of Site Stability in Limestone". Presented at Association of Engineering Geologists 1979 Annual Meeting, Chicago, Illinois.

Sheedy, K. A., Schoenberger, R. J., Haderer, P., Dovey, R., 1979, "Solid Waste Disposal in the Coastal Plain: A Case Study." Presented at Association of Engineering Geologists 1979 Annual Meeting, Chicago, Illinois.

Sheedy, K. A., Leis, W., Thomas, A., 1980, "Land Use in Limestone Terrain, Problems and Case Study Solutions". In *Applied Geomorphology*, (The "Binghamton" symposia; 11) George Allen and Unwin, 1982.

Sheedy, K. A., Leis, W. Bopp, F., Anderson, J., "Use of Ground Penetrating Radar in Limestone Terrain". American Geographers Association, 1981.

Sheedy, K. A., "Methodology for the Selection of Low-Level Radioactive Waste Disposal Sites". American Nuclear Society, 1982.



Registration

Registered Professional Geologist in the States of Georgia (No. 440) and Indiana.

Fields of Competence

Detection and abatement of groundwater contamination; design of artificial recharge wells; deep well disposal; simulation of groundwater systems; hydrogeologic evaluation of hazardous waste sites and landfills; practical applications of geophysical surveys to hydrologic systems, site investigations, and borehole geophysical surveys. Geochemical studies of acid mine drainage and hazardous wastes.

Experience Summary

Sixteen years experience as field hydrogeologist, field supervisor, project director, research director. Six years research involving two consecutive projects. 1) application of geophysical techniques in evaluating groundwater supplies in fractured rock terrain in Delaware and Pennsylvania; 2) project director for an artificial recharge and deep well disposal study. Provided consultation for waste disposal and aquifer quality problems for coastal communities.

Developed geochemical sampling techniques for deep mine sampling. Evaluated synthetic and field hydrologic data for deep formulational analysis in coal field projects.

Earlier research experience involved developing techniques for mapping subsurface regional structures having interstate hydrologic significance, and defining ore bodies by geochemical prospecting.

Credentials

B.S., Biochemistry-Albright College (1966)

M.S., Hydrogeology-University of Delaware (1975)

Cooperative Program Environmental Engineering— University of Pennsylvania Walter M. Leis, P.G.

Additional special course work in Geology and Hydrology, Franklin and Marshall College and Pennsylvania State University

Remote Sensing Data Processing Training, Goddard Space Center (1978)

OWRR Research Feilow, 1973

National Water Well Association, Technical Division.

Geological Society of America, Engineering Geological Division

Society of Economic Paleontologists and Mineralogists

Employment History

1974-Present	WESTON
1973-1974	University of Delaware Water Resources Center
1971-1973	University of Delaware
1967-1971	Pennsylvania Department of Environmental Resources

Key Projects

Definition of groundwater contamination from sanitary landfill leachate and recovery of contaminants to protect heavily used aquifer in Delaware.

Field design studies for artificial recharge and waste disposal wells.

Design and construction of hydrologic isolation systems for various class hazardous wastes.

Design and supervision of chemical and physical rehabilitation of groundwater collection systems in fractured rock and coastal plain areas.

Principal investigator for six projects involving subsurface migration of PCB's in New York, New Jersey, Pennsylvania, and Oklahoma.

Design and construction supervision of hydrocarbon recovery wells in Pennsylvania.

Proiessional Proille

Geochemical evaluation of coal mine pools in West Virginia.

Geochemistry of subsurface migration of toxic substances.

Principal investigator for eight projects involving migration of volatile chlorinated hydrocarbons in groundwater.

Mineable reserve evaluations for coal, sand and gravel, limestone, clay deposits, mine reclamation, and monitoring.

Design geophysical and remote sensing assessments of hazardous waste disposal areas.

Publications

Leis, W., and R.R. Jordan, 1974, "Geologic Control of Groundwater Movement in a Portion of the Delaware Piedmont", OWRR-DEL 20.

Leis, W., 1976, "Artificial Recharge for Coastal Sussex County, Delaware", University of Delaware Press, Water Resources Center.

Leis, W., D.R. Clark, and A. Thomas, 1976, "Control Program for Leachate Affecting a Multiple Aquifer System, Army Creek Landfill, New Castle County, Delaware", National Conference on Management and Disposal of Residue on Land.

Leis, W., W.F. Beers, J.M. Davidson, and G.D. Knowles, 1978, "Migration of PCB's by Groundwater Transport— A Case Study of Twelve Landfills & Dredge Disposal Sites on the Upper Hudson Valley, New York", Proceedings of the 1st Annual Conference of Applied Research & Practice on Municipal and Industrial Waste. Leis, W., R.D. Moose, and W.F. Beers, "Critical Area Maps, a Regional Assessment for Karst Topography", Association of Engineering Geologists 1978 Annual Meeting.

Leis, W., and W.F. Beers, "Soil Isotherm Studies to Predict PCB Migration Within Groundwater", (Abstract) ASTM 1979 Annual Meeting, Philadelphia, Pennsylvania.

Thomas, A., and W. Lein, "Physical & Chemical Rehabilitation of Contaminant Recovery Wells", Association of Engineering Geologists 1978 Annual Meeting.

Leis, W., W.F. Beers, and F. Benenati, "Migration of PCB's from Landfills and Dredge Disposal Sites in the Upper Hudson River Valley", New York Academy of Science Symposium on PCB's in the Hudson River.

Leis, W., "Subsurface Reclamation by Counter Pumping Systems: Geologic and Geotechnical Aspects of Land Reclamation", ASCE/AEG 1979 Symposium.

Leis, W., and A. Metry, "Field Characterization of Leachate Quality", Water Pollution Control Federation 1979 Annual Meeting.

Leis, W., and A. Metry, "Multimedia Pathways of Contaminant Migration", Water Pollution Control Federation 1980 Annual Meeting.

Leis, W., and K. Sheedy, "Geophysical Location of Abandoned Waste Disposal Sites", 1980 National Conference on Management of Uncontrolled Hazardous Waste Sites.

Sheedy, K., and W. Leis, 1982, "Hydrogeological Assessment in Karst Environments (chapter)."



Fields of Competence

Analytical laboratory management: organic chemistry: mass spectrometry, GC/MS/DS, high and low resolution, chemical ionization and special techniques: gas chromatography including capillary column techniques, high performance liquid chromatography (HPLC), the uses of NMR, IR, UV, visible, inorganic analyses, elec trochemical, thermal techniques and surface meth odologies (SEM, ESCA, SIMS) to solve industrial problems; the development of quality control measures in analytical protocols, the testing of laboratory safety methodologies; innovation of new analytical techniques and methods to solve industrial product liability, production and environmental problems.

Experience Summary

Eleven years experience in the supervision of an analytical group involved in solving all types of industrial problems including environmental, product safety, production, research and development. The main emphasis was on the innovative development of analytical methods utilizing instrumental technologies. Indepth experience in the organic chemicals, inorganic chemicals, polymer, fiber, tire, solvent, fluorine chemicals, coke and coal tar industries. Numerous scientific presentations. Contributor to three Chemical Manufacturers Association Task Groups: Environmental Monitoring, Groundwater, and Hazardous Waste Response Center.

Taught general chemistry, analytical chemistry, organic chemistry, and instrumental analysis for four years at Eastern Michigan University and the University of Illinois.

Credentials

B.A., Chemistry-Williams College (1960)

Ph.D., Organic Chemistry-Iowa State University (1964)

Postdoctoral Organic Chemistry—University of Illinois (1966)

Postdoctoral Mass Spectroscopy—Cornell University (1969)

James S. Smith, Ph.D.

American Chemical Society American Society for Testing Materials American Society of Mass Spectroscopists

Employment History

1981-Present	WESTON
1969-1981	Allied Chemical Corporation Corporate Research Center
1966-1968	Eastern Michigan University Assistant Professor of Chemistry
1965-1966	University of Illinois

Key Projects

Directed analytical group for five years of intensive sampling and analysis of a toxic insecticide. Analyses involved soil, air, water, sludge, blood, bile, feces, urine, animal feed, and plant samples to detect the compound at the low parts-per-billion level. The project involved rapid development of new and accurate analytical methods.

Developed an industrumental analytical laboratory consisting of trace environmental analyses, gas chromatography, high performance liquid chromatography, mass spectrometry, surface analyses, X-ray photoelectron spectroscopy and nuclear magnetic resonance spectroscopy including the design and manufacture of instrument modifications, purchasing instruments, and hiring of key personnel

Isolated, identified, and developed a method of analysis for a colored impurity on a bulk chemical product. Synthesized the colorant for proof of identification and as a standard for future analysis. Proved the mechanism of the development of the color from the packaging materials. Designed new specifications eliminating the problem

Conducted corporate plant environmental laboratory QA/QC audits including the development of a corporate QA/QC manual.

Projessional Proilia

Provided an inexpensive and accurate method of analysis of lead for a manufacturing plant effluent. A published methodology in kit form was modified for plant personnel use to measure soluble and total lead in a waste stream without use of excessive manpower or capital. QA/QC procedures were included as well as the use of performance samples.

Supervision of analytical technological advances that lead to either patents and new products in the fields of coal tar chemicals, food packaging and transformer manufacturing.

Publications

Smith, J., A. Weston, and C. Wezwick, "Tire Cord Emission Studies, Conclusion", The International Society of Industrial Yarn Manufacturers, Savannah, Georgia, 3-4 November 1977.

Hanrahan, J., E. McCarthy, D. Richton, J. Smith, and A. Weston, "Identification of an Interfering Compound is the Determination of Dimethylnitrosamine by Gas Chromatography-Mass Spectrometry". 26th Annual Conference on Mass Spectrometry and Allied Topics, St. Louis, Missouri, 28 May to 2 June 1978.

Brozowski, E., D. Jerolamon, D. Richton, D. Smith, J. Smith, and A. Weston, "Industrial Applications of Chemical Ionization with the Ammonium Ion", 26th Annual Conference on Mass Spectrometry and Allied Topics, St. Louis, Missouri, 28 May to 2 June 1978.

Mueller, B.W., L. Palmer, G. Rebyak, and J. Smith, "Analysis of Alpha and Beta Naphthalene Sulfonic Acids by High Performance Liquid Chromatography". North Jersey A.C.A. Chromatography Discussion Group, Nutley, New Jersey, 14 March 1979.

French, C., L. Palmer, and J. Smith, "Analysis of Polymer Oligomers by High Performance Liquid Chromatography", Middle Atlantic Regional A.C.S. Meeting, West Long Branch, New Jersey, 19-23 March 1979. Burkitt, D. and J. Sinith, "A Simple Chromatographic Modification Providing for Rapid Interchange of Capillary and Packed Columns", Middle Atlantic Regional A.C.S. Meeting, West Long Branch, New Jersey, 19-23 March 1979.

Brozowski, E., D. Jerolamon, D. Richton, D. Smith, and J. Smith, "A Convenient Method for the Evaporation of Solvent in the Priority Pollutant Program," Middle Atlantic Regional A.C.S. Meeting, West Long Branch, New Jersey, 19-23 March 1979.

Mady, N., D. Smith, J. Smith, and C. Wezwick, "The Analysis of Kepone in Biological Samples", Proceedings of the 9th Materials Research Symposium, Gaithersburg, Maryland, 10-12 April 1978.

Mueller, B., L. Palmer, and J. Smith, "A High Performance Liquid Chromatographic Method for the Analysis of Bis-phenol-A and Its Impurities", Middle Atlantic Regional A.C.S. Meeting, West Long Branch, New Jersey, 19-23 March 1979.

Gabriel, M., J. Hanrahan, and J. Smith, "A Sensitive Method for the Quantitative Analysis of Pyridine at the Low PPM Level", Middle Atlantic Regional A.C.S. Meeting, West Long Branch, New Jersey, 19-23 March 1979.

Burkitt, D., J. Hanrahan, and J. Smith, "Analysis of Hexachloroacetone and Hexafluoroacetone in Industrial Wastewater", Proceedings of the A.S.T.M. Committee D-19 Symposium, "The Measurement of Organic Pollutants in Water and Wastewater", Denver, Colorado, 19-20 June 1978.

Brozowski, E., D. Burkitt, M. Gabriel, E. McCarthy, J. Hanrahan, and J. Smith, "A Simple, Sensitive Method for the Quantitative Analysis of Carbon Tetrachloride and Chloroform in Water at the Parts Per Billion Level", Proceedings of the 9th Materials Research Symposium, Gaithersburg, Maryland, 10-12 April 1978.



Theodore F. Them, Ph.D.

Fields of Competence

Inorganic and organic chemistry, instrumental analytical techniques, synthesis of organic chemicals, laboratory management, chemical research and education

Experience Summary

Nine years experience in inorganic and organic chemistry with strong synthetic organic and instrumental analytical background. Experienced researcher and teacher. Background in conceptualizing, founding etfecting, and administering a chemical consulting firm.

Credentials

M.S. Chemistry-University of New Mexico (1975)

Ph.D., Chemistry-University of New Mexico (1977)

American Chemical Society

The Society of Sigma Xi

Southwest Association of Forensic Scientists-Associate Member

Society of Applied Spectroscopy. Rio Grande Section

Employment History

1982-Present	WESTON
1981-1982	Bell Petroleum Services, Inc.
1982-1982	Bell Petroleum Laboratories
1977-1981	AnaChem, Inc. Co-Founder, Vice President
1975-1977	University of New Mexico

Practical Experience

Familiarity with use, maintenance, and operation of gas chromatographs with flame ionization, electron capture.

thermal conductivity, and photoionization detectors. Experience includes methods development, separation optimization, and data reduction.

Familiarity with use, maintenance, and operation of gas chromatograph/mass_spectrometer/data_system_(GC/ MS/DS) in separations and identifications of complex mixtures and molecules_Experience includes methods development_separation_enhancement_packed_and capillary column techniques, and data reduction

Familiarity with use and operation of various infrared, nuclear magnetic resonance (NMR), atomic absorption (AA), and liquid chromatographic (LC) instrumentation

Familiarity with use, maintenance, and operation of Tekmar Models LSC-2 and ALS purge/trap and liquid sample concentrator devices and associated gas chromatographic methods.

Familiarity with use, maintenance, and operation of Fisher Model 490 Coal Analyzer for analysis of moisture, volatiles and ash in coal.

Familiarity with use, maintenance, and operation of Fisher Sulfur Analyzer System for analysis of sulfur in coal and hydrocarbon fuels.

Familiarity with use maintenance, and operation of Parr Adiabatic Bom Calorimeter and associated Master Controller in calorimetric analysis of coal and coke, foodstuffs, and fuels

Familiarity with use, maintenance, and operation of Fisher Models Titralyzer II (Fixed End Point) and Tritrimeter II automatic titration systems for analysis of water by pH or millivolt-sensitive methods.

Publications

Hazardous Properties and Environmental Effects of Materials Used in Solar Heating and Cooling (SHAC) Technologies: Interim Handbook, J.Q. Search (ed.), August 1978. Sandia Laboratories report Sand 78-0842. available from National Technical Information Service. Springfield, Virginia.

Proiessional Proiile

"Isomerism in Complexes of Bidentate Ligands with Enantiotopic Donor Atoms". R.E. Tapscott, J.D. Mather, and T.F. Them, *Coordination Chemistry Reviews*, Vol. 19, Nos. 2/3, September 1979.

"Stereochemical Studies on Diastereomers of Tris (2,3-butanediamine)-Colbalt (III)", C.J. Hilleary, T.F. Them, R.E. Tapscott, *Inorganic Chemistry*, Vol. 19, No. 102, 1980.

"Staying Abreast of PCB Regulations: TESTING", R.M. Holland and T.F. Them, *Professional Trade Publication*, June 1980.

"Stereochemistry of Arsenic (III) and Antimony (III) 1.2-DihydroxyEychohexane-1.2-dicarboxylates," D. Marcovich, E.N. Duesler, R.E. Tapscott, and T.F. Them, *Inorganic Chemistry*, 1982.
Alison L. Dunn

Fields of Competence

Groundwater flow system analysis and numerical modelling, groundwater contamination assessment and remediation, hydrogeologic evaluation of solid and hazardous waste sites, water supply and recovery well design and testing monitor well network design and implementation, sampling of soil and water for conventional and hazardous chemical compounds

Experience Summary

Three years experience as field hydrogeologist and project geologist in industrial and hazardous waste disposal site investigations including two Superfund sites and in inventories and assessments of various classes of injection wells. Three years of graduate research in hydraulic properties of shales and mudstones watershed hydrology and coastal hydrogeology including practical applications of numerical groundwater flow models.

Credentials

B.A. Geology – Mount Holyoke College (1976)
 M.S. Hydrogeology – University of Arizoria (1981)
 National Water Well Association Technical Division
 American Geophysical Union Hydrology Division

Employment History

1984 Present	WESTON
1981 1984	SMC Martin Inc
1976 1981	University of Arizonal Dept. of Hydrology Environmental Research Laboratory and Office of Arid Land Studies
1978 (Summer	Office of the State Geologist Montpeller, VT

Key Projects

Field evaluation of potential groundwater contamination at an Air Force Base in California including monitor well installation and sample collection analysis of hydrogeologic and chemical data

Site assessment and remediation at an uncontrolled hazardous waste disposal site in New Jersey including field sampling of highly contaminated groundwater and soils, conceptual development of site remediation measures and testing of remedia measures on a computer groundwater flow mode!

Hydrogeologic investigation of a 50 acre site for impact of past electronic components manufacturing operations on ground and surface water

Evaluation of the effect of placing an innovative top seat for closure of a 25 acre municipal landfill including analysis of long-term hydrogeologic and geochemical conditions

Site assessment and remediation at an uncontrolled hazardous waste disposal site in Ohic including a metadetector survey for buried drums, soil sampling, drilling and well construction supervision, well logging, and data analysis.

Evaluation of surface seepage from a 3-acre wastewater lagoon, including water level monitoring and a detailed water budget

Publications

Trichloroethylene Occurrence and Ground Water Restoration in Highly Anistopic Bedrock A Case Study Colauthor David L Kraus in Proceedings of the Third National Symposium and Exposition on Aquiter Restoration and Groundwater Monitoring National Water Wel Association Columbus OH 1983

The Impact of Top Sealing on the Windham Connecticut Landfill Colauthors R M Schuller and W W Beck Jr. in Proceedings of the 9th Annual U.S. EPA MERUSHWRD Conference 1983

Leachate Quality Improvements after Top Searing Coauthors W W Beck Jr. and G H. Emrich in Proceedings of the 8th Annual U.S. EPA MERL SHWRD Conference 1982 "Preliminary Assessment of the Hydrologic Environment of Klamath Marsh, Oregon" Co-authors M.E. Norvelle, S.L. Vierek, and S. Ince. NADSAT Project Completon Report No. 31, Office of Arid Land Studies, University of Arizona, 1981, 71 p.

"A Study of Salinity in Effluent Lakes, Puerto Penasco, Sonora, Mexico." Hydrology and Water Resources in Arizona and the Southwest, American Water Resources Association, Arizona Section, 1981.

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"Analysis of a Saline Ground-Water Flow System in Puerto Penasco, Sonora, Mexico." Presented to the Cordilleran Section Meeting of the Geological Society of America, March, 1981.

"A Bibliography of Vermont Geology" Compiled with Charles A Ratte and Diane Vanacek. Office of the State Geologist, Montpelier, Vermont, 1980



Glenn R. Smart

Fields of Competence

Hydrogeologic investigations of potential hazardous waste sites and landfills; design and supervision of installation of groundwater monitoring programs; collection of field data and evaluation of potential environmental impact; management of hydrogeologic projects at hazardous waste sites.

Experience Summary

Seven years of experience in various aspects of the water resource industry. Involvement in over 100 hazardous waste projects in sixteen states. Development of hazardous waste site preliminary assessments and full field investigations. Development of site safety plans for use during hazardous waste site evaluations. Fully trained in the use of respiratory protective equipment, emergency first aid procedures, site sampling protocols and chain-of-custody procedures, and general site safety programs. Frequent interaction with government and industrial clients. Provided expert testimony for super-fund litigation.

Employed remote sensing techniques and on-site investigations to locate favorable sites for the development of groundwater supplies. Collected field data, compiled hydrologic and hydraulic input, prepared reports for flood insurance studies. Presented study results to federal, state and local authorities.

Credentials

B.S. Hydrology—University of New Hampshire (1977) National Water Well Association, Technical Division American Water Resource Association

Employment History

1984-Present	WESTON
1979-1984	Ecology and Environment, Inc.
1977-1979	Sverdrup & Parcel and Associates, Inc.

Key Projects

Project Manager for Superfund site hydrogeologic investigation to determine potential impact on local well water supplies

Project Manager for complete hydrogeologic investigation of Superfund site involving alleged contamination of municipal field

Project Manager for confidential industrial client Project included hydrogeologic study to determine the groundwater quality beneath site slated for industrial development

Supervised a team of six field geologists and participated in collection of geologic data for nationwide mineral survey. Responsible for all planning, logistics, quality assurance and financial control of the team.

Designed shallow water table study to assess impact of past waste disposal practices of confidential client

Designed and supervised installation of numerous groundwater monitoring programs at hazardous waste sites.

Publications

Hagger, C.L.D., and G.R. Smart, "Drilling and Installation of Groundwater Monitoring Wells on Hazardous Waste Sites: Construction Specifications and Preparations for Non-ideal Field Conditions." Paper presented to Northeast Conference on the Impact of Waste Storage and Disposal on Groundwater Resources, Ithaca, New York, July, 1982.

Smart, G.R., "A Cost-Effective Approach to Monitoring Well Installation." Paper presented to Triangle Conference on Environmental Technology, University of North Carolina at Chapel Hill, North Carolina, April, 1983.

Smart, G.R., "Installation of Monitoring Wells at Hazardous Waste Sites." Paper presented to 1983 Spill Control and Hazardous Materials Conference. New Haven, Connecticut, 1983

Smart, G.R., "Design of Monitoring Well Systems to Meet RCRA Requirements." Presented at the HMCRI Waste Site Conference, Houston, Texas, March, 1984

Steven I. Michelson

Registration

Engineer-In-Training

Fields of Competence

Field investigations; groundwater resource evaluations; hydrogeologic investigations of landfills and potential water resource impacts; geologic mapping, regional and local structural and geomorphological analyses; microscopic identification of minerals, foundation and structural concrete design; surveying; analysis of soil stability and mechanics; small systems analysis and design, CPM generation, Fortran IV program design and analysis.

Employment History

1983-Present	WESTON
1982	Getty Refining and Marketing
1981	Geological Mapping and Interpretation Wyoming-Idaho Rockies

Credentials

- B.S., Geology-Lehigh University (1982)
- B.S., Civit Engineering—Lehigh University (1982)

Key Projects

Assisted in the evaluation of contaminant migration to a future Bedford, Massachusetts well-water site as part of a U.S. Air Force-sponsored project at Hanscom Field.

Technical supervision and participation in the scheduled operation and disassembly of pilot treatment plant. Conducted sampling and field studies in support of pilot treatment unit.

Participated in procedural design and operation of field sampling and analysis of a chemical waste impoundment

Assisted in design and evaluation for fresh water storage in Lincoln, New Hampshire Organized written and plan specifications for contract bidding.

Assisted in the evaluation of the environmental impact of present landfill leachate and seepage

Conducted site design, evaluation and construction cost estimations for wastewater treatment plant in North Andover, Massachusetts.

Professional Profile

Fields of Competence

Sampling of groundwater, wastewater, soils and air; chain-of-custody protocols; operation, calibration and maintenance of laboratory and field sampling equipment and analytical equipment. Laboratory analysis of water and gas samples ranging from wet chemistry to automated instrumental methods.

Experience Summary

Seven years laboratory and field experience including environmental water sampling, soil sampling, and air pollution testing. Experience in developing and fabricating equipment for groundwater sampling. Analytical laboratory experience in water, wastewater, and air pollution. Process and quality control analysis for laboratory serving an agricultural chemicals complex.

Credentials

B.A. — California State College Stanislaus Additional courses in Chemistry

Employment History

1983-Present	WESTON
1982-1983	J. R. Simplot Company
1978-1982	Occidential Chemical Company
1976-1978	Valley Nitrogen Producers

Key Projects

Occidential Chemical Company: Sampling of groundwater monitoring wells, domestic wells, and city-maintained wells for trace organic and inorganic analysis.

Inorganic analysis of water and soil.

Assisted in planning a new laboratory facility including startup and certification.

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MONITOR WELL LOGS AND CONSTRUCTION DIAGRAMS

APPENDIX D

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		SKETCH MAP
DRILLING LOG		
WELL NUMBER	OWNER USAF ADDRESS Mather AFB	
SURFACE ELEVATION	TOTAL DEPTH128 ' WATER LEVEL	
	NG DATE DD <u>Mud Rotary</u> DRILLED: <u>3/7/84</u> HELPER	NOTES:
LOG BY SIM/ALD		



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			SKETCH MAP
DRILLING LOG	3		
WELL NUMBER	MAFB-2	OWNER	
		TOTAL DEPTH	
DRILLING COMPANY	DRIL MET	LING DATE HODDRILLED	
	······································	_ HELPER	
there the share out	Wet Wet Pt Pt H W	/	PTION SOIL CLASSIFICATION
thin the way with the second	MIPE JAMPE JAMPEL	/	R. TEXTURE STRUCTURES)
t ^{p:n} tt	MIPE JAMPE JAMPEL	(COLO) D-100' brown SILT and Cl little Gravel	R. TEXTURE STRUCTURES)
	MIPE JAMPE JAMPEL	(COLO) D-100' brown SILT and Cl little Gravel	R.TEXTURE STRUCTURES)
	MIPE JAMPE JAMPEL	(COLOR D-100' brown SILT and CI little Gravel gravel content de	R.TEXTURE STRUCTURES)
	MIPE JAMPE JAMPEL	(COLOR D-100' brown SILT and CI little Gravel gravel content de	R.TEXTURE STRUCTURES)
	MIPE JAMPE JAMPEL	(COLOR D-100' brown SILT and CI little Gravel gravel content de	R.TEXTURE STRUCTURES)

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		SKETCH MAP
SURFACE ELEVATION	TOTAL DEPTH WATER LEVEL	
DRILLING COMPANY DRILLER	DRILLING DATE DRILLEDDRILLED HELPER	NOTES
LOG BY		
in the start	NONT I DESCRI	PTION SOIL CLASSIFICATION DR TEXTURE STRUCTURES)
	42-44' COBBLES and GRAVEL	and SAND
++	little Silt and Cla	ay (difficult drilling)
+		
+		
╡┝╴╶┨┝──╺┝	44-66' brown-grav SILT and	t CLAY
↓ ↓ ↓ +	trace fine Gravel	
+}}+	'Ittle fine Sand	
╆┝╴╺┠╾╌┿	Gravel concent incr	
+	with depth (easy dr	-illing)
	66-75' SAND - (gradual	from above,
	SAND cont	ent increasing with depth)
	little Grave)	
	little Clav, Silt	(smooth, easy drilling)
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	MY COMPANY	
		SKETCH MAP
DRILLING LOG		
WELL NUMBERMAFB-4	OWNER	
	ADDRESS:	
	TOTAL DEPTH	
	WATER LEVEL:	
COMPANYME	THOD:DRILLED	NOTES
LOG BY	_	
CENTH FEEL	DESCRIPTION	SOIL CLASSIFICATION
40	(COLOR, TEX)	TURE, STRUCTURES)
40 42	-45' tan SILT, little Grave	1 and Clay
	trace fine Sand	
+┝╸╺┠╾╾┼╌-┼──-╢──-		
	-58' tan SAND and GRAVEL, 1	·····
50		
+	trace Silt and Clav	
+	few zones of SILT and	
	fine SAND, little Grave	e]
	1'-1:' thick	
60	-78' fine to coarse SAND and	d fine CRAVEL
<u>+</u> }}	little Silt	
+	trace Clay (red and Col	bbles/
· · · · · · · · · · · · · · · · · · ·		
70		
<u>↓</u> ┣╸╺┫ <u>├</u> ──┼──┼──┤┝───		
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				SKETCH MAP
	DRILLING LOG			
		-B-4	OWNER:	
			ADDRESS:	
		1	OTAL DEPTH	
			WATER LEVEL:	
	DRILLING COMPANY:	DRILLIN) [.] DRILLED:	NOTES.
	DHILLER:	I	HELPER:	
	LOG BY:			
	DEPTH FEET	IMBER PE OWS	DESCRIPT	ION SOIL CLASSIFICATION
~	DEPTH IFEET	MBER MPLE TYPE BLOWS		TEXTURE. STRUCTURES)
0——				
-	┼┝╴ ╶╢ ╴╴┼╴╴┼			······································
-	<u></u> <u></u> <u></u> <u></u> <u></u> <u></u> <u></u> <u></u> <u></u> <u></u> <u></u>			
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-	┟┝╸╶┨┝──┼╌┼╴			
0				
		105'-	-146' tan, brown	
			CLAY	
			little fine Sand	, Gravel and Silt
1				
-	┝┠╍╶╶┨┣╼╾┾╾╾┾╸			
0	┝┝╸╺┨┝──┼──┼			
1	┝┝╴╶╢┝──┼			
T	┝┠╴╶┨┝╾╌┿╌╌┿	146-1	166' blue-gray CLAY	
_	┟┠╴╺┨┝──┼──┼		little fine Sand	and Gravel
-			· · · · · · · · · · · · · · · · · · ·	
o				
1				
-	┼┠╴╶┨┟ ╴╸┥			
-	┟┠╴ ╶┨┝ ╼╍┼╼╸┼╸			
-	┝┝╴╺╢╴╴┼╴╴┼			
		166'	End of Hole	





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		SKETCH MAP
DRILLING LOG		
WELL NUMBER: <u>MAF8-5</u> LOCATION: <u>NE Perimeter near</u> Folsom Canal	OWNER <u>USAF</u> ADDRESS <u>Mather AFB</u>	
	TOTAL DEPTH146 '	
DRILLING Change DRILLIN		
COMPANY Stang METHO DRILLER Cliff Patrick	D:	NOTES
LOG BY: SIM/ALD		

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	DEPTH FEEL OG NUMBER OF	EBION ⁵ DESCRIPTION : SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0		D-1' red-brown CLAY, little Sand, Gravel, Cobbles
-		1-1½' red, stratified Hardpan , SILT, little Gravel,
-		Cobbles, wood fibers and roots (cemented)
-		12-22' red, SILT, some Gravel and Cobbles, Little
10		Clay (slightly unconsolidated)
10		22-5' red SILT, little Gravel (massive)
_		5-6' green SILT, little Gravel (mottled)
_	6	5-9' red, SILT and CLAY, little Sand and Gravel
-	c c	9-16' Cobbles (difficult drilling)
20 —		
20		16-32' red CLAY and SILT
-		little Sand and Gravel
_		Gravel and Cobble
		content increasing with depth
30 —		32-40' GRAVEL and COBBLES (difficult drilling)
_		
-		
-		
40	1 3 1 14 D1586	D-18 SHEET1_ OF _3

			SKETCH MAP
DRILLING LOG			
WELL NUMBER. MAFB-5			
SURFACE ELEVATION:		тн /EL:	
DRILLING COMPANY	DRILLING METHOD:		
DRILLER:			
LOG BY			

	DEPTH IFEEL	PE BLONS DESCRIPTION SOIL CLASSIFICATION
40	DEPTH FEELOUS ANPLE NUMER	MPLEBLC (COLOR, TEXTURE, STRUCTURES)
		40-48' red tan, SILT and CLAY
-		some Gravel, little Cobbles
-		
50		
-		
-		
_		48-60' light brown, clean SILT and CLAY
-		little Gravel
60		
-		
-		60-68' light brown, CLAY and SILT
-		little Sand
-		Some Cobbles (difficult drilling)
70 -		
70		68-90' brown, SAND and GRAVEL
-		some Cobbles
-		trace Silt and Clay (difficult drilling)
_		
0		
80	* A S T M D1586	D-19 SHEET 2 OF 3



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	WI STORY	SKETCH MAP
DRILLING LOG		
WELL NUMBER MAFB-6 LOCATION: NE Perimeter on Main Base	OWNER: USAF ADDRESS: <u>Mather AFB</u>	
	MATER LEVEL:	
	NG Rotary ORILLED: 3/12/84 HELPER:	NOTES
LOG BYSIM/ALD		







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			SKETCH MAP
	MBER <u>MAFB-7</u> N <u>7100 Area</u>	OWNER: USAF ADDRESS: <u>Mather AFB</u> TOTAL DEPTH 128'	
DRILLING COMPANY DRILLER:	ELEVATION:	WATER LEVEL	84 NOTES
itPittiFEE!	PMC 200 NUMBER 17PE	ONS DESCRIPTION	N SOIL CLASSIFICATION XTURE. STRUCTURES)
	0-	<pre>1' coarse GRAVEL and COBBL (road base, little demo</pre>	ES, little Sand and Silt lition debris, asphalt)
	1-4	brown-red, SILT and CLA trace fine Gravel (verv	
0	4 - 4	cemented COBBLES & GRAVI	EL - rounded
	43-0	6' COBBLES, some Gravel, 1 (compacted, stratified)	ittle Silt & Clav matrix
	6-2	7' COBBLES and GRAVEL	
		little Sand, Clay, and S	Silt (difficult drilling)
	27-	-40' brownish-gray fine to m	nedium SAND
┥┝╴╶┥┿╴╴┆		little Silt and Clay, t	
			ic chemical odor below 30'-
		effluent	
	1 1 T 1/ 11486	D-25	SHEET OF

	MARTIN N	
		SKETCH MAP
DRILLING LOG		
	OWNER	
LOCATION	ADDRESS:	_
	TOTAL DEPTH	
	DRILLING DATE METHOD:DRILLED:	
	HELPER:	
LOG BY		
atin	<u></u>	
40	E BUNS DESCRIPTIC	DN SOIL CLASSIFICATION EXTURE. STRUCTURES)
40	40-42' CLAY & GRAVEL	
	some Silt and little	Sand
	42-78' Tan SILT	
	some Clay	
50	little Sand and Grave	el
	grading to	
	medium to coarse SAN	D
	Some Silt and Gravel	
	little Clay	
60	grading to	
	fine to medium SAND	and SILT
	little Clay	
	(strong chemical	odor, solvent or
	fuel, below 50')	
70		
30		
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	WI STREET	SKETCH МАР
DRILLING LOG		
	AFB-7OWNER: ADDRESS:	
SURFACE ELEVATION	TOTAL DEPTH	
	DRILLING DATE METHOD:DRILLED: HELPER:	
LOG BY		
itepity refer 00	ale ale al	ON SOIL CLASSIFICATION
30	(COLOR.)	
	78-106' black medium GRAVEL	
	some fine to medium	
	tan silt/Clay matrix	X
	Gravel content incre	eases with
	depth (smooth drilli	ing)
+		
+		
+		
+	106-115' brown-gray, stiff, some fine to medium	
+	little fine Gravel	· · · · · · · · · · · · · · · · · · ·
	115-128' tan, soft, SILT	
	and fine to medium	SAND
	Some clay	
	little gravel	
	becomes denser with 128'End of Hole D-28	n depth SHEET _3_OF _3_

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	MARCH MARK	
		SKETCH MAP
DRILLING LOG		
	OWNER USAF ADDRESS Mather AFB	
	TOTAL DEPTH 128'	
SURFACE ELEVATION	WATER LEVEL:	
DRILLING Stang DRILLING METHO		NOTES:
DRILLER J. Kirby	HELPER.	
LOG BYSIM/ALD		

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0 CEPTH FEE	ARPHIC OU SAMPLE SAMPLE SAMPLE	BLOW5	DESCRIPTION - SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
		0-8"	TOP SOIL
		8''-2'2'	red brown, fine SAND and SILT
			little_clay roots
4		2 ¹ / ₂ -3'	Old pavement zone or asphalt fill
10-+		3-8 '	tan, fine, SAND,
+			some clay
			little Silt
		8-18'	fine COBBLES and GRAVEL
			little Sand
20 -			trace Silt (moderate drilling difficulty)
+		18-36'	COBBLES and GRAVEL
			little Sand
			trace Silt (difficult drilling)
30			
		36-60'	brown CLAY
			some Silt, trace fine Sand
			occasional zones of gravelly clav
			and tan Silt, some fine to medium Sand
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		WI STREET	SKETCH MAP
DRILLING LOG			
WELL NUMBER.	MAFB-9		
	7100 Area	ADDRESS Mather AFB	
		TOTAL DEPTH128 '	
DRILLING		WATER LEVEL Mud ING DATE 3/20/84 OD Rotary DRILLED 3/20/84	
COMPANY: DRILLER:	KirbyMETH	HELPER	NOTES
LOG BYSIM	/ALD		
DEPTH FEEL	PLE NUMBER MPE BLOWS		SOIL CLASSIFICATION TURE. STRUCTURES)
		red TOPSOIL	
++-			
++-			
	1-15	COBBLES and GRAVEL	
		matrix-red, fine to co	arse SAND
		and SILT	
		little Clav	
++-			
	15-4	5' COBBLES and GRAVEL	
++-		some Sand	
++-		little Silt. trace Cla	v (mav have some comentation or
+		cobbles to 21').	
++-			
30			
+			
++-			
	-+		
•يــــــــــــــــــــــــــــــــــــ	 		SHEET OF





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DRILLING LOG	SKET	СН МАР
WELL NUMBER MAFE-10 LOCATION West Ditch	OWNER USAF ADDRESS Mather AFB	
SURFACE ELEVATION DRILLING Star.u COMPANY DRILLERLKITDY LOG BYSIM_ALD	TOTAL DEPTH 120' WATER LEVEL DRILLING ROTARY DATE 8/31/84 METHOD ROTARY DRILLED NOTE	S
A CONTRACT OF CONTRACT.	DESCRIPTION SOIL CLA COLOR TEXTURE ST	
	0-1' TOPSOIL	
	1-3' red, fine SAND and SILT	
	little clay	
	3-91 red. Silt/Clav and fine SAM	1D
••••••••••••••••••••••••••••••••••••••	brittle hardban	
	9-18' COBBLES and GRAVEL	
	matrix-red, fine SAND and S	51LT
	little Clav (difficult dri	ling)
	18-421 COBBLES and GRAVEL-black to	nafic)
•	one foot thick zones of	
•• { }	brown, dense, fine SAND/SIL	.T
+ + + +	little Clav (difficult dri	ling)
►		
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		• •

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		SKETCH MAP
DRILLING LOG		
WELL NUMBER MAFB-10	OWNER	
	ADDRESS	
	TOTAL DEPTH	
	DRILLING DATE	
COMPANYM	METHODDRILLED	
DRILLER	HELPER	
LOG BY		
		L
IN THE REAL		
LOIM FEL	BLOW DESCRI	PTION SOIL CLASSIFICATION R TEXTURE STRUCTURES)
	77-120' brown SILT, CLA	
	and fine SAND	
╶┝╴╶┥┝╌╴┾╵╶╌┾──╌┥┝─		
┝╸╶┫┝╌┄┿╌╌╍┿╴╴╌┥┝╌╴	lenses of mediu	im to coarse SAND
	easy drilling)	
┝╴╶┥┝╾╌┿╌╾┥┝╌╴		
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		···· · · · · · · · · · · · · · · · · ·
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	·	
┝╴╺┫┝╶╶┿╌╴┽╴╶┪┝┈		
	120 End of hole	

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		SKETCH MAP
DRILLING LOG		
WELL NUMBER	OWNER USAF ADDRESS Mather AFB	
	TOTAL DEPTH118'	
SURFACE ELEVATION	WATER LEVEL.	
DRILLING Stang DRILLI COMPANY Stang METHO	NG DATE 2/22/81	
DRILLER J. Kirby	HELPER	NOTES.
LOG BYSIM/ALD		

	Athen its	IN . UN AMPLE - AMPLE - A	NE BUNN	DESCRIPTION SOIL CLASSIFICATION (COLOR. TEXTURE, STRUCTURES)	
э —			0-6''	red-brown TOPSOIL	
			6''-3'	red, fine SAND and SILT, little Clay	<i>(</i>
			3-6	red, SILT, little Clay and fine Sand	ł,
-				trace Gravel	
• •			6-42 '	COBBLES and GRAVEL	· · · · · · · · · · · · · · · · · · ·
-				red, Silt and fine Sand matrix	
				little Boulders	
_				Gravel is black,	
-				mostly mafic	
-				(At 19' bit ground on boulder	
				for 105 minutes before breaking	
-				through)	
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WELL NUMBERMAFB	ADDRESS		
SURFACE ELEVATION	TOTAL DE	 РТН VEL	
DRILLING COMPANY	DRILLING	DATE DRILLED:	

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APPENDIX E

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AQUIFER RECOVERY TESTS

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TABLE E-1

SUMMARY OF RECOVERY TEST RESULTS

WELL NUMBER	RESIDUAL DRAWDOWN Over One Log Cycle,	PU RA	MMPING TE, Q ₃	TRANSMISSIVITY T (1)
	Js' (feet)	(gpm)	(ft ³ /day)	(ft2/day)
2	5.2	5	962	33.87
3	6.5	7.3	1,405	39.57
4	9.0	12	2,310	46.97
5	22.2	6	1,155	9.52
7	23.1	12	2,310	18.30
8	11.2	25	4,812	78.64
9	8.5	10	1,925	41.45
÷	35	15	2,887	15.10
10	19.6	20	3,850	35.95

(1) Formula : $T = \frac{2.3 Q}{4 \pi \Delta s'}$

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FIELD SAMPLING AND QA/QC PLAN

APPENDIX F

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SAMPLING AND QA/QC PLAN

Base Well Pumping

The following procedures will be followed in sampling the 15 base production wells:

- Ascertain whether the well is pumping or not. If it has not been pumped during the last 2 hours, treat it as a static well and go to Step 3).
- 2. If the well is pumping, measure the pumping water level and record that level, the pumping rate, and the cumulative reading (total gallons pumped) on the flow meter. Run the sampling tap just long enough to clear any standing water from the line and begin sampling.
- 3. If the well is static, measure the static water level (SWL). Compare this to the total well depth (see Table 1) to obtain the height of the column of standing water in the well. Convert this to a value in gallons. Multiply by 3 to obtain 3 well volumes.
- 4. Turn the pump on, and use the flow meter to obtain a flow rate. When the flow rate has stabilized, calculate the time necessary to pump three well volumes.
- 5. Run the pump for the total time necessary to pump three volumes, <u>if possible</u>. If there are physical constraints in the pumping or distribution system, make a note of the SWL, well volume, pumping rate, and total time pumped. At the end of this time, run the sampling tap long enough to clear standing water and begin sampling following Steps 6 through 9 below.

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Monitor Well Pumping and Sampling

In general, ground-water samples will be collected from pump discharge after pumping 3 well volumes from each well. Prior to initiation of well pumping, however, a small volume of sample will be collected from the top of the water column for analysis of oils and greases. The parameters to be sampled for and appropriate containers are described in separate attachments.

All monitor wells will be pumped using an electric submersible pump connected to a Teflon discharge line. The pump and discharge line will have been completely decontaminated (including purging with a detergent, nitric acid and distilled water) prior to first use at the site.

Between monitor wells, the equipment will be decontaminated by flushing the inside and hosing the outside with approximately 50 gallons of potable water from a Base source (use the same source throughout the sampling). At the end, approximately 5 to 10 gallons of dilute nitric acid solution (mixed in Base water) will be flushed through the pump and line, followed by 5 to 10 gallons of distilled or deionized water.

The following procedures will be followed in sampling each well:

- 1. Measure the SWL with reference to the measuring point marked on the top of the casing.
- 2. Lower a bottom-loading Teflon^(R) bailer slowly down to the air-water interface, and draw off the top 6 inches, approximately, of the water column. Transfer this sample into the container for oil and grease analysis until it is three-quarters full.
- 3. Calculate the volume of standing water in the well.
- 4. Lower the pump and begin pumping. Record the pumping rate and total time to pump at least 3 well volumes.
- 5. At the end of this time, decrease the pumping rate, if necessary, and begin sampling.

- 6. Collect grab samples for immediate measurement of temperature, pH and specific conductance.
- 7. Gently fill each sample container from the pump line, taking care to avoid aeration or turbulence of the sample water. All containers should be filled completely (taking care not to spill preservatives if they are pre-dosed) except for the bottles for oil and grease analysis, which are to be only three-quarters full.
- 8. Filter 750 to 1000 ml of sample using a field filtering apparatus with as little exposure to air as possible. Transfer the filtered sample to an appropriate container and add sufficient nitric acid to lower pH of sample below 2 (approximately 2 ml).
- 9. Wrap the sample containers in protective packaging and pack with ice in a thermal chest to insure cooling to 4° C.

Soil Sampling

Fully decontaminate the trowel or spatula used before collecting samples. Work from area of less suspected contamination (downstream from the oil skimmer to the area of greater suspected contamination (upstream).

- Collect samples for VOA analysis in 30 ml vials, taking care to leave as little void space as possible and to completely crimp the Teflon-lined cap.
- 2. Collect another liter of sample in a separate amber glass jar with Teflon -lined cap for the remaining analyses.

QC Samples

Approximately 20 percent additional samples will be collected for the purpose of validating field and analytical techniques. These will include 1 field blank and 2 duplicate ground-water samples.

The field blanks will consist of distilled water collected using methods and equipment the same or as close as possible to those used in actual sample collection: e.g. distilled water will be pumped from a clean glass jar through the pump

F - 3

and line to obtain the field blank associated with ground-water sampling and distilled water will be poured into the closing sampler and from there into sample containers to obtain the field blank associated with surface-water sampling. Duplicates will be collected as separate samples, not splits of a single sample.

In addition, a trip blank of distilled water in two 30 ml glass vials with Teflon -lined septa will accompany each ice chest during sampling, and will be returned un-opened with the ice chest as it is shipped back to the laboratory.

Container Preparation

Another consideration in this, or any analytical project is that of sample container preparation. Accordingly, all appropriate sample bottles shall be cleaned in a manner mandated by the U.S. EPA to insure maximal cleanliness (and minimal contamination) before the containers go to the field. Sufficient bottles to accommodate both laboratory and field requirements will be necessary.

Chain-of-Custody

Since they document the history of samples, chain-of-custody procedures are a crucial part of a sampling/analysis program. Chain-of-custody documentation enables identification and tracking of a sample from collection to analysis to reporting.

WESTON's chain-of-custody program necessitates the use of EPA-approved sample labels, secure custody, and attendant record keeping. Depending on the client's requirements, WESTON also offers container sealing during unattended transportation of samples.

In essence, WESTON considers a sample in custody if it: is in a WESTON employee's physical possession; it is in view of that WESTON employee; is secured by that WESTON employee to prevent tampering; or is secured by that WESTON employee in an area that is restricted to authorized personnel.

Each time a sample is relinquished from one analyst to another, or from one location to another, WESTON's analytical personnel are required to make appropriate entries. Personnel-specific initials are used as identifiers of analysts, as are location codes for various locations (refrigerators, extraction areas, analytical areas, etc.).

Quality Assurance Plan

WESTON'S analytical services enforces a rigid QA/QC program toward maintenance of validity and reliability of all analytical data. The Laboratory QA/QC Manual outlines the specifics of the QA/QC plan. This plan is patterned after the EPA Handbook for Analytical Quality Control in Water and Wastewater Laboratories (EPA-600/4-79-019, March 1979), augmented by general applicable experience and interaction with the QA/QC plan of the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA). All methods and procedures followed by WESTON are either USEPA or ASTM-approved. Any variations from such procedures, regardless of cause, are documented by the responsible analyst(s) and are documentable and literature-traceable. - ATTACHMENTI, Tablel

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EY DATE 4-10-14_	DIV	SHEET OF
CHKD BY DATE	DEPT	W.O. NO. <u>0628-05-26</u>
-PROJECT		

SUBJECT SUMMARY OF WELL SPECS -MATHER AFB BASE WEL . -- -----_ __ _ - - -

WELL_	FACILITY	TOTAL	PERFURATED	ORIGINAL	CURRENT
NAME	¥	DEPTH	INTERVAL	YIELD	CAPALI
- · · -	·	(FEET BO	(in (in the second seco	(604)	(FPH)
6c-1	8867	561	302-462	2400	*****
66.2	8880	4 03	-		
FH-1	:4418	531	262-517	1500	550
FH - 2	14147	400	348-400	1100	635-
FH - 3	H 488	5700	280-500	1020	600
FH - 4	1987	500	205-500	825	575
FH · S	17757	550	152 - 550	1100	955
=H -6	16000	1 79	246-500	3400	-
B-1	3476	532	262 - 532	1225	365
B-2	3795	584	186 - 494	1400	616
B-3	2795	501	294 - 500	1,000	600
3-4	2930	500	246-422	1,200	49:
Acw	10151	250	200-220	140	2
K-9	18005	250		50	۰.
JTC	7098	~250	-		





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MICROCOPY RESOLUTION TEST CHART NATIONAL BURGLOUP CONVERSION AND CONVERSION

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Sample Hold- ing Time	14 days 28 days 28 days 28 days 28 days 6 months 6 months 6 months 6 months 6 months 6 months ac., 30 days thereafter "	14 days 28 days 28 days 14 days 6 months	on limits given
Analytical Methods and Regulieu moluny limes (W. O. #0623-05-26) EPA Method (Reference (1)	601 and 602 415.1 413.2 420.1 335.2 239.2 1CP Optical Emission Spectrometic Method 213.2 1CP Optical Emission Spectrometic Method 272.2 1CP Optical Emission Spectrometic Method 272.2 1CP Optical Emission Spectrometic Method 608 608 608 608 600/4-81-053	5020 Modifield 3540 (Soxhlet Extraction) 420.1 9010 ICP Optical Emission Spectrometic Method	the methods listed will meet the reguired detection limits given
Parameter	1. Water Samples VOA TOC Oils & Greases Phenols Cyanides Lead Chromium Cadmium Nickel Silver Dimethylnitrosamine (DMN) PCB DDT isomers Chlordane 2,4-D	<pre>2. Soil Samples VOA Oils & Greases Phenols Cyanide Metals (Pb, Cr, Cd, Ni, Ag)</pre>	(1) It is assumed that the

Attention 3 Required Sample Detection Limits

Prezeter	Soil/Secigent	Water
*Iotal Organic Carbon (TOC) Dils and Grezses (IR Method 412.3)	1.0 milligram/gram 100 micrograms/gram	1.0 milligram/L
Dis and Grezses (in Method 412.5) Phenol	1 microgram/gram	10 Eicrogres/L 1.0 Eicrogres/L
Cyanide	1 microgram/gram	10 micrograms/L
Lead	P	20 micrograms/L
Chrocium Cadrium	5 micrograms/gram 1 microgram/gram	50 micrograms/L 10 micrograms/L
Nickel	10 Bicrograms/gram	100 micrograms/L
Silver	1 microgram/gram	10 micrograms/L
PCB's	*	0.25 micrograms/L
Dimethylnitrosamine (DMR)		1.0 microgram/L
DDT isomers		0.02 micrograms/L
Chlordane		0.02 micrograms/L
2,4-D		0.06 microgram/L
Volatile Organic Compounds (VOC)	6 8	**

*Detection levels for TOC must be 3 times the noise level of the instrument. Laboratory distilled water must show no response; if it shows a response, corrections of positive results must be made.

**Detection limits for VOCs shall be as specified for those compounds listed EPA Methods 601 and 602.

Method: Federal Register, Vol 44, No. 233, pp 69458-69473.

This method should be strictly followed including these iters:

Item 1.4 - This method is recommended by EPA for use only by <u>experienced</u> residue analysts or under the <u>close</u> supervision of such qualified persons.

Item 2.2 - This is <u>most important</u>. If interferences are encountered (as in early peaks such as vinyl chloride), the method provides a secondargas chromatographic column that will be helpful in resolving the compounds of interest from interferences. This <u>must</u> be done in the case of vinyl chloride and so noted in analysis report.

Items 3.3, 7.1-7.3 - These sections on interferences, contamination and QC should be <u>strictly</u> followed.

Items 8.3 - All samples must be analyzed within the recommended holding time: This <u>must</u> be followed without exception.

If questions are encountered about certain contaminants you may be asked to show both chromatograms used to rule out possible interferences.

F33615-80-D-4006/002602 F-8

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APPENDIX G

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FIELD SAMPLE LOG SHEETS

ROUND 85-1

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GROUNDWATER WELL LOG SHEET							
Site M	ather AF	B Sa	mplers	Begrar He	Nes		
Field #				-9			
Sample I.D.	8-1	Da	te <u>5</u> -	31-85	Time	1600	
TOTAL WELL DEPTH _		FT.	SAMPLES	TAKEN:			
S.W.L.		FT.	VCA TCC				
WATER COLUMN		FT.	Cil : PCF	Ercase			
WATER VOLUME		G.					
X3=		G.					
FLOW RATE		G.P.M.					
PUMPING TIME REQUI	RED	MINS.			C (Imr	nediate)	
				16.9	_ Conduct	tivity	
ACTUAL PUMPING TIM	LE	MINS.		6.2	(umho pH	55)	
BAILED				18.4	_ °C (at Rea	pH Cond. adings)	
Duplicate Taken:	Yes No			5 TAKEN:			
I.D. Assigned			FLC.	A Liante		e . ⁻ (
Field #			1 an	intersitients		in a day	
				inter ing	1. 1. 1. 1	· * • , =	
<u></u>	°C (Immed	iate)	· · · · · · · · · · · · · · · · · · ·	i) while and	tot is .	····	
	Conductiv (umhos) pH	ity	+ 53	and contract			
	- °C (at pH Readi				·		

G**-**1

	ŢŢ		
	Sa	LL LOG SHEET mplers <u>NBANT</u> te <u>5 30 55</u>	Time <u>///55</u>
TOTAL WELL DEPTH	_ FT.	SAMPLES TAKEN:	
S.W.L.	_ FT.		
WATER COLUMN	FT.		
WATER VOLUME	_ G.		
X3=	_ G.	2 Section 2	
FLOW RATE	G.P.M.		
PUMPING TIME REQUIRED	MINS.		°C (Immediate)
ACTUAL PUMPING TIME	_ MINS.		Conductivity (umhos) pH
BAILED	_		_ °C (at pH Cond. Readings)
Duplicate Taken: Yes N	• •	SAMPLES TAKEN:	
I.D. Assigned		Version Restored and the second	· · · · · · · · · · · · · · · · · · ·
Field #			
Conducti Conducti (umhos pH	vity	an an <u>a</u> n an <u>a</u> n	.•
°C (at p Read	H Cond. ings)		

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	GROUNDWAT				
Site // 1	ther AFB	_ Samp	lers	M3/NT	
Field #		_			
Sample I.D. FB	3	_ Date	5:30	35	Time 1775
TOTAL WELL DEPTH	FT		SAMPLES 1		
S.W.L.	FT		Meta	$e \left(s \right)^{2} \left(s \right)^{2}$	1; Poster Ing
WATER COLUMN	FT	•			
WATER VOLUME	G.				
X3=	G.				
FLOW RATE	G.	P.M.			
PUMPING TIME REQUIR	ED MI	NS.		15	_ °C (Immediate) _ Conductivity
ACTUAL PUMPING TIME	MI	NS.		<u> </u>	_ Conductivity (umhos) _ pH
BAILED				53	_ °C (at pH Cond. Readings)
Duplicate Taken:	Ye s No		SAMPLES	TAKEN:	
I.D. Assigned			()~···	1.1.1.1.	in the second
Field #				1	
	°C (Immediat	e)		and the second	
Conductivity				Brite	ling 7021
	(umhos) pH				
	°C (at pH Co Readings				:

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PRODUCTION WELL							
site Muther AFB		Samplers 16/DT					
Field #			6-3-85				
Field # Sample I.DFH-1			5-20-35	Time _	0855		
STATIC		SAMPLES	TAKEN:				
TOTAL WELL DEPTH <u>53</u> /	FT.	134 T32	1001 + 602				
S.W.L.	FT.	C+E-					
WATER COLUMN	FT.						
WATER VOLUME							
FLOW RATE							
PUMPING TIME REQUIRED	MINS.						
ACTUAL PUMPING TIME	MINS.						
OPERATING X			22	°C (Im	mediate)		
WATER LEVEL	FT.		168		tivity os)		
PUMPING RATE /050	G.P.M.		7.3	рН			
TOTAL GALLONS PUMPED 264362	<i>.</i>		·9.1		pH Cond. adings)		
DUPLICATE TAKEN YES (N I.D. ASSIGNED FIELD # /		SAMPLES	TAKEN:				
1120 °C 	(umhos)	G-4					

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	PRODUCT	ION WELL	
site Malker Al	B	Samplers DE/13J	
		6-3-85	
Field # Sample I.D74-2-0	/	Date 5	
STATIC	-	SAMPLES TAKEN:	
TOTAL WELL DEPTH	FT.	VBA (act + lec) tele	2)
S.W.L.	_ FT.	()+(<u>-</u>	
WATER COLUMN	FT.		
WATER VOLUME			
FLOW RATE	_ G.P.M.		
PUMPING TIME REQUIRED	MINS.		
ACTUAL PUMPING TIME	MINS.		
OPERATING	-	.77	_ °C (Immediate)
WATER LEVEL	FT.	"3	_ Conductivity (umnos)
PUMPING RATE	_ G.P.M.	7,3	_рн
TOTAL GALLONS PUMPED 44, 569	.000	<i>~1.0</i>	C (at pH Cond. Readings)
DUPLICATE TAKEN YES N I.D. ASSIGNED FIELD #°C	-	SAMPLES TAKEN:	
CONDUCTIVITY	(umhos)	_	

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PRODUCTION WELL					
site Mather Af	73	Samplers 1.8/1.J	-		
Field #					
Sample I.D. FH-3		Date 5-3-85	Time/000		
STATIC		SAMPLES TAKEN:			
TOTAL WELL DEPTH 500	FT.	VDA (GAL+GD. TOC	2)		
S.W.L.	FT.	C+G			
WATER COLUMN	FT.				
WATER VOLUME	G. G.				
FLOW RATE	G.P.M.	Samples were Winted Track	ar hereity as some states		
PUMPING TIME REQUIRED	MINS.	3 - in lessele	2 4 4 954 2 - 2 5 50 - 12		
ACTUAL PUMPING TIME	MINS.				
12" SOIVERL OPERATING			°C (Immediate)		
WATER LEVEL 190	FT.	510	Conductivity (umnos)		
PUMPING RATE //20	G.P.M.	-7.2	рН		
TOTAL GALLONS PUMPED 27992	G.		°C (at pH Cond. Readings)		
DUPLICATE TAKEN (YES) N I.D. ASSIGNED	E.	SAMPLES TAKEN:			
11000 # 11000 # °C	(umhos)				

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PRODUCTION WELL						
site Mather A	HF3	Samplers <u>PRIN</u>	-			
		1-2.8-				
Field # Sample I.DFH-U		Date	Time			
STATIC		SAMPLES TAKEN:				
TOTAL WELL DEPTH 500	FT.	VEA (601-602) TOC				
S.W.L.	FT.	0+6-				
WATER COLUMN	FT.					
WATER VOLUME	G.					
	G.					
FLOW RATE	G.P.M.					
PUMPING TIME REQUIRED	MINS.					
ACTUAL PUMPING TIME	MINS.					
11-11 Sineen		216				
OPERATING	-		°C (Immediate)			
WATER LEVEL	FT.	129	Conductivity (umnos)			
PUMPING RATE Y600	G.P.M.	7.45	ЪН			
TOTAL GALLONS PUMPED 45849	G.	<u> </u>	°C (at pH Cond. Readings)			
DUPLICATE TAKEN YES N I.D. ASSIGNED FIELD # °C CONDUCTIVITY pH		SAMPLES TAKEN: Frése very Oily Tring & Lici	when WC.			

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	PRODUCTI	ON WELL		
Site Mather AFB		Samplers $DB/$	25	
Piold #				
Sample I.D. <u>13-1</u>		Date	<u>55</u> Tim	e <u>1505</u>
STATIC		SAMPLES TAKEN:		
TOTAL WELL DEPTH	FT.	VCIA Tec		
S.W.L.	FT.	Otto- Matals		
WATER COLUMN	FT.	DMNi Pestilleibic		
WATER VOLUME				
FLOW RATE	G.P.M.			
PUMPING TIME REQUIRED	MINS.			
ACTUAL PUMPING TIME	MINS.			
12 " OPERATING		51	°C	(Immediate)
WATER LEVEL /20	FT.			ductivity umnos)
PUMPING RATE	G.P.M.		pH	
TOTAL GALLONS PUMPED	G.		°C	(at pH Cond. Readings)
DUPLICATE TAKEN YES N I.D. ASSIGNED	0	SAMPLES TAKEN:		
FIELD # °C CONDUCTIVITY PH	(umhos)			

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PRODUCTION WELL				
Site Mathir AF	2	Samplers T.B. D.T		
Field #		6-3		
Sample I.D. $B-2$		e _7	Time	
STATIC		SAMPLES TAKEN:		
		V BA		
TOTAL WELL DEPTH _ 584	FT.	TCC		
S.W.L.	ምጥ	C+G		
5.W.D.		Metals DMN		
WATER COLUMN	FT.	Factifiers		
-				
WATER VOLUME X3=				
FLOW RATE	G.P.M.			
PUMPING TIME REQUIRED	MINS.			
ACTUAL PUMPING TIME	MINS.			
12" Some on				
OPERATING			°C (Immediate)	
WATER LEVEL 175	FT.		Conductivity	
			(umnos)	
PUMPING RATE 1140	G.P.M.		рн	
TOTAL GALLONS PUMPED 304, 'rC,C	00			
TOTAL GALLONS POMPED			°C (at pH Cond. Readings)	
	~			
DUPLICATE TAKEN YES	၀ ်	SAMPLES TAKEN:		
I.D. ASSIGNED				
FIELD #°C				
CONDUCTIVITY	(umhos)			
рН	ļ	-0		
	(3-9		

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PRODUCTION WELL				
Site Mathia AFB	Samplers La Da			
m. 12 4				
Sample I.D. <u>B-3</u>	Date	Time		
STATIC	SAMPLES TAKEN:			
TOTAL WELL DEPTH FT.	VEA			
s.w.l. <u>90</u> ft.	TCC. C+G Mitais			
WATER COLUMN FT.	DMN Pest/Hr, b			
WATER VOLUME G. X3= G.	1-ESTI AT I LU			
FLOW RATE G.P.M.				
PUMPING TIME REQUIRED MINS.				
ACTUAL PUMPING TIME MINS.				
OPERATING		_°C (Immediate)		
WATER LEVEL //O FT.		_ Conductivity (umnos)		
PUMPING RATE STC G.P.M.		рН		
TOTAL GALLONS PUMPED "" CSSCICG.		_ °C (at pH Cond. Readings)		
DUPLICATE TAKEN YES NO	SAMPLES TAKEN:			
C C CONDUCTIVITY (umhos) PH	G-10			

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PRODUCTION WELL				
site <u>Mafriar Al</u>	525	Samplers DR 55	-	
Field #				
Sample I.D. <u>B-4</u>		6-3- Date <u>-85</u>	Time	
STATIC	-	SAMPLES TAKEN:		
TOTAL WELL DEPTH 500	_ FT.	VDA (Golffers Tre-) (2.24.)	
s.w.l. <u>70</u>	FT.	0+6-		
WATER COLUMN	FT.	Metais DMN	_	
WATER VOLUME		Pest/Herb (3		
X3=				
FLOW RATE	G.P.M.			
PUMPING TIME REQUIRED	MINS.			
ACTUAL PUMPING TIME	MINS.			
12" Sorecin	·····			
OPERATING	-		°C (Immediate)	
WATER LEVEL	FT.		Conductivity (umnos)	
PUMPING RATE	G.P.M.	· · · · ·	рН	
TOTAL GALLONS PUMPED	G.		°C (at pH Cond. Readings)	
DUPLICATE TAKEN (YES N I.D. ASSIGNED	(umhos)	SAMPLES TAKEN: MA TOG CHC MA Districts DMA Logenous		

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P	RODUCTI	ION WELL	
site Marthur Ar	B	Samplers BAST	
Field #			
Sample I.D. JTC		6-3- Date 535	Time /STS
STATIC		SAMPLES TAKEN:	
TOTAL WELL DEPTH	FT.	V3A (Got - 100 -100	2.)
S.W.L.	FT.	O+L- Phenolics	
WATER COLUMN	FT.	l'yande Mitais	
WATER VOLUME	G.	/4.:+a. 3	
x 3=			
FLOW RATE	G.P.M.		
PUMPING TIME REQUIRED	MINS.		
ACTUAL PUMPING TIME	MINS.		
OPERATING			°C (Immediate)
WATER LEVEL	FT.		Conductivity (umnos)
PUMPING RATE	G.P.M.		рН
TOTAL GALLONS PUMPED	G.		°C (at pH Cond. Readings)
DUPLICATE TAKEN YES NO I.D. ASSIGNED FIELD # °C CONDUCTIVITY (PH	umhos)	SAMPLES TAKEN: The netres Cyanude	
		G-12	

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PRODUCTION WELL					
site Mathir AT	F,	Samplers SELDJ			
Field #		6-3.85			
Sample I.D. <u>K-7</u>		Date			
STATIC	_	SAMPLES TAKEN:			
TOTAL WELL DEPTH	FT.	VSA TOC-			
S.W.L.	_ FT.	C(1 + CrCa = c)			
WATER COLUMN	FT.				
WATER VOLUME					
FLOW RATE					
PUMPING TIME REQUIRED	MINS.				
ACTUAL PUMPING TIME	MINS.				
OPERATING			°C (Immediate)		
WATER LEVEL //D	FT.	· · · · · · · · · · · · · · · · · · ·	Conductivity (umnos)		
PUMPING RATE <u>30</u>	G.P.M.	1.54	рн		
TOTAL GALLONS PUMPED	,		°C (at pH Cond. Readings)		
DUPLICATE TAKEN YES I.D. ASSIGNED FIELD # CONDUCTIVITY	NO 	SAMPLES TAKEN:			
рн		G-13			

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	FRODUCT	ION WELL	
site Mathir AF	r)	Samplers <u>I.P./I.T</u>	
Field #			
Sample I.D. GC-1		Date 25	Time
STATIC		SAMPLES TAKEN:	
	-		
TOTAL WELL DEPTH 562	FT.	VOA (GCILGEL) TRC	
S.W.L.	FT.	C+ (-	
WATER COLUMN	FT.		
WATER VOLUME	_ G.		
X3=	G.		
FLOW RATE	G.P.M.		
PUMPING TIME REQUIRED	MINS.		
ACTUAL PUMPING TIME	MINS.		
15" Sincon			
OPERATING	_		°C (Immediate)
WATER LEVEL	FT.	:45	Conductivity
PUMPING BATE	G.P.M.	-,4	(umnos)
PUMPING RATE	- G.P.M.		рН
TOTAL GALLONS PUMPED	G.	:0.0	°C (at pH Cond. Readings)
	ат. Г		
DUPLICATE TAKEN YES	10	SAMPLES TAKEN:	
I.D. ASSIGNED			
FIELD #			
°C			
CONDUCTIVITY	(umhos)		
рн		G-14	

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PRODUCTION WILL				
Site Mid-Hill	FERS	Samplers <u>BBAN</u>		
Field #		6-3-85		
Sample I.D. CC-2-2	/	Date 5799 347	Time 12 15	
STATIC	-	SAMPLES TAKEN:		
TOTAL WELL DEPTH 403	FT.	VCA (uc) (C2)		
S.W.L.	FT.	culture concase		
WATER COLUMN	FT.			
WATER VOLUMEX3=				
FLOW RATE				
PUMPING TIME REQUIRED	MINS.			
ACTUAL PUMPING TIME	MINS.			
OPERATING X	-	21	°C (Immediate)	
WATER LEVEL 80	FT.	·	Conductivity (umnos)	
PUMPING RATE	G.P.M.	·	рН	
TOTAL GALLONS PUMPED	.	a1.5	°C (at pH Cond Readings)	
DUPLICATE TAKEN (YES N I.D. ASSIGNED $-C - C - C - C - C - C - C - C - C - C$		SAMPLES TAKEN:	· · · · · · · · · · · · · · · · · · ·	

	GROUNDWATER	WELL LOG SHEET	
Site	Marine: HEB	Samplers <u>BAST</u>	
Field #			
Sample I.D/	MAFS-3	Date State 85	Time 1723
TOTAL WELL DEPT	1 FT.	SAMPLES TAKEN:	
S.W.L	11008 FT.	VCA TEC CILIENPASE	
WATER COLUMN	13.72 FT.	PCB	
WATER VOLUME	$\frac{3.3}{210.4}$ G.		
FLOW RATE	G.P.	м.	
PUMPING TIME RE(DUIRED MINS		°C (Immediate)
ACTUAL PUMPING	TIME MINS		Conductivity (umhos) pH
BAILED		203	°C (at pH Cond. Readings)
1000	1-120		
Duplicate Taken	Yes No	SAMPLES TAKEN:	
I.D. Assigned		_	
Field #		-	
	<pre> °C (Immediate) Conductivity (umhos) pH</pre>		, • ,

Z



GROUND Site <u>Mar AEB</u> Field #	Sai	LL LOG SHEET mplers <u>B</u>	
Sample I.D. <u>L'AF3-2</u>		te <u>5-31-85</u>	Time
TOTAL WELL DEPTH 23.7 S.W.L. 29.77 WATER COLUMN 23 WATER VOLUME 7.4 x3 = 77.7 FLOW RATE	FT. FT. FT. G. G.	SAMPLES TAKEN: VBA TOC Ciland Greasc FCB	
PUMPING TIME REQUIRED ACTUAL PUMPING TIME BAILED DATES A REA-REA		<u> </u>	°C (Immediate) Conductivity (umhos) pH °C (at pH Cond. Readings)
Duplicate Taken: Yes No I.D. Assigned <u>MAFR-2</u> Field # C (Immed <u>123</u> Conductiv (umhos) <u>126</u> °C (at pH Readi	iate) ity Cond.	SAMPLES TAKEN: VZA TER EN TER ENR	· •

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	A COLLEN	
GROUNDWATER W		
site <u>Mathir AFB</u> s	amplers <u>BIDT</u>	
Field #		
Sample I.D. <u>MAFB-3</u> D	ate <u>5-31-85</u>	Time
TOTAL WELL DEPTH FT.	SAMPLES TAKEN:	
S.W.L. /67.19 FT.		
WATER COLUMN FT.	Ciland Crease MB	-
WATER VOLUME & G.		
$X3 = \frac{352}{G}$		
FLOW RATE G.P.M.		
PUMPING TIME REQUIRED 2.5 Mins.	· · · · · · · · · · · · · · · · · · ·	°C (Immediate)
ACTUAL PUMPING TIME MINS.	7.6	Conductivity (umhos) pH
BAILED	20.5	°C (at pH Cond. Readings)
<u>Sancon</u> (02-120)		
Duplicate Taken: Yes (No)	SAMPLES TAKEN:	
I.D. Assigned		
Field #		
°C (Immediate)		
Conductivity		
(umhos) pH		
°C (at pH Cond. Readings)		

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GROUNDWATER WELL LOG SHEET					
site Mather AFB s	amplers <u>Recenter Ader</u>	<u>(</u>			
Field #					
Sample I.D. <u>MAFB-4</u>	ate <u>531-85</u>	Time <u>0955</u>			
TOTAL WELL DEPTH FT.	SAMPLES TAKEN:				
S.W.L. 109.36 FT.	TOC				
WATER COLUMN <u>44.14</u> FT.	Dil Crease Mitals				
WATER VOLUME 29 G.	DMN Pest/14.50				
$x_3 = \frac{37}{G}$.	1251/112				
FLOW RATE G.P.M.					
PUMPING TIME REQUIRED MINS.	18	°C (Immediate)			
	20.5	Conductivity			
ACTUAL PUMPING TIME <u>3/</u> MINS.	6.63	(unhos) Hq			
BAILED		°C (at pH Cond.			
server 135.5-1.53.5		Readings)			
Duplicate Taken: Yes No	SAMPLES TAKEN:				
I.D. Assigned					
Field #					
°C (Immediate)					
Conductivity (umhos) pH		.•			
°C (at pH Cond. Readings)					

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GROUNDWATER WEI	LL LOG SHEET	
Site Matchier AFB San	nplers <u>CB/UT</u>	
Field #		
Sample I.D. MAF3-25 Dat	te <u>5-3/-85</u>	Time 0155
TOTAL WELL DEPTH $\frac{79.5}{123.5}$ FT. S.W.L. $\frac{79.18}{29.32}$ FT. WATER COLUMN $\frac{39.32}{25.7}$ FT. WATER VOLUME $\frac{25.7}{7.7}$ G. X3= $\frac{77.7}{3.3}$ G.P.M.	SAMPLES TAKEN: VCA TEC CII: Linease Metais CMIN. Pesticule / Herbary	recti
	,	
PUMPING TIME REQUIRED $\frac{25}{25}$ MINS.	·	°C (Immediate) Conductivity
ACTUAL PUMPING TIME MINS.	7.1	(umhos) pH
BAILED		°C (at pH Cond. Readings)
Duplicate Taken: Yes No I.D. Assigned <u>MAFB-55</u> Field # <u>Conductivity</u> <u>7.1</u> <u>H</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conductivity</u> <u>Conduc</u>	SAMPLES TAKEN: VDA TOC OIL & CONCASE Metais CUMN PEET METB	, *

W. E. L. J					
GROUNDWATER WE	LL LOG SHEET				
site illithis AFG sa	mplers 33				
Field #					
Sample I.D. <u>MAFE-Le</u> Da	te <u>5:30-85</u>	Time			
TOTAL WELL DEPTH 173.5 FT.	SAMPLES TAKEN:				
S.W.L. <u>7/1.27</u> FT. 23	VOA TEC-				
WATER COLUMN #23 FT.	C+G Mitais				
WATER VOLUME	DMN				
X3= <u>1455.5</u> G.	restillerb				
FLOW RATE 3.5 G.P.M.					
PUMPING TIME REQUIRED // MINS.	1	°C (Immediate)			
ACTUAL PUMPING TIME <u>2</u> MINS.	<u> </u>	(umbos)			
BAILED		°C (at pH Cond. Readings)			
Duplicate Taken: Yes No I.D. Assigned	SAMPLES TAKEN:				
Field #					
C (Immediate) Conductivity (umhos) pH					
•C (at pH Cond. Readings)					

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•		LL LOG SHEET	
Site Minhar AFB	Sa	mplers	
Field #			
Sample I.D. MAFB-7	Da	te <u> </u>	Time <u>1936</u>
TOTAL WELL DEPTH	FT.	SAMPLES TAKEN:	
S.W.L. 7255	FT.	It A The	
WATER COLUMN <u>37.45</u>	FT.		
WATER VOLUME75	G.	2. zadi	
x3= 72.5		the take	
FLOW RATE			
PUMPING TIME REQUIRED	MINS.	21	_°C (Immediate)
ACTUAL PUMPING TIME	MINS.		_ Conductivity (umhos) pH
BAILED			- °C (at pH Cond.
2019 a. 92-100			Readings)
Duplicate Taken: Yes No		SAMPLES TAKEN:	
I.D. Assigned <u>NATE 25</u>		All the second second	
Field #		and the second sec	
		í.	
C (Immedi			
Conductivi (umhos) pH	.ty		, .
°C (at pH Readin			

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Ϋ́,	XISTERN	
	TELL LOG SHEET	
Field #		
Sample I.D. <u>NIAFE-S</u> D	Date <u>539</u> 85	Time 1455
TOTAL WELL DEPTH FT.	SAMPLES TAKEN:	
s.w.l. 7749 ft.		
WATER COLUMN FT.		
WATER VOLUME G.		
$x_3 = 579$ G.	11. March	
FLOW RATE G.P.M.		
PUMPING TIME REQUIRED 45 MINS.		°C (Immediate)
ACTUAL PUMPING TIME MINS.	<u> </u>	Conductivity (umhos) pH
BAILED	<u>.</u>	°C (at pH Cond.
Strater 87-127		Readings)
Duplicate Taken: Yes No	SAMPLES TAKEN:	
I.D. Assigned		
Field #	· · ·	
°C (Immediate)		
<u> </u>		
(umhos)		.•
°C (at pH Cond. Readings)		

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	SING	
GROUNDWATER WEI Site <u>Mathur AFB</u> Sau Field # Sample I.D. <u>MAFB - G</u> Da	mplers <u>M</u> /X	Time 50
TOTAL WELL DEPTH $1/0$ FT. S.W.L. 05.05 FT. WATER COLUMN 4155 FT. WATER VOLUME 37 G. x3 = 37 G. FLOW RATE -11 G.P.M. PUMPING TIME REQUIRED 37 MINS. ACTUAL PUMPING TIME MINS.	1812	<pre>^°C (Immediate) Conductivity (umhos)</pre>
BAILED 92-1162	<u> </u>	_ pH _ °C (at pH Cond. Readings)
Duplicate Taken: Yes No. I.D. Assigned Field #	SAMPLES TAKEN: Mangders M Judina La M	
C (Immediate) Conductivity (umhos) pH C (at pH Cond. Readings)		. ``

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GROUNDWATER WELL LOG SHEET Site Mather ATB Samplers 122017 Field # Sample I.D. <u>NATE-10</u> Date 5 30 S5 _____ Time 1320 TOTAL WELL DEPTH 25 FT. SAMPLES TAKEN: 11 2 S.W.L. 74,71 FT. C+ -Files of WATER COLUMN ______ FT. munde WATER VOLUME 20 G. X3 = 20 G. No faile FLOW RATE ______ G.P.M. \rightarrow pumping time required $_/ \mathcal{B} _$ mins. ac (Immediate) Conductivity ACTUAL PUMPING TIME \mathscr{FC} MINS. (umhos) 7-1 pH 18.4 ___ °C (at pH Cond. BAILED Readings) Sinch Strices Duplicate Taken: Yes No SAMPLES TAKEN: Anorel 1 Syamai Field #_____ °C (Immediate) _____ Conductivity (umhos) _____ pH • •C (at pH Cond. Readings)

	<u>Kouzzn</u>	
GROUNDWATER WE Site <u>Mather AFB</u> Sa		
Field # Sample I.D Da	ite <u>530-85</u>	Time 1155
TOTAL WELL DEPTH FT.	SAMPLES TAKEN: VCA TCC	
WATER COLUMN 31.63 ft. WATER VOLUME 32.7 G.	C+'s Phinade Mariae	
$X3 = \underbrace{\begin{array}{c} \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\$	miteils	
pumping time required $\frac{18}{2}$ mins. Actual pumping time $\frac{18}{2\sqrt{c}}$ mins.		°C (Immediate) Conductivity (umhos) pH
BAILED	<u> </u>	°C (at pH Cond. Readings)
Duplicate Taken: Yes No I.D. Assigned MAFE NO Field #	SAMPLES TAKEN:	
•C (Immediate) ····· ····· ····· ····· ····· ····· ····· ····· ····· ····· ····· ····· ····· ····· ····· ····· ····· ····· ····· ····· ····· ····· ····· ····· ····· ····· ····· ····· ····· ····· ····· ····· ····· ····· ····· ····· ····· ····· ····· ····· ····· ····· ····· ····· ····· ····· ····· ····· ····· ·····<	$\frac{1}{2} \sum_{i=1}^{n} \frac{1}{i} \sum_{i=1}^{n} \frac{1}$	

ROUND 85-2

		<u>Ster</u>	IJ	
GROUNDW. Site Mather AFB, 24				
Field # Sample I.DFB-/	Da	te	4 27-35	
TOTAL WELL DEPTH	FT.	SAMP	LES TAKEN:	
S.W.L.	FT.			
WATER COLUMN	FT.	- - -		
WATER VOLUME				
X3=				
PUMPING TIME REQUIRED	MINS.			°C (Immediate)
ACTUAL PUMPING TIME	MINS.		<u>163</u> 331	(uphod) -
BAILED			112	₽
Duplicate Taken: Yes No I.D. Assigned Field #		Samp	LES TAKEN:	
C (Immedi Conductivi (umhos) pH				
ph °C (at pH Readin				. ۲

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	PRODUCTI	ON WELL		
site <u>Aluina, AFB</u>		Samplers	L. Cruch	
Field #				
<u> </u>		Date	77.85	Time CHEP
STATIC		SAMPLES	TAKEN:	
TOTAL WELL DEPTH	FT.	101 Ten?		
S.W.L.	_ FT.	p St. fm	Color Inda	SC.
WATER COLUMN	FT.			
WATER VOLUME	1			
x ≽	_ G.			
FLOW RATE	G.P.M.			
PUMPING TIME REQUIRED	MINS.			
ACTUAL PUMPING TIME	_ MINS.			· _ /
PEPATING			-7 _	°C (Immediate)
WATER LEVEL 75	FT.			_ Conductivity (umnos)
PUMPING RATE	G.P.M.		7 4.	DH
TOTAL GALLONS PUMPED	G.			°C (at pH Cond. Readings)
DUPLICATE TAKEN YES I.D. ASSIGNED FIELD # °C		SAMPLES	TAKEN:	
CONDUCTIVITY	(umhos)			

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Ę	PRODUCTI	ON WELL	
Site		Samplers	
Field #			
Sample I.D. <u>AUN</u>		Date <u>3 72 55</u>	Time <u>2277</u>
STATIC		SAMPLES TAKEN:	
DOTAL WELL ORPICE	i.		
ê. .	FT		
WATER COLUMN	ET.		
WATER VOLUME X &			
TLUM NATE			
PAMPING TIME GU_MIRED	MINS.		
ACTUAL PUMBING COME	MINS.		
PEPATING		1.ì;	2 Connection
WATER LEVEL		<u>·····</u> ·······························	linaistisis Kirtos
PUMPING RATE	З.⊇.М.	<u>}</u>	; : i
TOTAL GALLONS PUMPED	3,		<pre>'C (at (8 2)nd. E: (dings)</pre>
DUPLICATE TAKEN TES NO)	SAMPLES TAKEN:	
I.D. ASSIGNED <u>ANDE</u> FIELD # <u><u>NDD</u> 2C <u>CONDUCTIVITY</u> <u><u>NDD</u> PH</u></u>	(umhos)		

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GROUNDWATER WELL LOG SHEET				
Site	Mather AFB	A sa	mplers 26/21	
			-	
	ويبيها يتكفيها تسويد فسكف فبتخص وكالم		te 1997 85	
Sample I.D.		Ua		
TOTAL WELL DE	PTH 123.5	FT.	SAMPLES TAKEN:	
S.W.L.	27	FT.	10A 7 11C	
WATER COLUMN	2	FT.	(
WATER VOLUME	×	G.		
<u>x</u> 3=		G.		
FLOW RATE	<u>?</u> ,:	G.P.M.		
	REQUIRED			°C (Immediate) Conductivity (umhos) pH
BAILED				°C (at pH Cond. Readings)
Duplicate Tak	en: Yes No		SAMPLES TAKEN:	
I.D. Assigned				
Field #				
	Conductiv Conductiv (umhos)	-		.•
	•C (at pH Readi			

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	GROUND	WATER W	ELL LOG	SHEET	
Site _P	Var har AFB OF	s	amplers	DE DT	
Field #					
Sample I.D	MAFB-2	D	at e	19:17:15	Time <u>Dail</u>
TOTAL WELL DEP	TH 123.7	FT.	SAMPL	ES TAKEN:	
S.W.L.	10. U	FT.		0.4 10	
WATER COLUMN _	13.1	FT.	, t		
WATER VOLUME		G.			
×3=_	ale.	G.			
FLOW RATE					
PUMPING TIME R	EQUIRED	MINS.		7.7	_°C (Immediate)
ACTUAL PUMPING	TIME 10	MINS.		376 29 6.75	Conductivity
BAILED		-	· · ·)2.1	°C (at pH Cond. Readings)
Duplicate Take	n: Yes No		SAMPL	ES TAKEN:	
I.D. Assigned	· 、			Dia mandra dia	An at the
Field #				in any contract	
	C (Immed	liate)			
	Conductiv (umhos) pH				
	°C (at pH Readi				.'

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GROUNDWATER WELL LOG SHEET						
Site _	Mather AFB.	<u>14</u> Sa	amplers	JB/LT		
Field # _						_
Sample I.D.	MAFB-3	Da	ate	p-27-R,	T	time <u>092</u> 0
TOTAL WELL DE	EPTH 123.4	FT.	SAMPI	ES TAKEN:	y	
S.W.L.	15 44	FT.			. • . •	
WATER COLUMN	15.76	FT.			ڊ د ۱	
WATER VOLUME	()	G.				
X3=	24.24	G.				
FLOW RATE	· · · · · · · · · · · · · · · · · · ·	G.P.M.				
PUMPING TIME	REQUIRED	MINS.		2,2,5	•	C (Immediate)
ACTUAL PUMPIN	NG TIME	MINS.		317 7 5 5		Conductivity (umhos) H
BAILED			· · ·	9.8	°	C (at pH Cond. Readings)
Duplicate Tak	ken: (Yes) No)	SAMPI	.ES TAKEN:		
I.D. Assigned	MAFB - 30	2				
Field #						
				•		
	•C (Immed	liate)	1			
<u></u> ?3						
70	رستان (umhos) روم pH				•	•
	C (at pH Readi				•	

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			LL LOG SHEET	
Site _/	lather AFB	San	nplers <u>CB/X</u>	
Field #	1400 - 6'		· 6-27-85	12 "D
Sample I.D/	47.5-7	Dat		Time <u>130</u>
WATER COLUMN	: 58.47 47.93 31 93 3.3 EQUIRED <u>28</u>	_ FT. _ FT. _ G. _ G. _ G.P.M. _ MINS.	SAMPLES TAKEN: 1 CA TOC- OFC- Metals DMN Pest Herber 32 143 6.91 27.1	<pre> °C (Immediate) Conductivity (umhos) pH °C (at pH Cond. Readings)</pre>
Duplicate Take I.D. Assigned Field #		5)	SAMPLES TAKEN:	,,.,.,.,.,,,,,,,,,,,,,,,,,,,,,,
		oH Cond. lings)		

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GROUNDWATER WELL LOG SHEET				
Field #				
Sample I.D.	IMAFE-5	Date 10-27-85	Time	
TOTAL WELL DE	PTH 127.9 FT			
S.W.L				
WATER COLUMN	<u> </u>	r. O+G Aletals		
WATER VOLUME	22	D. J. He. Lo		
		.P.M.		
PUMPING TIME	REQUIRED 30- MI		"C (Immediate)	
ACTUAL PUMPIN	G TIME MI		Conductivity (umhos) pH	
BAILED		·	°C (at pH Cond. Readings)	
Duplicate Tak	en: Yes (No	SAMPLES TAKEN:		
I.D. Assigned	· · · · · · · · · · · · · · · · · · ·			
Field #	<u></u>			
	C (Immedia)			
	(umhos)	r	.•	
	°C (at pH Co Readings			

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Site	•	TER WELL LOG SHEET	
-			
-	MAFB-6	Date5	
TOTAL WELL DE	CPTH <u>102.5</u> F	T. SAMPLES TAKEN:	
S.W.L.	72.11 F	T. +6C	
WATER COLUMN	<u> </u>	1.01.013	
	<u> </u>	Port Pro	
FLOW RATE	GGGGGGG		
PUMPING TIME	REQUIRED M		°C (Immediate)
ACTUAL PUMPIN	NG TIME M	$\frac{342}{6.9}$	(umbog)
BAILED			
Duplicate Tal	ken: Yes No	SAMPLES TAKEN:	
I.D. Assigned	MAFB-60		
Field #			
	°C (Immedia	ite)	
238	Conductivit	:y	
6.9	(umbos)		
24.4	°C (at pH C Reading		.*

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GROUNDWATER WELL LOG SHEET				
site Maither AFB, CA Sa	umplers D3/27			
Field #				
Sample I.D. MAFB-7 Da	te 626-85 Time 1350			
TOTAL WELL DEPTH <u>117.8</u> FT. S.W.L. <u>74.83</u> FT. WATER COLUMN <u>37.97</u> FT. WATER VOLUME <u>24.8</u> G. X3= <u>74.4</u> G.	SAMPLES TAKEN: 10A TX- 0+C- Metals Phennel Cyamale			
FLOW RATE G.P.M.				
PUMPING TIME REQUIRED 22.5 MINS. ACTUAL PUMPING TIME 22 MINS. BAILED	$\frac{37.5}{1005}$ °C (Immediate) $\frac{1005}{1005}$ Conductivity (umhos) pH $\frac{129.7}{1007}$ °C (at pH Cond. Readings)			
Duplicate Taken: Yes No I.D. Assigned MARE 70 Field # °C (Immediate) Conductivity (umhos) pH °C (at pH Cond. Readings)	SAMPLES TAKEN: angen brown Very dir ty descharge at Fist Ran clear a cer a 3 comin Microfies yande			

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WASSER				
site Mather AFB, CA	WELL LOG SHEET Samplers D. Jones / D	tynur		
Field # Sample I.D	Date 6-26-85	Time 1220		
TOTAL WELL DEPTH $\frac{79.8}{79.3}$ FT.	SAMPLES TAKEN: VOAS			
WATER COLUMN <u>30.49</u> FT.	Cil > mase Metals			
WATER VOLUME $\overrightarrow{A0}$ G. X3= $\cancel{00}$ G. FLOW RATE 3.3 G.P.N	Phenotics Cyanide			
PUMPING TIME REQUIRED MINS		C (Immediate) Conductivity (umhos) pH		
BAILED	<u> </u>	_ PH _ °C (at pH Cond. Readings)		
Duplicate Taken: Yes NO I.D. Assigned <u>MATE-80</u> Field #	SAMPLES TAKEN: - Phanolics Cyande			
Conductivity (umhos) pH Conductivity (umhos) pH Conductivity (umhos) pH	•	.'		

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GROUNDWATER WELL LOG SHEET				
site Mattic, AFB sa	mplers			
Field #	11:0			
Sample I.D. 1445-9 Da	te Time			
$\frac{113.\$}{113.\$}$ TOTAL WELL DEPTH $\frac{113.\$}{113.\$}$ FT. S.W.L. $\frac{18.3()}{113.\$}$ FT. WATER COLUMN $\frac{45.59}{113.59}$ FT.	SAMPLES TAKEN: VDA TTCC Oil: Crease_			
WATER VOLUME 379.78 G. X3 = 8974 G. FLOW RATE $3-3$ G.P.M.	Phinolees Cyanide Metals			
PUMPING TIME REQUIRED 27 MINS. ACTUAL PUMPING TIME 07 MINS. BAILED	$\frac{20.5}{1093}$ °C (Immediate) $\frac{1093}{6.7}$ Conductivity (umhos) pH $\frac{27.5}{1000}$ °C (at pH Cond. Readings)			
Duplicate Taken: Yes No I.D. Assigned <u>MARB-90</u> Field # <u>1097</u> °C (Immediate) <u>1097</u> Conductivity (umhos) pH <u>27.9</u> °C (at pH Cond. Readings)	SAMPLES TAKEN: Jame as above			



GROUNDWATER WEI Site <u>Mather AFB</u> Sar	
Field # Data Sample I.D Data	te <u>10-26-85</u> Time <u>1675</u>
TOTAL WELL DEPTH 107.9 FT. S.W.L. 14.32 FT. WATER COLUMN 33.58 FT. WATER VOLUME 32.58 FT. WATER VOLUME 32.3 G. $x_3 = 166$ G. FLOW RATE 3.3 G.P.M. PUMPING TIME REQUIRED 20 MINS. ACTUAL PUMPING TIME MINS. BAILED	SAMPLES TAKEN: VOA TOC. OtG Mcfals Phenolics Cyanide $\frac{20}{3.4}$ °C (Immediate) $\frac{380}{23.4}$ °C (at pH Cond. Readings)
Duplicate Taken: Yes No I.D. Assigned <u>MAFB-100</u> Field # <u><u>ABB</u> °C (Immediate) <u>ABB</u> Conductivity (umhos) pH <u>23.6</u> °C (at pH Cond. Readings)</u>	SAMPLES TAKEN: Same and interest Citedy and interest after records time slightly clouder after records time
GROUNDWATER WE Site Mathematik CA Sa	
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Field #	
Sample I.D. <u>NAFB-11</u> Da	te <u>6-26-85</u> Time <u>1530</u>
TOTAL WELL DEPTH 108 FT. S.W.L. 379 FT. WATER COLUMN 34.2 FT. WATER VOLUME 34.2 FT. WATER VOLUME 34.2 FT. WATER VOLUME 34.2 G. $x_3 = 127$ G. FLOW RATE 3.3 G.P.M. PUMPING TIME REQUIRED 370 MINS. ACTUAL PUMPING TIME 370 MINS. BAILED $0+67$	SAMPLES TAKEN: VOA TOC OtG Metals Dhenofics Guandc 1 Conductivity (umhos) PH GZT 2 C (at pH Cond. Readings)
Duplicate Taken: Yes No I.D. Assigned MATETIC Field # °C (Immediate) Conductivity (umhos) pH °C (at pH Cond. Readings)	SAMPLES TAKEN: Veniorangen brown discharge at first felenred offer a few Minutes Thinklics ipanide

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APPENDIX H

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SAMPLE CHAIN-OF-CUSTODY RECORDS

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· · ·				Date Shipped 31 Mari 85.	· ·
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CHAIN OF CUSTODY RECORD

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Phone: <u>207-957-3405</u>	Location Mather Al	
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Roy F. Neston Inc.	Address 7720 Lorran	inc Are #165
256 WILLPOOLRS	Stackton Pt	4
LEMANTHE FA 19353	Date Shipped Vunc 25 Shipment Service FRACTURE Ex,	ortise
ATTENTION: Judy Forta Phone No. 215-524-0181	Airbill No	
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		TODY RECORD		
SAMPLERS: (Signature) Delta (ah A clant Phone: 209-957-34050 SHIP TO:		SHIPPING INFORMATION Location <u>Mather AFE CA</u> Shipper <u>Rey F. Weston Inc.</u> Address <u>7720 Lorraine Ave.</u> <u>C. Stickton CA 75210</u> Date Shipped <u>30 Mail 95</u> Shipment Service <u>Han'd Carried</u> Airbill No.) 	
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Analysis laboratory should complete "sample cond. upon receipt" section below, sign and return copy to Shipper

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ROY F. WESTON INC.	<u> </u>	Address	
7720 LORRAINE AVE #105		Date Shipped JUNE 85	
STOCKTON, CA 95210	·	Shipment Service	°~1
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\$	TOCKTON	N, CA 95210	·		Date Shipped	3-1000	d Carri		
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SHIPPING INFORMATION Location <u>Mather AFB</u> Shipper <u>ROY F. WESTON INC</u> Address <u>7720 LORRAINE AVE #1055</u> <u>STOCKTON, CA 95210</u> Date Shipped <u>Store ES</u> Shipment Service <u>Federal EX</u> Airbill No.		
Shipper <u>ROY F. WESTON INC</u> Address <u>7720 LORRAINE AVE #1055</u> STOCKTON, CA 95210 Date Shipped <u>Sources</u> Shipment Service <u>Federal EX</u> Airbill No.	· · · · · · · · · · · · · · · · · · ·	
Address <u>7720 LORRAINE AVE #105</u> <u>STOCKTON, CA 95210</u> Date Shipped <u>SUME 85</u> Shipment Service <u>Federal EX</u> Airbill No.		
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Analysis laboratory should complete "sample cond. upon receipt" section below, sign and return copy to Shipper

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SAMPLERS: (Signature) _ Keltera		shipping information	
Phone: 209.957-34	125-0	Location Mather AFB	
SHIP TO: *		Shipper Roy F. Wester Inc	2
RONF Weston I	ne.	Address Address 7720 Lorraine H	tre #105
ast with for A) S .	Stockton NA 95	210
L'onville PA 19.	353	Date Shipped June 25	
		Shipment Service Federal Exfine	55
ATTENTION: Judy Abrta	· · ·	Airbill No.	
Phone No 215 - 524 - 015	1.	Cooler No	· · · · · · · · · · · · · · · · · · ·
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		11ctmi K. Dmours	6/4/85 10:00
Analysis laboratory should complet	e "sample co	nd. upon receipt section below, sign and return copy	to Shipper
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Phone:			11		Location Marher AFE /	A
SHIP TO:			•		Shipper Rey F. Weston =	THE.
					Address 7720 Lorraine Are	#105
_			1-		E' stockton M 750	10
					Date Shipped Pr. Mar; 35	
					Shipment Service Hand Carried	(
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Relinquished	l by: (Signati	ure)		Receiv	ed for laboratory by: (Signature)	Date/Time 5/3/ 9:00
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				Airbill No		<u> </u>		<u> </u>
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einquisned by: (Signature	2)	Û	heceive	eu by. (Signature)			Dates	
lelinquished by: (Signature	9)		Receive	o by: (Signature)			Date/	Time
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SAMPLERS:	(Signature) _	Rebusi	Anci			SHIPPING INFORM	IATION
Phone:	•		<u>'</u>		Location _	Mather AFB	<u> </u>
			· · · ·		Shipper _	ROY F. WESTON I	NC.
2		VESTON INC	· · · ·		Address _	7720 LORRAINE AVE	
	77 <u>2</u> 0 LORR	AINE AVE. #10)5		_	STOCKTON, CA 2321	
		N. CA 95210			Date Ship	Ded 27-4.12 85	
						Service hand rairie	
ATTENTION:							
Phone No						·	
	d by: (Signafu	ıre)		Receive	d by: (Sign		Date/Time
	alich		•				6/27/85
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Phone:			U	Location Norther AFB	
SHIP TO:		· · · · · · ·		Shipper ROY F. WESTON INC.	
Poy F	(Noster	100		Address 7720 LORRAINE AVE #105	· · · · · · · · · · · · · · · · · · ·
	Leb		<u> </u>	STOCKTON, CA 95210	
-56 L	Volci P.	A RJ.	1	Date Shipped July 85	
Lion ville				Shipment Service Fed Er	·
ATTENTION:	_1;0	11: Porta		Airbill No	
Phone No		215-524	0180	Cooler No	
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Analys			- U	and, upon receipt" section below, sign and return copy to	Shipper
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SAMPLERS:	(Signature)	Reborali	d-Ar	121		SHIP	PING INFORMATI	ON	
Phone:			U		Location _	Mather	AFR		
SHIP TO:					Shipper_	DOVE	WESTON INC	······	
onii 10.			•	•	Address		RAINE AVE. #10		
		WESTON IN			Address _		N, CA, 25210		
~	-7720 LOR	RAINE AVE. #	105						
<u> </u>	-STOCKT()N, CA 95210	<u> </u>		(Ivro 85		
· · · · · · · · · · · · · · · · · · ·		<u> </u>			Shipment	Service <u>he</u>	rd carried		
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Relinquished by: (Signature)			Receiv	ed for labor	atory by: (Sign	nature)	Date 6/28	Time 7/37	
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<u>.</u>			Date Sampled	nd. upor		ection below, Analysis	and the second	opy to Shippe Sampl	r e Cond
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	CONSULTANTS	J a	HAIN OF	CUSTODY RECORD	
	(Ci=-)	Lebres.	if he)N
Phone:		<u></u>	<u> </u>		
SHIP TO:			······································	Location Melher AFB ROY F. WESTON INC.	
	lunder 10	e		Address 7720 LORRAINE AVE #105	
1				STOCKTON, CA 95210	
		a.t.		Date Shipped Autor 45	
Lars 110	PA	19353		Shipment Service F.d. Ex	
ATTENTION	July	Asita	• 	Airbill No	
Phone No	a15-	524-0180	·	Cooler No	
Relinquished	by: (Signati	Crones		Received by: (Signature)	Date/Time
Relinquished				Received by: (Signature)	Date/Time
Relinquished	d by: (Signati	ure)		Received by: (Signature)	Date/Time
Relinquished	by (Signate	ure)		Pacaived for laboratory by: (Signature)	Date/Time
Analy	sis laborator	y should comple	te ''sample co	nd. upon receipt'' section below, sign and return cor	by to Shipper
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Hemarks					
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SAMPI ERS	(Signature)	Deforation	and Jay	SHIPPING INFORMAT	ION
Phone:		,	J	Location Malker AFB	
SHIP TO:	······································			Shipper ROY F. WESTON INC.	
· · · ·	Wester	Inc		Address 7720 LORRAINE AVE #10	5
,	Lob			STOCKTON, CA 95210	
255	Ludich Por	I RJ.		Date Shipped	
Linsille	PA 1	9353		Shipment Service For Er	
ATTENTION		udy Porta 215-5a	· · ·	Airbill No	
Phone No		215-5a	4-0180	Cooler No	
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· · ·	1	W		Dil + Grease	
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P.230 1 2 1			·		
	-1	ACW-1	6-27-85	TOC	
	·/			Oil + Grease	
	·				
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			<u></u>		
Com-sta	 				
Remarks:					
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X SILVERS CONSULTANTS

SAMPLERS: (Signature) Debug 11 de -	shipping information					
Phone:	Location Mather AFB	Shipper ROY F. WESTON INC. Address 7720 LORRAINE AVE. #105 STOCKTON, CA_ 25210				
SHIP TO:	Shipper ROY F. WESTON INC.					
ROY F. WESTON INC	Address 7720 LORRAINE AVE. #105					
7720 LORRAINE AVE. #105						
STOCKTON CA 95210	Date Shipped P7. JUNG 85					
	Shipment Service head corried					
ATTENTION:	Airbill No					
Phone No	Cooler No					
Relinquished by: (Signature)	Received by: (Signature)	Date/Time				
Relinquished by: (Signature)	Received by: (Signature)	Date/Time				
Relinquished by: (Signature)	Received by: (Signature)	Date/Time				
Relinquished by: (Signature)	Received for Jaboratory by: (Signature)	Date/Time				
Analysis laboratory should complete "sample co	nd. upon receipt" section below, sign and return copy t					
Sample No. Of Site Date Number Cont. Identification Sampled	Analysis Requested	Sample Cond Upon Receipt				
- ACW 0.37.35	ERAGOI	UK				
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	PCB	V				
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	- ACW	<u>3-37-35</u>	ERA 601	UK
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SAMPLERS: (Signature) Defoult of charact					SHIPPING INFO	RMATION				
				Location _	Mall. AFA			·		
					Shipper_					
	ROY F. WESTON INC.				Address 7720 LORRAINE AVE #105					
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	STOCKTO	N, CA 95210	·· <u>·</u> ·································		Date Ship	ped <u>07 fans</u>	35			
					Shipment	Service Fed Er				
ATTENTION:	· · · · · · · · · · · · · · · · · · ·	<u></u>			Airbill No.					
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Analys	sis laborator	y should complet	le "sample co	nd upor	receipt" se	ection below, sign and r	eturn copy t	o Shippe	r	
Sample Number	No. Of Cont.	Site	Date - Sampled			Analysis Requested			e Cond. Receipt	
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SAMPLERS: (Signature) Situal Juite	ê4	SHIPPING INFORMATION	
Phone:		Location Mather AFB	<u></u>
SHIP TO:		Shipper ROY F. WESTON INC.	
Pay F. Waster lac.		Address 7720 LORRAINE AVE #105	
Licayille Lob		STOCKTON, CA 95210	
256 Wolch fool Fi		Date Shipped	
Linsula PA. 19353		Shipment Service Fect Fr	
ATTENTION: Ander Porta		Airbill No.	
Phone No. 0 215:524-0180		Cooler No	
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Analysis laboratory should complete "sample con	d. upon	receipt" section below, sign and return copy	o Shipper

Sample Number	No. Of Cont	Site Identification	Date Sampled	Analysis 3	Sample Cond Upon Rece n t
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Remarks:					
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SAMPLERS: (Signature) Deberati at fame	SHIPPING INFORMATION Location Mather AFB			
Phone:				
SHIP TO:		Shipper ROY F. WESTON INC		
ROY F. WESTON INC. 7720 LORRAINE AVE. #105		Address 7720 LORRAINE AVE #10 STOCKTON, CA 95210 Date Shipped 77 June 35		
STOCKTON, CA 95210		Shipment Service hand carcied		
ATTENTION:		Airbill No		
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Analysis laboratory should complete "sample co	nd. upor	receipt" section below sign and return con		

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		•	· .	Address 7720 LORRAINE AVE	#105
	•			STOCKTON, CA 952	10
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Analy		ry should comple	te "sample co	nd, upon receipt" section below, sign and retur	n copy to Shipper
Analy Sample	No. Of	Site	Date	nd, upon receipt" section below, sign and retur Analysis	Sample Con
Analy Sample	sis laborator	Site Identification	Date Sampled	nd, upon receipt" section below, sign and retur Analysis Requested	Sample Con Upon Pecey
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	0		Location	Mather AFR		
			Shipper	ROY F. WESTON INC	· ·	
ROY F. WESTON			Address	7720 LORRAINE AVE. #10	ち	
- 7720 LORRAINE AV				STOCKTON, CA 95210		
			Date Shippe	0 27 June 15		
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Analysis laboratory s	hould complete "s	sample cor	nd. upon receipt" sect	tion below, sign and return co	py to Shipper	
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Pr, IV	rleston	lar			Address Address Address		
Lizza l'e	6-6				STOCKTON, CA 95210		
256 14					Date Shipped		
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Relinquished b	oy: (Signatu	ire)		Berly	ed for laboratory by: (Signature)	1 Dater	ring?
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SAMPLERS: (Signature) Leburah st. Ann					SHIPPING INFORMATION				
Phone:			<u> </u>		Location Mother AFB				
SHIP TO:			· ·		Shipper ROY F. WESTON INC.				
POY	F. WESTC	N INC.	<u></u>	<u></u>	Address Address <u>7720 LORRAINE AVE #105</u> <u>STOCKTON, CA</u> Date Shipped <i>77 MAS</i>				
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Sample	No. Of	Site	Date		Analysis	Samp	le Cond		
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SHIP TO:			·················	Shipper ROY F. WESTON INC.				
Roy F	haston 1.	re		Address 7720 LORRAINE AVE #10				
1.0001110	6-5			STOCKTON, CA 95210				
255 h	alsh Root P.	J		Date Shipped 1. July 35				
	PA . 19			Shipment Service Foll E.				
ATTENTION: Judie Porta Phone No. 215-524-0180				Airbill No				
				Cooler No				
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Analy	sis laborator	y should complete "sample	cond upo	n receipt" section below, sign and return co	py to Shipper			
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					Location Mather AF13		
SHIP TO:			· · · · · · · · · · · · · · · · · · ·	Shipper ROY F. WESTON INC			
ROY	F. WES	ION INC.		Address			
7720	LORRAIN	E AVE. #105		- STOCKTON, CA 95210			
510	CKION, C	A 95210			Date Shipped 37 June 35		
		· · · · · · · · · · · · · · · · · · ·			Shipment Service <u>hard</u> rarried		
ATTENTION	:				Airbill No		
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Analy	sis laborato	ry should complete	e "sample co	nd. upor	receipt" section below, sign and return cor	by to Shipper	
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SAMPLERS: (Signature) _	Deborah	2 Jan	nez	SHIPPING INFORM	ATION			
Phone:			0		Location 14-ther AFR				
SHIP TO:					Shipper ROY F. WESTON INC.				
R. E.	Nosten 1-	e			Address 7720 LORRAINE AVE. #105 STOCKTON, CA 95210				
Leerite									
		21.			Date Shipped				
L:1-11 PA 19353 ATTENTION: Judy Parta Phone No. 915-524-0180				Shipment Service <u>FeJ. Er.</u>					
				Airbill No					
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	CHAIN C	OF CUS	STODY RECORD		
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Relinquished by: (Signatu		191	red for laboratory by <i>(Signature)</i> Malanalo n receipt" section below, sign and return co	Date/Time 928 7 Africant	
Sample No. Of Cont.	Site Date Identification Sampleo (MAFB-6		Analysis Requested EPA 601 EPA 601 EPA 601 EPA 602 2st/Herb		
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SAMPLERS:	(Signature)	Debo	all for		N
Phone:			14 / J	Location 14-14- AFB	
SHIP TO:				Shipper ROY F. WESTON ING.	
Pry F. 1	vestos, la	<u><</u>		Address 7720 LCERIANE AVE #40	5
•	'				·
256 140	ish Pool	R.J.		Date Shipped State	
- Lienalie	PA. 19	353	4	Shipment Service <u>F.J.</u>	
ATTENTION:	<u> </u>	1353 Ly Porta		Airbill No	
Phone No	á	15-524-018	20 \$	Cooler No.	
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Analys	sis laborato	ry should comple	te "sample co	nd. upon receipt'' section below, sign and return co	py to Shipper
Sample	No. Of	Site	Date	Analysis	Sample Con
Number	Cont.	Identification	Sampled	Requested	
		Identification MAFB-G	Sampled	Requested	
Number				Requested TUC Dilt Grease	
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Number				Requested TUC Dilt Grease	
Number		MAFB-G		Requested TUC Oil & Grease Metals (CdCrPbN:Ag) DMN	
Number				Requested TUC O:1 & Grease Metabs (CdCr PbN: Az) DMN TOC.	
Number		MAFB-G		Requested TUC Oil & Grease Metabs (CdCr PbN: Ag) DMN TOC. Dil & Grease	
Number		MAFB-G		Requested TUC Oil & Grease Metabs (CdCr PbN: Ag) DMN TOC. Oil & Grease Metals (CdCr PbNi Ag)	
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SAMPLERS: (Signature) _ Cutola 1 of for	i4	L	SHIPPING INFORMATIC	ИС	
Phone:		Location	Mather AFB		
SHIP TO:		Shipper	ROY F. WESTON INC.		
ROY F. WESTON INC.		Address	7720 LORRAINE AVE #105	,	
			STOCKTON, CA 95210		
STOCKTON, CA		Date Ship	ped = 6 June 85		
			Service land rarried		
ATTENTION:					
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Analysis laboratory should complete "sample cond. upon receipt" section below, sign and return copy to Shipper

Sample Number	No. Of Cont.	Site Identification	Date Sampled	Analysis Requested	Sample Cond. Upon Receipt
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SAMPLERS: (Signature) Littand. fond	SHIPPING INFORMATION	
Phone:	Location Matter AFB ROY F. WESTON INC.	
SHIP TO:	Shippor	
Pry 1- Wester be	7/20 LOKKALINE AVE #105	
Lucille Lab	STOCKTON, CA 95210	
256 Uselsh Pool RJ.	Date Shipped 27 Size 85	
Licasille FA 19353	Shipment Service <u>Fort</u> Ex	
ATTENTION, Judy Aprta	Airbill No	
Phone No. 215-524-0180	Cooler No	
	Received by: (Signature)	Date/Time
	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received for laboratory by: (Signature)	Date/Time
Analysis laboratory should complete "sample cond	, upon receipt" section below, sign and return copy	to Shipper
Sample No. Of Site Date	Analysis	Sample Cond
Number Cont. Identification Sampled	Requested TOC	Upon Receipt
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	Oil + Grease	
	Phenolics	
	Metals (CdCrPbM.Ag)	
	Metals ((dlr PhN. Ag)	
1 MAFB-70 1-26-35	Phenolics	
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Phone:				Shipper _	DOV E MUTCTON			
	ROY F. V	WESTON IN	С	Address _	7720 LORRAINE AV	E. #105		
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				nd. upo	n receipt" sect	ion below, sign a	d return copy	to Shippe	r
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256 Walder Poul RJ		Date Shipped 37 VUNE 85			
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ATTENTION: Judy Porta	180	Airbill No			
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Analysis laboratory should comp					
	iele sample yo	and upon receip?" section below, sign and return co	py to Shipper		
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SAMPLERS:	(Signature)	KEFrun.	1. 1186	4	SHIF			
	Phone:				Location Matter AFR			
SHIP TO: ROY F. WESTON INC. 7720 LORRAINE AVE. #105 STOCKTON, CA 95210					Shipper ROY F. WESTON INC. Address 7720 LORRAINE AVE. #105			
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ATTENTION:			<u></u>		Airbill No			
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SAMPLERS: (Signature)	SHIPPING INFORMATION
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SHIP TO:	Shipper ROY F. WESTON INC.
R. F. Weston for	Address 7720 LORRAINE AVE #105
····· Lob	STOCKTON, CA 95210
256 Wilch Pool Pel.	Date Shipped 27 June 35
L'ansille PA. 19353	Shipment Service Ex
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	- Oil + Grease
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1 MAFB-100 6-26-35	TOC
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Sample Number	No Of	Site Identification	Date Sampled	Analysis Requested TOC OTI-TORGESC = Phenolics	Sample Co Upon Rece AVT			
Sample Number	No Of Cont / / /	Site Identification MAFR-I/	Date Sampled	Analysis Requested TCC -OIL-9- Granse = Phenolics (yanide Metal (CdCrNiPo	Sample Co Upon Rece AVT			
Sample Number	No Of Cont / / /	Site Identification MAFR-I/	Date Sampled	Analysis Requested TCC -OIL-T OVELSC = Phenolics (yanide Mitul (ColCrNiPo.	Sample Co Upon Rece AVT			
Sample Number	No Of Cont / / /	Site Identification	Date Sampled	Analysis Requested TCC -OIL-9- Granse= Phenolics (yanide Metal (CdCrNiPo	Sample Co Upon Rece AVT			
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Sample Number	No Of Cont / / /	Site Identification MAFR-I/	Date Sampled	Analysis Requested TCC -OIL-T OVELSC = Phenolics (yanide Mitul (ColCrNiPo.	Sample Co Upon Rece AVT			
Sample Number	No Of Cont / / /	Site Identification MAFR-I/	Date Sampled	Analysis Requested TCC -OIL-T OVELSC = Phenolics (yanide Mitul (ColCrNiPo.	Sample Co Upon Rece AVT			
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APPENDIX I

ANALYTICAL METHODS AND REQUIRED DETECTION LIMITS

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APPENDIX I

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#### ANALYTICAL METHODS AND REQUIRED DETECTION LIMITS

|                            | Water S                               | amples                     | Soil Samples                    |                              |  |
|----------------------------|---------------------------------------|----------------------------|---------------------------------|------------------------------|--|
| Analyte                    | Detection<br>Limit                    | Method                     | Detection<br>Limit              | Method                       |  |
| Volatile organic compounds | Specified by<br>compound in<br>method | EPA Methods<br>601 and 602 | Specified by compound in method | EPA Methods 8010<br>and 8020 |  |
| Total organic carbon (TOC) | l mg/L                                | EPA Method<br>415.1        |                                 |                              |  |
| Oils and grease            | 0.1 mg/L                              | EPA Method<br>413.2        | 100 ug/g                        | Standard Method 503D         |  |
| Phenol (total)             | l ug∕L                                | EPA Method<br>420.1        | l uġ∕ġ                          | EPA Method 420.1             |  |
| Cadmium (Cd)               | l0 ug∕L                               | EPA Method<br>213.2        | l ug∕g                          | ICP Optical                  |  |
| Lead (Pb)                  | 20 ug/L                               | EPA Method<br>239.2        | 2 ug∕g                          | ICP Optical                  |  |
| Chromium (Cr)              | 50 ug∕L                               | ICF Optical                | 5 ug/g                          | ICP Optical                  |  |
| Nickel (Ni)                | 100 ug∦L                              | ICF Optical                | 10 ug≠g                         | ICP Optical                  |  |
| Silver (Ag)                | 10 ug/L                               | EPA Method<br>272.2        | l ug∕a                          | ICP Optical                  |  |
| Cyanide                    | 10 ug∕L                               | EPA Method<br>335.2        | l uą∕a                          | EPA Method 9010              |  |
| PCB                        | 0.25 ug/L                             | EPA Method<br>608          |                                 |                              |  |
| DMN                        | l ug/L                                | EPA Method<br>625          |                                 |                              |  |
| TOD                        | 0.02 ug/L                             | EPA Method<br>608          |                                 |                              |  |
| Chlordane                  | 0.02 ug/L                             | EPA Method<br>608          |                                 |                              |  |
| 2,4-D                      | 0.06 ug/L                             | EPA Method<br>608          |                                 |                              |  |

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APPENDIX J

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LABORATORY QA/QC PLAN

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#### APPENDIX J

#### LABORATORY QA/QC PLAN

#### J.1 QUALITY ASSURANCE PLAN

WESTON Analytical Services enforces a rigid QA/QC program toward maintenance of validity and reliability of all analytical data. <u>The Laboratory QA/QC Manual</u> (Table of Contents thereof is Attachment No. 1 to this appendix) outlines the specifics of the QA/QC plan. This plan is patterned after the <u>EPA Handbook for</u> <u>Analytical Quality Control in Waste and Wastewater Laboratories</u> (EPA-600/4-79-019, March 1979), augmented by general applicable experience and interaction with the QA/QC plan of the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA). All methods and procedures followed by WESTON are either USEPA or ASTM-approved. Any variations from such procedures, regardless of cause, are documented by the responsible analyst(s) and are documentable, and, literature-traceable. A general review of this QA/QC plan is in the following paragraphs.



Although specific QA/QC measures for each method are designated in WESTON's Laboratory Quality Assurance Manual, the general QA/QC program normally includes:

- EPA-acceptable sample preparation and analytical methods.
- Instrument calibration via use of Standard Analytical Reference Materials (SARMS).
- Regular equipment maintenance and servicing.
- Use of SARMS and QA/QC samples (spikes, laboratory blanks, replicates, and splits) to ascertain overall precision.
- Statistical evaluation of data to delineate acceptable limits.
- Documentation of system/operator performance.
- Suitable chain-of-custody procedures.
- Maintenance and archiving of all records, charts, and logs generated in the above.
- Proper reporting.

Acceptable analyses at WESTON's Analytical Laboratory Services include, but are not limited to, the above.

In general, WESTON'S QA/QC sequence follows the following diagram (Figure J-1). Documentation (as available from instrument recordings and technicians' notebooks) is sufficient to validate each step in the sequence.

#### J.2 CONTAINER PREPARATION

Another consideration in this, or any, analytical project is that of sample container preparation. Accordingly, all appropriate sample bottles shall be cleaned in a manner mandated by the U.S. EPA to insure maximal cleanliness (and minimal contamination) before the containers go to the field. Sufficient bottles to accommodate both laboratory and field blank requirements will be preferred in a single batch mode for each monthly sampling requirement.



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#### J.3 VERIFICATION/VALIDATION

In the laboratory, the analytical scheme begins with initial verification, which is comprised of:

- <u>Lab Blanks</u> To insure that no background level of specific analytes is introduced by laboratory procedures.
- <u>Standard Analytical Reference Materials (SARMS)</u> -To determine the accuracy and precision of procedures.
- <u>Spikes</u> To determine the percent recovery of analyte(s).

If the laboratory QA/QC program is extended to the field, it includes a fifth item:

• <u>Field Blanks</u> - To provide a check on contamination of containers and/or preservatives and to establish "practical" detection limits.

WESTON has used all of the above in this project. All data resulting from these verification media have been archived for future reference, retrieval, or processing. (QA/QC data from WESTON's above-described, internal QA/QC plan normally are not available to clientele without associated reimbursement to WESTON).

#### J.4 DATA HANDLING - LABORATORY

Use of any analytical data should be preceded by an assessment of its quality. The assessment should be based on accuracy, precision, completeness, representativeness, and comparability. These criteria are, in turn, assessed as follows:

• <u>Accuracy</u> - Is it acceptable for the planned use? QA/QC shall measure the accuracy of all data.



- Precision Is it acceptable for the planned use? QA/QC shall reflect the reproducibility of the measurements.
- <u>Completeness</u> Are the data sufficient for the planned use? QA/QC shall identify the quantity of data needed to match the goals.
- <u>Representativeness</u> -Do the data accurately reflect actual site conditions, sampling procedures, and analytical method? QA/QC shall ensure this.
- <u>Comparability</u> Is the report self-consistent in format, units, and standardization of methods used to generate it? QA/QC shall ensure this.

Additionally, statistical methods outlined in the QA/QC program have been applicable to data evaluation.

The Laboratory Supervisor and the Laboratory QA/QC Officer have been responsible for the evaluation of the above criteria and for enforcement of analytical protocols that will necessarily lead to acceptable data quality. The signature of the Supervisor and QA/QC Officer accompany each laboratory analytical report and serve to ensure the overall validity of the reported data.

#### J.5 SAMPLE PLAN/LOG

Normal protocol demands client-and /or site-specific logging of all sample batches delivered to WESTON. Basic information -- such as client name, address, etc.; client phone number; reporting/invoicing instructions; site descriptions; and parameter-specifications and total requirements -- is initiated here. Additionally, sample storage/disposal instructions as well as turnaround requirements and sample collection requirements are addressed at this point.

The appropriate number of method blanks is also logged at this point, and in-house chain-of-custody documentation is initiated here.

#### J.6 SAMPLE RESULTS

WESTON's analytical protocols generally require five-point calibration curve plus a reagent blank s the basis for



quantification analytes from a linear calibration curve. (A three-point plus blank curve vs. the original five point one is acceptable if it falls within the QA/QC requirements of 3 standard deviation of the original curve.) Linear regression analysis is then performed. Method- and detection limit-specific data are accessed for quantitation and

report-writing from each such data set. For reporting accuracy, the algorithm

| Linear-Regressed       | Solid Sample   | Concentration    |         |
|------------------------|----------------|------------------|---------|
| Raw Concentration      | Extract Volume | e or             | Final   |
| from Calibration Curve | If Solid       | Dilution Factor= | Concen- |
| Solid Sa               | mple Fra       | action           | tration |
| Mass If                | Solid Solid    | ls If Solid      |         |

is used for all quantitations. (All such algorithm input data are archived for long-term storage.) Detection limits for solids are generated on a per-sample basis and calculated by replacing "LINEAR-REGRESSED RAW CONCENTRATION FROM CALIBRATION CURVE" with "DETECTION LIMIT OF ANALYTE IN LIQUID MATRIX" in the above equation.

#### J.7 <u>CHAIN-OF-CUSTODY</u>

Since they document the history of samples, chain-of-custody procedures are a crucial part of a sampling/analysis program. Chain-of-custody documentation enables identification and tracking of a sample from collection to analysis to reporting.

WESTON's chain-of-custody program necessitates the use of EPA-approved sample labels, secure custody, and attendant recordkeeping. Depending on the client's requirements, WESTON also offers container sealing during unattended transportation of samples.

In essence, WESTON considers a sample in custody if it: is in a WESTON employee's physical possession; it is in view of that WESTON employee; is secured by that WESTON employee to prevent tampering; or is secured by that WESTON employee in an area that is restricted to authorized personnel.

Each time a sample is relinquished from one analyst to another or from one major location to another, WESTON's analytical personnel are required to make appropriate entries. Personnel-specific initials are used as identifiers of analysts, as are location codes for various locations (refrigerators, extraction areas, analytical areas, etc.)

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within the laboratory. Each transaction for each sample is accompanied by a specific reason for transfer. Chain-of-custody documentation is given in Appendix F.

### J.8 <u>QA/QC OFFICER</u>

Toward maintenance of a rigid, credible QA/QC regimen, WESTON Analytical Services maintains a full-time, in-house QA/QC officer who retains independent authority to declare out-of-control situations, thereby precluding reporting of unacceptable data. The QA/QC officer has been available, as needed, on the project.

# WIGHEN

#### ATTACHMENT 1

### LABORATORY QUALITY ASSURANCE MANUAL

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APPENDIX K

### LABORATORY ANALYTICAL REPORTS

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inter-office memorandum

TO: Concord) Allison Dunn (Concord) Kass Sheedy Rich Johnson cc: Les Eng (Memo Only) Carter Nulton (Memo Only) DATE: July 16, 1985

RECEIVED JUL 16 1985 GEOSCIENCES DEPT

W. O. No.: 0628-05-26

Enclosed are the reports of analysis for samples submitted May 31 to June 12, 1985 with the exception of results for soil samples US and USD which will follow tomorrow.

If you have any questions, please don't hesitate to call.

JP/eb

FROM: Judy Porta

SUBJECT: MATHER A.F.B. REPORT

K-1

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DATE OF REPORT: JULY 11, 1985

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#### MATHER A.F.B. WATER SAMPLES INORGANIC SUMMARY REPORT FOR SAMPLES REC'D MAY 31 to JUNE 5, 1985 W.O. NO. 0628-05-26

I. TOTAL CYANIDE (CN<sup>-</sup>) ANALYSIS a)

| R.F.W. NO.    | SAMPLE      | DATE      | DATE     | DATE     | TOTAL CYANIDE, |
|---------------|-------------|-----------|----------|----------|----------------|
|               | DESCRIPTION | COLLECTED | RECEIVED | ANALYZED | mg/L           |
| 8506-579-0020 | MAFB 7      | 5-30-85   | 6-4-85   | 6-12-85  | -0.01          |
| 8505-564-0020 | MAFB 8      | 5-29-85   | 5-31-85  | 6-3-85   | -0.01          |
| -0030         | MAFB 9      | 5-29-85   | 5-31-85  | 6-3-85   | -0.01          |
| 8506-579-0160 | MAFB 10     | 5-30-85   | 6-4-85   | 6-12-85  | -0.01          |
| -0180         | MAFB 11     | 5-30-85   | 6-4-85   | 6-12-85  | -0.01          |
| -0030         | MAFB 70     | 5-30-85   | 6-4-85   | 6-12-85  | -0.01          |
| 8505-564-0010 | MAFB 80     | 5-29-85   | 5-31-85  | 6-3-85   | -0.01          |
| -0040         | MAFB 90     | 5-29-85   | 5-31-85  | 6-12-35  | -0.01          |
| 8506-579-0170 | MAFB 100    | 5-30-85   | 6-4-85   | 6-12-85  | -0.01          |
| -0190         | MAFB 110    | 5-30-85   | 6-4-85   | 6-12-85  | -0.01          |
| 8506-579-0010 | FB-2        | 5-30-85   | 6-4-85   | 6-12-85  | -0.01          |
| 3506-533-0070 | JTC         | 6-3-85    | 6-5-85   | 6-14-85  | -0.01          |
| -0080         | JTC-1       | 6-3-85    | 6-5-85   | 6-14-85  | -0.01          |

TOTAL CN<sup>-</sup> ANALYSIS WAS NOT REQUESTED FOR SAMPLES IDENTIFIED AS MAFB 1-6, MAFB 20, MAFB 50, B1 to B4, B40, FB 1, FH 1-3, FH-6, FH 30, GC-1 to GC-2, GC-20 and K-9.

b) All samples were analyzed using EPA METHOD 335.2 within the EPA recommended holding time of 14 days. The requested detection limit of 0.01 mg/L ( $10 \pm g/L$ ) was acheived.

K**-**2
DATE OF REPORT: JULY 11, 1985

MATHER A.F.B. (CON'T.) PG. 2

II. OIL AND GREASE (O/G) ANALYSIS a)

| R.F.W. NO.    | SAMPLE<br>DESCRIPTION | DATE<br>COLLECTED | DATE<br>RECEIVED | DATE<br>ANALYZED | 0/G,<br>ma/L |
|---------------|-----------------------|-------------------|------------------|------------------|--------------|
| 8506-579-0140 | MAFB-1                | 5-31-85           | 6-4-85           | 6-8-85           | 0.74         |
| -0080         | MAFB-2                | 5-31-85           | 6-4-85           | 6-8-85           | 0.52         |
| -0100         | MAFB-3                | 5-31-85           | 6-4-85           | 6-8-85           | 0.26         |
| -0110         | MAFB-4                | 5-31-85           | 6-4-85           | 6-8-85           | 0.34         |
| -0120         | MAFB-5                | 5-31-85           | 6-4-85           | 6-8-85           | 0.33         |
| -0150         | MAFB-6                | 5-30-85           | 6-4-85           | 6-8-85           | 0.27         |
| -0020         | MAFB-7                | 5-30-85           | 6-4-85           | 6-8-85           | 0.44         |
| 8505-564-0020 | MAFB-8                | 5-29-85           | 5-31-85          |                  | 0.52         |
| -0030         | MAFB-9                | 5-29-85           | 5-31-85          |                  | 0.55         |
| 8506-579-0160 | MAFB-10               | 5-30-85           | 6-4-85           | 6-8-85           | 0.26         |
| -0180         | MAFB-11               | 5-30-85           | 6-4-85           | 6-8-85           | 0.17         |
| -0090         | MAFB-20               | 5-31-85           | 6-4-85           | 6-8-85           | 0.52         |
| -0130         | MAFB-50               | 5-31-85           | 6-4-85           | 6-8-85           | 0.52         |
| 8505-564-0010 | MAFB-30               | 5-29-85           | 5-31-85          |                  | 0.56         |
| 8506-579-0190 | MAFB-110              | 5-30 <b>-</b> 85  | 6-4-85           | 6-8-85           | 0.17         |
| 3506-583-0010 | B <b>-</b> 1          | 6-3-85            | 6-5-85           | 6-8-85           | 0.10         |
| -0020         | B-2                   | 6-3-85            | 6-5-85           | 6-8-85           | 0.10         |
| -0030         | B <b>-</b> 3          | 6-3-85            | 6-5-85           | 6-8-85           | 0.13         |
| -0040         | B-4                   | 6-3-85            | 6-5-85           | 6-8-85           | 0.10         |
| -0050         | B-40                  | 6-3-85            | 6-5-85           | 6-8-85           | 0.13         |
| 3506-579-0070 | FB-1                  | 5-31-85           | 6-5-85           | 6-8-85           | 0.72         |
| -0010         | FB-2                  | 5-30-85           | 6-5-85           | 6-8-85           | 0.20         |
| 3506-583-0130 | FH-1                  | 6-3-85            | 6-5-85           | 6-8-85           | 0.21         |
| -0140         | FH-2                  | 6-3-85            | 6-5-85           | 6-8-85           | 0.12         |
| -0150         | FH-3                  | 6-3-85            | 6 <b>-</b> 5-85  | 6-8-85           | 0.19         |
| -0120         | FH-6                  | 6-3-85            | 6-5-85           | 6-8-85           | 0.31         |
| -0160         | FH-30                 | 6-3-85            | 6-5-85           | 6-8-85           | 0.22         |
| -0110         | GC-1                  | 6-3-85            | 6-5-85           | 6-8-85           | 0.63         |
| -0090         | GC-2                  | 6-3-85            | 6-5-85           | 6-8-85           | 0.22         |
| 2506-583-0100 | QC-20                 | 6-3-85            | 6-5-85           | 6-8-85           | 0.22         |
| ~0070         | JTC .                 | 6-3-35            | 6-5-35           | 6-8-85           | 0.10         |
| ~0060         | K-9                   | 6-3-85            | 6-5-35           | 6-8-85           | - C.10       |

OIL & GREASE AMALYSIS was not requested for samplesidentified as MAFB 70, MAFB 90, MAFB 100 and JTC-1.

t) All samples were analyzed using EPA METHOD 413.2 within the EPA recommended holding time of 28 days. The nequested detection limit of 100  $\,$  g/L (0.100 mg/L) was achieved.

DATE OF REPORT: JULY 11, 1985

MATHER A.F.B. (CON'T.) PG. 3

III. TOTAL PHENOLICS ANALYSIS
a)

| R.F.W. NO.     | SAMPLE<br>DESCRIPTION | DATE<br>COLLECTED | DATE<br>RECEIVED | DATE<br>ANALYZED | TOTAL PHENOLI<br>ma/L | ,  |
|----------------|-----------------------|-------------------|------------------|------------------|-----------------------|----|
| 8506-579-0020  | MAFB-7                | 5-30-85           | 6-4-85           | 6-10-85          | 0.006                 |    |
| 8505-564-0020  | MAFB-8                | 5-29-85           | 5-31-85          | 6-10-85          |                       |    |
| -0030          | MAFB-9                | 5-29-85           | 5-31-85          | 6-10-85          | 0.005                 |    |
| -0030          |                       | 5-29-85           | 5-31-85          | 6-10-85          |                       |    |
| 0030           | (LAB DUPLICATE)       |                   | 3 51 53          | 0 10 00          | 0,000                 |    |
| 8506-579-0160  | MAFB-10               | 5-30-85           | 6-4-85           | 6-10-85          | 0.013                 |    |
| -0180          | MAFB-11               | 5-30-85           | 6-4-85           | 6-10-85          | 0.006                 |    |
| -0030          | MAFB-70               | 5-30-85           | 6-4-85           | 6-10-85          | 0,005                 |    |
| -0030          | DUP MAFB-70           | 5-30-85           | 6-4-85           | 6-10-85          | 0.005                 |    |
|                | (LAB DUPLICATE)       |                   |                  |                  |                       |    |
| 8505-564-0010  | MAFB-80               | 5-29-85           | 5-31-85          | 6-10-85          | -0.005                |    |
| 8506-579-0190  | MAFB-110              | 5-30-85           | 6-4-85           | 6-10-85          | 0.005                 |    |
| 8506-579-0010  | FB-2                  | 5-30-85           | 6-5-85           | 6-10-85          | 0.006                 |    |
| 8506-583-0070  | JTC                   | 6-3-85            | 6-5-85           | 6-10-85          | -0.005                |    |
| -0080          | JTC-1                 | 6-3-85            | 6-5-85           | 6-10-85          | -0,005                |    |
| -0080          | DUP JTC-1             | 6-3-85            | 6-5-85           | 6-10-85          | 0,006                 |    |
|                | (LAB DUPLICATE)       |                   |                  |                  |                       |    |
| 8505-564-0000  | LAB BLANK             | DNA               | DNA              | 6-10-85          | 0,005                 |    |
| 8505-564-SPIKE | BLANK SPIKE           | DNA               | DNA              | 6-10-85          | 84% RECOVER           | Y  |
| 8506-579-0000  | LAB BLANK             | DNA               | DNA              | 6-10-85          | -0.005                |    |
| 8506-579-SPIKE | BLANK SPIKE           | DNA               | DNA              | 6-10-85          | 76% RECOVE            |    |
| 8506-583-0000  | LAB BLANK             | DNA               | DNA              | 6-10-85          | -0.005                |    |
| 8506-583-SPIKE | BLANK SPIKE           | DNA               | DNA              | 6-10-85          | 79° RECOVER           | ŧΥ |

NOTE: No other samples required PHENOLICS analysis

b) All samples were analyzed using EPA METHOD 420.1 within the EPA recommended holding time of 28 days. As per the memo of March 5, 1985, this method is sensitive to 5  $_{\rm L}g/L$ ; therefore the requested detection limit of 1  $_{\rm L}g/L$  was not achieved.

K-4



# Date of Revised Report: August 2, 1985 Date of Original Report: July 11, 1985

# MATHER A.F.B. ADD'N TOTAL PHENOLICS RESULTS FOR SAMPLES REC'D MAY 31 to JUNE 5, 1985 W.O. NO. 0628-05-26

| R.F.W. NO.     | SAMPLE<br>DESCRIPTION | DATE<br>COLLECTED | DATE<br>RECEIVED | DATE<br>ANALYZED | TOTAL PHENOLICS<br>mg/L |
|----------------|-----------------------|-------------------|------------------|------------------|-------------------------|
| 8505-564-0040  | MAFB-90               | 5-29-85           | 5-31-85          | 6-10-85          | 0.008                   |
| 8506-579-0170  | MAFB-100              | 5-30-85           | 6-4-85           | 6-10-85          | 0.005                   |
| E.P.A. METHOD: |                       |                   |                  |                  | 420.1                   |

1 htt a conte COMPILED BY:

Kidith A. Porta Eaboratory Operations Manager WESTON Analytical Laboratories

APPROVED BY: Sarlin

Earl M. Hansen, Ph.D. Manager WESTON Analytical Laboratories `,

MATHER A.F.B. (CON'T.) PG. 4

IV. TOTAL ORGANIC CARBON (TOC) ANALYSIS

a)

R.F.W. NO. SAMPLE DATE DATE DATE TOC, ma/L DESCRIPTION COLLECTED RECEIVED ANALYZED 8506-579-0140 MAFB-1 6-4-85 6-11-85 < 0.5 5-31-85 6-11-85 2.4 -0080 MAFB-2 5-31-85 6-4-85 < 0.5-0100 MAFB-3 5-31-85 6-4-85 6-11-85 -0.5 -0110 MAFB-4 5-31-85 6-4-85 6-11-85 -0120 MAFB-5 5-31-85 6-4-85 6-11-85 <0.5 <0.5 -0150 MAFB-6 5-30-85 6-4-85 6-11-85 -0020 MAFB-7 5-30-85 6-11-85 9.0 6-4-85 8505-564-0020 MAFB-8 5-29-85 5-31-85 6-6-85 4.4 -0020 DUP MAFB-8 5-29-85 6-6-85 4.6 5-31-85 (LAB DUPLICATE) 8505-564-0030 MAFB-9 5-29-85 5-31-85 6-6-85 5.7 MAFB-10 8506-579-0160 <0.5 5-30-85 6-4-85 6-6-85 -0180 MAFB-11 5-30-85 6-4-85 6-6-85 0.7 -0090 MAFB-20 5-31-85 6-4-85 6-11-85 -0.5 MAFB-50 6-11-85 -0.5 -0130 5-31-85 6-4-85 8505-564-0010 4.5 MAFB-80 5-29-85 5-31-85 6-6-85 8506-579-0190 MAFB-110 0.7 5-30-85 6-4-85 6-11-85 MAFB-110 -0190 DUP 5-30-85 6-4-85 6-11-85 1.0 (LAB DUPLICATE) -0190 SPIKE MAFB-110 5-30-85 6-4-85 6-11-85 104% RECOVERY (MATRIX SPIKE) 8506-583-0010 B-1 6-5-85 -0.5 6-3-85 6-11-85 -0020 B-2 6-5-85 -0.5 6-3-85 6-11-85 6-5-85 0.5 -0030 B-3 6-3-85 6-11-35 -0040 .0.5 B-4 6-3-85 6-5-85 6-11-85 -0050 B-40 6-3-85 6-5-85 6-11-85 -0.5 8506-579-0070 FB-1 5-31-85 6-5-85 6-6-85 0.6 -0010 FB-2 5-30-85 6-5-85 6-6-85 0.6 8506-583-0130 FH-] 6-3-85 6-5-85 6-11-85 0.5 -0140 FH-2 6-3-85 6-5-85 6-11-85 0.5 -0150 FH-3 6-3-85 6-5-85 6-11-85 -0.5 -0120 FH-6 6-3-85 6-5-85 6-11-85 0.5 -0160 FH-30 6-5-85 -0.5 6-3-85 6-11-85 -0110 GC-1 6-3-85 6-5-85 6-11-85 16.1 -0090 GC-2 6-3-85 6-5-85 6-11-85 17.3 -0100 GC-20 6-3-85 6-5-85 6-11-85 17.8 -0070 JTC 6-3-85 6-5-85 6-11-85 13.0 -0060 0.5 K-9 6-3-85 6-5-85 6-11-85 8506-579-0000 LAB BLANK DNA DNA 6-6-85 0.5 8506-579-SPIKE BLANK SPIKE DNA DNA 98 RECOVERY 6-6-85 -0.5 8506-583-0000 LAB BLANK DNA DNA 6-11-85 8506-583-SPIKE BLANK SPIKE DNA DNA 6-11-35 98' RECOVERY

DATE OF REPORT: JULY 11, 1985

MATHER A.F.B. (CON'T.) PG. 5

IV. TOTAL ORGANIC CARBON (CON'T.)

NOTE: TOC analysis was not requested for samples identified as MAFB 70, MAFB 90, MAFB 100, and JTC-1.

b) All samples were analyzed by EPA METHOD 415.2 using a DOHRMANN DC 80 Carbon Analyzer within the EPA recommended holding time of 28 days. A detection limit of 500  $\pm$ g/L was achieved.

COMPILED BY: Judith a. Porta

Laboratory Support Manager VESTON Analytical Laboratories

Approved By: Canta .... Earl M. Hansen, Ph.D.

Manager WESTON Analytical Laboratories



# DATE OF REPORT: July 15, 1985

# MATHER A.F.B. TOTAL METALS SUMMARY REPORT FOR SAMPLES RECEIVED JUNE 12, 1985 W.O. NO. 0628-05-26

# DATE SAMPLES COLLECTED: May 29-June 3, 1985

SAMPLES SUBMITTED BY: Nancy Schultz

Ι.

| DESCRIPTION         ug/L                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |         |                 |          |          | TOTAL    |          |         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-----------------|----------|----------|----------|----------|---------|
| 8506-611-0110       MAFB 4       <2.5       <50       <10       <100       <         -0120       MAFB 5       <2.5       <50       <10       <100       <         -0060       MAFB 6       <2.5       <50       <10       <100       <         -0060       SPIKE       MAFB 6        <2.5       <50       <10       <100       <         -0060       SPIKE       MAFB 6         <2.5       <50       <10       <100       <         -0060       SPIKE       MAFB 7       <2.5       <50       <10       <100       <         -0070       MAFB 8        <2.5       <50       <10       <100       <         -0070       MAFB 9       <2.5       <50       <10       <100       <       <         -0020       MAFB 9       <2.5       <50       <10       <100       <       <         -0020       MAFB 10       <2.5       <50       <10       <100       <         -0080       MAFB 11       <2.5       <50       <10       <100       <         -0030       MAFB 80       <2.5       <50       <10       <100                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |         | SAMPLE          | Cd       | Cr       | РЬ       | Ni       | Ag      |
| -0120 MAFB 5 <2.5 <50 <10 <100 <<br>-0060 MAFB 6 22.5 <50 <10 <100 <<br>-0060 SPIKE MAFB 6 88 75% 88% 75%<br>(MATRIX SPIKE) RECOVERY RE |         | DESCRIPTION     | ug/L     | ug/L     | ug/L     | ug/L     | ug/L    |
| -0060 MAFB 6 <2.5 <50 <10 <100 <<<br>-0060 SPIKE MAFB 6 88° 75° 88° 75° (MATRIX SPIKE) RECOVERY     | 0110    | MAFB 4          | <2.5     | < 50     | < 10     | <100     | <2.5    |
| -0060 SPIKE MAFB 6 88: 75% 88% 75% (MATRIX SPIKE) RECOVERY RECOVER       | 0120    | MAFB 5          | <2.5     | <50      | <10      | <100     | <2.5    |
| (MATRIX SPIKE)       RECOVERY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 060     | MAFB 6          |          | < 50     | <10      | <100     | <2.5    |
| -0070 MAFB 7 <2.5 <50 <10 <100 <100 <100 <100 <100 <100                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | )060 SP | KE MAFB 6       | 88 1     | 75%      | 88%      | 75       | 104     |
| -0010 MAFB 8 <2.5 60 <10 150 <1<br>-0020 MAFB 9 2.5 <50 <10 <100 <100 (LAB DUPLICATE)<br>-0080 MAFB 10 2.5 <50 <10 <100 <100 <100 <100 <100 <100                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |         | (MATRIX SPIKE)  | RECOVERY | RECOVERY | RECOVERY | RECOVERY | RECOVER |
| -0020 MAFB 9 -2.5 <50 <10 <100 <100 <100 <100 <100 <100                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 070     | MAFB 7          | <2.5     | <50      | <10      | <100     | <2.5    |
| -0020 MAFB 9 -2.5 <50 <10 <100 <100 <100 <100 <100 <100                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 010     | MAFB 8          | <2.5     | 60       | <10      | 150      | <2.5    |
| (LAB DUPLICATE)         -0080       MAFB 10       2.5       50       10       100       100         -0090       MAFB 11       2.5       50       10       100       100         -0130       MAFB 50       2.5       50       10       100       100       100         -0030       MAFB 80           100       100       100         -0030       DUP       MAFB 80           100       100       100         -0100       MAFB 110       2.5       50       10       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100 <t< td=""><td>020</td><td>MAFB 9</td><td>~2.5</td><td>&lt; 50</td><td>&lt; 10</td><td>&lt;100</td><td>&lt;2.5</td></t<>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 020     | MAFB 9          | ~2.5     | < 50     | < 10     | <100     | <2.5    |
| -0080       MAFB 10       2.5       50       10       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       100       <                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | )020 DU | MAFB 9          | ×2.5     | < 50     | <10      | <100     |         |
| -0090       MAFB 11       2.5       <50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |         | (LAB DUPLICATE) |          |          |          |          |         |
| -0130 MAFB 50 <2.5 <50 <10 <100 <2<br>-0030 MAFB 80 <2.5 <50 <10 <100 <2<br>-0030 DUP MAFB 80 <2<br>(LAB DUPLICATE)<br>-0100 MAFB 110 <2.5 <50 <10 <100 <2<br>-0100 DUP MAFB 110 <2.5 <50 <10 <100 <2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 080     | MAFB 10         | -2.5     | ~50      | < 10     | <100     | <2.5    |
| -0030 MAFB 80 <2.5 <50 <10 <100 <100 <100 <100 <100 <100                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 090     | MAFB 11         | .2.5     | <50      | <10      | < 100    | <2.5    |
| -0030 DUP MAFB 80                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 0130    | MAFB 50         | ~2.5     | < 50     | <10      | < 100    | <2.5    |
| (LAB DUPLICATE)<br>-0100 MAFB 110 + 2.5 + 50 < 10 < 100 <<br>-0100 DUP MAFB 110 + 2.5 + 50 < 10 < 100 <                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 030     | MAFB 80         | -2.5     | - 50     | <10      | <100     | <2.5    |
| -0100 MAFB 110 2.5 50 <10 <100 <<br>-0100 DUP MAFB 110 2.5 50 <10 <100 <                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 030 DU  | MAFB 80         |          |          |          |          | <2.5    |
| -0100 DUP MAFB 110 <2.5 <50 <10 <100 <                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |         | (LAB DUPLICATE) |          |          |          |          |         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 0100    | MAFB 110        | <2.5     | - 50     | < 10     | <100     | <2.5    |
| (LAB DUPLICATE)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 0100 DU | MAFB 110        | <2.5     | ~ 50     | < 10     | <100     | <2.5    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |         | (LAB DUPLICATE) |          |          |          |          |         |
| -0140 B-1 <2.5 <50 <10 <100 <3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0140    | B-1             | ·2.5     | < 50     | <10      | ~ 100    | <2.5    |
| -0150 B-2 <2.5 <50 <10 <100 <                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0150    | B-2             | <2.5     | ~50      | ~10      | <100     | <2.5    |
| -0160 B-3 <2.5 <50 <10 <100 <                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |         |                 |          |          |          | < 100    | <2.5    |
| -0160 SPIKE B-3 92 92 148 92                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0160 SP | KE B-3          | 92       | 92       | 148      | 92       | 108     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |         | (MATRIX SPIKE)  |          | RECOVERY | RECOVERY | RECOVERY | RECOVER |



MATHER A.F.B. (CON'T) PG. 2

# DATE OF REPORT: July 15, 1985

|                |                       |                  |                 | TOTAL            |                 |                  |
|----------------|-----------------------|------------------|-----------------|------------------|-----------------|------------------|
| R.F.W. NO.     | SAMPLE<br>DESCRIPTION | Cd<br>ug/L       | Cr<br>ug/L      | Pb<br>ug/L       | Ni<br>ug/L      | Ag<br>ug/L       |
| 8506-611-0170  | B-4                   | <2.5             | <50             | <10              | <100            | <2.5             |
| -0180<br>-0040 | B-40<br>FB-2          | <2.5<br><2.5     | <50<br><50      | <10<br><10       | <100<br><100    | <2.5<br><2.5     |
| -0050<br>-0190 | FB-3<br>JTC           | <2.5<br><2.5     | <50<br><50      | <10<br><10       | <100<br><100    | <2.5<br><2.5     |
| 8506-611-0000  | LAB BLANK             | <2.5             | < 50            | <10              | <100            | <2.5             |
| 8506-611-SPIKE | BLANK SPIKE           | 100%<br>RECOVERY | 92%<br>RECOVERY | 100%<br>RECOVERY | 90%<br>RECOVERY | 104%<br>RECOVERY |

II. All samples were analyzed within the EPA recommended holding time of six months from date of collection to date of analysis. The method of analysis and the requested and achieved detection limits are as follows:

| METAL    | METHOD    | REQUESTED<br>DETECTION LIMIT | ACHIEVED<br>DETECTION LIMIT |
|----------|-----------|------------------------------|-----------------------------|
| CADMIUM  | EPA 213.2 | 10 ug/L                      | 2.5 ug/L                    |
| CHROMIUM | EPA 218.1 | 50 ug/L                      | 50 ug/L                     |
| LEAD     | EPA 239.2 | 20 ug/L                      | 10 ug/L                     |
| NICKEL   | EPA 249.1 | 100 ug/L                     | 100 ug/L                    |
| SILVER   | EPA 272.2 | 10 ug/L                      | 2.5 ug/L                    |

COMPILED BY: Indiala. Porta

Sudith A. Porta Laboratory Operations Manager WESTON Analytical Laboratories APPROVED BY:

F Earl M. Hansen, Ph.D.
 Manager
 WESTON Analytical Laboratories



DATE OF REPORT: JUNE 10, 1985

| t i i i i i i i i i i i i i i i i i i i | <b>ATHI</b> | ER A. | .F.8 | 3.   |
|-----------------------------------------|-------------|-------|------|------|
|                                         |             | 1ARY  |      |      |
| W.O.                                    | NO.         | 0628  | 3-0  | 5-26 |

#### DIMETHYLNITROSAMINE (DMN) ANALYSIS

| R.F.W. NO.             | SAMPLE<br>DESCRIPTION | DATE<br>COLLECTED | DATE<br>REC'D | DATE<br>EXTRACTED | DATE<br>ANALYZED | DMN,<br>ug/L    |
|------------------------|-----------------------|-------------------|---------------|-------------------|------------------|-----------------|
| 8506-579 <b>-0</b> 110 | MAFB-4                | 5-31-85           | 6-4-85        | 6-5-85            | 6-7-85           | <0.2            |
| -0120                  | MAFB-5                | 5-31-85           | 6-4-85        | 6-5-85            | 6-7-85           | <0.2            |
| -0130                  | MAFB-50               | 5-31-85           | 6-4-85        | 6-5-85            | 6-7-85           | <0.2            |
| -0150                  | MAFB-6                | 5-30-85           | 6-4-85        | 6-5-85            | 6-7-85           | <0.2            |
| 8506-583-0010          | B-1                   | 6-03-85           | 6-5-85        | 6-5-85            | 6-7-85           | <0.2            |
| -0020                  | B-2                   | 5-30-85           | 6-5-85        | 6-5-85            | 6-7-85           | <1.0            |
| -0030                  | B-3                   | 5-30-85           | 6-5-85        | 6-5-85            | 6-7-85           | <0.2            |
| -0040                  | B _4                  | 6-03-85           | 6-5-85        | 6-5-85            | 6-7-85           | <0.2            |
| -0050                  | B-40                  | 6-03-85           | 6-5-85        | 6-5-85            | 6-7-85           | <0.2            |
| 8506-579&583/          | LAB BLANK             |                   |               | 6-5-85            | 6-7-86           | <0.2            |
| 8506-579&583/          | SPIKE D.I.            | SPIKE             |               | 6-5-85            | 6-7-85           | 46%<br>RECOVERY |
| 8506-579&583/          | S.D. D.I. S           | SPIKE<br>DUP.     |               | 6-5-85            | 6-7-85           | 46%<br>RECOVERN |

These samples were analyzed using EPA Method 607. All samples were extracted within seven days of collection and were analyzed within two days of extraction. The requested detection limit of lug/L was achieved.

nethod 207 is correct returns Approved By: Dall as sponshed in a mino 3 Approved By: Earl M. Applothe No. Fred La. Corter Manager Notion My Earl M. Hansen Manager

Manager WESTON Analytical Laboratories

K-10



#### DATE OF REPORT: July 11, 1985

# MATHER A.F.B. SOIL SAMPLES INORGANIC SUMMARY REPORT FOR SAMPLES REC'D JUNE 4, 1985 W.O. NO. 0628-05-26

DATE SAMPLES COLLECTED: 5-30-85

| R.F.W. NO.                                   | SAMPLE<br>DESCRIPTION                | TOTAL CN <sup>-</sup> ,<br>ug/g  | OIL & GREASE<br>ug/g           | TOTAL PHENOLICS<br>ug/g |
|----------------------------------------------|--------------------------------------|----------------------------------|--------------------------------|-------------------------|
| 8506-579-0040<br>-0050<br>-0050 DUP<br>-0060 | USD<br>US<br>US (LAB DUPLICATE<br>DS | <0.13<br><0.13<br>(0.13<br><0.13 | 2,140<br>3,840<br>3,800<br>302 | 0.357<br>0.395<br>0.234 |
| 8506-579-0000                                | LAB BLANK                            |                                  | 12.0                           |                         |

NOTE: THE OIL & GREASE RESULTS ARE NOT BLANK CORRECTED.

| DATE OF ANALYSIS:           | 6-13-85   | 6-12-85   | 6-10-85    |
|-----------------------------|-----------|-----------|------------|
| METHOD OF ANALYSIS:         | EPA 335.2 | EPA 413.2 | EPA 420.1  |
| DETECTION LIMIT ACHIEVED:   | 0.13 ug/g | 8.0 ug/g  | 0.123 ug/g |
| REQUESTED DETECTION LIMITS: | 1.0 ug/g  | 100 ug/g  | 1.0 ug/g   |

COMPILED BY: Judit a. Porta

Audith A. Porta Laboratory Operations Manager WESTON Analytical Laboratories

APPROVED BY: Curte

For Earl M. Hansen, Ph.D. Manager WESTON Analytical Laboratories

1

inter-office memorandum

TO:

Katherine Sheedy

Debie Josef

FROM: David Ben-Hur, Stockton Laboratory

SUBJECT: Analytical results, Mather AFB, Sampling Round of May 1985

RECEIVED JUL 3 1985 GEOSCIENCES DEPT W. O. No.:

DATE: June 27, 1985

Attached are the results of the analyses performed at the Stockton Laboratory on the samples collected in the first round of resampling at Mather AFB.

MATTHER AFB Sampling and Analysis Chronology

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|                | Date sampled |             |         |           | Date Ana     | ulyzed     |          |           |          |
|----------------|--------------|-------------|---------|-----------|--------------|------------|----------|-----------|----------|
|                |              | EPA 601     | EPA 602 | Pestici   | Pesticides H | Herbicides | ides     | PCB's     | 3's      |
|                |              | :<br>;<br>; |         | Extracted | Analyzed     | Extracted  | Analyzed | Extracted | Analyzed |
| MAFB-8         | 5/29/85      | 6/12/85     | 6/4/85  | I         | ł            | I          | I        | I         | 1        |
| MAFB-9         | =            | =           | =       | I         | ł            | I          | I        | I         | I        |
| MAFB-80        | =            | =           | -       | 1         | ł            |            | 1        | 1         | I        |
| MAFB-6         | 5/30/85      | Ξ           | Ξ       | 6/5/85    | 6/1/85       | 6/6/85     | 6/12/85  | ı         | I        |
| MAFB-7         | =            | =           | =       | I         | J            |            | 1        | ı         | ı        |
| MAFB-10        | =            | =           | =       | I         | 1            | 1          | 1        | I         | I        |
| MAFB-11        | =            | =           | :       | I         | ţ            | I          | ı        | ı         | I        |
| FB-2           | =            | =           | :       | 1         | ı            | I          | ı        | ı         | I        |
| IS (soil)      | =            | 6/18/85     | 6/20/85 | ı         | 1            | I          | I        | ı         | I        |
| ISD (soil)     | =            | =           | =       | ı         | ı            | I          | ı        | ı         | I        |
| DS (soil)      | =            | =           | =       | 1         | J            | 1          | ł        | ı         | ı        |
| MAFB-1         | 5/31/85      | 6/13/85     | 6/4/85  | ١         | ł            | i          | I        | 6/7/85    | 6/11/85  |
| MAFB-2         | ÷            | z           | =       | ı         | I            | ı          | ı        | =         | =        |
| MAFB-3         | =            | Ξ           | =       | ı         | ł            | ı          | l        | =         | Ξ        |
| MAFB-4         | =            | Ξ           | =       | 6/5/85    | 6/1/85       | 6/6/85     | 6/12/85  | 1         | I        |
| MAFB-5         | =            | =           | =       | =         | =            | Ξ          | Ξ        | 1         | I        |
| <b>MAFB-20</b> | =            | =           | =       | 1         | ł            | ı          | I        | Ŭ         | 6/11/8   |
| MAFB-50        | =            | =           | =       | 6/5/85    | 6/1/85       | 6/6/85     | 6/12/85  |           | ı        |
| MAFB-110       | =            | =           | =       | I         | J            | ı          | I        | 1         | ı        |
| ET1. ]         | =            | =           | =       |           |              |            |          |           |          |

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MATHER AFB Sampling and Analysis Chronology

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|              | 's      | Analyzed           | I       | ı   | I   | ı      | ł       | I    | I     | I    | ł       | 1     | ı   | 1    | ١     | ł      | 1   |
|--------------|---------|--------------------|---------|-----|-----|--------|---------|------|-------|------|---------|-------|-----|------|-------|--------|-----|
|              |         | Extracted Analyzed | ļ       | ı   | ı   |        | I       | 1    | ı     | J    | ţ       | 1     | ı   | I    | ł     | ł      | I   |
|              | ides    | Analyzed           | 6/12/85 | =   | =   | 2      | :       | I    | ł     | I    | i       | 1     | ł   | I    | I     | I      | 1   |
| lyzed        | llerbic | Extracted Analyzed | 6/6/85  | z   | -   | 2      | =       | I    | ١     | I    | ł       | I     | I   | I    | I     | ı      | ł   |
|              |         |                    |         |     | =   | =      | =       | i    | 1     | ł    | ł       | 1     | ł   | ł    | 1     | ı      | ł   |
|              | Pestici | Extracted          | 6/5/85  | =   | =   | 6/7/85 | =       | ł    | I     | i    | I       | I     | ł   | 1    | 1     | ł      | 1   |
|              | E17602  |                    | 6/6/85  | -   | =   | =      | =       | =    | =     | =    | =       | =     | =   | -    | =     | 6/1/85 | =   |
|              | EPA 601 |                    | 6/17/85 |     | Ξ   | F      | 6/13/85 | =    | =     | =    | 6/14/85 | -     | =   | :    | •     | =      | =   |
| Date Sampled | 4       |                    | 6/3/85  | 84  | =   | =      | 2       | =    | =     | =    | 2       | Ŧ     | =   | =    | =     | Ŧ      | =   |
| Sample ID    |         |                    | B-1     | B-2 | B-3 | B-4    | B-40    | FH-1 | F11-2 | FH-3 | F11-6   | FH-30 | C-1 | GC-2 | GC-20 | JTC    | K-9 |

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MATHER AFB QA/QC Data

### 1. Second column confirmation for volatile compounds

The following samples have been subjected to a second column confirmation. The confirmation was performed qualitatively only. Compounds that were identified and quantitated in the primary column, but could not be confirmed, were reported as  $\mathbb{ND}$  - not detected.

Sample ID

MAFB-8 MAFB-9 MAFB-80 MAFB-1 MAFB-2 MAFB-3 MAFB-20 GC-2 GC-20

# 2. Laboratory duplicates for volatile compounds analysis

iethod 601

Sample ID: MAFB-9

| Compound                             | Concentra  | tion, $ug/L$ |
|--------------------------------------|------------|--------------|
|                                      | First      | Second       |
| Trichloroethene<br>Tetrachloroethene | 4.8<br>1.3 | 7.0<br>2.4   |
| Sample ID: GC-20                     |            |              |
| 1,1,1-Trichloro-<br>ethane           | 9.5        | ND           |

#### Method 602

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| Compound             | MAFB      | -8           | MAFE      | -9         | MAFB      | -80     |
|----------------------|-----------|--------------|-----------|------------|-----------|---------|
|                      | Concentra | tion, $ug/L$ | Concentra | tion, ug/L | Concentra | tion, t |
|                      | First     | Second       | First     | Second     | First     | Sec     |
| Chlorobenzene        | 1.7       | 0.94         | D         | :Đ         | 1.7       | 0.      |
| 1,3,-Dichlorobenzene | ND        | ND           | ND        | 17D        | ND        | D       |
| 1,2-Dichlorobenzene  | 1.2       | 1.0          | ND        | ND         | 1.2       | 1.      |
| 1,4-Dichlorobenzene  | 0.32      | :D           | ND        | ND         | 0.61      | 0.      |
| Benzene              | ND        | ND           | ND        | ND         | ND        | ND      |
| Toluene              | 0.47      | 0.33         | ND        | ND         | 0.40      | 0       |
| Ethylbenzene         | :D        | ND.          | ND        | ND         | ND        | ND      |

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# MATHER AFB QA/QC Data

# 3. Matrix Spikes for volatile compounds

| Compound                 | Spike, | Pe     | ercent Reco | overy |     |
|--------------------------|--------|--------|-------------|-------|-----|
| -                        | ug/L   | MAFB-9 | MAFB-11     | FH-3  | B-1 |
| 1,1-Dichloroethene       | 1.2    | NS     | NS          | 82    | NS  |
| 1,1-Dichloroethane       | 1.2    | NS     | NS          | 68    | NS  |
| trans-1,2-dichloroethene | 1.2    | NS     | NS          | 68    | NS  |
| Trichloroethene          | 1.2    | NS     | NS          | 90    | 104 |
| Tetrachloroethene        | 1.2    | NS     | NS          | 75    | 83  |
| Chlorobenzene            | 1.2    | 101    | 98          | NS    | NS  |
| l,2-Dichlorobenzene      | 1.2    | 86     | 98          | NS    | NS  |
| 1,3-Dichlorobenzene      | 1.2    | 94     | 106         | NS    | NS  |
| 1,4-Dichlorobenzene      | 1.2    | 95     | 98          | NS    | NS  |

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NS = Not spiked

# 4. Pesticide and herbicide matrix spike

| Compound  | Spike, | Perc | ent Rec     | covery |
|-----------|--------|------|-------------|--------|
|           | ug/L   | B-2  | <u>B-40</u> | Water  |
| o,p'-DDT  | 0.15   | NS   | 120         | 100    |
| Chlordane | 0.14   | NS   | 80          | 71     |
| 2,4-D     | 0.18   | 98   | NS          | 93     |

# LAB NO. 85-05-044

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Pesticide and Herbicide Analysis Mather AFB Jample: MAFB-6

| Campound                          | Detection<br>Limit, ug/L | Found<br>ug/L  |
|-----------------------------------|--------------------------|----------------|
| o,p'-DDT<br>p,p'-DDT<br>Chlordane | 0.02<br>0.02<br>0.02     | ND<br>ND<br>ND |
| 2,4-D                             | 0.06                     | ND             |

# LAB NO. 85-06-001

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Pesticide and Herbicide Analysis Mather AFB

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| Campound  | Detection   | Concer | ntration, | ug/L    |
|-----------|-------------|--------|-----------|---------|
| <u></u>   | Limit, ug/L | MAFB-4 | MAFB-5    | MAFB-50 |
| o,p'-DDT  | 0.02        | ND     | ND        | ND      |
| p,p'-DDT  | 0.02        | ND     | ND        | ND      |
| Chlordane | 0.02        | ND     | ND        | ND      |
| 2,4-D     | 0.06        | ΝD     | ND        | :D      |

# LAB NO. 85-06-001

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# PCB Analysis Mather AFB

| Deverator                                                                        | Detection                                    |                            | Concer                                 | ntration,                                          | ug/L                             |             |
|----------------------------------------------------------------------------------|----------------------------------------------|----------------------------|----------------------------------------|----------------------------------------------------|----------------------------------|-------------|
| Parameter                                                                        | Limit, ug/L                                  | MAFB-1                     | MAFB-2                                 | MAFB-3                                             | MAFB-20                          | <u>FB-1</u> |
| PCB 1016<br>PCB 1221<br>PCB 1232<br>PCB 1242<br>PCB 1248<br>PCB 1254<br>PCB 1260 | 0.04<br>0.10<br>0.05<br>0.08<br>0.05<br>0.15 | ND 19 19 19 19 19 19 19 19 | ND<br>ND<br>ND<br>ND<br>ND<br>ND<br>ND | ND<br>ND<br>ND<br>ND<br>ND<br>ND<br>ND<br>ND<br>ND | אם<br>אם<br>אם<br>אם<br>אם<br>אם | 6666666     |

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# LAB NO. 85-06-004

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# Pesticide and Herbicide Analysis Mather AFB

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| Campound  | Detection   |            | Concer     | ntratio | on, ug/    | L           |
|-----------|-------------|------------|------------|---------|------------|-------------|
|           | Limit, ug/L | <u>B-1</u> | <u>B-2</u> | B-3     | <u>B-4</u> | <u>B-40</u> |
| o,p'-DDT  | 0.02        | ND         | ND         | ND      | ND         | ND          |
| p,p'-DDT  | 0.02        | ND         | ND         | ND      | ND         | ND          |
| Chlordane | 0.02        | ND         | ND         | ND      | ND         | ND.         |
| 2,4-D     | 0.06        | ND         | ND         | ND      | ND         | :D          |

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DATE: November 4, 1985

# inter-office memorandum

TO:

Katherine Sheedy

cc: Alison Dunn, Concord Office

FROM: David Ben-Hur

SUBJECT: Mather AFB Volatiles Analysis Results W. O. No.:

Attached are the corrected results for the water samples collected at Mather AFB during May and June 1985.

These data are blank corrected.

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Mather AFB - May 1985 Sampling Revised Report Volatiles Analysis by EFA Nethods 601 (GC/Hall Detector) and 602 (GC/PID)

| Camponent                        | Detection<br>Limit, ug/L | ().()      | Concer<br>GC-2 | Concentration,<br>CC-2 CC-20 | JTC<br>JTC | 6У       |
|----------------------------------|--------------------------|------------|----------------|------------------------------|------------|----------|
|                                  | (                        | 1          |                |                              |            |          |
|                                  |                          | <b>N</b> N | CL2            | L <sup>I</sup>               | 2          | DZ<br>DZ |
| st dignethane                    | 1.2                      | ę          | ē              | Ð                            | ę          | £        |
| Dichlorodiflucromethare          | 1.8                      | ę          | ę              | <u>1</u>                     | Ð          | Ø        |
| Vinyl chloride                   | 0.2                      | Ę          | Ð              | QN                           | Ð          | Ð        |
| Chlcroethane                     | 0.5                      | Q:         | Ę              | ß                            | ą          | Ð        |
| letrylere chloride               | 0.2                      | <u>A</u>   | Ð              | Q                            | Q          | Ð        |
| Trichlorofluoromethane           | 2.0                      | Ð          | Ð              | R                            | Ð          | Q        |
| I, l-Dichloroethene              | 0.2                      | Ð          | Ð              | QN                           | Ð          | Q        |
| l, l-Dichloroethane              | 0.1                      | QN         | 2              | QZ                           | Ð          | Ð        |
| Trans-1,2-dichloroethene         | 0.1                      | QZ         | Ð              | Q                            | 2          | Ð        |
| Chloraform                       | 0.1                      | Ð          | Ē              | Q                            | Ð          | QN       |
| 1, 2-Dichloroethane              | 0.02                     | Ð          | Ð              | Q                            | £          | Ð        |
| <pre>I,l,l-Trichloroethane</pre> | 0.1                      | Ð.         | 6.2            | 9.5                          | Ð          | Ð        |
| Carbon tetrachloride             | 0.1                      | Ð          | Q              | Q                            | Ð          | Ð        |
| <b>Eramodichloramethane</b>      | 0.1                      | QN         | <u>a</u>       | Ë                            | QN         | 2        |
| 1, 2-Dichloropropane             | 0.1                      | QN         | Q.             | R                            | Ð          | Ð        |
| Cis-1, 3-dichloropropene         | 0.3                      | C N        | QN             | QN                           | Q          | R        |
| Trichloroethene                  | 0.1                      | QN         | 9              | ß                            | Ð          | R        |
| Diprotochloromethane             | 0.1                      | ē          | Ð              | R                            | Ð          | Ð        |
| 1,1,2-Trichlorcethane            | <u>č0.0</u>              | Ë          | СIХ            | <u>e</u>                     | Ę          | Ð        |
| Tins-1, J-dichloropropene        | 0.2                      | Д.         | ДŅ             | Ë                            | Ð          | 2        |
| 2-2hloroethylvinyl ether         | 0.2                      | DI.        | Q.             | <u>P</u>                     | Q.         | 5        |
| Lioncion                         | 0.2                      | Ð          | Q.             | Ð.                           | Q          | Q        |
| 1,1,2,2-Tetrachloroethane        | 0.05                     | QN         | СĽ.            | Ð                            | QN         | Ð        |
| Terrachloroethene                | 0.05                     | CIN.       | CII.           | e:                           | Ð          | Ð        |
| . h. orokentere                  | 0.3                      | CII;       | CIC            | ð                            | QN         | ł        |
| 1,3-Jichlorchenzene              | 0.3                      | CIK.       | <u>P</u>       | Ê:                           | <u>e</u>   | Q        |
| 1,2-Jichlorobenzene              | 0.5                      | (II)       | <u>A</u>       | (E.                          | Ð          | 9        |
| 1,4-Jichlorobenzene              | 0.2                      |            | <u>n</u>       | <u>G</u>                     | Ð          | R        |
| uri vine                         | 0.2                      | CI:        | (III)          | ar:                          | R          | Ð        |
| PoliteCe                         | 0.2                      | 0.31       | (F.            | 0.84                         | 1.2        | 0.66     |
| austrument                       | 0.2                      | С,         | С.             | QU                           | 0.67       |          |
|                                  |                          |            |                |                              |            |          |

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LAB NO. 85-06-004

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Muther AFB - thay 1985 Sampling Ruvised Report Volatiles Analysis by EPA Methods 601 (GC/Hall Detector) and 602 (GC/PID)

| FB-1                                          | ₽₽₽                                                      | 29             | 22                 | 見                      | 2                  | 29                                             | Ð          | Ð                   | QN                     | Ð                                 | Ð                                | ł                   | Ð                        | R               | Ð                    | Ð                                        | Ð                          | QN                       | ß         |                           | _                 |               |                     |                     |                     |                | -()<br>E |                   |
|-----------------------------------------------|----------------------------------------------------------|----------------|--------------------|------------------------|--------------------|------------------------------------------------|------------|---------------------|------------------------|-----------------------------------|----------------------------------|---------------------|--------------------------|-----------------|----------------------|------------------------------------------|----------------------------|--------------------------|-----------|---------------------------|-------------------|---------------|---------------------|---------------------|---------------------|----------------|----------|-------------------|
| MAFB-110                                      | 222                                                      |                | 22                 | Q                      | 9                  | 29                                             | Q          | Ð                   | QN                     | QN                                | Q                                | Ð                   | ß                        | Ð               | Ð                    | QN                                       | Ŗ                          | Ð                        | £         | ß                         | Ð                 | Ð             | Ð                   | Q                   | ß                   | ß              | Ð        | Q                 |
| MREB-50                                       | <u> 9 9 9</u>                                            | 99             | 22                 | 2                      | <u>9</u> !         | 29                                             | Ð          | Ð                   | Ð                      | ß                                 | 9                                | Ð                   | 見                        | ĕ               | ß                    | ß                                        | ß                          | ß                        | ß         | ß                         | ß                 | ë             | Ŗ                   | ß                   | ë                   | Ê              | 0.84     | £                 |
| /L<br>11AFB-20                                | 2 2 2                                                    | 29             | 22                 | Q                      | 29                 |                                                | Q          | Q                   | Q                      | Ð                                 | Ð                                | Ð                   | Q                        | 5.1             | Ð                    | Ð                                        | Ð                          | Ð                        | Ð         | Ð                         | Q                 | Q             | Ð                   | Ê                   | Ð                   | Ð              | 0.84     | QN                |
| Concentration, ug/I<br><u>MAFB-4 NAFB-5 n</u> | 2 2 2                                                    | 22             | 22                 | Ð                      | £!                 | ₹₽                                             | Ð          | Ð                   | Ð                      | Ð                                 | Ð                                | Ð                   | Ð                        | Ð               | Q.                   | Ð                                        | Ð                          | Ð                        | Ð         | Ð                         | Ð                 | Ð             | Ð                   | Ð                   | Ð                   | £              | 0.69     | ON.               |
| Concentra<br>MAFB-4                           | 2 2 2                                                    | 2 2            | 28                 | Ð                      | 2                  | 2 2                                            | Ð          | Q                   | Ð                      | Ð                                 | Q                                | QN                  | Ð                        | Ð               | Q                    | Ð                                        | ND                         | CIN                      | Ð         | Ð                         | Ð                 | Ð             | Ð                   | Ð                   | Ð                   | £              | 1.2      | 0.35              |
| MAFB-3                                        | <u> </u>                                                 |                | 2 <del>2</del>     | Ð                      | 2                  | ₹ £                                            | Ð          | Ð                   | Ð                      | Ð                                 | CP2                              | Ð                   | Ð                        | 33.             | Q                    | Ŕ                                        | Ð                          | Q                        | Q         | Ę,                        | Ð                 | 2             | Ð                   | CL1                 | Ð,                  | <u>e</u>       | t6.0     | CI I              |
| MAFB-2                                        | 899                                                      |                | 22                 | Q                      | 見                  | 29                                             | Ð          | QN                  | Ð                      | Ð                                 | ð                                | Q.                  | ë                        | 13.             | ð                    | Ð                                        | Q.                         | Ð                        | 92        | G2                        | Ð                 | Ë             | £                   | <u>e</u>            | ĕ                   | <u>P</u>       | 0.74     | Q.                |
| MVFB-1                                        | 999<br>999<br>999                                        | e e            | 99                 | Ð                      | 2                  | 2 8                                            |            | Ð,                  | Q.                     | Ð                                 | Ê                                | СI.                 | ę                        | 7.7             | Ë                    | Ë                                        | Ð                          | QN.                      | 2         | Ð                         | Ê                 | Ë             | Ð                   | Ŗ                   | Ë                   | <u>6</u>       | 2.0      | C:                |
| Detection<br>Limit, ug/L                      | 1,0<br>1.2<br>1.8                                        | 0.2            | 0.2                | 2.0                    | 0.2                | 0.1                                            | 0.1        | 0.02                | 0.1                    | 0.1                               | 0.1                              | 0.1                 | 0.3                      | 0.1             | 0.1                  | 0.05                                     | 0.2                        | 0.2                      | 0.2       | 0.05                      | 0.05              | 0.3           | 0.3                 | 0.2                 | 0.2                 | 0.2            | 0.2      | 0.2               |
| Carponent                                     | Chloramethane<br>Branamethane<br>Dichlorodifluoramethane | Vinyl chloride | lethylene chloride | Trichlorofluoromethane | l,l-Dichloroethene | 1,1-UIChloroethane<br>Trans-1.2-dichloroethene | Chloroform | l, 2-Dichloroethane | 71,1,1-Trichloroethane | <sup>N</sup> Carbon tetrachloride | <sup>w</sup> Brandichloramethane | l,2-Dichloropropane | Cis-1, 3-dichloropropene | Trichloroethene | Dipromochloromethane | <ol> <li>1, 2-Trichloroethane</li> </ol> | Trans-1, 3-dichloropropene | 2-Chlorcethylvinyl ether | Bremoform | 1,1,2,2-Tetrachloroethane | Tetrachloroethene | Chlerchenzene | 1,3-Dichlorobenzene | 1,2-5ichlorcbenzene | 1,4-Dichlorobenzene | <b>ラ</b> にしょしい | loluene  | Et hij lit endene |

11 - Not detected

| VOLACITES AMALYSIS DY EPA M      | EPA RETROIS 601 (GC/Hall |              | Detector) and | 602 (GC/PID)   | (DI)    |      |
|----------------------------------|--------------------------|--------------|---------------|----------------|---------|------|
| Canpenent                        | Detection                |              | Conce         | Concentration, | ug/L    |      |
|                                  | Limit, uj/L              | NAFB-6       | MAFB-7        | MAFB-10        | MAFB-11 | FB-2 |
| Chloramethane                    | 1.0                      | Ð            | Q             | Ð              | Ð       | Ð    |
| Bromomethane                     | 1.2                      | Q            | Q             | Ð              | 2       | Ð    |
| Dichlorodifluoramethane          | 1.8                      | Ð            | ę             | ЯD<br>М        | Ð       | Ð    |
| Vinyl chloride                   | 0.2                      | Q            | Ą             | QN             | Q       | Q    |
| Chloroethane                     | 0.5                      | <u>Q</u>     | 2             | Ð              | Ð       | Q    |
| Methylere chloride               | 0.2                      | <del>A</del> | Ð             | Ð              | Ð       | 2    |
| Trichlorofluoromethane           | 2.0                      | Ð            | Ð             | Q              | Q       | Ð    |
| 1,1-Dichlcroethene               | 0.2                      | Ð            | Ð             | Ð              | Ð       | 2    |
| <pre>l,l-Dichlcroethane</pre>    | 0.1                      | Œ            | 2             | QN             | Q       | Ð    |
| Trans-1, 2-iichloroethere        | 0.1                      | Ð            | QN            | Q              | Q       | Ð    |
| Chlorafarm                       | 0.1                      | ß            | Q             | Ð              | Ð       | Ð    |
| 1,2-Dichloroethane               | 0.02                     | Q            | 92            | QZ             | Q       | Ð    |
| <pre>l,l,l-Trichloroethane</pre> | 0.1                      | Ð            | Ð             | Ð              | Q       | Ð    |
| Carbon tetrachloride             | 0.1                      | £            | Q             | Ð              | Ð       | Ð    |
| Branodichloramethane             | 0.1                      | Ð            | Ð             | ₽              | £       | Ð    |
| 1,2~Dichlcropropane              | 0.1                      | £            | Q             | Ð              | £       | Ð    |
| Cis-1,3-iichloropropene          | 0.3                      | £            | Ð             | Ð              | ł       | Q    |
| Trichloroethene                  | 0.1                      | 02           | Ð             | Ð              | QN      | QN   |
| Dibromochloromethane             | 0.1                      | Ð            | Q             | Ð              | Q       | Ð    |
| <pre>l,l,2-Trichloroethane</pre> | 0.05                     | Ð            | Ð             | Ð              | Ð       | Ð    |
| Trans-1, 3-lichloropropene       | 0.2                      | £            | Ð             | Ð              | Ę       | Q    |
| 2-Chloroethylvinyl ether         | 0.2                      | Ð            | Q             | <u>A</u>       | Ð       | Ð    |
| Bronoform                        | 0.2                      | Ð            | Ð             | £              | Q       | ß    |
| 1,1,2,2-Tetrachloroethane        | 0.05                     | £            | QN            | Q              | Ð       | Ð    |
| Tetrachloroethene                | 0.05                     | Ê            | Ð             | Q              | Q       | Ð    |
| Chlorobenzene                    | 0.3                      | Ŗ            | 2             | Q              | Ð       | ₽    |
| l,3-Dichlcrobenzene              | 0.3                      | Ð            | Ð             | Ð              | Ð       | Ð    |
| 1,Dichlorokenzene                | 0.2                      | Д,           | 2             | Ð              | Q       | Ð    |
| <pre>l,4-Dichlcrobenrene</pre>   | 0.2                      | ß            | Ð             | Ð:             | Ð       | Ð    |
| lenzene                          | 0.2                      | Ë            | Ð             | СIX            | Ð       | Ð    |
| Toluere                          | 0.2                      | £            | ß             | Q              | Ę       | Ð    |
| Ethyltenzere                     | 0.2                      | Д,           | Ð             | <u>A</u>       | Ð       | Ð    |
| :                                |                          |              |               |                |         |      |
| ll = lot letecte:                |                          |              |               |                |         |      |

Mather AFB - May 1985 Sampling Revised Report

LAB NO. 85-05-044

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Mitther AFB - May 1985 Sampling Revised Report Tolatiles Analysis by EPA Methods 601 (GC/Hall Detector) and 602 (GC/PID)

|                           | Limit, ug/L | LOICE       | Concentration,<br>12FB-8 MMFB-9 | 11AFB-80     |
|---------------------------|-------------|-------------|---------------------------------|--------------|
| Cilorometiane             | 1.0         | Ð           |                                 | Ę            |
| Brondnethane              | 1.2         | Ð           |                                 | Ð            |
| Dichlorodifluoromethane   | 1.8         | CI L        | Cr1                             | Ð            |
| Vinyl chloride            | 0.2         | e<br>2      |                                 | Ð            |
| Chloroethane              | 0.5         | 8           |                                 | ę            |
| Methylene chloride        | 0.2         | <u>9</u>    |                                 | Ð            |
| Trichlorofluoromethane    | 2.0         | Ð.          |                                 | Q            |
| 1,1-Dichloroethene        | 0.2         | Ð.          |                                 | ę            |
| 1,1-Cichloroethane        | 0.1         | <b>U:</b> : |                                 | Ð            |
| Trans-1,2-dichloroetheme  | 0.1         | Q.          |                                 | Ð            |
|                           | 0.1         | 9           |                                 | Ð            |
| 1, 2-Dichloroethane       | 0.02        | Ð:          |                                 | Ë            |
| 1,1,1-Trichloroethane     | 0.1         | a:          |                                 | ĕ            |
| Caricon tetrachlorile     | 0.1         | ë           |                                 |              |
| 1                         | 0.1         | CH1         |                                 | Ð            |
| 1,2-Dichleropropane       | 0.1         | Ū.          |                                 | Ū.           |
| Clark, 3-lichloroproperty | 0.3         | CI:         |                                 | 11           |
| Trishlorve hene           | 0.1         | х.<br>Т.Х   |                                 | 3 <b>1</b> . |
| Ditrarcchloramethane      | 0.1         | í.          |                                 | A            |
| 1,1,2-Trichloroethane     | 0.05        | CIIC        |                                 | Q            |
| Trans-1,3-Archloroprofere | 0.2         | (E:         |                                 | ß            |
| 2-Chlordethylvingletier   | 0.2         | 110         |                                 | ę.           |
| Broncform                 | 0.2         | Ĥ           |                                 | Û.           |
| 1,1,2,2-Tetrachlorvethane | 0.05        | (P.)        |                                 | Ð            |
| Tetrachlorosthune         | 0.05        | 20.         |                                 | 13.          |
| Uhlorohenume              | ŋ.3         | 1.7         |                                 | 1.7          |
| 1,3-Dichlerobendene       | 0.3         | 11C         |                                 | Ð            |
| 1,2-11thlorobenzene       | 0.2         | 1.2         |                                 | 1.2          |
| 1,4-Dichlorobenzene       | 0.2         | 0.32        |                                 | 0.61         |
|                           | 0.2         | 9           |                                 | Q.           |
| T. L. Lefter              | 0.2         | Я.          |                                 | CI:          |
|                           | c<br>c      | i           |                                 | ÷            |

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LAB NO. 15-05-042

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Muther AFB - May 1985 Sampling Revised Report Volatiles Analysis by EPA Nethods 601 (CC/Hall Detector) and 602 (GC/PID)

| Curronert                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Detection   |                     | 1       |       | Con  | centra         | Concentration, ug/L | J/L      |      |       |                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------------|---------|-------|------|----------------|---------------------|----------|------|-------|----------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Limit, ug/L | 1-1                 | 13-2    | B-3   | B-4  | B-40           | IEI                 | FH-2     | FH-3 | F11-6 | FII-30         |
| Chloromethane                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1.0         | Ð                   | CL.     |       | Ð    | Ð              | СЦ<br>Д             | Q        | Ð    | Q     | Đ.             |
| Bromorethane                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1.2         | QN                  | Ð       |       | Ð    | Q              | QN                  | Ð        | Ð    | Ð     | 2              |
| Dichlorodifluoromethane                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 1.8         | Q,                  | CIN     |       | Ð    | Ð              | Ð                   | Q        | Ð    | Ð     | <del>Q</del> 1 |
| Vingl chloride                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 0.2         | QN                  | QN      |       | Q    | Q              | Ð                   | Ð        | £    | Ð     | Ð              |
| Chloroethane                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 0.5         | Ð                   | Ð       |       | Ð    | QN             | QU                  | Q        | Ð    | Ð     | Ð              |
| Methylene chloride                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 0.2         | ß                   | Ð       |       | Q    | QN             | Ð                   | Ð        | Ð    | Ð     | <u>e</u>       |
| Trichlorofluoromethane                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 2.0         | Ð                   | Q       |       | Ð    | Ð              | Ð                   | Q        | Ð    | Ð     | Ą              |
| I, l-Dichloroethene                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 0.2         | Ð                   | ę       |       | £    | £              | Q                   | Ð        | Q    | Ð     | <b>A</b>       |
| 1, 1-Dichlorcethane                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 0.1         | 2                   | R       |       | £    | Q              | QN                  | Ð        | Ð    | Q     | Ð              |
| Trans-1,2-dichloroethene                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0.1         | ß                   | Ð       |       | Ð    | <u>1</u>       | Ð                   | £        | Ð    | £     | Ð              |
| Chloraform                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 0.1         | Ð                   | ę       |       | Q    | Ð              | Q                   | Q        | Ð    | ₽     | 8              |
| 1,2-Dichloroethane                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 0.02        | Ð                   | Q       |       | Ð    | <u> </u>       | Q                   | Ð        | QN   | Ð     | Ą              |
| 1,1,1-Trichloroethane                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 0.1         | Ê                   | Ð       |       | Ð    | Q              | C N                 | Q        | Q    | Ź     | Ð              |
| Carbon terrachloride                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0.1         | Ð,                  | ЦС<br>П |       | Ð    | R              | Q.                  | £        | Ð    | Ð     | e:             |
| Brancdichloromethane                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0.1         | Ð.                  | QY.     |       | Ð    | Ð              | Q.                  | Ę        | 2    | Ð     | QN             |
| 1,2-Dichlorcpropane                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 0.1         | A                   | þ       |       | Ð    | QN             | Q.                  | Ð        | Ð    | Ð     | Ą              |
| Cis-l, 3-lichloropropene                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0.3         | Ë                   | Ê       |       | Ð    | Ð              | Ę                   | Ð        | Ð    | Ð     | R              |
| Truchoethene                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 0.1         | Ë                   | ł       |       | 2    | Ŗ              | Q.                  | Ð        | Q    | Ð     | Ð              |
| Dibramochloramethane                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0.1         | 9                   | ß       |       | Ē    | £              | QU                  | Ð        | Ð    | Ð     | Ð              |
| 1,1,2-Trichloroethane                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 0.05        | Ê                   | £.      |       | Ë    | £              | QN                  | <u>e</u> | Ð    | QN    | Ð              |
| Trans-1, 3-dichlorupropene                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 0.2         | Ë                   | ÛI.     |       | Ë    | ДĽ,            | Ę                   | Ë        | ß    | Ð     | ß              |
| 2-Chloroethylvinyl ether                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0.2         | Û.                  | Q.      |       | e    | CIT:           | Ę,                  | Ë        | R    | Œ     | ł              |
| Brancform                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 0.2         | (II)                | 9       |       | Ы    | Д,             | Ð                   | 2        | Ø    | Ð     | £              |
| <pre>1,1,2,2-Tetrachloroethane</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0.05        | Û.                  | £       |       | Д.   | <del>Q</del> : | Q.                  | ę        | Ð    | Ð     | ð              |
| Terrachloroethene                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 0.05        | Ĥ.                  | QI.     |       | Ð    | ß              | QN                  | R        | Ð    | Ê     | ß              |
| Chlorobenzene                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 0.3         | Ð                   | Q::     |       | Ê    | Ð,             | QU                  | Ð        | £    | Ę     | ß              |
| 1,3-Dichlorobenzene                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 0.3         | Û.                  | ОĽ.     |       | Ê    | £              | Ē                   | ð        | Ē    | Ð     | ß              |
| 1,2-Jichlorcitenzene                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0.2         | Ê                   | Q.      |       | Ê    | ß              | СĽ.                 | Ŗ        | ß    | Ð     | <u>ک</u>       |
| 1,4-Dichlorokenzene                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 0.2         | 2 H H<br>H H<br>H H | 1       |       | ЭĽ   | Ê.             | Ð                   | ę,       | Q    | Q     | Å              |
| Jentane                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0.2         | ; ;                 | î.      |       | Í.   | £.             | C.                  | R        | £    | B     | Ê              |
| a:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             | Ē.                  | 17. U   | (III) | ¢. [ | 1.1            | 0.74                | 16.0     | 0.69 | 0.74  | 0.94           |
| and an active for the former of the former o | 5.0         | 17                  | Ē       |       | (I.) | Œ.             | ę                   | <u>A</u> | ë    | ß     | e.             |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |             |                     |         |       |      |                |                     |          |      |       |                |

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Muther AFB - May 1985 Sampling

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Volatiles Anulysis by EPA Nathods 601 (OC/Hall Detuctor) and 602 (OC/PID)

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|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-----------|-----------|-----------|-------------|------------|----------------------------------------------------------------|------------|
| Chloromethane                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 1.0         | I         | ı         | ł         | Ż           | 2          | 2                                                              | (P         |
| ar Jhunet have                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 1.2         | ı         | ţ         | ı         | 2           | 2          | 9                                                              | Â          |
| Dichloudif hordmethame                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 1.8         | I         | 1         | ı         | 2           | 9          | 2                                                              | 2          |
| VEAL CLICED AND                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 0.2         | :         | ų         | 1         | 2           | Q          | 2                                                              | Ŷ          |
| Churthertunde                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 0.5         | 1         | ,         | I         | Î           | R          | Q                                                              | 2          |
| 'erry tere chlor ide                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 0.2         | ı         |           |           | 0.32        | 0.25       | 0.20                                                           | 95.0       |
| Trivilatot huuramethume                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 2.0         | 1         | ,         | Ţ         | Î           | 2          | ( <b>7</b>                                                     | 2          |
| 1, 1-01.4.1or outhere                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0.2         |           |           |           | ÿ           | Ĩ          | 7                                                              | R          |
| 1, 1-but loroethane                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0.1         | ı         |           |           | ŷ           | Ŷ          | Î                                                              | 2          |
| Thurs 1, 2-dichloroethere                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 0.1         | ı         | I         | i         | (IN         | <u>n</u>   | 9                                                              | Ì          |
| Chlutoform                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 0.1         | ,         | 1         | i         | <u>S</u>    | 92         | ŷ                                                              | 0.17       |
| -, 2 Dictilor dethane                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0.02        | ;         | ,         | I         | Q.          | 9          | 2                                                              | 2          |
| 1,.,1 Trichluroethane                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0.1         |           |           |           | 2           | Î          | Ŷ                                                              | 2          |
| abrachterrachter ach                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 0.1         | ı         |           |           | Ì           | Ì          | 0 N                                                            | 9          |
| fr grant of lor one thank                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 0.1         | 1         | ı         | ł         | 11)         | 2          | Ż                                                              | 2          |
| eurodo rekutor (2011) - 111                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 0.1         |           | ı         | ı         | Ŷ           | Î          | Î                                                              | Ŷ          |
| anadorologi un terresta estas                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 0.3         | t         | ,         | ı         | (3.         | 2          | 9<br>N                                                         | Ĩ          |
| The second second                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | C.J         |           |           | r         | Ñ           | Ĵ          | Ĩ                                                              | 2          |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Ú.1         | ,         | 4         | I         | 14)<br>     | ź          | Ì                                                              | Ĩ          |
| enderthere it is a second                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 0.05        | ł         | ı         | ı         | ź           | ź          | 2                                                              | 9          |
| anacontro to to the total of total | 0.2         |           |           | 1         | 2           | Ż          |                                                                | î          |
| <ul> <li>I startylumi ether</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0.2         | r         |           | 1         | <b>14</b> 0 | Î          | Î                                                              | Z          |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 0.2         | ţ         |           |           | er.         | Î          | NB N                                                           | ź          |
| <pre>contraction cettame</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 0.05        |           | :         | ٠         | Î           | Ż          | Ĩ                                                              | Ż          |
| The state of the second s                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 0.05        | 1         | ı         | ١         | Î           | Ŷ          | Ĵ                                                              | Ĩ          |
| c) A periodene                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 0.1         | Ð         | ź         | 2         | 2           | Î          | 9                                                              | Ĩ          |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 0.3         | 9         | Î         | ź         | Ŷ           | Ð          | 2                                                              | ŷ          |
| - huurd burgerse                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 0.2         | Ĵ         | <u>a</u>  | Î         | Ĩ           | Î          | ŝ                                                              | Ĵ          |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 0.2         | ź         | ź         | Ŷ         | NE)         | ź          | Ŷ                                                              | Ĵ          |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 7.0         | ź         | Î         | Ŷ         | ţ           | ı          | 1                                                              | ı          |
| , <b>,</b> , ,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 0.2         | 0.21      | 6.23      | ź         | ſ           | ı          | ,                                                              | ł          |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 0.2         | Î         | Ŷ         | 9         | L           | i          | ,                                                              | ı          |

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# inter-office memorandum TO: DATE: August 2, 1985 Allison Dunn (Concord Office) DATE: August 2, 1985 Kass Sheedy Rich Johnson cc: Earl Hansen (Memo Only) Les Eng (Memo Only) DETE: Discrete Final REPORT SUBJECT: FINAL REPORT MATHER A.F.B. W. O. No.:

The attached represents the final report for all samples currently in-house for MATHER A.F.B. If you have any questions, please don't hesitate to call.

JP/eb

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DATE OF ANALYSIS:

COMPILED BY:

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#### Date of Report: August 2, 1985

# MATHER A.F.B. SOLUBLE METALS SUMMARY REPORT FOR WATER SAMPLES REC'D JUNE 28, 1985 W.O. NO. 0628-09-05

DATE SAMPLES COLLECTED: June 26, 1985 SAMPLES SUBMITTED BY: Debbie Jones

|                   |                 |       |         | SOLUBLE |       |       |
|-------------------|-----------------|-------|---------|---------|-------|-------|
| R.F.W. NO.        | SAMPLE          | Cd    | Cr      | Pb      | Ni    | Ag    |
|                   | DESCRIPTION     | ug/L  | ug/L    | ug/L    | ug/L  | ug/L  |
| 8506-660-0010     | MAFB-7          | <2.5  | = 1.0   | 31.8*   | < 4() | <2.5  |
| -0020             | MAFB-70         | N.R.  | N.R.    | N.R.    | N.R.  | N.R.  |
| -0030             | MAFB-8          | <2.5  | <10     | <10     | <40   | <2.5  |
| -0040             | MAFB-80         | N.R.  | N.R.    | N.R.    | N.R.  | N.R.  |
| -0050             | MAFB-9          | - 2.5 | <10     | <10     | 55    | <2.5  |
| -0060             | MAFB-90         | <2.5  | - 10    | - 10    | 54    | <2.5  |
| -0070             | MAFE-10         | -2.5  | - 10    | - 10    | 41    | <2.5  |
| -0070             | MAFB-10         | .2.5  | <10     | <10     | <40   | 2.5   |
| DUP               | (LAB DUPLICATE) |       |         |         |       |       |
| -0080             | MAFB-100        | -2.5  | - 10    | < 10    | <40   | 2.5   |
| -0090             | MAFB-11         | -2.5  | - 10    | ~10     | - 40  | <2.5  |
| -0100             | MAFB-110        | N.R.  | N.R.    | N.R.    | N.R.  | N.R.  |
| 3506-660-0000     | LAB BLANK       |       | -10     |         |       |       |
| -000K             | BLANK SPIKE     |       | 118.    |         |       |       |
|                   |                 |       | RECOVER | ?Υ      |       |       |
| N.R. = NOT REQUES | STED            |       |         |         |       |       |
| EPA METHOD:       |                 | 213.2 | 218.2   | 239.2   | 249.1 | 272.2 |

7-19-35 7-24-85 7-12-85 6-18-85 7-22-85

APPROVED BY

Earl M. Hansen, Ph.D. Manager WESTON Analytical Laboratoric

Adith A. Porta Laboratory Operations Manager WESTON Analytical Laboratories

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# MATHER A.F.B. INORGANICS SUMMARY REPORT FOR WATER SAMPLES REC'D JUNE 28, 1985

DATE SAMPLES COLLECTED: June 26, 1985 SAMPLES SUBMITTED BY: Debbie Jones

| R.F.W. NO.       | SAMPLE<br>DESCRIPTION | CN<br>mg/L | O/G<br>mg/L | PHENOLICS<br>mg/L | TOC<br>mg/L |
|------------------|-----------------------|------------|-------------|-------------------|-------------|
| 8506-660-0010    | MAFB-7                | <0.01      | 0.57        | <0.005            | 10.2        |
| -0020            | MAFB-70               | <0.01      | N.R.        | 0.007             | N.R.        |
| -0030            | MAFB-8                | .0.01      | 0.68        | <0.005            | 4.6         |
| -0040            | MAFB-80               | <0.01      | N.R.        | 0.007             | N.R.        |
| -0050            | MAFB-9                | <0.01      | 0.67        | <0.005            | 5.6         |
| -0050            | MAFB-9                |            |             | -0.005            |             |
| DUP              | (LAB DUPLICATE)       |            |             |                   |             |
| -0060            | MAFB-90               | <0.01      | 0.57        | 0.006             | 5.7         |
| -0060            | MAFB-90               |            |             |                   | 5.5         |
| DUP              | (LAB DUPLICATE)       |            |             |                   |             |
| ~006K            | MAFB-90               |            |             |                   | 106         |
| SPIKE            | (MATRIX SPIKE)        |            |             |                   | RECOVERY    |
| -0070            | MAFB-10               | -0.01      | 0.33        | 0.077             | 0.6         |
| -0080            | MAFB-100              | 0.01       | 0.30        | <0.005            | <0.5        |
| -0090            | MAFB-11               | <0.01      | 0.33        | <0.005            | 0.6         |
| -0100            | MAFB-110              | 0.01       | N.R.        | ~0.005            | N.R.        |
| -0010K           | MAFE-110              |            |             | 91                |             |
| SPIKE            | (MATRIX SPIKE)        |            |             | RECOVERY          |             |
| -0000            | LAB BLANK             |            |             | 40.005            | -0.5        |
| BLANK            |                       |            |             |                   |             |
| -000K            | BLANK SPIKE           |            |             | 93                | 98          |
| SPIKE            |                       |            |             | RECOVERY          | RECOVERY    |
| METHOD (EPA)     |                       | 335.2      | 413.2       | 420.1             | 415.2       |
| DATE OF ANALYSIS | 5:                    | 7-3-85     | 7-2-85      | 7-1-85            | 7-1-35      |
| N.P. = NOT REQUI | RED                   |            |             | $\sim$            | 1           |

MATLED BY: Unded a Porte

Judith A. Porta Laboratory Operations Manager WESTON Analytical Laboratories

APPROVED BY; Ú

Earl M. Hansen, Ph.D. Manager WESTON Analytical Laboratorie

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# MATHER A.F.B. SOLUBLE METALS SUMMARY REPORT FOR WATER SAMPLES REC'D JULY 2, 1985 W.O. NO. 0628-09-05

DATE SAMPLES COLLECTED: June 27, 1985 SAMPLES SUBMITTED BY: Debbie Jones

|                                                   |                                               |                                      |                                              | SOLUBLE                              |                            |                                        |
|---------------------------------------------------|-----------------------------------------------|--------------------------------------|----------------------------------------------|--------------------------------------|----------------------------|----------------------------------------|
| R.F.W. NO.                                        | SAMPLE<br>DESCRIPTION                         | Cd<br>ug/L                           | Cr<br>ug/L                                   | Pb<br>ug/L                           | Ni<br>ug/L                 | Ag<br>ug/L                             |
| 8507-673-0010<br>-0090<br>-0100<br>-0110<br>-0120 | FB-1<br>MAFB-6<br>MAFB-60<br>MAFB-5<br>MAFB-4 | <2.5<br><2.5<br><2.5<br><2.5<br><2.5 | < 10<br>< 10<br>< 10<br>< 10<br>< 10<br>< 10 | - 10<br>< 10<br>< 10<br>< 10<br>< 10 | 51<br>58<br>61<br>51<br>62 | 2.5<br>2.5<br>2.5<br>2.5<br>2.5<br>2.5 |

SOL. METALS ANALYSIS NOT REQUESTED FOR SAMPLES ACW, ACW-1, MAFB-1, MAFB-2, MAFB-3 AND MAFB-30.

| E.P.A. METHOD:    | 213.2   | 218.2   | 239.2   | 249.1   |
|-------------------|---------|---------|---------|---------|
| DATE OF ANALYSIS: | 7-19-85 | 7-24-85 | 7-12-85 | 6-18-85 |

COMPILED BY: Judit aforta

(Judith A. Porta Laboratory Operations Manager WESTON Analytical Laboratories

APPROVED BY

Earl M. Hansen, Ph.D. Manager WESTON Analytical Laboratories

272.2 7-22-85



# MATHER A.F.B. INORGANICS SUMMARY REPORT FOR WATER SAMPLES REC'D JULY 2, 1985 W.O. NO. 0628-09-05

DATE SAMPLES COLLECTED: June 27, 1985 SAMPLES SUBMITTED BY: Debbie Jones

| R.F.W. NO.    | SAMPLE<br>DESCRIPTION | CN-<br>mg/L | 0/G<br>mg/L | PHENOLICS<br>mg/L | TOC<br>mg/L    |
|---------------|-----------------------|-------------|-------------|-------------------|----------------|
| 8507-673-0010 | FB-1                  | <0.01       | 0.24        | 0.009             | 0.5            |
| -0020         | FH-5                  | N.R.        | 0.20        | N.R.              | <0.5           |
| -0030         | ACW                   | N.R.        | 0.27        | N.R.              | <0.5           |
| -0040         | ACW-1                 | N.R.        | 0.28        | N.R.              | <0.5           |
| -0050         | MAFB-1                | N.R.        | 0.76        | N.R.              | <0.5           |
| -0060         | MAFB-2                | N.R.        | 0.29        | N.R.              | 0.7            |
| -0070         | MAFB-3                | N.R.        | 0.19        | N.R.              | 1.0            |
| -0080         | MAFB-30               | N.R.        | 0.21        | N.R.              | 0.6            |
| -0090         | MAFB-6                | N.R.        | 0.29        | N.R.              | <0.5           |
| -0100         | MAFB-60               | N.R.        | 0.31        | N.R.              | <0.5           |
| -0110         | MAFB-5                | N.R.        | 0.14        | N.R.              | 0.5            |
| -0120         | MAFB-4                | N.R.        | 0.38        | N.R.              | 0.8            |
| -0120         | MAFB-4                |             |             |                   | 0.3            |
| DUP           | (LAB DUPLICATE)       |             |             |                   |                |
| -0000         | LAB BLANK             |             |             |                   | <0.5           |
| -000K         | BLANK SPIKE           |             |             |                   | 96<br>RECOVERY |

E.P.A. METHOD: DATE OF ANALYSIS: N.R. = NOT REQUESTED

335.2 413.2 7-2-85 7-9-85

APPROVED BY: (

420.1

7-16-85

and aPorte COMPILED BY: 🖌 Judith A. Porta

Laboratory Operations Manager WESTON Analytical Laboratories Earl M. Hansen, Ph.D. Manager WESTON Analytical Laboratories

415.2

7-5-85



# MATHER A.F.B. METALS SUMMARY REPORT FOR SOIL SAMPLES REC'D JULY 19, 1985 W.O. NO. 0628-05-26

DATE SAMPLES COLLECTED: June 30, 1985 SAMPLES SUBMITTED BY: Kathy Schultz

|               |                       |             |             | TOTAL       |             |                |
|---------------|-----------------------|-------------|-------------|-------------|-------------|----------------|
| R.F.W. NO.    | SAMPLE<br>DESCRIPTION | Pb<br>mg/Kg | Cr<br>mg/Kg | Cd<br>mg/Kg | Ni<br>mg/Kg | Ag<br>mg/Kg    |
| 8506-627-0010 | US                    | 14.4        | 53.8        | 4.20        | 26.0        | 0.730          |
| -0020         | USD                   | 13.1        | 101         | 4.03        | 22.7        | 0.580          |
| -0020 DUP     | USD (LAB DUPLICA      | TE)48.4     | 23.3        | 3.37        | 20.6        | 0.330          |
| -0030         | DS                    | 44.3        | 35.0        | 4.65        | 26.2        | 0.220          |
| -0000         | LAB BLANK             |             |             |             |             | 0.625          |
| -000K         | BLANK SPIKE           |             |             |             |             | 90<br>RECOVERY |

DATE OF ANALYSIS:

6-22-85 6-29-85 6-29-85 8-1-85 7-25-35

dit aPata COMPILED BY:

Judith A. Porta Laboratory Operations Manager WESTON Analytical Laboratories

APPROVED BY:

Earl M. Hansen, Ph.D. Manager WESTON Analytical Laboratorie



Date of Report: July 30, 1985

# MATHER A.F.B. DMN SUMMARY REPORT FOR SAMPLES REC'D JULY 2, 1985 W.O. NO.# 0628-09-05

DATE SAMPLES COLLECTED: June 27, 1985 DATE EXTRACTED: July 3, 1985 DATE ANALYZED: July 3, 1985

| R.F.W. NO:          | SAMPLE<br>DESCRIPTION | DIMETHYLNITROSAMINE<br>ug/L | SURROGATE RECOVERY<br>(D <sub>z</sub> -NITROBENZENE) |
|---------------------|-----------------------|-----------------------------|------------------------------------------------------|
| 8507-673-0010       | FB-1                  | < 1                         | 63%                                                  |
| -0090               | MAFB-6                | < 1                         | 49%                                                  |
| -0100               | MAFB-60               | < 1                         | 51%                                                  |
| -0110               | MAFB-5                | < 1                         | 73%                                                  |
| -0120               | MAFB-4                | < 1                         | 52%                                                  |
| 8507-673/           | Lab Blank             | <1                          | 65%                                                  |
| 8507-673/Spike      | Blank Spike           | 31% Recovery                | 55%                                                  |
| 8507-673/Spike Dup. | Blank Spike Dup.      | 44% Recovery                | 76%                                                  |

Compiled by: Joint Conta Midith A. Porta Lab Support Manager WESTON Analytical Laboratories

Approved by 10 Earl M. Hansen, Ph.D. Manager

WESTON Analytical Laboratories



# inter-office memorandum

TO:

Katherine Sheedy

DATE: July 16, 1985

A ver all the terms of all strengthe

FROM: David Ben-Hur, Stockton Laboratory

SUBJECT: Analytical Results, Mather AFB, Second W. O. No.: Sampling Round, June 1985

Attached are the results of the analyses performed at the Stockton Laboratory on the samples collected in the second round of resampling at Mather AFB

RFW 2-74-39

MATTLER AFB Sampling and Analysis Chronology

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| <u>EPA 602</u> | bate M<br>icides<br>Mullyzed                                 | lerbic<br>Extracted                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Analyzed                                                   | Rtracted Malyzee                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | B's<br>Analyzed                                                                                                |
|----------------|--------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| 5.8/6/1        | ١                                                            | I                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | ١                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | ł                                                                                                              |
| Ξ              | ۱                                                            | ١                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | ١                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | I                                                                                                              |
| ;              | ١                                                            | I                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | ١                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | ı                                                                                                              |
| ۱<br>=         | ı                                                            | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | ١                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | ١                                                                                                              |
| ı<br>=         | ţ                                                            | ı                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | ı                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1                                                                                                              |
| " –            | ţ                                                            | ı                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | ι                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | I                                                                                                              |
| ;              | l                                                            | ı                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | ł                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | ı                                                                                                              |
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| ,<br>=         | ţ                                                            | ſ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Í                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 2                                                                                                              |
| " 7/3/85       | 7/9/85                                                       | 7/1/85                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 7/8/85                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | I                                                                                                              |
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K-37

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MATHER AFB - Second Round, June 1985 QA/QC Data

# 1. Second Column Confirmation for Volatile Compounds

The following samples have been subjected to a second column confirmation. The confirmation was performed qualitatively only. Compounds that were identified and quantitated in the primary column, but could not be confirmed, were reported as ND - not detected.

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Sample ID MAFB-8 MAFB-9 MAFB-11 MAFB-90 MAFB-1 MAFB-2 MAFB-3 MAFB-3 MAFB-5 MAFB-6 MAFB-60 ACW ACW-1

2. Laboratory Duplicate for Volatile Compounds

Sample ID: MAFB-8

| Campound                 | Concentra | tion, $ug/L$ |
|--------------------------|-----------|--------------|
|                          | First     | Second       |
|                          |           |              |
| l,l-Dichloroethene       | 1.4       | 1.7          |
| l,l-Dichloroethane       | 1.6       | 2.0          |
| Trans-1,2-Dichloroethene | 2.0       | 2.1          |
| 1,2-Dichloroethane       | 0.16      | : D          |
| l,l,l-Trichloroethane    | 0.71      | 0.53         |
| Trichloroethene          | 100.      | 120.         |
| Tetrachloroethene        | 5.4       | 7.1          |
| Chlorobenzene            | 3.0       | 1.3          |
| l,2-Dichlorobenzene      | 1.0       | 0.76         |
| Benzene                  | 0.99      | 0.52         |

# 3. Matrix Spike for Volatile Compounds

| Compound            | Spike<br>_ug/L_ | Percent Recovery<br>MAFB-7 |
|---------------------|-----------------|----------------------------|
| Chlorobenzene       | 2.0             | 92                         |
| 1,2-Dichlorobenzene | 2.0             | 90                         |
| 1,3-Dichlorobenzene | 2.0             | 86                         |
| 1,4-Dichlorobenzene | 2.0             | 85                         |
| Tolueen             | 2.0             | 89                         |

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MATHER AFB - Second Round, June 1985 QA/QC Data

| Water Spike IOL       | Spike,       | Percent Recover |
|-----------------------|--------------|-----------------|
| Compound              | ug/L         |                 |
| o,p'-DDT<br>Chlordane | 0.15<br>0.14 | 73<br>86        |
| Chlordane<br>2,4-D    | 0.18         | 92              |

# 4. Water Spike for Pesticides and Herbicides

### LAB NO. 85-06-035

MATHER AFB - Second Round, June 1985 PCB Analysis

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| Parameter                                                                                    | Detection<br>Limit, ug/L                                                            | MAFB-1                                             | Cor<br>MAFB-2                                      | MAFB-3      | MAFB-30 | ACW                                                                             | ACW-1                                                                                            | FB-1 |
|----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------|----------------------------------------------------|-------------|---------|---------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|------|
| PCB 1016<br>PCB 1221<br>PCB 1232<br>PCB 1242<br>PCB 1248<br>PCB 1254<br>PCB 1254<br>PCB 1260 | $\begin{array}{c} 0.04 \\ 0.10 \\ 0.10 \\ 0.05 \\ 0.08 \\ 0.05 \\ 0.15 \end{array}$ | 19<br>19<br>19<br>19<br>19<br>19<br>19<br>19<br>19 | ND<br>ND<br>ND<br>ND<br>ND<br>ND<br>ND<br>ND<br>ND | 59999999999 | 6666666 | 19<br>19<br>19<br>19<br>19<br>19<br>19<br>19<br>19<br>19<br>19<br>19<br>19<br>1 | 5<br>7<br>7<br>7<br>7<br>7<br>7<br>7<br>7<br>7<br>7<br>7<br>7<br>7<br>7<br>7<br>7<br>7<br>7<br>7 |      |

### MATHER AFB - Second Round, June 1985 Pesticide and Herbicide Analysis

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| Compound  | Detection   |        | Concent | ration, u | g/L     |      |
|-----------|-------------|--------|---------|-----------|---------|------|
|           | Limit, ug/L | MAFB-4 | MAFB-5  | MAFB-6    | MAF3-60 | FB-1 |
| o,p'-DDT  | 0.02        | ND     | ND      | ND        | ND      | ND   |
| p,p'-DDT  | 0.02        | ND     | ND      | 2D        | ND      | ND   |
| Chlordane | 0.02        | ND     | ND      | :D        | D       | ND   |
| 2,4-D     | 0.06        | ND     | ND      | ND        | ND      | ND   |



DATE:

November 4, 1985

# inter-office memorandum

Katherine Sheedy

TO:

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cc: Alison Dunn, Concord Office

FROM: David Ben-Hur

SUBJECT: Mather AFB Volatiles Analysis Results W. O. No.:

Attached are the corrected results for the water samples collected at Mather AFB during May and June 1985.

These data are corrected for laboratory blanks.

RFW 2 14 39

lather AFB - June 1985 Sampling Revised Report Volatiles Analysis by EPA Methods 601 (GC/Hall Detector) and 602 (GC/PID)

| Camponent                     | Detection<br>Limit, ug <u>.</u> T |            | entrati<br><u>A</u> M | Concentration, w <u>11</u><br><u>FIE-7 AW ACA-1 FB-1</u> |          |
|-------------------------------|-----------------------------------|------------|-----------------------|----------------------------------------------------------|----------|
| uitordieundre<br>Bronomethane |                                   | 99         | <u>e</u> e            | <u>e</u> e                                               | 22       |
| Dichlorodifluorcmethane       | 1.8                               | ar.        | Q.                    | B                                                        | 12       |
| Vinyl chloride                | 0.2                               | R          | CIN                   | ÛN                                                       | QN       |
| Chloroethane                  | 0.5                               | CI:        | CII:                  | Û,                                                       | ЫD       |
| Sethylene chloride            | 0.2                               | CP.        | 0N                    | Ð                                                        | Q        |
| Trichlorofluoromethane        | 2.0                               | Q.         | Œ                     | QN                                                       | Ð        |
| l, l-Dichloroethene           | 0.2                               | (II:       | QN                    | Ð                                                        | Ð,       |
| l, l-Dichloroethane           | 0.1                               | CI.        | Q                     | Ð                                                        | Ð        |
| rans-1, 2-dichloroethene      | 1.0                               | Q          | 2                     | 2                                                        | £        |
|                               | 0.1                               | <u> </u>   | £                     | Q                                                        | Ð        |
| l,2-Dichloroethane            | 0.02                              | <u>P</u>   | Ð                     | Ð                                                        | £        |
| l,l,l-Trichloroethane         | 0.1                               | £          | 3.7                   | 3.7                                                      | QN       |
| tetrachloride                 | 0.1                               | Ð          | QN                    | Ð                                                        | Q        |
| Bramodichloromethane          | 0.1                               | Ð          | Q                     | Q                                                        | Ð        |
| ,2-Dichloropropane            | 0.1                               | <u>Q</u>   | (IN                   | Ð                                                        | QN       |
| chloropropene                 | 0.3                               | Q.         | Ð                     | Q                                                        | ę        |
| richloroethene                | 0.1                               | Ê          | 67.                   | 76.                                                      | Q2       |
| Dibromochloromethane          | 0.1                               | Ë          | £                     | Q.                                                       | l        |
| ,1,2-Trichloroethane          | 0.05                              | Ē          | QN                    | QN                                                       | Ð        |
| rans-l,3-dichloropropene      | 0.2                               | <u>е</u> : | ΟN                    | Ð                                                        | QN       |
| -Chlorcethylvinyl ether       | 0.2                               | Ð          | Ð                     | R                                                        | <u>e</u> |
|                               | 0.2                               | ß          | Q                     | ę,                                                       | QZ       |
| 1,1,2,2-Tetrachlorcethane     | 0.05                              | DN         | Q                     | QN                                                       | £        |
| etrachloroethene              | 0.05                              | Ð          | QN                    | Ŗ                                                        | Ð        |
| hiorobenzene                  | 0.3                               | Q          | Q                     | Ą                                                        | Q        |
| <b>Dichlorobenzere</b>        | 0.3                               | )<br>DD    | QN                    | Q                                                        | R        |
| ,2-Sichlorotenzere            | 0.2                               | CI.        | Ð                     | Ē                                                        | £        |
| Dichlorobenzere               | 0.2                               | Ŕ          | CIN                   | <u>O</u> ?                                               | Ð        |
|                               | 0.2                               | <u>A</u>   | Ð                     |                                                          | 0.28     |
|                               | 0.2                               | 0.60       | 0.30                  |                                                          | QN       |
| ij it un tene                 | 0.2                               | CD         | QN                    |                                                          | QN       |
|                               |                                   |            |                       |                                                          |          |

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|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|--------------------------|------------|----------|------------|---------------------|-------------------|----------------|----------|---------------|
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | ane<br>Ane       |                          |            |          |            |                     | <u> </u>          |                | i f      |               |
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| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | ifluoromethane   | 1.8                      |            | £        | Q          | £                   | 9                 | Ē              | Ê        | e e           |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | oride            | 0.2                      | Ð          | Q        | Q          | Q                   | Ð                 | ម្ភ            | Ŗ        | e.            |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | ane              | 0.5                      | CIN        | Ð        | Q          | QN                  | QN                | Ë              | 9        | <u>e</u>      |
| 2.0 30 10 10 10 10 10 10 10 10 10 10 10 10 10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | chloride         | 0.2                      | £          | Q        | Q          | Q                   | QN                | QI.            | Ę        | Q.            |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | fluoromethane    | 2.0                      | Ð          | QIN      | Q          | UN                  | CI I              | Ð              | Q.       | Q.            |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | orceuhene        | 0.2                      | QZ         | CIN<br>N | CI1        | QN                  | QN                | DI:            | ß        | Ð             |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | orcethane        | 0.1                      | Q          | Q        | 0N<br>D    | Ð                   | QIN               | Ð              | Ð        | CII.          |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | -dichlorcethere  | 0.1                      | 0.43       | QN       | Q          | Ð                   | QN                | Q              | QN       | Q             |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | E                | 0.1                      | ę          | Û        | Q          | Ð                   | QN                | Ð              | Ð,       | Q.            |
| 0.1       4.5       MD       2.5       ND       1.6       1.4       MD         0.1       ND       ND       ND       ND       ND       ND       ND       ND         0.1       ND       ND       ND       ND       ND       ND       ND       ND         0.1       ND       ND       ND       ND       ND       ND       ND       ND         0.1       ND       ND       ND       ND       ND       ND       ND       ND       ND         0.1       460.       36.       27.       ND       ND <t< td=""><td>orcethane</td><td>0.02</td><td>Ð</td><td>QN</td><td>Q</td><td>見</td><td>QU</td><td>Ð</td><td>Ð</td><td>2</td></t<>                                                                                                                                              | orcethane        | 0.02                     | Ð          | QN       | Q          | 見                   | QU                | Ð              | Ð        | 2             |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | ch loroe hane    | 0.1                      | 4.5        | QN       | 2.5        | Ð                   | 1.6               | 1.4            | ЯD<br>Д  | 1.7           |
| 0.1       ND       ND <t< td=""><td>truchloride</td><td>0.1</td><td>02</td><td>QN</td><td>Q</td><td>Ð</td><td>QN</td><td>QIN</td><td>QN</td><td>ß</td></t<>                                                                                                          | truchloride      | 0.1                      | 02         | QN       | Q          | Ð                   | QN                | QIN            | QN       | ß             |
| Perce         0.1         ND         ND <th< td=""><td>lordmethane</td><td>0.1</td><td>Q</td><td>QN</td><td>Q</td><td>СР</td><td>Q</td><td>£</td><td>Ð</td><td>Ŭ</td></th<>    | lordmethane      | 0.1                      | Q          | QN       | Q          | СР                  | Q                 | £              | Ð        | Ŭ             |
| perce         0.3         ND         ND <th< td=""><td>eunicitie e</td><td>0.1</td><td>Q.</td><td>R</td><td>QN</td><td>R</td><td>Q.</td><td>Ð</td><td>СĮ.</td><td>9</td></th<> | eunicitie e      | 0.1                      | Q.         | R        | QN         | R                   | Q.                | Ð              | СĮ.      | 9             |
| 0.1       460.       36.       27.       ND                                                                                                                                                                                                                                            | util or opropere | 0.3                      | QN         | QN       | QN         | Ð                   | Q                 | ð              | Ð        | Ê             |
| 0.1       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10 <t< td=""><td>• : • : 1,6-</td><td>0.1</td><td>460.</td><td>36.</td><td>27.</td><td>Q</td><td>Q</td><td>2</td><td>120.</td><td>ē</td></t<>                                                                                                     | • : • : 1,6-     | 0.1                      | 460.       | 36.      | 27.        | Q                   | Q                 | 2              | 120.     | ē             |
| 0.05       70.05       70.05         0.105       70       70       70         0.11       70       70       70       70         0.11       70       70       70       70       70         0.12       70       70       70       70       70       70         0.12       70       70       70       70       70       70       70       70         0.12       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70       70                                                                                                                                                                                                                                                                               | ret me           | 0.1                      | 0N         | Ð        | Q          | QN                  | Q                 | ê              | Ð        | Ŗ             |
| 0.2       0.2       0.0         0.2       0.0       0.0         0.2       0.0       0.0         0.2       0.0       0.0         0.2       0.0       0.0         0.2       0.0       0.0         0.105       0.0       0.0         0.105       0.0       0.0         0.105       0.0       0.0         0.105       0.0       0.0         0.105       0.0       0.0         0.105       0.0       0.0         0.105       0.0       0.0         0.11       0.0       0.0         0.11       0.11       0.0         0.11       0.11       0.11         0.11       0.11       0.11         0.11       0.11       0.11         0.11       0.11       0.11         0.11       0.11       0.11         0.11       0.11       0.11         0.11       0.11       0.11         0.11       0.11       0.11         0.11       0.11       0.11         0.11       0.11       0.11         0.11       0.11       0.11 <t< td=""><td>918 U.S.</td><td>0.05</td><td>CI (</td><td>CIN</td><td></td><td>Ð</td><td>ŨŊ</td><td>Ð,</td><td>Ð</td><td>Ŗ</td></t<>                                                                                                                                                                                                                                             | 918 U.S.         | 0.05                     | CI (       | CIN      |            | Ð                   | ŨŊ                | Ð,             | Ð        | Ŗ             |
| 0.2       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30       30 <t< td=""><td></td><td>0.2</td><td><b>D</b>N</td><td>Q</td><td>Q</td><td>QN</td><td>Q</td><td>Ð</td><td>Ð</td><td>ß</td></t<>                                                                                                                  |                  | 0.2                      | <b>D</b> N | Q        | Q          | QN                  | Q                 | Ð              | Ð        | ß             |
| 10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10 <th< td=""><td></td><td>0.2</td><td>ЗШ<br/>Д</td><td>R</td><td>Ð</td><td>Ð</td><td>Q</td><td>£</td><td>R</td><td>R</td></th<>                                                                                                                   |                  | 0.2                      | ЗШ<br>Д    | R        | Ð          | Ð                   | Q                 | £              | R        | R             |
| 30       N0       N0 <td< td=""><td></td><td>0.2</td><td><u>G</u></td><td>Û</td><td>Q</td><td>ð</td><td>Q</td><td>Ð</td><td>£</td><td>Ð</td></td<>                                                                                                                   |                  | 0.2                      | <u>G</u>   | Û        | Q          | ð                   | Q                 | Ð              | £        | Ð             |
| ND       ND <td< td=""><td></td><td>0.05</td><td><u>O</u>C</td><td>ND</td><td>Q</td><td>Ð</td><td>QN</td><td>ß</td><td>Ð</td><td><u> </u></td></td<>                                                                                                        |                  | 0.05                     | <u>O</u> C | ND       | Q          | Ð                   | QN                | ß              | Ð        | <u> </u>      |
| ND         FD         ND         ND<                                                                                                                                |                  | 0.05                     | Q          | С.       | Q          | QN                  | 0.13              | Ð              | 6        | Q;            |
| ND         ND<                                                                                                                                |                  | 9.3                      | 2          | Q        | Q          | QN                  | QN                | Ð              | R        | Ë             |
| SID         ND         SID         ND         N                                                                                                                                |                  | 0.3                      | Ð          | Ð        | Q          | Ê                   | Q                 | Ð              | <u>A</u> | ĕ             |
| ND         ND<                                                                                                                                |                  | 0.2                      | <u>D</u>   | QIN      | <u>C</u> Z | ė                   | <u>UN</u>         | ë              | 9        | Ê             |
| 0.21 0.21 0.22 0.57 0.27 ND 0.40<br>0.44 ND ND ND ND ND ND ND<br>ND ND ND ND ND ND ND                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                  | ~ <b>:</b>               | СI:        | Ð        | ſŗ.        |                     | Û.                | ß              | ß        | e             |
| ON O                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                  | r:                       | 0.21       | 0.21     | 0.22       | 0.57                | 0.27              | Ð              | 0.40     | C .           |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                  | - 2                      | 0.44       | NI)      | CIX.       | Ŕ                   | Q                 | ß              | ЯD       | 0.31          |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                  | -                        | UD.        | CI.      | R          | Ŗ                   | Q                 | £              | Ð        | e             |

Muther AFB - June 1985 Sampling Maxisui Report Volatiles Analysis by EPA Nethods 601 (GC/Nall Detector) and 602 (GC/PID)

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Mather AFB - June 1985 Sampling Revised Report Volatiles Analysis by EPA Methods 601 (GC/Hall Detector) and 602 (GC/PID)

|     | Component                            | Detection<br>Limit, ug/L | MAFB-7 | MAFB-8 | Conc<br>MAFB-9 | Concentration,<br>MAFB-9 MAFB-10 | . ug/L<br>MAFB-11 | MAFB-90 | MAFB-100 |     |
|-----|--------------------------------------|--------------------------|--------|--------|----------------|----------------------------------|-------------------|---------|----------|-----|
|     |                                      |                          |        |        |                |                                  |                   |         |          |     |
|     | Chloromethane                        | 1.0                      | Ð      | CIN    |                | CIN                              | CI2               | Ę       | Ę        |     |
|     | Bromonethane                         | 1.2                      | ļ      | Ē      | 1              | į                                | į                 |         | j        |     |
|     | Dichlowodiffluoremothers             | 1 c                      |        | E E    | Z              |                                  | 2                 | 2       | N        |     |
|     |                                      | р•Т                      | 2      | Ð      | 2              | 2                                | ₽                 | 2       | 見        |     |
|     | VINYI CHIOLIDE                       | 0.2                      | Ð      | Ð      | Ð              | Ð                                | Ð                 | Ð       | Ð        |     |
|     | Chloroethane                         | 0.5                      | Ð      | Ð      | Ð              | Ð                                | Ð                 | Ð       | Ð        |     |
|     | Methylene chloride                   | 0.2                      | 2      | Ð      | Ð              | Ð                                | Ð                 | Ð       | Ð        |     |
|     | Trichlorofluoromethane               | 2.0                      | Ð      | 2      | Ð              | Ð                                | Q                 | Ð       | Ð        |     |
|     | <pre>l,l-Dichloroethene</pre>        | 0.2                      | 2      | 1.4    | 0.64           | QN                               | QN                | 0.64    | Ð        |     |
|     | <pre>l,l-Dichloroethane</pre>        | 0.1                      | Ð      | 1.6    | 0.34           | Ð                                | Q                 | 0.31    | Ð        |     |
|     | Trans-1, 2-dichloroethene            | 0.1                      | Ð      | 2.0    | 0.15           | Ð                                | Ð                 | 0.14    | Ð        |     |
|     | Chloroform                           | 0.1                      | Ð      | Ð      | 2              | 2                                | 0.32              | Q       | Ð        |     |
|     | I, 2-Dichloroethane                  | 0.02                     | Ð      | 0.16   | Ð              | ₽                                | Ð                 | Ð       | Ð        |     |
| K-  | <pre>l,l,l-Trichloroethane</pre>     | 0.1                      | 0.15   | 0.71   | 0.89           | Ð                                | 0.52              | 3.7     | ₽        |     |
| - 4 | Carbon tetrachloride                 | 0.1                      | Ð      | Ð      | Ð              | Ð                                | Ð                 | Q       | Ð        |     |
| 5   | Branodichloromethane                 | 0.1                      | Ð      | Ð      | Ð              | Ð                                | Û                 | Q       | Ð        |     |
|     | 1,2-Dichloropropane                  | 0.1                      | Ð      | Ð      | Ð              | Q                                | Ð                 | Q       | Ð        |     |
|     | Cis-l,3-dichloropropene              | 0.3                      | Ð      | Q      | Ð              | Ð                                | Q                 | Ð       | Ð        |     |
|     | Trichloroethene                      | 0.1                      | 0.79   | 100.   | 5.4            | Ð                                | Q                 | 5.5     | 0.26     |     |
|     | Dibramochloramethane                 | 0.1                      | ß      | Ð      | Ð              | Ð                                | Ð                 | Ð       | Q        |     |
|     | <pre>1,1,2-Trichlorcethane</pre>     | 0.05                     | Ð      | Ð      | Ð              | Ð                                | Q                 | QN      | Ð        |     |
|     | Trans-1, 3-dichloropropene           | 0.2                      | 2      | Ð      | 2              | 2                                | 2                 | 2       | Ð        |     |
|     | 2-Chloroethylvinyl ether             | 0.2                      | Ð      | Ð      | £              | Ð                                | Ð                 | Ð       | Ð        |     |
|     | Bramoform                            | 0.2                      | ₽      | Ð      | Ð              | Ð                                | Ð                 | Ð       | Ð        |     |
|     | <pre>1,1,2,2-Tetrachlorcethane</pre> | 0.05                     | Ð      | Ð      | £              | Ð                                | Q                 | Ð       | Ð        | -   |
|     | Tetrachloroethene                    | 0.05                     | Ð      | 5.4    | 0.95           | Ð                                | 2                 | 0.98    | ₽        |     |
|     | Chlorobenzene                        | 0.3                      | ð      | 3.0    | Ð              | Ð                                | Ð                 | Ð       | Ð        |     |
|     | l,3-Dichlorobenzene                  | 0.3                      | £      | Ð      | Ð              | Ð                                | Ð                 | 0.55    | 2        | ••  |
|     | <pre>l,2-Dichlorobenzene</pre>       | 0.2                      | ß      | 1.0    | ₽              | Ð                                | Q                 | Ð       | Ð        | 0.  |
|     | <pre>l,4-Dichlorobenzene</pre>       | 0.2                      | 0.54   | Ð      | Ð              | Ð                                | 1.9               | 2.7     | R        |     |
|     | Benzene                              | 0.2                      | ß      | 0.99   | 0.45           | 0.25                             | 0.32              | 0.32    | 0.25     | 0   |
|     | Toluene                              | 0.2                      | ß      | Ð      | Ð              | Ð                                | QN                | Ð       | Ð        | 0-  |
|     | Ethylbenzene                         | 0.2                      | ß      | QN     | Ð              | Ð                                | £                 | Q       | Ð        | ,,, |
|     |                                      |                          |        |        |                |                                  |                   |         |          |     |

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|   | Carponent                            | Detection Limit | Conce | Concentration, | ng/kg |
|---|--------------------------------------|-----------------|-------|----------------|-------|
|   |                                      | TYbn            | 3     |                | 2     |
|   | Ch loromethane                       | 1.0             | 2     | 2              | Ð     |
|   | Brononethane                         | 1.2             | ₽     | Ð              | Ð     |
|   | Dichlorodifluoromethane              | 1.8             | 2     | 2              | Ð     |
|   | Vinyl chloride                       | 0.2             | 2     | 2              | Ð     |
|   | Croroethane                          | 0.5             | ₽     | 2              | Ð     |
|   | Methylene chloride                   | 0.2             | Ð     | Ð              | ₽     |
|   | Trichlorofluoromethane               |                 | 2     | 2              | Ð     |
|   | 1,1-Dichloroethene                   | 0.2             | ₽     | Ð              | Ð     |
|   | l, l-Dichloroethane                  | 0.1             | ₽     | Ð              | Ð     |
|   | Trans-1, 2-dichloroethene            | 0.1             | Ð     | ₽              | Ð     |
|   | Chloroform                           | 0.1             | Ð     | Ð              | Ð     |
|   | <i>l,2-Dichloroethane</i>            | 0.02            | ₽     | Ð              | Q     |
|   | 1,1,1-Trichloroethane                | 0.1             | 2     | 2              | Ð     |
|   | Carbon tetrachloride                 | 0.1             | 2     | Ð              | Ð     |
|   | Bromodichloromethane                 | 0.1             | Ð     | Ð              | Ð     |
| r | 1,2-Dichloropropane                  | 0.1             | 2     | Ð              | Ð     |
|   | Trans-1, 3-dichloropropene           | 0.3             | 2     | Q              | Ð     |
|   | Trichloroethene                      | 0.1             | 2     | 2              | Ð     |
|   | Dibromochloromethane                 | 0.1             | Ð     | Ð              | Ð     |
|   | <pre>l,l,2-Trichloroethane</pre>     | 0.05            | 2     | Ð              | Ð     |
|   | Cis-l, 3-dichloropropene             | 0.2             | ₽     | Ð              | Q     |
|   | 2-Chloroethylvinyl ether             | 0.2             | ₽     | Ð              | 9     |
|   | Bromoform                            | 0.2             | Ø     | 2              | Ð     |
|   | <pre>1,1,2,2-Tetrachloroethane</pre> | 0.05            | 2     | 2              | 9     |
|   | <b>Tetrach loroethene</b>            | 0.05            | Ð     | ₽              | 9     |
|   | Chlorobenzene                        | 0.3             | Ð     | Ð              | Ð     |
|   | 1, 3-Dichlorobenzene                 | 0.3             | Ð     | Ð              | Ð     |
|   | 1,2-Dichlorobenzene                  | 0.2             | 2     | Ð              | Ð     |
|   | 1,4-Dichlorobenzene                  | 0.2             | 1.1   | 1.9            | 2     |
|   | Benzene                              | 0.2             | 2     | ₽              | 2     |
|   | Toluene                              | 0.2             | 2     | 2              | 2     |
|   | Ethy lbenzene                        | 0.2             | ᢓ     | 2              | 2     |
|   |                                      |                 |       |                |       |

Volatiles analysis by EPA Methods 601 (GC/Hall Detector) and 602 (GC/PID)

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Muther AFB - June 1985 Sampling

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Volatiles Analysis by ETA Nethods 601 (CC/Hall Detector) and 602 (CC/PID)

| Carponent                      | Detection<br>Limit, ug/L | Concentration, ug/L<br>Blank 7/9 Blank 7 | ion, ug/L<br>Blank 7/10 |
|--------------------------------|--------------------------|------------------------------------------|-------------------------|
|                                |                          |                                          |                         |
| Chloromethane                  | 1.0                      | ſ                                        | 2                       |
| Br cardine churve              | 1.2                      | ,                                        | 2                       |
| Dichlorodut luoromethame       | 1.8                      | ,                                        | 2                       |
| vinyl chloride                 | 0.2                      | ,                                        | 2                       |
| Chloroethane                   | 0.5                      | ı                                        | 9                       |
| Nethylone chloride             | 0.2                      | ł                                        | 0.32                    |
| Trichlorof luoromethane        | 2.0                      | ı                                        | 2                       |
| 1,1~Dich Lorcethene            | 0.2                      | ı                                        | 9                       |
| 1, 1-Dictiloroethane           | 0.1                      | I                                        | 2                       |
| Trans-1, 2-dichloroethene      | 0.1                      | ı                                        | 2                       |
| Chlaruform                     | 0.1                      | ,                                        | 2                       |
| 1, 2-Dichloroethane            | 0.02                     | ı                                        | 9                       |
| 1,1,1-Trich) aroethane         | 0.1                      | ı                                        | 0.17                    |
| Carbon tetrachloride           | 0.1                      | ł                                        | 2                       |
| Brandich lor anethane          | 0.1                      | I                                        | 2                       |
| 1, 2-Dichloropropane           | 0.1                      | 1                                        | 2                       |
| Cis-1, 3-dichloropropene       | 0.3                      | 1                                        | 9                       |
| Truchloroethene                | 0.1                      | ı                                        | Q                       |
| Ditrumich lorumethane          | 0.1                      | •                                        | ç                       |
| 1,1,2-Truchloroethane          | 0.05                     | 1                                        | Ð                       |
| "It ans-1, 3-duch loropropen:  | 0.2                      | ſ                                        | 2                       |
| 2 Culoroethylvinyl ether       | 0.2                      | ı                                        | Ŷ                       |
| bromoform                      | 0.2                      | 1                                        | 2                       |
| 1,1,2,2-Tutrachloroethane      | 0.05                     | ı                                        | Î                       |
| Tetrachloroethene              | 0.05                     | 1                                        | 2                       |
| Chlorabenzene                  | 0.3                      | Î                                        | 2                       |
| 1, 1-Dichlorobenzene           | 0.3                      | 2                                        | 2                       |
| 1, 2-Dichlor dienzene          | 0.2                      | 2                                        | 2                       |
| 1, 1-Dichlor divenzione        | 0.2                      | 2                                        | 2                       |
| benzene                        | 0.2                      | 9                                        | 1                       |
| Toluene                        | 0.2                      | 0.23                                     | ,                       |
| Ethy literation and the second | 0.2                      | Ŷ                                        | ı                       |
|                                |                          |                                          |                         |

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APPENDIX L

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FEDERAL AND STATE DRINKING WATER AND HUMAN HEALTH STANDARDS APPLICABLE IN THE STATE OF CALIFORNIA



# GUIDE TO GROUND-WATER STANDARDS

### API PUBLICATION 4366

JULY 1983

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#### 3. FEDERAL PROTECTION OF GROUND-WATER QUALITY

The lederal programs dealing with the protection of ground-water quality are administered largely by the Environmental Protection Agency (EPA). The lederal programs which provide the framework for state regulations are summarized in this section.



#### 3.1 GROUND-WATER PROTECTION POLICY

At this writing, February 1983, U.S. EPA's final policy on ground-water protection, scheduled for September 1982 release, has not been published. Based on the proposed strategy published by EPA in November 1980 and recent press releases, it appears that EPA will be implementing a policy that would give the states lead responsibility in the protection of ground-water quality. EPA's efforts apparently will be focused in three major areas:

- 1. Development of an internally consistent federal approach to ground-water protection
- Monitoring, research and development efforts directed toward more comprehensive problem definition and new detection, controls, and clean-up technology development.
- 3. Guidance, coordination, and assistance to states in the development of state policies

A significant component of EPA's policy is expected to be a ground-water classification system which could be used to determine the degree of protection needed for various types of ground water. Ground-water classification is discussed in Chapter 4.

#### 3.2 CLEAN WATER ACT

This statute refers to ground-water protection in municipal waste water treatment, planning, and research programs. Its principal regulatory programs, however, focus on surface water. Section 303 empowers EPA to approve states water quality standards which are based on the states classification of rivers and streams. Many states have included ground water in their definition of "waters of the state" for purposes of this act (state summaries). On this basis the National (state) Pollutant Discharge Elimination System (NPDES:SPDES) permitting process may be invocable for purposes of ground-water protection. In addition the act empowers EPA to

- 1. Develop a comprehensive program for ground-water pollution control [Section 102(a)]
- 2 In cooperation with states, equip and maintain a surveillance system for monitoring ground-water quality [Section 104(a)(5)]
- Provide grants to states and area-wide agencies to develop ground-water quality management plans to identify salt water intrusion and control disposal of pollutants in subsurface excevations, and control disposition of wastes. (May include authority for comprehensive ground-water management plans, including conjunctive use with surface water) [Section 102(c), 208(b)].
- Require development of Best Management Practices (BMP) to control nonpoint source pollution problems to ground-water quality [Section 208(b)]
- 5. Develop criteria for ground-water quality considering kind and extent of effects on health and welfare from the presence of pollutants [Section 304(a)]
- Determine information necessary to restore and maintain chemical, physical, and biological integrity of ground water [Section 304(a)]
- Issue information on the factors necessary to restore and maintain chemical physical, and biological integrity of ground water [Sections 304(a)(2)]

#### 3.3 SAFE DRINKING WATER ACT

This statute authorizes EPA to set maximum contaminant levels (MCLs) and monitoring requirements for public water systems and provides for the protection of underground sources of drinking water. The MCLs regulate the quality of "finished" water, i.e., water as delivered, not the quality of the source water. As discussed below the MCLs have been utilized by EPA and the states as the basis for other regulations dealing with ground-water quality and protection.

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#### 3.3.1 National Interim Primary Drinking Water Regulations

EPA initiated a detailed study of the health effects of various contaminants in water soon after the Sate Dinki Act (SDWA) was signed into law. So that the regulations could include the findings of this and other studies, t primary drinking water regulations were to be developed in two stages: an interim version and a final version. T interim version of the regulation became effective 24 June 1977. SDWA provides for delegation of authority to t states. State Primary Drinking Water Regulations must be at least as stringent as the federal regulations.

The National Interim Primary Drinking Water Regulations define Maximum Contaminant Level as the maximum permissible level of a contaminant in water which is delivered to the free-flowing outlet of the ultimate user or public water system, except in the case of turbidity (applicable to surface water only) where the maximum permissible level is measured at the point of entry to the distribution system. The MCLs are provided with the stasummaries.

#### 3.3.2 National Secondary Drinking Water Regulations

These regulations control contaminants in drinking water that primarily affect the aesthetic qualities relating to t public acceptance of drinking water. At considerably higher concentrations of these contaminants, hea implications may also exist as well as aesthetic degradation. The National Secondary Drinking Water Regulatio are not federally enforceable but are intended as guidelines for the states.

Secondary Maximum Contaminant Levels (SMCLs) are defined as the maximum permissible level of contaminant in water which is delivered to the free-flowing outlet of the ultimate user of a public water syste. Federal and state SMCLs are provided in the state summaries. The states may establish higher or lower leve which may be appropriate depending upon local conditions such as unavailability of alternate sources of water other compelling factors, provided the public health and welfare are not adversely affected.

#### 3.3.3 Sole Source Aquifer

The Sole Source Aquifer provisions of SDWA allow EPA to designate an aquifer as the sole source of drinki water for an area thereby guaranteeing protection from contamination by federally assisted activities. Loc regional, or state agencies can petition EPA for sole source designation. The EPA Administrator may designate aquifer which is a sole or principal drinking water source if its contamination would create a significant hazard public health. If the designation is made, no federal money or financial commitment may be made for any proje which the Administrator determines may contaminate the designated aquifer through its recharge zone

 At this writing, February 1983, EPA has designated the following ten sole source aquifers.

 Biscayne Aquifer - Florida
 Nassau and Sutfolk counties - Ne

 Buned Valley Aquifer - New Jersey
 Cape Cod - Massachusetts

 Edwards Aquifer - Texas
 Fresno - California

Camano Island—Whidbey Island Aquifer - Washington Spokane-Rathdrum Aquifer - Washington and Idaho

The following eighteen are under consideration:

Anzona

Santa Cruz, Upper Santa Cruz, Aura-Altar Basins

California Scotts Valley

Delaware New Castle County

Florida Volusia - Floridan Aquifer

Idaho Snake River Plain

Louisiana Baton Rouge

DeSota Parish

New Jersey Coastar Plain Ridgewood Upper Rockaway Nassau and Suffolk countries - New York Cape Cod - Massachusetts Fresno - California Ten Mile Creek - Maryland Northern Guarn Lens - Guarn

New York Kings and Queens counties Sardinia Schenectady Vestal

Pennsylvania Seven Valleys

Texas Carrizo-Wilcox Aquiter

Texas and New Mexico Delaware Basin

Wisconsin Niagara Aquifer

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#### 3.3.4 Underground Injection Control

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The Underground Injection Control (UIC) program regulates the uses of underground injection wells to protect an underground source of drinking water (USDW). USDW means an aquifer or its portion which

- supplies any public water system or contains a sufficient quantity of ground water to supply a public water system;
- 2. currently supplies drinking water for human consumption or contains less than 10,000 mg/liter total dissolved solids; and
- 3. is not an exempted aquifer (40 CFR 146.04 provides criteria for exemption).

SDWA requires any state designated by EPA as requiring a UIC program to develop and submit a state UIC program for EPA approval. EPA has designated each of the fifty states.

The federal program classifies injection wells as follows:

Class I-Wells used to inject hazardous waste, or other industrial and municipal disposal wells which inject fluids beneath the lower-most formation containing a USDW within one-quarter mile of the well bore.

Class II---Wells that inject fluids

- which are brought to the surface as part of conventional oil or natural gas production and may be mixed with production waste waters from gas plants, unless those waters are classified as a hazardous waste at the time of injection;
- 2. for enhanced recovery of oil or natural gas; and
- for storage of hydrocarbons which are liquid at standard temperature and pressure.

Class III-Wells that inject for extraction of minerals including

- 1. mining of sulfur by the Frasch process;
- in situ production of uranium or other metals. This category includes only in situ production from ore bodies which have not been conventionally mined. Solution mining of conventional mines such as stopes leaching is included in Class V; and
- 3. solution mining of salts or potash.

Class IV—Wells used to dispose of hazardous or radioactive waste into or above a formation which contains a USDW within one-quarter mile of the well. Also, wells used to inject hazardous waste that cannot be classified as Class I or Class IV under the above criteria are Class IV wells.

Class V-All other injection wells (40 CFR 146.05(e) and 146.51 provide specific information and exemptions).

Underground injection is controlled through the permitting process. Construction, operation, monitoring and reporting activities are controlled. Individual state programs are based upon, and must be essentially equivalent to, the federal criteria and standards (40 CFR 146).

#### 3.4 TOXIC SUBSTANCE CONTROL ACT

This statute (TSCA) authorizes EPA to restrict or prohibit the manufacture, distribution, and use of products which may result in unreasonable risk to health and the environment. Although ground water is not specifically named in the Act. EPA has taken the position that the protection of health and the environment includes the protection of oround water.

#### 3.5 FEDERAL INSECTICIDE, FUNGICIDE, RODENTICIDE ACT

This statute (FIFRA) gives EPA the responsibility to control the sale and use of all pesticides to prevent unreasonable adverse environmenta: and health effects. The use and disposal of pesticide packages and containers is also regulated. In deciding whether to register, cancel, suspend, or change the classification of a pesticide. EPA considers a broad range of environmental impacts including those affecting ground water.

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#### 3.6 RESOURCE CONSERVATION AND RECOVERY ACT

The Solid Waste Disposal Act and the Resource Recovery Act of 1970, as amended by the Resource Conservation and Recovery Act of 1976 (RCRA), require EPA to establish a national program to regulate the management of waste materials.

#### 3.6.1 Solid Waste

Subtitle D of RCRA established a broad-based national program to improve solid waste management through the development of state and regional solid waste management plans. The act offered federal financial assistance to states interested in developing and implementing a solid waste management plan. The state plans, under federal guidelines, identify respective responsibilities of local, state, and regional authorities, and encourage resource recovery and conservations and the application and enforcement of environmentally sound disposal practices.

A major element of the Subtitle D program is the open dump inventory. Section 4005 of RCRA prohibits open dumping. Federal criteria for classifying solid waste management facilities are provided in 40 CFR 257. EPA cannot approve a state solid waste management program with less stringent criteria. Solid waste management facilities failing to satisfy the criteria are considered open dumps. In order to satisfy these criteria, a facility or practice (in addition to other environmental considerations) shall not contaminate an underground drinking water source beyond the solid waste boundary or beyond an alternative boundary established by the state or in court persuant to the stipulations of 40 CFR 257.3-4. The federal criteria define contamination as an exceedence of the MCLs provided in the National Interim Primary Drinking Water Regulations or an increase in concentration of any parameter for which the ambient concentration exceed the MCL.

#### 3.6.2 Hazardous Waste

EPA has issued a series of hazardous waste regulations under Subtitle C of RCRA (40 CFR 260 to 267 and 122 to 124). On 19 May 1980, EPA issued a comprehensive set of standards for generators and transporters of hazardous waste and "interim status" standards for facilities in existence on 19 November 1980, that treat, store, or dispose of hazardous waste. Such facilities were allowed to operate under interim status until they received an RCRA permit. Subsequently, EPA issued standards for granting RCRA permits to treatment and storage facilities. Standards for land disposal facilities were issued on 26 July 1982—virtually completing the program for controlling hazardous waste under RCRA.

The standards for permitting land disposal facilities were issued after a wide range of regulatory options were considered. Over a period of several years, EPA proposed two different sets of land disposal standards and solicited comments on various issues. On 13 February 1981, EPA issued temporary standards for new land disposal facilities. The 26 July regulations replace those temporary standards except for Class I underground injection wells. These will remain subject to the temporary standards until final standards are issued.

The regulations consist primarily of two complementary sets of performance standards:

- 1. A set of design and operating standards tailored to each of four types of facilities
- 2. Ground-water monitoring and response regulations applicable to all land disposal facilities

The design and operating standards implement a liquids management strategy that has two goals

- 1. Minimize leachate generated at the facility
- 2. Remove leachate generated to minimize its chance of reaching ground water

The major requirements include

- 1. Liner
  - · Requirement: design to prevent migration of waste out of the facility during its active life
  - Applicability: landfills, surface impoundments, and waste piles
- 2. Leachate collection and removal
  - Requirement collect and remove leachate from the facility and ensure that leachate depth over the liner does not exceed 30 centimeters (1 foot)
  - Applicability, landfills and waste piles

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- 3. Run-on and runoff control systems
  - · Requirement: design to control flow during at least 25-year storm
  - · Applicability: landfills, waste piles, land treatment
- 4 Wind dispersal controls
  - Requirement cover waste or otherwise manage unit to control wind dispersal
  - Applicability: landfills, waste piles, and land treatment units that contain particulate matter.
- 5. Overtopping controls
  - Requirement: prevent overtopping or overfilling
  - Applicability: surface impoundments
- 6. Disposal unit closure
  - Requirement: final cover (cap) over waste unit designed to minimize infiltration of precipitation
     Applicability. landfills and surface impoundments (if used for disposal)
- 7. Storage unit closure
  - Requirement: remove waste and decontaminate.
  - · Applicability: surface impoundments used for treatment or storage and waste piles
- 8. Postciosure Care
  - Maintain effectiveness of final cover
  - Operate leachate collection and removal system
  - Maintain ground-water monitoring system (and leak detection system where double liner is used)
  - Continue 30 years after closure

The goal of the ground-water monitoring and response program is to detect and correct any ground-water contamination. There are four main elements:

- A detection monitoring program which requires the permittee to install a system to monitor ground water in the uppermost aquifer to determine if a leachate plume has reached the edge of the waste management area.
- 2. A ground-water protection standard is set when a hazardous constituent is detected. The standard specifies concentration limits, compliance point, and compliance period.
- 3. A compliance monitoring program determines if the facility is complying with its ground-water protection standard
- 4. Corrective action is required when the ground-water protection standard is violated. The permittee must either remove the contamination or treat it in place to restore ground-water quality.

Until hazardous waste management facilities are issued permits, existing facilities will continue to operate under interim status standards. Facilities operating under interim status will be required to file Part B applications for final permits.

Under Subtitle C of RCRA. EPA approves state hazardous waste management programs in two phases. Phase I authorization gives states the right to control transportation and generation of hazardous wastes within their borders and to regulate existing treatment, storage, and disposal facilities. Phase I authorization includes the permitting of new facilities.

3.7 COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT

This statute (CERCLA), commonly referred to as Superfund, authorizes EPA to respond to releases or threatened releases into the environment, including ground water, of any hazardous substance which may present an imminent and substantial danger to public health. The act provides funds for emergency action and has cost recovery provisions.

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#### CALIFORNIA



**Classification**—Ground water is included in the definition of "Waters of the State" as found in the California Wat Quality Act. Ground water has been included in beneficial use classes developed as part of Basin Manageme Programs of the Water Resources Control Board and the Regional Boards.

Quality Standards-The general policy is a nondegradation policy to protect the present and possible future use of ground water as a source of potable, industrial, and agricultural water supply. Quality standards are specific each use class and Basin Program.

Drinking Water Standards-The California Water Resources Control Board has adopted the federal primary ar secondary drinking water standards.

Appropriations-There are no state-wide permit requirements, however, see Controlled Use Areas below.

Controlled Use Areas-Several ground-water basins are being managed by local authorities in response 1 special legislative acts and court orders. These authorities regulate ground-water withdrawals within the jurisdictions. However, these areas account for less than five percent of all ground-water basins.

Well Construction-Local counties may adopt well construction standards and require drillers to be licensed Approximately half of California's 58 counties have done so.

Underground Injection Control-California is in the process of submitting a UIC program for EPA approval. Th Water Resources Control Board will be the lead agency in the program. Class II wells will be regulated by the C and Gas Division of the Department of Conservation.

Waste Management Facilities-The solid and hazardous waste management programs are administered by th Solid Waste Management Board. The Hazardous Waste Management Regulations are administered by th Department of Health Services.

Solid Waste-The California Solid Waste Management Regulations require a ground-water monitonn system for disposal sites. Monitoring requirements are on a case-by-case basis.

Hazardous Waste-California has received interim status authorization for its RCRA Phase I program and i seeking Phase II authority. Ground-water monitoring requirements are included in permit conditions and an generally equivalent to EPA requirements.

Sole Source Aquifers-The Fresho area aquifer has been designated as sole source by EPA. The Scotts Valle aquifer is under consideration by EPA.

#### Geological Surveys-

Division of Mines and Geology Department of Conservation 1416 Ninth St. Sacramento, CA 95814 916-445-1923 State Geologist: Dr. James F. Davis

References-California Water Quality Act (California Water Code, Div. 7, Ch. 482)

California Solid Waste Management Regulations (California Admin. Code, Title 14, Div. 7, Ch. 1-5 and 9)

Contecta-

Ms. Helen Joyce Peters Department of Water Resources P.O. Box 388 Sacramento, CA 95802 916-445-2182 Water Resources Division U.S. Geological Survey Federal Bldg., Room W-2235 2800 Cottage Way Sacramento, CA 95825 916-484-4606 District Chief: T.J. Durbin

California Hazardous Waste Management Regulations (California Admin. Code, Title 22, Div. 4, Ch. 30)

Mr. Evan Nossoff Water Resources Control Board P.O. Box 100 Sacramento, CA 95801 916-322-8353

Revisions provided by Ms. Helen Joyce Peters in a letter received 11 April 1983.

### CALIFORNIA

|                        | Delakia - I  | Water Standarde |                   | Monitoring | Requirements |
|------------------------|--------------|-----------------|-------------------|------------|--------------|
| Parameter              |              | Water Standards |                   | Solid      | Hazardous    |
| (mg/l unless noted)    | Federal      | State           | Quality Standards | Waste      | Waste        |
| Arsenic                | 0.05         | 0.05            |                   |            |              |
| Barium                 | 1.0          | 1.0             |                   |            |              |
| Cadmium                | 0.010        | 0.010           |                   |            |              |
| Chromium               | 0.05         | 0.05            |                   |            |              |
| Lead                   | 0.05         | 0.05            |                   |            |              |
| Mercury                | 0.002        | 0.002           |                   |            |              |
| Selenium               | 0.01         | 0.01            |                   |            |              |
| Silver                 | 0.05         | 0.05            |                   |            |              |
| Fluoride               | 1.4-2.4      | 1.4-2.4         |                   |            |              |
| Nitrate (as N)         | 10.0         | 10.0            |                   |            |              |
| Endrin                 | 0.0002       | 0.0002          |                   |            |              |
| Lindane                | 0.004        | 0.004           |                   |            |              |
| Methoxychlor           | 0,1          | 0.1             |                   |            |              |
| Toxaphene              | 0.005        | 0.005           |                   |            |              |
| 2,4-D                  | 0.1          | 0.1             |                   |            |              |
| 2,4,5-TP Silvex        | 0.01         | 0.01            |                   |            |              |
| Trihalomethanes        | 0.01         | 0.1             |                   |            |              |
| Turbidity (TU)         | 1.0          | 1.0             |                   |            |              |
| Colitorm bacteria —    | 1.0          | 1.0             |                   |            |              |
| membrane filter        |              |                 |                   |            |              |
|                        |              |                 |                   |            |              |
| test (#/100 ml)        | 1.0          | 1.0             |                   |            |              |
| Gross alpha (pCi/l)    | 15.0         | 15.0            |                   |            |              |
| Combined Radium 226    |              |                 |                   |            |              |
| and Radium 228         | 5.0          | 5.0             |                   |            |              |
| Beta and photon        |              |                 |                   |            |              |
| particle activity      |              |                 |                   |            |              |
| (mrem/yr)              | 4.0          | 4.0             |                   |            |              |
| Sodium                 | M            | м               |                   |            |              |
| Chlonde                | 250.0        | 250.0           |                   |            |              |
| Color (units)          | 15.0         | 15.0            |                   |            |              |
| Copper                 | 1.0          | 1.0             |                   |            |              |
| Corrosivity            | Noncorrosive | Noncorrosive    |                   |            |              |
| Foaming agents         | 0.5          | 0.5             |                   |            |              |
| Iron                   | 0.3          | 0.3             |                   |            |              |
| Manganese              | 0.05         | 0.05            |                   |            |              |
| Odor (threshold no.)   | 3.0          | 3.0             |                   |            |              |
| pH (units)             | 6.5-8.5      | 6.5-8.5         |                   |            |              |
| Sulfate                | 250.0        | 250.0           |                   |            |              |
| Total dissolved solids | 500.0        | 500.0           |                   |            |              |
| Zinc                   | 5.0          | 5.0             |                   |            |              |
| Phenois                |              |                 |                   |            |              |
| Specific conductance   |              |                 |                   |            |              |
| Total organic carbon   |              |                 |                   |            |              |
| Total organic halogen  |              |                 |                   |            |              |

Note. "M" denotes monitoring requirement. See Section 4.3

**m**.

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#### ENVIRONMENTAL PROTECTION AGENCY NATIONAL INTERIM PRIMARY DRINKING WATER REGULATIONS

(40 CFR 141; 40 FR 59565, December 24, 1975; Amended by 41 FR 28402, July 9, 1976; 44 FR 68641, November 29, 1979; Corrected by 45 FR 15542, March 11, 1980; 45 FR 57342, August 27, 1980)

Title 40-Protection of Environment CHAPTER I-ENVIRONMENTAL PROTECTION AGENCY

SUBCHAPTER D-WATER PROGRAMS PART 141-NATIONAL INTERIM PRIMARY DRINKING WATER REGULATIONS

#### Subpart A-General

141.1 Applicability. 141.2 Definitions.

- 141.3 Coverage. 141.4 Variances and exemptions.
- 141.5 Siting requirements. 141.6 Effective dates.

Subpart B-Maximum Contaminant Levels 141.11 Maximum contaminant levels for in-

- 141.12 Maximum contaminant levels for in-organic chemicals. 141.12 Maximum contaminant levels for organic chemicals.
- 141.13 Maximum contaminant levels for turbidity. 141.14 Maximum microbiological contami-
- nant levels 141,15 Maximum contaminant levels for
- radium 226, radium 228, and gross alpha particle radioactivity in community water systems. 141.16 Maximum contaminant levels for beta
- particle and photon radioactivity from man-made radionuclides in community water systems

#### Subpart C-Monitoring and Analytical Requirements

141.21 Microbiological contaminant sampling and analytical requirements.

- 141.22 Turbidity sampling and analytical requirements
- 141.23 Inorganic chemical sampling and analytical requirements. 141.24 Organic chemicals other than total trisampling and
- halomethanes, sampling and analytical requirements.
- 141.25 Analytical Methods for Radioactivity. 141.26 Monitoring Frequency for Radioac-tivity in Community Water Systems.
- 141.27 Alternative analytical techniques.
- 141.28 Approved laboratories. 141.29 Monitoring of consecutive public water systems.

### Subpart D-Reporting Public Notification, and Record-keeping

- 141.31 Reporting requirements 141.32 Public notification of variances, ex-
- emptions, and non-compliance with reculations
- 141 33 Record maintenance

Subpart E-Special Monitoring Regulations for Organic Chemicals

141.40 Special monitoring for organic chemical.

Authority: Secs. 1412, 1414, 1445, and 1450 of the Public Health Service Act, 88 Stat. 1660 (42 U.S.C. 300g-1, 300g-3, 300j-4, and 300j-9).

#### Subpart A-General

§141.1 Applicability.

This part establishes primary drinking water regulations pursuant to section 1412 of the Public Health Service Act, as amended by the Safe Drinking Water Act (Pub. L. 93-523); and related regulations applicable to public water systems.

#### § 141.2 Definitions.

As used in this part, the term:

(a) "Act" means the Public Health Service Act, as amended by the Safe Drinking Water Act, Pub. L. 93-523.

(b) "Contaminant" means any physical, chemical, biological, or radiological substance or matter in water.

(c) "Maximum contaminant level" means the maximum permissible level of a contaminant in water which is delivered to the free flowing outlet of the ultimate user of a public water system, except in the case of turbidity where the maximum permissible level is measured at the point of entry to the distribution system. Contaminants added to the water under circumstances controlled by the user, except those resulting from corrosion of piping and plumbing caused by water quality, are excluded from this definition.

(d) "Person" means an individual, corporation, company, association, partnership, State, municipality, or Federal agency.

(e) "Public water system" means a system for the provision to the public of piped water for human consumption. if such system has at least fifteen service connections or regularly serves an average of at least twenty-five individuals daily at least 60 days out of the year. Such term includes (1) any collection. treatment, storage, and distribution facilities under control of the operator of such system and used primarily in connection with such system, and (2) any collection or pretreatment storage facilities not under such control which are used primarily in connection with such system. A public water system is either

a "community water system" or a " community water system."

(i) "Community water system" n a public water system which serv least 15 service connections used by ; round residents or regularly serve least 25 year-round residents

(ii) "Non-community water sy: means a public water system that i a community water system.

(f) "Sanitary survey" means ar site review of the water source, f ties, equipment, operation and ma nance of a public water system fo purpose of evaluating the adequasuch source, facilities, equipment eration and maintenance for produ and distributing safe drinking wate

(g) "Standard sample" means aliquot of finished drinking water th examined for the presence of colibucteria

(h) "State" means the applies o State government which has jur tion over public water systems D any period when a State does not primary enforcement repons. pursuant to Section 1413 of the Act term "State" means the Regional ministrator, U.S. Environmental Pr

(i) "Supplier of water" means person who owns or operates a p water system.

(j) "Dose equivalent" means the ; uct of the absorbed dose from ion radiation and such factors as accour. differences in biological effectiveness to the type of radiation and its dist. tion in the body as specified by the ternational Commission on P. hole Units and Measurements (ICRU)

(k) "Rem" means the unit of equivalent from ionizing radiation to total body or any internal organ or o system. A "millirem (mrem)" is 1. of a rem.

(1) "Picocurie (pCi)" means that q ty of radioactive material produ 2.22 nuclear transformations per min

(m) "Gross alpha particle activ means the total radioactivity due alpha particle emission as inferred f measurements on a dry sample

(n) "Man-made beta particle and p means all rationuc ton emitters' emitting beta particles and or phot

[Sec. 141.2(n)]

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listed in Maximum Permissible Body Burdens and Maximum Permissible Concentration of Radionuclides in Air or Water for Occupational Exposure, NHS Handbook 69, except the daughter products of thorium-232, uranium-235 and uranium-238.

(o) "Gross beta particle activity" means the total radioactivity due to beta particle emission as inferred from measurements on a dry sample.

[41 FR 28402, July 9, 1976] [141.2 (p)-(1) added by 44 FR 68641, November 29, 1979]

(p) "Halogen" means one of the chemical elements chlorine, bromine or iodine.

(q) "Trihalomethane" (THM) means one of the family of organic compounds, named as derivatives of methane, wherein three of the four hydrogen atoms in methane are each substituted by a halogen atom in the molecular structure.

(r) "Total trihalomethanes" (TTHM) means the sum of the concentration in milligrams per liter of the trihalomethane compounds (trichloromethane [chloroform], dibromochloromethane, bromodichloromethane and tribromomethane [bromoform]). rounded to two significant figures.

(s) "Maximum Total Trihalomethane Potential (MTP)" means the maximum concentration of total trihalomethanes produced in a given water containing a disinfectant residual after 7 days at a temperature of 25° C or above.

(t) "Disinfectant" means any oxidant, including but not limited to chlorine, chlorine dioxide, chloramines, and ozone added to water in any part of the treatment or distribution process, that is intended to kill or inactivate pathogenic microorganisms.

#### § 141.8 Coverage.

This part shall apply to each public water system, unless the public water system meets all of the following conditions:

(a) Consists only of distribution and slorage facilities (and does not have any collection and treatment facilities);

(b) Obtains all of its water from, but is not owned or operated by, a public water system to which such regulations apply:

(c) Does not sell water to any person; and

(d) Is not a carrier which conveys passengers in interstate commerce.

§ 141.4 Variances and exemptions.

Variances or exemptions from certain provisions of these regulations may be granted pursuant to Sections 1415 and 1416 of the Act by the entity with primary enforcement responsibility, Proviions under Part 142, National Inferim Primary Drinking Water Regulations implementation—subpart E (Variances) and subpart F (Exemptions)—apply where EPA has primary enforcement responsibility.

#### § 141.5 Siting requirements.

Before a person may enter into a finuncial commitment for or initiate construction of a new public water system or increase the capacity of an existing public water system, he shall notify the State, and, to the extent practicable, avoid locating part or all of the new or expanded facility at a site which:

(a) Is subject to a significant risk from carthquakes, floods, fires or other disasters which could cause a breakdown of the public water system or a portion thereof; or

(b) Except for intake structures, is within the floodplain of a 100-year flood or is lower than any recorded high tide where appropriate records exist.

The U.S. Environmental Protection Agency will not seek to override land use decisions affecting public water systems siting which are made at the State or local government levels.

#### § 141.6 Effective dates.

[141.6 revised by 44 FR 68641, November 29, 1979]

(a) Except as provided in paragraph (b) of this section, the regulations set forth in this part shall take effect on June 24, 1977.

(b) The regulations for total trihalomethanes set forth in § 141.12(c) shall take effect 2 years after the date of promulgation of these regulations for community water systems serving 75.000 or more individuals, and 4 years after the date of promulgation for communities serving 10.000 to 74.999 individuals.

(c) The regulations set forth in 141.11 (a), (c) and (d): 141.14(a)[1]: 141.14(b](1](c): 141.14(b)(2](i): 141.14(d); 141.21 (a), (c) and (i): 141.22 (a) and (e): 141.23 (a)[3] and (a)[4]: 141.23(f); 141.24(a)[3]: 141.24 (e) and (f): 141.25(e); 141.27(a): 141.28 (a) and (b): 141.31 (a), (c). (d) and (e): 141.32(b)[3]: and 141.32(d) shall take effect immediately upon promulgation.

(d) The regulations set forth in 141.41 shall take effect 18 months from the date of promulgation. Suppliers must complete the first round of sampling and reporting within 12 months following the effective date.

(e) The regulations set forth in 141.42 shall take effect 18 months from the date of promulgation. All requirements in 141.42 must be completed within 12 months following the effective date.

[141.6 (c)-(e) added by 45 FR 57342, August 27, 1980] Subpart B---Maximum Contaminant Levels § 113.11 - Maximum contaminant levels For inorganic chemicals

(a) The MCL for nitrate is applicable to both community water systems and non-community water systems except as provided by in paragraph (d). The levels for the other organic chemicals apply only to community water systems. Compliance with MCLs for inorganic chemicals is calculated pursuant to § 141.23.

[141.11(a) amended by 45 FR 57342. August 27, 1980]

(b) The following are the maximum contaminant levels for inorganic chemicals other than fluoride:

|                | Level.                  |
|----------------|-------------------------|
| Contaminant    | milligrams<br>per liter |
| Arsenic        | 0.05                    |
| Barium         |                         |
| Cadmium        | 0.010                   |
| Chromium       | 0. 05                   |
| Lead           | 0 05                    |
| Mercury        | 0 002                   |
| Nitrate (as N) | 10.                     |
| Selenium       | 0.01                    |
| Silver         | 0. 05                   |

(c) When the annual average of the maximum daily air temperatures for the location in which the community water system is situated is the following, the maximum contaminant levels for fluoride are:

| Te reperature<br>Degrees<br>Fabre obest | Dexices Colsus               | Level,<br>millerams<br>per liter |
|-----------------------------------------|------------------------------|----------------------------------|
| All 7 and 1+ low.                       | 12.0 and below               |                                  |
| 5 4 to (3 *                             | 14 7 10 17.6.                | 22                               |
| 43 1 to 70 6                            | 17.7 to 21.4                 | 1 *                              |
|                                         | 21.5 to 20.2<br>20.3 to 32.5 | 16                               |

(c) Fluoride at optimum levels in drinking water has been shown to have beneficial effects in reducing the occurrence of tooth decay.

[141.11 (c) amended by 45 FR 57342. August 27, 1980]

(d) At the discretion of the State, nitrate levels not to exceed 20 mg/l may be allowed in a non-community water system if the supplier of water demonstrates to the satisfaction of the State that:

(1) Such water will not be available to children under 8 months of age; and

(2) There will be continuous posting of the fact that nitrate levels exceed 10 mg/l and the potential health effects of exposure: and

(3) Local and State public health authorities will be notified annually of nitrate levels that exceed 10 mg/l; and (4) No adverse health effects shall

result.

[141.11 (d) added by 45 FR 57342. August 27, 1950]

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§ 141.12 Maximum contaminant levels for Corganic chemicals.

[141-12 revised by 44 FR 68641, November 29, 1979]

The following are the maximum contaminant levels for organic chemicals. The maximum contaminant levels for organic chemicals in (paragraphs (a) and (b) of this section apply to all community water systems. Compliance with the maximum contaminant levels in paragraphs (a) and (b) is calculated pursuant to § 141.24. The maximum comtaminant level for total trihalomethanes in paragraph (c) of this section applies only to community water systems which serve a population of 10,000 or more individuals and which add a disinfectant (oxidant) to the water in any part of the drinking water treatment process. Compliance with the maximum contaminant level for total trihalomethanes is calculated pursuant to § 141.30.

#### Level. millicrams per liter

| (a) Chlorinated hydrocarbons:                         |      |
|-------------------------------------------------------|------|
| Endrin (1.2.3.4.10, 10-hexachloro,                    | 0.00 |
| 6.7-epoxy-1.4. 4a.5.6.7.8.8a-octa-                    | 02   |
| hydro-1.4-endo, endo-5.8-dimeth-<br>ano naphthalene), |      |
| Lindane (1.2.3.4.5.6-hexachlorocy-                    | 0.0  |
| clohexane, gamma isomer).                             | - 41 |
| Methoxychlor (1.1.1 Trichloro 2, 2-                   | i (  |
| bis [p-methoxypheny]] ethane)                         | /•   |
| Toxaphene (C.,H.,CI, Technical                        | Ó.0  |
| chlorinated camphene, 67-69 per-<br>cent chlorine:    | 5    |
|                                                       |      |

(b) Chlorophenoxys: 2.4-D. (2.4-Dichlorop

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2.4.D. (2.4.Dichlorophenoxyacetic acid). 2.4.5 TP Silvex (2.4.5 Trichloro-

phenoxy propionic acid).

(c) Total trihalomethanes (the sum of the concentrations of bromodichloromethane, dibromochloromethane, tribromomethane (bromoform) and trichloromethane (chloroform) 0.10 mg 1.

1141 12(c) added by 44 FR 68641, November 29 1979]

#### § 141.13 Maximum contaminant levels for turbidity. .

The maximum contaminant levels for turbidity are applicable to both community water systems and non-community water systems using surface water sources in whole or in part. The maximum contaminant levels for turbidity in drinking water, measured at a representative entry point(s) to the distribution system, are

(a) One turbidity unit (TU), as de-

termined by a monthly average pursuant to § 141.27, except that five or fewer turbidity units may be allowed if the supplier of water can demonstrate to the State that the blacker turbidity does not do any of the following:

(1) Interfere with disinfection;

(2) Prevent insintenance of an effective disinfectant agent throughout the distribution system; or

(3) Interfere with microbiological determinations.

(b) Five turbidity units based on an average for two consecutive days pursuant to § 141.22.

#### § 141.14 Maximum microbiological con-Jaminant levels

The maximum contaminant levels for collform bacteria, applicable to community water systems and non-community water systems, are as follows: (a) When the membrane filter tech-

(a) When the membrane filter technique pursuant to § 141.21(a) is used, the number of coliform bacteria shall not exceed any of the following:

#### [141.14(a)(1) revised by 45 FR 57342, August 27, 1980]

(1) One per 100 milliliters as the arithmetic mean of all samples examined per compliance period pursuant to § 141.21(b) or (c), except 002 that, at the primacy Agency's discretion 1Pb systems required to take 10 or fewer samples per month may be authorized to 89L exclude one positive routine sample per month from the monthly calculation if: • Pb(i) as approved on a case-by-case basis PP) the State determines and indicates in PP) writing to the public water system that no unreasonable risk to health existed under the conditions of this modification. This determination should

be based upon a number of factors not 0.01 limited to the following: (A) the system Jopp provided and had maintained an active disinfectant residual in the distribution system, (B) the potential for contamination as indicated by a sanitary survey. and (C) the history of the water quality at the public water system (e.g. MCL or monitoring violations); (ii) the supplier initiates a check sample on each of two consecutive days from the same sampling point within 24 hours after notification that the routine sample is positive, and each of these check samples is negative; and (iii) the original positive routine sample is reported and recorded by the supplier pursuant to § 141.31(a) and § 141.33(a). The supplier shall report to the State its compliance with the conditions specified in this paragraph and a summary of the corrective action taken to resolve the prior positive sample result. If a positive routine sample is not used for the

monthly calculation, another routine

sample must be analyzed for compliance purposes. This provision may be used only once during two consecutive compliance periods.

(2) Four per 100 milliliters in mor than one sample when less than 20 ar examined per month; or

(3) Four per 100 milliliters in mor than five percent of the samples whe: 20 or more are examined per month.

(b) (1) When the fermentation tubmethod and 10 milliliter standard portions pursuant to § 141.21(a) are used colliform bacteria shall not be present ir any of the following:

[141.14(b)(1)(i) revised by 45 FR 57342 August 27, 1980]

(i) More than 10 percent of the portions (tubes) in any one month pursuant to \$ 141.21 (b) or (c) except that, at the State's discretion, systems required to take 10 or fewer samples per month may be authorized to exclude one positive routine sample resulting in one or more positive tubes per month from the monthly calculation if: (A) as approved on a case-by-case basis the State determines and indicates in writing to the public water system that no unreasonable risk to health existed under the conditions of this modification. This determination should be based upon a number of factors not limited to the following: (1) the system provided and had maintained an active disinfectant residual in the distribution system. (2) the potential for contamination as indicated by a sanitary survey, and (3) the history of the water quality at the public water system (e.g. MCL or monitoring violations); (B) the supplier initiates a check sample on each of two consecutive days from the sampling point within 24 hours after notification that the routine sample is positive, and each of these check samples is negative; and (C) the original positive routine sample is reported and recorded by the supplier pursuant to § 141.31(a) and § 141.33(a). The supplier shall report to the State its compliance with the conditions specified in this paragraph and report the action taken to resolve the prior positive sample result. If a positive routine sample is not used for the monthly calculation, another routine sample must be analyzed for compliance purposes. This provision may be used only once during two consecutive compliance periods.

(ii) three or more portions in more than one sample when less than 20 samples are examined per month; or

(iii) three or more portions in more than five percent of the samples when 20 or more samples are examined per month.

(2) When the fermentation tube

#### L-11

#### [Sec 141.14(b)(2)]

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### PUD shed by THE BUREAU OF NATIONAL AFFAIRS, INC. WASHINGTON D.C. 20037

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Friday November 28, 1980

## Part V

# Environmental Protection Agency

Water Quality Criteria Documents; Availability



#### ENVIRONMENTAL PROTECTION AGENCY

[FRL 1623-3]

Water Quality Criteria Documents; Availability

**AGENCY: Environmental Protection** Agency.

ACTION: Notice of Water Quality Criteria Documents.

SUMMARY: EPA announces the availability and provides summaries of water quality criteria documents for 64 toxic pollutants or pollutant categories. These criteria are published pursuant to section 304(a)(1) of the Clean Water Act.

AVAILABILITY OF DOCUMENTS: Summaries of both aquatic-based and health-based criteria from the documents are published below. Copies of the complete documents for individual pollutants may be obtained from the National Technical Information Service (NTIS), 5285 Port Royal Road. Springfield, VA 22161. (703-487-4650). A list of the NTIS publication order numbers for all 64 criteria documents is published below. These documents are also available for public inspection and copying during normal business hours at Public Information Reference Unit. U.S. Environmental Protection Agency. Room 2404 (rear), 401 M St., S.W., Washington, D.C. 20460. As provided in 40 CFR Part 2, a reasonable fee may be charged for copying services. Copies of inese documents are also available for review in the EPA Regional Office libraries.

L'Copieror the documenta are not valiable from the EVA office Heldel

below. kequests sent to that office will be forwarded to NTIS or returned to the sender.

- 1. Acenaphthene, PB81-117269.
- 2. Acrolein. PB81-117277.
- 3. Acrylonitrile, PB81-117285.
- 4. Aldrin/Dieldrin, PE81-117301.
- 5. Antimony, PB81-117319.
- 6. Arsenic. PB81-117327.
- 7. Asbestos, PB81-117335.
- 8. Benzene, PB81-117293.
- 9. Benziaine, PB81-117343.
- 10. Beryllium, PB81-117350.
- 11. Cadmium. PB81-117368.

12. Carbon Tetrachloride, PB81-117376

13. Chlordane, PB81-117384.

14. Chlorinated benzenes, PB81-

- 117392
  - 15. Chlorinated ethanes. PB81-117400.
  - 16. Chloroalkyl ethers, PB81-117413. 17. Chlorinated naphthalene, PB81-
- (17426
- 18. Chlorinated phenois, PB81-117434.
- 19. Chloroform, PE81-117442.
- 20. 2-chiorophenol. PB81-117459.

21. Chromium. PB81-117467. 22. Copper. PB81-117475. 23. Cyanides. PB81-117483.

- 24. DDT, PB81-117491.
- 25. Dichlorobenzenes, PB81-117509.
- 26. Dichlorobenzidine, PB81-117517.
- 27. Dichloroethylenes, PB81-117525.
- 28. 2.4-dichlorophenol, PB81-117533.
- 29. Dichloropropanes/propenes, PB81-
- 117541.
  - 30. 2,4-dimethylphenol, PB81-117358.
  - 31. Dinitrotoluene, PB81-117566.
  - 32. Diphenylhydrazine, PB81-117731.
  - 33. Endosulfan, PB81-117574.
  - 34. Endrin, PB81-117382.
  - 35. Ethylbenzene, PB81-117590.
  - 36. Fluoranthene, PB81-117608.
  - 37. Haloethers, PB81-117616.
  - 38. Helomethanes, PB81-117624.
  - 39. Heptachlor, PB81-117832
  - 40. Hexachlorobutadiene, PB81-
- 117640
- 41. Hexachlorocyclohexane, PB81-117657.
- 42. Hexachlorocyclopentadiene, PB81-117665.
- 43. Isophorone. PB81-117673.
- 44. Lead. PB81-117681.
- 45. Mercury, PB81-117699.
- 46. Naphthalene, PB81-117707.
- 47. Nickel, PB81-117715.
- 48. Nitrobenzene, PB81-117723.
- 49. Nitrophenols, PB81-117749. 50. Nitrosamines. PB81-117756.
- 51. Pentachlorophenol. PB81-117764.
- 52. Phenol. PB81-117772.
- 53. Phthalate esters. PB81-117780.
- 54. Polychlorinated biphenyls (PCBs),
- PB81-117798.
- 55. Polynuclear aromatic
- hydrocarbons. PB81-1178C6.
  - 56. Selenium, PB81-117814.
  - 57. Silver. PB81-117822.
  - 58. Tetrachloroethylene. PB81-117830.
  - 59. Thallium, PB81-117848.
  - 60. Toluene. PB81-117855.

  - 62. Trichloroethylene. PB81-117871.
  - 63. Vinyl chloride, PB81-117889.
  - 64. Zinc. PB81-117897.

FOR FURTHER INFORMATION CONTACT: Dr. Frank Gostomski. Criteria and Standards Division (WH-585), United States Environmental Protection

SUPPLEMENTARY INFORMATION:

#### Background

Pursuant to section 304(a)(1) of the Clean Water Act, 33 U.S.C. 1314(a)(1), EPA is required to periodically review and publish criteria for water quality accurately reflecting the latest scientific knowledge:

(A) on the kind and extent of all identifiable effects on health and welfare including, but not limited to, plankton, fish,

shellfish, wildlife, plant life, shorelines beaches, esthetics, and recreation which may be expected from the presence of pollutants in any body of water. including groundwater. (B) on the concentration and dispersal of pollutants, or their byproducts, through piological, physical, and chemical processes. and (C) on the effects of pollutants on biological community diversity. productivity. and stability, including information on the factors affecting rates of eutrophication and rates of organic and inorganic sedimentation for varying types of receiving waters.

EPA is today announcing the availability of criteria documents for 64 of the 65 pollutants designated as toxic under section 307(a)(1) of the Act. The document on TCDD (Dioxin) will be published within the next month after review of recent studies. Criteria for the section 307(a)(1) toxic pollutants being published today will replace the criteria for those same pollutants found in the EPA publication. Quality Criteria for Water. (the "Red Book.") Criteria for all other pollutants and water constituents found in the "Red Book" remain valid. The criteria published today have been derived using revised methodologies for determining pollutant concentrations that will, when not exceeded. reasonably protect human health and aquatic life. Draft criteria documents were made available for public comment (44 FR 15928, March 15, 1979, 44 FR 43660, July 25, 1979, 44 FR 56628. October 1, 1979). These final criteria have been derived after consideration of all comments received.

These criteria documents are also issued in satisfaction of the Settlement Agreement in Natural Resources Defense Council. et al. v. Train. 8 E.R.C. 2120 (1976), modified, 12 E.R.C. 1833 (D.D.C. 1979). Pursuant to paragraph 11 of that agreement, EPA is required to publish criteria documents for the 65 pollutants which Congress, in the 1977 amendments to the Act. designated as toxic under section 307(a)(1). These documents contain recommended maximum permissible pollutant concentrations consistent with the protection of aquatic organisms, human health, and some recreational activities. Although paragraph 11 imposes certain 

#### The Development of Water Quality Criteria

Section 304(a)(1) criteria contain two essential types of information: (1) discussions of available scientific data on the effects of pollutants on public health and welfare, aquatic life and recreation, and (2) quantitative concentrations or qualitative assessments of the pollutants in water which will generally ensure water

- 61. Toxaphene, PB81-117863.

quality adequate to support a specified water use: Under section 304(a)(1), these criteria are based solely on data and scientific judgments on the relationship between pollutant concentrations and environmental and human health effects. Criteria values do not reflect considerations of economic or technological feasibility.

Publication of water quality criteria of this type has been an ongoing process which EPA, and its predecessor Agency. the Federal-Water Pollution Control Administration, have been engaged in since 1968. At that time the first Federal compilation of water quality criteria, the so-called "Green Book" (Water Ouality Criteria), was published. As now, these criteria contained both narrative discussions of the environmental effects of pollutants on a range of possible uses and concentrations of pollutants necessary to support these uses. Since that time, water quality criteria have been revised and expanded with publication of the "Blue Book" (Water Quality Criteria 1972) in 1973 and the "Red Book" (Quality Criteria for Water) in 1976.

Since publication of the Red Book there have been substantial changes in EPA's approach to assessing scientific data and deriving section 304(a)[1] criteria. Previous criteria were derived from a limited data base. For many pollutants, an aquatic life criterion was derived by multiplying the lowest concentration known to have acute lethal effect on half of a test group of an aquatic species (the LC50 value) by an application factor in order to protect against chronic effects. If data showed a substance to be bioaccumulative or to have other significant long-term effects, a factor was used to reduce the indicated concentrations to a level presumed to be protective. Criteria for the protection of human health were similarly derived by considering the pollutants' acute, chronic, and bioaccumulative effects on non-human mammals and humans.

Although a continuation of the process of criteria development, the criteria published today were derived using revised methodologies (Guidelines) for calculating the impact of pollutants on human health and aquatic organisms. These Guidelines consist of systematic methods for assessing valid and appropriate data concerning acute and chronic adverse effects of pollutants on aquatic organisms, non-human mammals, and humans. By use of these data in prescribed ways, criteria are formulated to protect aquatic life and human health from exposure to the pollutants. For

some pollutants, bioconcentration properties are used to formulate criteria protective of aquatic life uses. For almost all of the pollutants. bioconcentration properties are used to assess the relative extent of human exposure to the pollutant either directly through ingestion of water or indirectly through consumption of aquatic organisms. Human health criteria for carcinogens are presented as incremental risks to man associated with specific concentrations of the pollutant in ambient water. The Guidelines used to derive criteria protective of aquatic life and human health are fully described in appendices B and C. respectively, of this Notice.

The Agency believes that these Guidelines provide criteria which more accurately reflect the effects of these pollutants on human health and on aquatic organisms and their uses. They are based on a more rational and consistent approach for using scientific data. These Guidelines were developed by EPA scientists in consultation with scientists from outside the Agency and they have been subjected to intensive public comment.

Neither the Guidelines nor the criteria are considered inflexible doctrine. Even at this time. EPA is taking action to employ the resources of peer review groups, including the Science Advisory Board, to evaluate recently published data, and EPA is conducting its own evaluation of new data to determine whether revisions to the criteria documents would be warranted.

The criteria published today are based solely on the effect of a single pollutant. However, pollutants in combination may have different effects because of synergistic, additive, or antagonistic properties. It is impossible in these documents to quantify the combined effects of these pollutants, and persons using criteria should be aware that site-specific analysis of actual combinations of pollutants may be necessary to give more precise indications of the actual environmental impacts of a discharge.

#### Relationship of the Section 304(a)(1) Criteria to Regulatory Programs

Section 304(a)(1) criteria are not rules and they have no regulatory inpact. Rather, these criteria present scientific data and guidance on the environmental effect of pollutants which can be useful to derive regulatory requirements based on considerations of water quality impacts. Under the Clean Water Act, these regulatory requirements may include the promulgation of water quality-based effluent limitations under section 302, water quality standards under section 303. or toxic pollutant effluent standards under section 207. States are encouraged to begin to modify or, if necessary, develop new programs necessary to support the implementation of regulatory controlfor toxic pollutants. As appropriate. States may incorporate criteria for to pollutants, based on this guidance, in their water quality standards.

Section 304(a)[1) criteria have been most closely associated with the development of State water quality standards, and the "Red Book" value have, in the past, been the basis for EPA's assessments of the adequacy of State requirements. However, EPA is now completing a major review of its water quality standards policies and regulations. After consideration of comments received on an Advance Notice of Proposed Rulemaking (43 F 29588. July 10, 1978) and the draft criteria documents, the Agency intends to propose, by the end of this year, a revised water quality standards regulation which will clarify the Agency's position on a number of significant standards issues.

With the publication of these criter however, it is appropriate to discuss EPA's current thinking on standards issues relating to their use. This discussion does not establish new regulatory requirements and is intencaas guidance on the possible uses of these criteria and an indication of future rulemaking the Agency may undertak No substantive requirements will be established without further opportunity for public comment.

#### Water Quality Standards

Section 303 of the Clean Water Act provides that water quality standards be developed for all surface waters. A water quality standard consists basically of two parts: (1) A "designated use" for which the water body is to be protected (such as "agricultural." 'recreation" or "fish and wildlife"), a (2) "criteria" which are numerical pollutant concentration limits or narrative statements necessary to preserve or achieve the designated us A water quality standard is developed through State or Federal rulemaking proceedings and must be translated r enforceable effluent limitations in a point source (NPDES) permit or may form the basis of best management practices applicable to nonpoint sourunder section 208 of the Act.

#### Relationship of Section 304(a)(1) Criteria to the Criteria Component of State Water Quality Standards:

In the ANPRM. EPA announced a policy of "presumptive applicability" for

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section 304(a)(1) criteria codified in the "Red Book." Presumptive applicability meant that a State had to adopt a criterion for a particular water quality parameter at least as stringent as the recommendation in the Red Book unless the State was able to justify a less stringent criterion based on: natural background conditions, more recent scientific evidence, or local, site-specific information. EPA is rescinding the policy of presumptive applicability because it has proven to be too inflexible in actual practice.

Although the section 304(a)(1) criteria represent a reasonable estimate of pollutant concentrations consistent with the maintenance of designated water uses. States may appropriately modify these values to reflect local conditions. In certain circumstances, the criteria may not accurately reflect the toxicity of a pollutant because of the effect of local water quality characteristics or varying sensitivities of local populations. For, example, in some cases, ecosystem adaptation may enable a viable. balanced aquatic population to exist in waters with high natural background levels of certain pollutants. Similarly, certain compounds may be more or less toxic in some waters because of differences in alkalinity, temperature. hardness, and other factors.

Methods for adjusting the section 304(a)(1) criteria to reflect these local differences are discussed below.

#### Relationship of Section 304(a)(1) Criteria to Designated Water Uses:

The criteria published today can be used to support the designated uses which are generally found in State standards. The following section discusses the relationship between the criteria and individual use classifications. Where a water body is designated for more than one use, criteria necessary to protect the most sensitive use should be applied.

1. Recreation: Recreational uses of water include such activities as swimming, wading, boating and fishing. Although insufficient data exist on the effects of toxic pollutants resulting from exposure through such primary contact as swimming, section 304(a)(1) criteria based on human health effects may be used to support this designated use where fishing is included in the State definition of "recreation." In this situation only the portion of the criterion based on lish consumption should be used.

2. Protection and Propagation of Fish and Other Aquatic Life: The section 304(a), 1) criteria based on toxicity to acuatic life may be used directly to support this designated use 3. Agricultural and Industrial Uses: The section 304(a)(1) criteria were not specifically developed to reflect the impact of pollutants on agricultural and industrial uses. However, the criteria developed for human health and aquatic life are sufficiently stringent to protect these other uses. States may establish criteria specifically designed to protect these uses.

4. Public Water Supply: The drinking water exposure component of the human health effects criteria can apply directly to this use classification or may be appropriately modified depending upon whether the specific water supply system falls within the auspices of the Safe Drinking Water Act's (SDWA) regulatory control, and the type and level of treatment imposed upon the supply before delivery to the consumer. The SDWA controls the presence of toxic pollutants in finished ("end-oftap") drinking water. A brief description of relevant sections of this Act is necessary to explain how the SDWA will work in conjunction with section 304(a)(1) criteria in protecting human health from the effects of toxics due to consumption of water.

Pursuant to section 1412 of the SDWA. EPA has promulgated "National Interim Primary Drinking Water Standards" for certain organic and inorganic substances. These standards establish 'maximum contaminant levels' ("MCLs") which specify the maximum permissible level of a contaminant in water which may be delivered to a user of a public water system now defined as serving a minimum of 25 people. MCLs are established based on consideration of a range of factors including not only the health effects of the contaminants but also technological and economic feasibility of the contaminants' removal from the supply. EPA is required to establish revised primary drinking water regulations based on the effects of a contaminant on human health, and include treatment capability, monitoring availability, and costs. Under Section 1401(1)(D)(i) of the SDWA. EPA is also allowed to establish the minimum quality criteria for water which may be taken into a public water supply system.

Section 304(a)(1) criteria provide estimates of pollutant concentrations protective of human health, but do not consider treatment technology, costs and other feasibility factors. The section 304(a)(1) criteria also include fish bioaccumulation and consumption factors in addition to direct humar drinking water intake. These numbers were not developed to serve as "end of tap" drinking water standards, and they have no requisitory significance uncer-

the SDWA. Drinking water standards are established based on considerations. including technological and economic feasibility, not relevant to section 304(a)(1) criteria. Section 304(a)(1) criteria may be analogous to the recommended maximum contaminant levels (RMCLs) under section 1412(b)(1)(B) of the SDWA in which. based upon a report from the National Academy of Sciences, the Administrator should set target levels for contaminants in drinking water at which "no known or anticipated adverse effects occur and which allows an adequate margin of safety". RMCLs do not take treatment. cost and other feasibility factors into consideration. Section 304(a)(1) criteria are, in concept, related to the healthbased goals specified in the RMCLs. Specific mandates of the SDWA such as the consideration of multi-media exposure, as well as different methods for setting maximum contaminant levels under the two Acts. may result in differences between the two numbers.

MCLs of the SDWA, where they exist, control toxic chemicals in finished drinking water. However, because of variations in treatment and the fact that only a relatively small number of MCLs have been developed, ambient water criteria may be used by the States as a supplement to SDWA regulations. States will have the option of applying MCLs. section 304(a)(1) human health effects criteria. modified section 304(a)(1) criteria or controls more stringent than these three to protect against the effects of toxic pollutants by ingestion from drinking water.

For untreated drinking water supplies. States may control toxics in the ambient water through either use of MCLs (if they exist for the pollutants of concern), section 304(a)(1) human health effects criteria, or a more strigent contaminant level than the former two options.

Frontreated drinking water supplies serving less than 25 people. States may choose toxics control through application of MCLs (if they exist for the poilutants of concern and are attainable by the type of treatment) in the finished drinking water. States also have the options to control toxics in the ambient water by choosing section 304(a)(1.) criteria, adjusted section 304(a)(1) criteria resulting from the reduction of the direct drinking water exposure component in the criteria calculation to the extent that the treatment procedure reduces the level of pollutants, or a more stringent contaminant level than the former three options.

For treated drinking water supplies serving 25 people or greater. States musr control toxics down to levels at least as stringent as MCLs (where they exist for

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the pollutants of concern) in the finished drinking water. However, States also have the options to control toxics in the ambient water by choosing section 304(a)[1] criteria, adjusted section 304(a)[1] criteria resulting from the reduction of the direct drinking water exposure component in the criteria calculation to the extent that the treatment process reducers the level of pollutants, or a more stringent contaminant level than the former three options.

#### Inclusion of Specific Pollutants in State Standards:

To date. EPA has not required that a State address any specific pollutant in its stendards. Although all States have established standards for most conventional pollutants, the treatment of texic pollutants has been much less extensive. In the ANPRM, EPA suggested a policy under which States would be required to address a set of pollutants and incorporate specific toxic pollutant criteria into water quality standards. If the State failed to incorporate these criteria. EPA would promuigate the standards based upon these criteria pursuant to section 303(c)(4)(B).

In the forthcoming proposed revision to the water quality standard regulations, a significant change in policy will be proposed relating to the incorporation of certain pollutants in State water quality standards. This proposal will differ from the proposal made in the ANPRM. The ANPRM proposed an EPA-published list of pollutents for which States would have had to develop water quality standards. This list might have contained some for all) of the 65 toxic pollutants. However, the revised water quality standards regulation will propose a process by which EPA will assist States in identifying specific toxic pollutants required for assessment for possible inclusion in State water quality standards. For these pollutants. States will have the option of adepting the published criteria or of adjusting those criteria based on site-specific enalysis.

These pollutants would generally represent the greatest threat to sustaining a healthy, balanced ecosystem in water bodies or to human health due to exposure directly or

Indirectly from water. EPA is currently developing a process to determine which pollutants a State must assess for, possible inclusion in its water quality standards. Relevant factors might include the toxicity of the pollutant, the frequency and concentration of its discharge, its geographical distribution, the breadth of data underlying the scientific assessment of its aquatic life and human health effects. and the technological and economic capacity to control the discharge of the pollutant. For some of the pollutants, all States may be required to assess them for possible inclusion in their standards. For others, assessment would be restricted to States or limited to specific water bodies where the pollutants pose a particular site-specific problem.

#### Criteria Modification Process

Flexibility is available in the application of these and any other valid water quality criteria to regulatory programs. Although in some cases they may be used by the States as developed. the criteria may be modified to refect local environmental conditions and human exposure patterns before incorporation into programs such as water quality standards. If significant impacts of site-specific water quality conditions in the toxicities of pollutants can be demonstrated or significantly different exposure patterns of these pollutants to humans can be shown, section 304(a)(1) criteria may be modified to reflect these local conditions. The term "local" may refer to any appropriate geographic area where common aquatic environmental conditions or exposure patterns exist. Thus. "local" may signify a Statewide. regional, river teach, or entire river basin area. On the other hand, the criteria of some pollutants might be applicable nationwide without the need for adaptation to reflect local conditions. The degree of toxicity toward aquatic organisms and humans. characteristic of these pollutants would not change significantly due to local water quality conditions.

EPA is examining a series of environmental factors or water quality parameters which might realistically be expected to affect the laboratoryderived water quality onterion recommendation for a specific pollutant. Factors such as hardness. pH. suspended solids, types of aquatic organisms present, etc. could impact on the chemical's effect in the aquatic environment. Therefore, local information can be assembled and analyzed to adjust the oriterion recommendation if necessary.

The Gudelines for deriving critera for the protection of aquatic life suggest several approaches for modifying the criteria. First toxicity data, both acute and chronic, for local species could be substituted for some or all of the species used in deriving criteria for the water quality standard. The minimum data requirements should still be fulfilled in calculating a revised criterion. Second. criteria may be specifically tailored to a local water body by use of data from toxicity tests performed with that ambient water. A procedure such as this would account for local environmental conditions in formulating a criterion relevant to the local water body. Third, site-specific water quality characteristics resulting in either enhancement or mitigation of aquatic life toxicity for the pollutant could be factored into final formulation of the criterion. Finally, the criteria may be made more stringent to ensure protection of an individual species not otherwise adequately protected by any of the three modification procedures previously mentioned.

EPA does not intend to have States assess every local stream segment and lake in the country on an individual basis before determining if an adjustment is necessary. Rather, it is envisioned that water bodies having similar hydrological, chemical, physical, and biological properties will be grouped for the purpose of criteria adjustment. The purpose of this effort is to assist States in adapting the section 304(a) criteria to local conditions when needed, thereby precluding the setting arbitrary and perhaps unnecessarily stringent or underprotective criteria in a water body. In all cases. EPA will still be required, pursuant to section 303(c). to determine whether the State water quality standards are consistent with the goals of the Act, including a determination of whether Stateestablished criteria are adequate to support a designated use.

#### Criteria for the Protection of Aquatic Life

#### Interpretation of the Criteria

The aquatic life criteria issued today are summarized in Appendix A of this Federal Register notice. Criteria have been formulated by applying a set of Guidelines to a data base for each pollutant. The criteria for the projection of aquatic life specify pollutant concentrations which, if not exceeded. should protect most, but not necessar: all, aquatic life and its uses. The Guidelines specify that criteria should be based on an array of data from organisms, both plant and anima: occupying various trophic levels. Base on these data, criteria can be derived which should be adequate to protect the types of organisms necessary to support an equatic community

The Guidelines are not designed in derive criteina which will protect all life stages of all species under all conditions. Generally some life stage cone or more tested species, and 79322

probably some untested species, will have sensitivities below the maximum value or the 24-hour average under some conditions and would be adversely affected if the highest allowable pollutant concentrations and the worst conditions existed for a long time. In actual practice, such a situation is not likely to occur and thus the aquatic community as a whole will normally be protected if the criteria are not exceeded. In any aquatic community there is a wide range of individual species sensitivities to the effects of toxic pollutants. A criterion adequate to protect the most susceptible life stage of the most sensitive species would in many cases be more stringent than necessary to protect the overall aquatic community.

The aquatic life criteria specify both maximum and 24-hour average values. The combination of the two values is designed to provide adequate protection of aquatic life and its uses from acute and chronic toxicity and bioconcentration without being as restrictive as a one-number criterion would have to be to provide the same amount of protection. A time period of 24 hours was chosen in order to ensure that concentrations not reach harmful levels for unacceptably long periods. Averaging for longer periods, such as a week or a month for example. could permit high concentrations to persist long enough to produce significant adverse effects. A 24-hour period was chosen instead of a slightly longer or shorter period in recognition of daily fluctuations in waste discharges and of the influence of daily cycles of sunlight and darkness and temperature on both poilutants and aquatic organisms.

The maximum value, which is derived from acute toxicity data, prevents significant risk of adverse impact to organisms exposed to concentrations. above the 24-hour average. Merely specifying the average value over a specified time period is insufficient because concentrations of chemicals higher than the average value can kill or cause irreparable damage in short periods. Furthermore, for some chemicals the effect of intermittent high exposures is cumulative. It is therefore necessary to place an upper limit on pollutant concentrations to which aquatic organisms might be exposed. The two-number criterion is intended to describe the highest average ambient water concentration which will produce a water quality generally suited to the maintenance of aquatic life while restricting the extent and duration of the exclusions over that average to levels

which will not cause harm. The only

way to assure the same degree of protection with a one-number criterion would be to use the 24-hour average as a concentration that is not to be exceeded at any time in any place.

Since some substances may be more toxic in freshwater than in saltwater, or vice versa, provision is made for deriving separate water quality criteria for freshwater and for saltwater for each substance. However, for some substances sufficient data may not be available to derive one or both of these criteria using the Guidelines.

Specific aquatic life criteria have not been developed for all of the 65 toxic pollutants. In those cases where there were insufficient data to allow the derivation of a criterion. narrative descriptions of apparent threshold levels for acute and/or chronic effects based on the available data are presented. These descriptions are intended to convey a sense of the degree of toxicity of the pollutant in the absence of a criterion recommendation.

#### Summary of the Aquatic Life Guidelines

The Guidelines for Deriving Water Quality Criteria for the Protection of Aquatic Life and its Uses were developed to describe an objective. internally consistent, and appropriate way of ensuring that water quality criteria for aquatic life would provide. on the average, a reasonable amount of protection without an unreasonable amount of overprotection or underprotection. The resulting criteria are not intended to provide 100 percent protection of all species and all uses of aquatic life all of the time, but they are intended to protect most species in a balanced, healthy aquatic community. The Guidelines are published as Appendix B of this Notice. Responses to public comments on these Guidelines are attached as Appendix D.

Minimum data requirements are identified in four areas: acute toxicity to animals (eight data points), chronic toxicity to animals (three data points), toxicity to plants, and residues. Guidance is also given for discarding poor quality data.

Data on acute toxicity are needed for a vanety of fish and invertebrate species and are used to derive a Final Acute Value. By taking into account the number and relative sensitivities of the tested species, the Final Acute Value is designed to protect most, but not necessarily all, of the tested and untested species.

Data on chronic toxicity to animals can be used to derive a Final Chronic Value by two different means. If chronic values are available for a specified number and array of species, a final chronic value can be calculated directly. If not, an acute-chronic ratio is derived and then used with the Final Acute Value to obtain the Final Chronic Value.

The Final Plant Value is obtained by selecting the lowest plant toxicity value based on measured concentrations.

The Final Residue Value is intended to protect wildlife which consume aquatic organisms and the marketability of aquatic organisms. Protection of the marketability of aquatic organisms is, in actuality, protection of a use of that water body ("commercial fishery"). Two kinds of data are necessary to calculate the Final Residue Value: a bioconcentration factor (BCF) and a maximum permissible tissue concentration, which can be an FDA action level or can be the result of a chronic wildlife feeding study. For lipid soluble pollutants, the BCF is normalized for percent lipids and then the Final Residue Value is calculated by dividing the maximum permissible tissue concentration by the normalized BCF and by an appropriate percent lipid value. BCFs are normalized for percent lipids since the BCF measured for any individual aquatic species is generally proportional to the percent lipids in that species.

if sufficient data are available to demonstrate that one or more of the final values should be related to a water quality characteristic, such as salinity, hardness, or suspended solids, the final value(s) are expressed as a function of that characteristic.

After the four final values (Finai Acute Value, Final Chronic Value, Final Plant Value, and Final Residue Value; have been obtained, the criterion is established with the Final Acute Value becoming the maximum value and the lowest of the other three values becoming the 24-hour average value. All of the data used to calculate the four final values and any additional pertinent information are then reviewed to determine if the onterion is reasonable If sound scientific evidence indicates that the criterion should be raised or lowered, appropriate changes are made as necessarv

The present Guidelines have been revised from the earlier published versions (43 FR 21506, May 18, 1978; 43 FR 20028, July 5, 1978; 44 FR 15926, March 13, 1979). Details have been added in many places and the concept of a minimum data base has been incorporated. In addition, three adjustment factors and the species sensitivity factor have been deleted These modifications were the result of the Agency's analysis of public comments and comments received from the Science Advisory Board on earlier

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versions of the Guidelines. These comments and the Resultant modifications are addressed fully in Appendix D to this notice.

#### Criteris for the Protection of Human Health

#### Interpretation of the Human Health Criteria

The human health criteria issued today are summarized in Appendix A of this Federal Register notice. Criteria for the protection of human health are presented for 62 of the 65 pollutants based on their carcinogenic, toxic, or organoleptic (taste and odor) properties. The meanings and practical uses of the criteria values are distinctly different depending on the properties on which they are based.

The objective of the health assessment portions of the criteria documents is to estimate ambient water concentrations which, in the case of non-carcinogens, prevent adverse health effects in humans, and in the case of suspect or proven carcinogens, represent various levels of incremental cancer risk.

Health assessments typically contain discussions of four elements: Exposure, pharmacokinetics, toxic effects, and criterion formulation.

The exposure section summarizes information on exposure routes: ingestion directly from water, indirectly from consumption of aquatic organisms found in ambient water, other dietary sources, inhalation, and dermal contact. Exposure assumptions are used to derive human health criteria. Most criteria are based solely on exposure from consumption of water containing a specified concentration of a toxic pollutant and through consumption of equatic organisms which are assumed to have bioconcentrated pollutants from the water in which they live. Other multimedia routes of exposure such as air, non-aquatic diet, or dermal are not factored into the criterion formulation for the vast majority of pollutants due to lack of data. The criteria are calculated using the combined aquatic exposure pathway and also using the aquatic organism ingestion exposure route alone. In criteria reflecting both the water consumption and aquatic organism ingestion routes of exposure, the relative exposure contribution varies with the propensity of a pollutant to bioconcentrate, with the consumption of aquatic organisms becoming more important as the bioconcentration factor (BCF) increases. As additional information on total exposure is assembled for pollutants for which criteria reflect only the two specified

aquatic exposure routes, adjustments in water concentration values may be made. The Agency intends to publish guidance which will permit the States to identify significantly different exposure patterns for their populations. If warranted by the demonstration of significantly different exposure patterns. this will become an element of a process to adapt/modify human health-based criteria to local conditions, somewhat analogous to the aquatic life criteria modification process discussed previously. It is anticipated that States at their discretion will be able to set appropriate human health criteria based on this process.

The pharmacokinetics section reviews data on absorption, distribution, metabolism, and excretion to assess the biochemical fate of the compounds in the human and animal system. The toxic effects section reviews data on acute. subacute, and chronic toxicity, synergistic and antagonistic effects, and specific information on mutagenicity. teratogenicity, and carcinogenicity. From this review, the taxic effect to be protected against is identified taking into account the quality, quantity, and weight of evidence characteristic of the data. The criterion formulation section reviews the highlights of the text and specifies a rationale for criterion development and the mathematical derivation of the criterion number.

Within the limitations of time and resources, current published information of significance was incorporated into the human health assessments. Review articles and reports were used for data evaluation and synthesis. Scientific judgment was exercised in reviewing and evaluating the data in each criteria document and in identifying the adverse effects for which protective criteria were published.

Specific health-based criteria are developed only if a weight of evidence supports the occurrence of the toxic effect and if dose/response data exist from which criteria can be estimated.

Criteria for suspect or proven carcinogens are presented as concentrations in water associated with a range of incremental cancer risks to man. Criteria for non-carcinogens represent levels at which exposure to a single chemical is not anticipated to produce adverse effects in man. In a few cases, organoleptic (taste and odor) data form the basis for the criterion. While this type of criterion does not represent a value which directly affects human health. It is presented as an estimate of the level of a pollutant that will not produce unpleasant taste or odor either directly from water consumption or indirectly by consumption of aquatic

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organisms found in ambient waters. criterion developed in this manner is judged to be as useful as other types or criteria in protecting designated water uses. In addition, where data are available, toxicity-based criteria are also presented for pollutants with derived organoleptic criteria. The choice of criteria used in water quality standards for these pollutants will depend upon the designated use to be protected. In the case of a multiple use water body, the criterion protecting " most sensitive use will be applied. Finally, for several pollutants no crite..... are recommended due to a lack of information sufficient for quantitativcriterion formulation.

#### **Risk Extrapolation**

Because methods do not now exist to establish the presence of a threshold carcinogenic effects. EPA's policy is there is no scientific basis for estimating "safe" levels for carcinogens. The criteria for carcinogens, therefore, sta that the recommended concentration maximum protection of human health is zero. In addition, the Agency has presented a range of concentrations corresponding to incremental cancer. risks of 10" to 10" (one additional case of cancer in populations ranging from ten million to 100.000. respectively). Other concentrations representing different risk levels may be calculate ... by use of the Guidelines. The risk estimate range is presented for information purposes and does not represent an Agency judgment on an 'acceptable'' risk level.

#### Summary of the Human Health Guidelines

The health assessments and corresponding criteria published today were derived based on Guidelines an Methodology Used in the Preparation Health Effect Assessment Chepiers of the Consent Decree Water Criteria Documents (the Guidelines, developt by EPA's Office of Reserch and Development. The estimation of health risks associated with human exposure to environmental pollutants requires predicting the effect of low doses for : to a lifetime in duration. A combination of epidemiological and animal drise/ response data is considered the preferred basis for quantitative criteri derivation. The complete Guidelines a. presented as Appendix C. Major issues associated with these Guidelines and responses to public comments are presented as Appendix E.

No-effect (non-cercinogen) or specified risk (carcinogen) concentrations were estimated by extrapolation from animal toxicity or

human epidemiology studies using the following basic exposure assumptions: a 70-kilogram male person (Report of the Task Group on Reference Man. International Commission for Radiation Protection, November 23, 1957) as the exposed individual: the average daily consumption of freshwater and estuarine fish and shellfish products equal to 6.5 grams/day; and the average ingestion of two liters/day of water (Drinking Water and Health, National Academy of Sciences, National Research Council, 1977). Criteria based on these assumptions are estimated to be protective of an adult male who experiences average exposure conditions.

Two basic methods were used to formulate health criteria, depending on whether the prominent adverse effect was cancer or other toxic manifestations. The following sections detail these methods.

#### Carcinogens

Extrapolation of cancer responses from high to low doses and subsequent risk estimation from animal data is performed using a linearized multi-stage model. This procedure is flexible enough to fit all monotonically-increasing dose response data, since it incorporates several adjustable parameters. The multi-stage model is a linear nonthreshold model as was the "one-hit" model originally used in the proposed criteria documents. The linearized multistage model and its characteristics are described fully in Appendix C. The linear non-threshold concept has been endorsed by the four agencies in the Interagency Regulatory Lisison Group and is less likely to underestimate risk at the low doses typical of environmental exposure than other models that could be used. Because of the uncertainties associated with dose response, animal-to-human extrapolation and other unknown factors, because of the use of average exposure assumptions, and because of the serious public health consequences that could result if risk were underestimated. EPA believes that it is prudent to use conservative methods to estimate risk in the water quality criteria program. The linearized multistage model is more systematic and invokes fewer arbitrary assumptions than the "one-hit" procedure previously used.

It should be noted that extrapolation models provide estimates of risk since a varitey of assumptions are built into any model. Models using widely different assumptions may produce estimates ranging over several orders of

meen filde. Since there is at presenting.

way to demonstrate the scientific validity of any model, the use of risk extrapolation models is a subject of debate in the scientific community. However, risk extrapolation is generally recognized as the only tool available at this time for estimating the magnitude of health hazards associated with nonthreshold toxicants and has been endorsed by numerous Federal agencies and scientific organizations, including EPA's Carcinogen Assessment Group, the National Academy of Sciences, and the Interagency Regulatory Liaison Group as a useful means of assessing the risks of exposure to various carcinogenic-pollutants.

#### Non-Carcinogens

Health criteria based on toxic effects of pollutants other than carcinogenicity are estimates of concentrations which are not expected to produce adverse effects in humans. They are based upon Acceptable Daily Intake (ADI) levels and are generally derived using noobserved-adverse-effect-level (NOAEL). data from animal studies although human data are used wherever available. The ADI is calculated using safety factors to account for uncertainties inherent in extrapolation from animal to man. In accordance with the National Research Council recommendations (Drinking Water and Health. National Academy of Sciences. National Research Council, 1977), safety factors of 10, 100, or 1,000 are used depending on the quality and quantity of data. In some instances extrapolations are made from inhalation studies or limits to approximate a human response from ingestion using the Stokinger-Woodward model (Journal of American Water Works Association, 1958). Calculations of criteria from ADIs are made using the standard exposure assumptions (2 liters of water, 8.5 grams of edible aquatic products, and an average body weight of 70 kg).

Dated: October 24, 1980. Douglas M. Costle, Administrator.

#### Appendix A—Summary of Water Quality Criteria

#### Acenaphthene

#### Freshwater Aquatic Life

The available data for acenaphthene indicate that acute toxicity to freshwater aquatic life occurs at concentrations as low as  $1.700 \ \mu g/l$  and would occur at lower concentrations among species that are more sensitive than those tested. No data are available concerning the chronic toxicity of acenaphthene to sensitive freshwater aquatic animals but

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toxicity to freshwater algae occur at concentrations as low as  $520 \ \mu g/L$ 

#### Saltwater Aquatic Life

The available data for acenaphthene indicate that acute and chronic toxicity to saltwater aquatic life occur at concentrations as low as 970 and 710  $\mu$ g/l, respectively, and would occur at lower concentrations among species that are more sensitive than those tested. Toxicity to algae occurs at concentrations as low as 500  $\mu$ g/l.

#### Human Health

Sufficient data is not available for acenaphthene to derive a level which would protect against the potential toxicity of this compound. Using available organoleptic data, for controlling undesirable taste and odor quality of ambient water, the estimated level is 20  $\mu$ g/l. It should be recognized that organoleptic data as a basis for establishing a water quality criteria have limitations and have no demonstrated relationship to potential adverse human health effects.

#### Acrolein

#### Freshwater Aquatic Life

The available data for acrolein indicate that acute and chronic toxicity to freshwater aquatic life occurs at concentrations as low as 68 and 21  $\mu$ g/l, respectively, and would occur at lower concentrations among species that are more sensitive than those tested.

#### Saltwater Aquatic Life

The available data for acrolem indicate that acute toxicity to saitwater aquatic life occurs at concentrations as low as 55  $\mu$ g/l and would occur at lower concentrations among species that are more sensitive than those tested. No data are available concerning the chronic toxicity of acrolein to sensitive saltwater aquatic life.

#### Human Health

For the protection of human health from the toxic properties of acroiein ingested through water and contaminated aquatic organisms, the ambient water criterion is determined to be 320 µg/l.

For the protection of human health from the toxic properties of acrolein ingested through contaminated aquatic organisms alone, the ambient water criterion is determined to be 730 µ2.1

#### Acrylonitrile

#### Freshwater Acuatic Life

The available data for activiting indicate that acute toxicity to freshwater aquatic 1 fe occurs at concentrations as low as 7.550 µg/l and would occur at lower concentrations among species that are more sensitive than those tested. No definitive data are available concerning the chronic toxicity of acrylonitrile to sensitive freshwater aquatic life but mortality occurs at concentrations as low as 2.600 µg/l with a fish species exposed for 30 days.

#### Saltwater Aquatic Life

Only one saltwater species has been tested with acrylonitrile and no statement can be made concerning acute or chronic toxicity.

#### Human Health

For the maximum protection of human health from the potential carcinogenic effects due to exposure of acrylonitrile through ingestion of contaminated water and contaminated aquatic organisms, the ambient water concentration should be zero based on the non-threshold assumption for this chemical. However, zero level may not be attainable at the present time. Therefore, the levels which may result in incremental increase of cancer risk over the lifetime are estimated at 10<sup>-4</sup>, 10<sup>-4</sup>, and 10<sup>-7</sup>. The corresponding criteria are .58 µg/l. .058  $\mu$ g/l and .006  $\mu$ g/l, respectively. If the above estimates are made for. consumption of aquatic organisms only. excluding consumption of water, the levels are 6.5 µg/l. .65 µg/L and .065 µg/ L respectively. Other concentrations representing different risk levels may be . calculated by use of the Guidelines. The risk estimate range is presented for information purposes and does not represent an Agency judgment on an "acceptable" risk level.

#### Aldrin-Dieldrin

Dieldria

#### Freshwater Aquatic Life

For dieldrin the criterion to protect fresh water aquatic life as derived using the Guidelines is 0.0019  $\mu$ g/l as a 24hour average and the concentration should not exceed 2.5  $\mu$ g/l at any time.

#### Soltwater Aquatic Life ...

For dieldrin the criterion to protect saltwater aquatic life as derived using the Guidelines is 0.0019  $\mu g/l$  as a 24hour average and the concentration should not exceed 0.71  $\mu g/l$  at any time.

#### Human Health

For the maximum protection of human health from the potential carcinogenic effects due to exposure of dieldrin through ingestion of contaminated water and contaminated aquatic organisms, the ambient water concentration should be zero based on the non-threshold

assumption for this chemical. However, zero level may not be attainable at the present time. Therefore, the levels which may result in incremental increase of cancer risk over the lifetime are estimated at 10"\*, 10"\*, and 10"'. The corresponding criteria are .71 ng/l. .071 ng/L and .0071 ng/L respectively. If the above estimates are made for consumption of aquatic organisms only, excluding consumption of water, the levels are .78 ng/l, .076 ng/l, and .0078 ng/l respectively. Other concentrations representing different risk levels may be calculated by use of the Guidelines. The risk estimate range is presented for information purposes and does not ... represent an Agency judgment on an "acceptable" risk level.

#### Aldrin

#### Freshwater Aquatic Life

For freshwater aquatic life the concentration of aldrin should not exceed 3.0  $\mu$ g/l at any time. No data are available concerning the chronic toxicity of aldrin to sensitive freshwater aquatic life.

#### Saltwater Aquatic Life

For saltwater equatic life the concentration of aldrin should not exceed 1.3  $\mu$ g/l at any time. No data are available concerning the chronic toxicity of aldrin to sensitive saltwater equatic life.

#### Human Health

For the maximum protection of human health from the potential carcinogenic effects due to exposure of aldrin through ingestion of contaminated water and contaminated aquatic organisms, the ambient water concentration should be zero based on the non-threshold assumption for this chemical. However, zero level may not be attainable at the present time. Therefore, the levels which may result in incremental increase of cancer risk over the lifetime are estimated at 10<sup>-1</sup>, 10<sup>-4</sup>, and 10<sup>-1</sup>. The corresponding criteria are .74 ng/1. .074 ng/1, and .0074 ng/1, respectively. If the above estimates are made for consumption of aquatic organisms only, excluding consumption of water, the levels are .79 ng/1. .079 ng/1. and .0079 ng/1, respectively. Other concentrations respresenting different risk levels may be calculated by use of the Guidelines. The risk estimate range is presented for information purposes and does not represent an Agency judgment on an \_ "acceptable" nsk level.

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#### Antimony

#### Freshwater Aquatic Life

The available data for antimony indicate that acute and chronic toxicit to freshwater aquatic life occur at concentrations as low as 9.000 and 1.6...  $\mu g/L$  respectively, and would occur at lower concentrations among species that are more sensitive than those tested. Toxicity to algae occurs at concentrations as low as 610  $\mu g/L$ 

#### Saltwater Aquatic Life

No saltwater organisms have been adequately tested with antimony, and no statement can be made concerning acute or chronic toxicity.

#### Human Health

For the protection of human health from the toxic properties of antimony ingested through water and contaminated aquatic organisms, the ambient water criterion is determined to be 146 µg/L

For the protection of human health from the toxic properties of antimony ingested through contaminated aquatic organisms alone, the ambient water criterion is determined to be 45,000  $\mu$ 

#### Arsenic

#### Freshwater Aquatic Life

For freshwater aquatic life the concentration of total recoverable trivalent inorganic arsenic should not exceed 440  $\mu$ g/l at any time. Short-teeffects on embryos and larvae of aquart vertebrate species have been shown occur at concentrations as low as 40  $\mu$ g/

#### Saltwater Aquatic Life

The available data for total recoverable trivalent inorganic arsenic indicate that acute toxicity to saltwa aquatic life occurs at concentrations low as 308 µg/l and would occur at lower concentrations among species that are more sensitive than those tested. No data are available concerthe chronic toxicity of trivalent inorganic arsenic to sensitive saltwater aquatic life.

#### Human Health

For the maximum protection of humar health from the potential carcinogen effects due to exposure of arsenic through ingestion of contanuaated will, and contaminated aquatic organisms, the ambient water concentration should be zero based on the non-threshold assumption for this chemical. Howe zero level may not be attamable at the present time. Therefore, the levels which may result in incremental increase c cancer risk over the lifetime are estimated at 10<sup>-4</sup>, 10<sup>-4</sup>, and 10<sup>-3</sup>. The corresponding criteria are 22 ng/l. 2.2 ng/L and .22 ng/L respectively. If the above estimates are made for consumption of aquatic organisms only, excluding consumption of water, the levels are 175 ng/l, 17.5 ng/l, and 1.75 ng/l. respectively. Other concentrations representing different risk levels may be calculated by use of the Guidelines. The risk estimate range is presented for information purposes and does not represent an Agency judgment on an "acceptable" risk level.

#### Asbestos

#### Freshwater Aquatic Life

No freshwater organisms have been tested with any asbestiform mineral and no statement can be made concerning acute or chronic toxicity. -----

#### Saltwater Aquatic Life

tested with any asbestiform mineral and no statement can be made concerning acute or chronic toxicity.

For the maximum protection of humanhealth from the potential carcinogenic effects due to exposure of asbestos through ingestion of contaminated water and contaminated aquatic organisms, the ambient water concentration should be zero based on the non-threshold assumption for this chemical. However, zero level may not be attainable at the present time. Therefore, the levels which may result in incremental increase of cancer risk over the lifetime are estimated at 10", 10", and 10". The corresponding criteria are 300,000 fibers/1.30.000 fibers/1, and 3.000 fibers/ 1, respectively. Other concentrations representing different risk levels may be calculated by use of the Guidelines. The risk estimate range is presented for information purposes and does not represent an Agency judgment on an "acceptable" risk leveL

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#### Freshwater Aquatic Life

The available data for benzene indicate that acute toxicity to freshwater aquatic life occurs at concentrations as low as 5.300  $\mu$ g/l and would occur at lower concentrations among species that are more sensitive than those tested. No data are available concerning the chronic toxicity of benzene to sensitive freshwater aquatic life.

#### Saltwater Aquatic Life

The available data for benzene indicate that acute toxicity to saltwater aquatic life occurs at concentrations as

low as 5.100  $\mu$ g/l and would occur at lower concentrations among species that are more sensitive than those tested. No definitive data are available concerning the chronic toxicity of benzene to sensitive saltwater aquatic life, but adverse effects occur at concentrations as low as 700 µg/I with a fish species exposed for 168 days. •••• :

#### Human Health

For the maximum protection of human health from the potential carcinogenic effects due to exposure of benzene through ingestion of contaminated water and contaminated aquatic organisms. the ambient water concentration should be zero based on the non-threshold assumption for this chemical. However, zero level may not be attainable at the present time. Therefore, the levels which may result in incremental increase of cancer risk over the lifetime are estimated at 10", 10", and 10". The corresponding criteria are 6.6 µg/l, .66  $\mu g/L$  and .066  $\mu g/L$  respectively. If the above estimates are made for consumption of aquatic organisms only, excluding consumption of water, the levels are 400  $\mu$ g/l. 40.0  $\mu$ g/l. and 4.0  $\mu$ g/l L respectively. Other concentrations representing different risk levels may be calculated by use of the Guidelines. The risk estimate range is-presented for information purposes and does.not represent an Agency judgment on an acceptable" risk level.

#### Benzidine

#### Freshwater Aquâtic Life

The available data for benzidine indicate that acute toxicity to freshwater aquatic life occurs at concentrations as' low as 2.500  $\mu$ g/l and would occur at lower concentrations among species. that are more sensitive than those tested. No data are available concerning the chronic toxicity of benzidine to sensitive freshwater aquatic life.

#### Saltwater Aquatic Life

No saltwater organisms have been tested with benzidine and no statement can be made concerning acute and chronic toxicity. 1.5

#### Human Health

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For the maximum protection of human health from the potential carcinogenic effects due to exposure of benzidine through ingestion of contaminated water and conteminated aquatic organisms. the ambient water concentration should be zero based on the non-threshold assumption for this chemical. However, zero level may not be attainable at the present time. Therefore, the levels which may result in incremental increase of 1.-21

cancer risk over the lifetime are estimated at 10", 10", and 10". The corresponding criteria are 1.2 ng/1. .12 ng/1, and .01 ng/1; respectively. If the above estimates are made for consumption of aquatic organisms only. excluding consumption of water, the levels are 5.3 ng/1, .53 ng/1, and .05 ng/ 1. respectively. Other concentrations representing different risk levels may be calculated by use of the Guidelines. The risk estimate range is presented for information purposes and does not represent an Agency judgment on an "acceptable" risk level.

#### Beryllium

#### Freshwater Aquatic Life

The available data for beryllium indicate that acute and chronic toxicity to freshwater aquatic life occurs at concentrations as low as 130 and 5.3  $\mu g/$ I, respectively, and would occur at lower concentrations among species that are more sensitive than those tested. Hardness has a substantial effect on acute toxicity.

#### Salt water Aquatic Life

The limited saltwater data base available for beryllium does not permit any statement concerning acute or chronic toxicity.

#### Human Health

For the maximum protection of human health from the potential carcinogenic effects due to exposure of beryllium through ingestion of contaminated water and contaminated aquatic organisms. the ambient water concentration should be zero based on the non-threshold assumption for this chemical. However, zero level may not be attainable at the present time. Therefore, the levels which may result in incremental increase of cancer risk over the lifetime are estimated at 10<sup>-1</sup>, 10<sup>-1</sup>, and 10<sup>-1</sup>. The corresponding criteria are 37 ng/l. 3.7 ng/l, and .37 ng/L respectively. If the above estimates are made for consumption of aquatic organisms only. excluding consumption of water, the levels are 641 ng/l, 64.1 ng/l, and 6.41 ng/L respectively. Other concentrations representing different risk levels may be calculated by use of the Guidelines. The risk estimate range is presented for information purposes and does not represent an Agency judgment on an "acceptable" risk level.

#### Cadmium

#### Freshwater Aquatic Life

For total recoverable cadmium the criterion (in  $\mu g/l$ ) to protect freshwater aquatic life as derived using the Guidelines is the numerical value given

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No saltwater organisms have been -

#### Human Health

by et - a latare as a 24-hour average and the concentration (in  $\mu g/l$ ) should not exceed the numerical value given by e(1-20 Lin(Lardson)) - > 73 at any time. For example, a hardnesses of 50, 100, and 200 mg/l as CaCO, the criteria are 0.012, 0.025, and 0.051 µg/l. respectively, and the concentration of total recoverable cadmium should not exceed 1.5, 3.0 and 6.3 µg/L respectively, at any time.

#### Saltwater Aquatic Life

For total recoverable cadmium the criterion to protect saltwater aquatic life as derived using the Guidelines is 4.5  $\mu g/l$  as a 24-hour average and the concentration should not exceed 59 µg/1. at any time.

#### Human Health

The ambient water quality criterion for cadmium is recommended to be identical to the existing drinking water standard which is 10 µg/L Analysis of the toxic effects data resulted in a calculated level which is protective of human health against the ingestion of contaminated water and contaminated aquatic organisms. The calculated value is comparable to the present standard. For this reason a selective criterion based on exposure solely from consumption of 6.5 grams of aquatic organisms was not derived.

#### Carbon Tetrachloride

#### Freshwater Aquatic Life

The available date for carbon tetrachloride indicate that acute toxicity to freshwater aquatic life occurs at concentrations as low as 35,200 µg/l and would occur at lower concentrations among species that are more sensitive than those tested. No data are available concerning the chronic toxicity of carbon tetrachloride to sensitive freshwater aquatic life.

#### Saltwater Aquatic Life

The available data for carbon tetrachloride indicate that acute toxicity to saltwater aquatic life occurs at concentrations as low as 50,000  $\mu$ g/l and would occur at lower concentrations among species that are more sensitive that those tested. No data are available concerning the chronic toxicity of carbon tetrachloride to sensitivesaltwater aquatic life.

#### Human Health

For the maximum protection of human health from the potential carcinogenic. effects due to exposure of carbon tetrachloride through ingestion of contaminated water and contaminated equatic organisms the ambient water concentration should be zero based on

the non-threshold assumption for this chemical. However, zero level may not be attainable at the present time. Therefore, the levels which may result in incremental increase of cancer risk over the lifetime are estimated at 10<sup>-6</sup>, 10<sup>-6</sup>. and 10<sup>-7</sup>. The corresponding criteria are 4.0µg/L .40 µg/L and .04 µg/L respectively. If the above estimates are made for consumption of aquatic organisms only, excluding consumption of water, the levels are 69.4 µg/l, 6.94  $\mu$ g/l, and .89  $\mu$ g/l, respectively. Other concentrations representing different risk levels may be calculated by use of the Guidelines. The risk estimate range is presented for information purposes and does not represent an Agency judgment on an "acceptable" risk level.

#### Chlordane

#### Freshwater Aquatic Life

For chlordane the criterion to protect freshwater aquatic life as derived using the Guidelines is 0.0043  $\mu$ g/l as a 24hour average and the concentration should not exceed 2.4  $\mu$ g/l at any time.

#### Saltwater Aquatic Life

For chlordane the criterion to protect saltwater aquatic life as derived using the Guidelines is  $0.0040 \ \mu g/l$  as a 24hour average and the concentration should not exceed 0.09  $\mu$ g/l at any time. Human Health ...

For the maximum protection of human health from the potential carcinogenic effects due to exposure of chlordane through ingestion of contaminated water and contaminated aquatic organisms, the ambient water concentration should be zero based on the non-threshold assumption for this chemical. However, zero level may not be attainable at the present time. Therefore, the levels which may result in incremental increase of cancer risk over the lifetime are estimated at 10", 10", and 10". The corresponding criteria are 4.6 ng/l, .46 ng/L and .046 ng/L respectively. If the above estimates are made for consumption of aquatic organisms only, excluding consumption of water, the levels are 4.8 ng/l. .48 ng/l, and .048 ng/ L respectively. Other concentrations representing different risk levels may be calculated by use of the Guidelines. The risk estimate range is presented for information purposes and does not represent an Agency judgment on an 'acceptable" risk level.

#### **Chiorinated Benzenes**

#### Freshwater Aquatic Life

The available data for chlorinated benzenes indicate that acute toxicity to freshwater aquatic life occurs at

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concentrations as low as 250 µg/l and would occur at lower concentrations among species that are more sensitive than those tested. No data are available concerning the chronic toxicity of the more toxic of the chlorinated benzene to sensitive freshwater aquatic life bu toxicity occurs at concentrations as low as 50  $\mu$ g/l for a fish species exposed for 7.5 days.

#### Saltwater Aquatic Life

The available data for chlorinated benzenes indicate that acute and chronic toxicity to saltwater aquatic 1 occur at concentrations as low as 160 and 129  $\mu$ g/l, respectively, and would occur at lower concentrations among species that are more sensitive than those tested.

#### Human Health

For the maximum protection of hun health from the potential carcinogenia effects due to exposure of hexachlorobenzene through ingestion of contaminated water and contaminate aquatic organisms, the ambient water concentration should be zero based on the non-threshold assumption for this chemical. However, zero level may no be attainable at the present time. Therefore, the levels which may result in incremental increase of cancer risk over the lifetime are estimated at 10<sup>-1</sup>, 10<sup>-</sup> and 10<sup>-7</sup>. The corresponding

recommended criteria are 7.2 ng/l. .72 ng/l, and .072 ng/L respectively. If the above estimates are made for consumption of aquatic organisms on excluding consumption of water, the levels are 7.4 ng/l. .74 ng/l, and .074 ng/ L respectively.

For the protection of human health from the toxic properties of 1.2.4.5tetrachlorobenzene ingested through water and contaminated aquatic organisms, the ambient water criteric is determined to be 38  $\mu$ g/L

For the protection of human health from the toxic properties of 1.2.4.5tetrachlorobenzene ingested through contaminated aquatic organisms alor... the ambient water criterion is determined to be  $48 \mu g/l$ .

For the protection of human health from the toxic properties of pentachiorobenzene ingested through water and contaminated aquatic organisms, the ambient water criteric is determined to be 74  $\mu$ g/l.

For the protection of human health from the toxic properties of pentachlorobenzene ingested through contaminated aquatic organisms alor the ambient water criterion is determined to be 85  $\mu$ g/l.

Using the present guidelines, a satisfactory criterion cannot be deriv at this time due to the insufficiency in the available data for trichlorobenzene.

For comparison purposes, two approaches were used to derive criterion levels for monochlorobenzene. Based on available toxicity data, for the protection of public health, the derived level is 468  $\mu$ g/l. Using available organoleptic data. for controlling undesirable taste and odor quality of ambient water, the estimated level is 20  $\mu$ g/l. It should be recognized that organoleptic data as a basis for establishing a water quality criteria have limitations and have no demonstrated relationship to potential adverse human health effects.

#### Chlorinated Ethanes

#### Freshwater Aquatic Life

The available freshwater data for chlorinated ethanes indicate that toxicity increases greatly with increasing chlorination, and that acute toxicity occurs at concentrations as low as 118,000 µg/l for 1.2-dichloroethane, 18.000  $\mu$ g/l for two trichloroethanes, 9.320 µg/l for two tetrachloroeth ines. 7.240  $\mu$ g/l for pentachloroethane, and 980 µg/l for hexachloroethane. Chronic toxicity occurs at concentrations as low as 20,000 µg/l for 1.2-dichloroethane. 9.400 µg/l for 1.1.2-trichloroethane, 2.400  $\mu g/\Gamma$  for 1.1.2.2. -tetrachloroethane, 1.100  $\mu g/l$  for pentachloroethane, and 540  $\mu g/l$ for hexachloroethane. Acute and chronic toxicity would occur at lower concentrations among species that are more sensitive than those tested.

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#### Saltwater Aquatic Life

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The available saltwater data for chlorinated ethanes indicate that toxicity increases greatly with increasing chlorination and that acute toxicity to fish and invertebrate species occurs at concentrations as low as 113.000  $\mu$ g/l for 1.2-dichloroethane. 31.200 µg/l for 1.1.1-trichloroethane. 9.020 µg/l for 1.1.2.2-tetrachloroethane. 390 µg/l for pentachloroethane, and 940 µg/l for hexachloroethana. Chronic -4.2.4 toxicity occurs at concentrations as low as 281  $\mu$ g/l for pentachloroethane. Acute and chronic toxicity would occur at lower concentrations among species that are more sensitive than those

tested.

### Human Health

For the maximum protection of human health from the potential carcinogenic effects due to exposure of 1.2-dichloroethane through ingestion of contaminated water and contamineted aquatic organisms, the ambient water concentration should be zero based on

the non-threshold assumption for this

chemical. However, zero level may not be attainable at the present time. Therefore, the levels which may result in incremental increase of cancer risk over the lifetime are estimated at 10<sup>-4</sup>, 10<sup>-4</sup>. and 10<sup>-7</sup>. The corresponding criteria are 9.4 µg/l, .94 µg/l, and .094 µg/l, respectively. If the above estimates are made for consumption of aquatic organisms only, excluding consumption of water, the levels are 2,430 µg/l, 243  $\mu g/L$  and 24.3  $\mu g/l$  respectively. Other concentrations representing different risk levels may be calculated by use of the Guidelines. The risk estimate range is presented for information purposes and does not represent an Agency judgment on an "acceptable" risk level.

For the protection of human health from the toxic properties of 1.1.1trichloroethane ingested through water and contaminated aquatic organism, the ambient water criterion is determined to be 18.4 mg/L

For the protection of human health from the toxic properties of 1.1.1.-trichloroethane ingested through contaminated aquatic organisms alone, the ambient water criterion is determined to be 1.03 g/L

For the maximum protection of human health from the potential carcinogenic effects due to exposure of 1.1.2trichloroethane through ingestion of contaminated water and contaminated aquatic organisms, the ambient water concentration should be zero based on the non-threshold assumption for this chemical However, zero level may not be attainable at the present time. Therefore, the levels which may result in incremental increase of cancer risk over the lifetime are estimated at 10<sup>-4</sup>, 10<sup>-4</sup>. and 10<sup>-7</sup>. The corresponding criteria are 6.0 μg/l, .5 μg/l, and .06 μg/l, respectively. If the above estimates are made for consumption of aquatic organisms only, excluding consumption of water, the levels are 418  $\mu$ g/L 41.8  $\mu g/l_{\star}$  and 4.18  $\mu g/l$  respectively. Other concentrations representing different risk levels may be calculated by use of the Guidelines. The risk estimate range is presented for information purposes and does not represent an Agency judgment on an "acceptable" risk level.

For the maximum protection of human health from the potential carcinogenic effects due to exposure of 1.1.2.2-tetrachloroethane through ingestion of contaminated water and contaminated aquatic organisms, the ambient water concentration should be zero based on the non-threshold assumption for this chemical. However, zero level may not be attainable at the present time. Therefore, the levels which may result in incremental increase of cancer risk over the lifetime are estimated at 10<sup>-8</sup>, 10<sup>-8</sup>,

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and  $10^{-7}$ . The corresponding criteria are  $1.7 \mu g/l$ .  $1.7 \mu g/l$ , and  $.017 \mu g/l$ , respectively. If the above estimates are made for consumption of aquatic organisms only, excluding consumption of water, the levels are  $107 \mu g/l$ ,  $10.7 \mu g/l$ , and  $1.07 \mu g/l$ , respectively. Other concentrations representing different risk levels may be calculated by use of the Guidelines. The risk estimate range is presented for information purposes and does not represent an Agency judgment on an "acceptable" risk level.

For the maximum protection of human health from the potential carcinogenic effects due to exposure of hexachloroethane through ingestion of contaminated water and contaminated aquatic organisms, the ambient water concentration should be zero based on the non-threshold assumption for this chemical. However, zero level may not be attainable at the present time. Therefore, the levels which may result in incremental increase of cancer risk over the lifetime are estimated at 10<sup>-0</sup>, 10<sup>-0</sup>, and 10<sup>-7</sup>. The corresponding criteria are 19  $\mu$ g/L 1.9  $\mu$ g/L and .19  $\mu$ g/L respectively. If the above estimates are made for consumption of aquatic organisms only, excluding consumption of water, the levels are 87.4 µg/l. 8.74  $\mu g/L$  and .87  $\mu g/L$  respectively. Other concentrations representing different risk levels may be calculated by use of the Guidelines. The risk estimate range is presented for information purposes and does not represent an Agency judgment on an "acceptable" risk level.

Using the present guidelines, a satisfactory criterion cannot be derived at this time due to the insufficiency in the available data for monochloroethane.

Using the present guidelines, a satisfactory criterion cannot be derived at this time due to the insufficiency in the available data for 1.1.-

dichloroethane.

Using the present guidelines, a satisfactory criterion cannot be derived at this time due to the insufficiency in the available data for 1,1,1,2tetrachloroethane.

Using the present guidelines, a satisfactory criterion cannot be derived at this time due to the insufficiency in the available data for pentachloroethane.

#### **Chlorinated Naphthalenes**

#### Freshwater Aquatic Life

The available data for chlorinated naphthalenes indicate that acute toxicity to freshwater aquatic life occurs at concentrations as low as 1.600 µg/l and would occur at lower concentrations among species that are more sensitive than those tested. No data are available concerning the chronic toxicity of chlorinated naphthalenes to sensitive freshwater equatic life.

#### Saltwater Aquatic Life

The available data for chlorinsted napthalenes indicate that acute toxicity to saltwater aquatic life occurs at concentrations as low as 7.5  $\mu$ g/l and would occur at lower concentrations among species that are more sensitive than those tested. No data are available concerning the chronic toxicity of chlorinsted naphthalenes to sensitive saltwater aquatic life.

#### Human Health 📜

Using the present guidelines, a satisfactory criterion cannot be derived at this time due to the insufficiency in the available data for chlorinated napthalenes.

#### **Chlorinated Phenols**

#### Freshwater Aquatic Life

The available freshwater data for chlorinated phenols indicate that toxicity generally increases with increasing chlorination, and that acute toxicity occurs at concentrations as low as 30  $\mu$ g/l for 4-chloro-3-methylphenol to greater than 500,000  $\mu$ g/l for other compounds. Chronic toxicity occurs at concentrations as low as 970  $\mu$ g/l for 2.4.6-trichlorophenol. Acute and chronic toxicity would occur at lower concentrations among species that are more sensitive than those tested.

#### Saltwater Aquatic Life

The available saltwater data for chlorinated phenols indicate that toxicity generally increases with increasing chlorination and that acute toxicity occurs at concentrations as low as 440  $\mu$ g/l for 2,3,5,6-tetrachlorophenol and 29,700  $\mu$ g/l for 4-chlorophenol. Acute toxicity would occur at lower concentrations among species that are more sensitive than those tested. No data are available concerning the chronic toxicity of chlorinated phenols to sensitive saltwater aquatic life.

### Human Health

Sufficient data is not available for 3monochlorophenol to derive a level which would protect against the potential toxicity of this compound. Using available organoleptic data, for controlling undesirable taste and odor quality of ambient water, the estimated level is 0.1  $\mu$ g/L It should be recognized that organoleptic data as basis for establishing a water quality criteria bave inmitations and have no demonstrated relationship to potential adverse human health effects.

Sufficient data is not available for 4monochlorophenol to derive a level which would protect against the potential toxicity of this compound. Using available organoleptic data. for controlling undesirable taste and odor quality of ambient water, the estimated level is  $0.1 \mu g/L$  It should be recognized that organoleptic data as a basis for establishing a water quality criteria have limitations and have no demonstrated relationship to potential adverse human health effects.

Sufficient data is not available for 2.3dichlorophenol to derive a level which would protect against the potential toxicity of this compound. Using available organoleptic data, for controlling undesirable taste and odor quality of ambient water, the estimated level is .04  $\mu$ g/l. It should be recognized that organoleptic data as a basis for establishing a water quality criteria have limitations and have no demonstrated relationship to potential adverse human health effects.

Sufficient data is not available for 2.5dichlorophenol to derive a level which would protect against the potential toxicity of this compound. Using available organoleptic data, for controlling undesirable taste and odor quality of ambient water, the estimated level is  $5 \mu g/L$  It should be recognized that organoleptic data as a basis for establishing a water quality criteria have limitations and have no demonstrated relationship to potential adverse human health effects.

Sufficient data is not available for 2.6dichlorophenol to derive a level which would protect against the potential toxicity of this compound. Using available organoleptic data, for controlling undesirable taste and odor quality of ambient water, the estimated level is  $2 \mu g/L$  It should be recognized that organoleptic data as a basis for establishing a water quality criteria have limitations and have no demonstrated relationship to potential adverse human health effects.

Sufficient data is not available for 3.4dichlorophenol to derive a level which would protect against the potential toxicity of this compound. Using available organoleptic data, for controlling undesirable taste and odor quality of ambient water, the estimated level is .3  $\mu$ g/L It should be recognized that organoleptic data as a basis for establishing a water quality criteria have limitations and have no demonstrated relationship to potential adverse human health effects.

Sufficient data is not available for 2.3.4.6-tetrachlorophenol to derive a

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level which would protect against the "potential toxicity of this compound. Using available organoleptic data. for controlling undestrable taste and odor quality of ambient water, the estimated level is 1  $\mu$ g/L It should be recognized that organoleptic data as a basis for establishing a water quality criteria have limitations and have no demonstrated relationship to potential adverse human health effects.

For comparison purposes, two approaches were used to derive criterion levels for 2.4.5-trichloropheno<sup>1</sup> Based on available toxicity data. for the protection of public health, the derived level is 2.6 mg/L Using available organoleptic data, for controlling undesirable taste and odor quality of ambient water, the estimated level is 1.0  $\mu$ g/L It should be recognized that organoleptic data as a basis for establishing a water quality criteria have limitations and have no demonstrated relationship to potential adverse human health effects.

For the maximum protection of hume health from the potential carcinogenic effects due to exposure of 2.4.6trichlorophenol through ingestion of contaminated water and contaminated aquatic organisms, the ambient water concentration should be zero based on the non-threshold assumption for this chemical. However, zero level may not be attainable at the present time. Therefore, the levels which may result in incremental increase of cancer risk ov the lifetime are estimated at 10<sup>-5</sup>, 10<sup>-6</sup> and 10<sup>-7</sup>. The corresponding criteria are 12 µg/l, 1.2 µg/l, and .12 µg/l respectively. If the above estimates ar made for consumption of aquatic organisms only, excluding consumption of water, the levels are 36 µg/L 3.6 µg/L and .36  $\mu$ g/l, respectively. Other concentrations representing different risk levels may be calculated by use o. the Guidelines. The risk estimate range is presented for information purposes and does not represent an Agency judgment on an "acceptable" risk leve.

Using available organoleptic data. for controlling undesirable taste and odor quality of ambient water, the estimate level is  $2 \mu g/l$ . It should be recognized that organoleptic data as a basis for establishing a water quality criterion have limitations and have no demonstrated relationship to potentiz adverse human health effects.

Sufficient data is not available for 2methyl-4-chlorophenol to derive a levwhich would protect against any potential toxicity of this compound. Using available organoleptic data, for controlling undesirable taste and odo quality of ambient water, the estimate level is 1800  $\mu$ g/l. It should be

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recognized that organoleptic data as a basis for establishing a water quality criterion have limitations and have no demonstrated relationship to potential adverse human health effects.

Sufficient data is not available for 3methyl-4-chlorophenol to derive a lavel which would protect against the potential toxicity of this compound. Using available organoleptic data, for controlling undesirable taste and odor quality of ambient water, the estimated level is 3000  $\mu$ g/L. It should be recognized that organoleptic data as a basis for establishing a water quality criterion have limitations and have no demonstrated relationship to potential adverse human health effects.

Sufficient data is not available for 3methyl-6-chlorophenol to derive a level which would protect against the potential toxicity of this compound. Using available organoleptic data, for controlling undesirable taste and odor quality of ambient water, the estimated level is 20  $\mu$ g/L It should be recognized that organoleptic data as a basis for establishing a water quality criterion have limitations and have no demonstrated relationship to potential adverse human health effects.

# Chloroalkyl Ethers

## Freshwater Aquatic Life

The available data for chloroalkyl ethers indicate that acute toxicity to freshwater aquatic life occurs at concentrations as low as 238,000  $\mu$ g/l and would occur at lower concentrations among species that are more sensitive than those tested. No definitive data are available concerning the chronic toxicity of chloroalkyl ethers to sensitive freshwater aquatic life.

# Saltwater Aquatic Life

No saltwater organisms have been tested with any chloroalkyl ether and no statement can be made concerning acute « and chronic-toxicity.

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## Human Health

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For the maximum protection of human health from the potential carcinogenic effects due to exposure of bis-(chioromethyl)-ether through ingestion of contaminated water and contaminated aquatic organisms, the ambient water concentration should be zero based on the non-threshold assumption for this chemical. However, zero level may not be attainable at the present time. Therefore, the levels which may result in incremental increase of cancer risk over the lifetime are estimated at 10<sup>-4</sup>, 10<sup>-4</sup>, and 10<sup>-1</sup>. The corresponding criteria are .038 ng/L .0038 ng/L and .00038 ng/L respectively.

If the above estimates are made for consumption of aquatic organisms only, excluding consumption of water, the levels are 18.4 ng/L 1.84 ng/L and .184 ng/L respectively. Other concentrations representing different risk levels may be calculated by use of the Guidelines. The risk estimate range is presented for information purposes and does not represent an Agency judgment on an "acceptable" risk level.

For the maximum protection of human health from the potential carcinogenic effects due to exposure of bis (2chloroethyi) ether through ingestion of contaminated water and contaminated equatic organisms, the ambient water concentration should be zero based on the non-threshold assumption for this chemical. However, zero level may not be attainable at the present time. Therefore, the levels which may result in incremental increase of cancer risk over the lifetime are estimated at 10<sup>-4</sup>, 10<sup>-4</sup>, and 10<sup>-†</sup>. The corresponding criteria are .3 µg/l, .03 µg/l, and .003 µg/Lrespectively. If the above estimates are made for consumption of aquatic organisms only, excluding consumption of water, the levels are 13.8  $\mu$ g/l, 1.36 µg/L and .136 µg/L respectively. Other concentrations representing different risk levels may be calculated by use of the Guidelines. The risk estimate range is presented for information purposes and does not represent an Agency judgment on an "acceptable" risk level

For the protection of human health from the taxic properties of bis (2chloroisopropyl) ether ingested through water and contaminated aquatic organisms, the ambient water criterion is determined to be  $34.7 \ \mu g/l$ . For the protection of human health from the toxic properties of bis (2chloroisopropyl) ether ingested through contaminated aquatic organisms alone, the ambient water criterion is determined to be 4.36 mg/l.

## Chioroform

## Freshwater Aquatic Life

The available data for choloroform indicate that acute toxicity to freshwater aquatic life occurs at concentrations as low as 28,900  $\mu g/l$ , and would occur at lower concentrations among species that are more sensitive than the three tested species. Twenty-seven-day LC50 values indicate that chronic toxicity occurs at concentrations as low as 1,240  $\mu g/l$ , and could occur at lower concentrations among species or other life stages that are more sensitive than the earliest life cycle stage of the rainbow troat.

## Saltwater Aquatic Life

The data base for saltwater species is limited to one test and no statement can be made concerning acute or chronic toxicity.

# Human Health

For the maximum protection of human health from the potential carcinogenic effects due to exposure of chloroform through ingestion of contaminated water and contaminated aquatic organisms. the ambient water concentration should .be zero based on the non-threshold assumption for this chemical. However, zero level may not be attainable at the present time. Therefore, the levels which may result in incremental increase of cancer risk over the lifetime are estimated at 10<sup>-4</sup>, 10<sup>-4</sup>, and 10<sup>-1</sup>. The corresponding criteria are 1.90  $\mu$ g/L .19  $\mu g/l$ , and .019  $\mu g/l$ . respectively. If the above estimates are made for consumption of aquatic organisms only. excluding consumption of water, the levels are 157  $\mu$ g/l, 15.7  $\mu$ g/l, and 1.57  $\mu g/L$  respectively. Other concentrations representing different risk levels may be calculated by use of the Guidelines. The risk estimate range is presented for information purposes and does not represent an Agency judgment on an "acceptable" risk level.

#### 2-Chlorophenol

# Freshwater Aquatic Life

The availabe data for 2-chlorophenol indicate that acute toxicity to freshwater aquatic life occurs at concentrations as low as 4.380  $\mu g/l$  and would occur at lower concentrations among species that are more sensitive that those tested. No definitive data are available concerning the chronic toxicity of 2chlorophenol to sensitive freshwater squatic life but flavor impairment occurs in one species of fish at concentrations as low as 2.000  $\mu g/l$ .

#### -Saltwater Aquatic Life

No saltwater organisms have been tested with 2-chlorophenol and no statement can be made concerning acute and chronic toxicity.

#### Human Health

Sufficient data is not available for 2chlorophenol to derive a level which would protect against the potential toxicity of this compound. Using available organoleptic data. for controlling undesirable taste and odor quality of ambient water, the estimated level is 0.1 µg/l. It should be recognized that organoleptic data as a basis for establishing a water quality criteria have limitations and have no

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demonstrated relationship to potential adverse human health effects.

## Chromium

## Freshwater Aquatic Life

For total recoverable hexavalent chromium the criterion to protect freshwater aquatic life as derived using the Guidelines is 0.29  $\mu$ g/l as a 24-hour average and the concentration should not exceed 21  $\mu$ g/l at any time.

For freshwater aquatic life the concentration (in  $\mu g/l$ ) of total recoverable trivalent chromium should not exceed the numerical value given by "e(1.08[ln(hardness)]+3.48)" at any time. For example, at hardnesses of 50, 100 and 200 mg/l as CaCO, the concentration of total recoverable trivalent chromium should not exceed 2,200, 4,700, and 9,900 µg/l, respectively, at any time. The available data indicate that chronic toxicity to freshwater aquatic life occurs at concentrations as low a 44  $\mu$ g/l and would occur at lower concentrations among species that are more sensitive than those tested.

#### Saltwater Aquatic Life

For total recoverable bexavalent chromium the criterion to protect saltwater aquatic life as derived using the Guidelines is 18  $\mu$ g/l as a 24-hour average and the concentration should not exceed 1,280  $\mu$ g/l at any time.

For total recoverable trivalent chromium, the availabe data indicate that acute toxicity to saltwater aquatic life occurs at concentrations as low as 10.300  $\mu$ g/l, and would occur at lower concentrations amoung species that are more sensitive than those tested. No data are available concerning the chronic toxicity of trivalent chromium to sensitive saltwater aquatic life.

#### Human Health

For the protection of human health from the toxic properties of Chromium III ingested through water and contaminated aquatic organisms, the ambient water criterion is determined to be 170 mg/l.

For the protection of human health – from the toxic properties of Chromium III ingested through contaminated aquatic organisms alone, the ambient water criterion is determined to be 3433 mg/L

The ambient water quality criterion for total Chromium VI is recommended to be identical to the existing drinking water standard which is 50  $\mu$ g/l. Analysis of the toxic effects data resulted in a calculated level which is protective of human health against the ingestion of contaminated water and contaminated aquatic organisms. The calculated value is comparable to the present standard. For this reason a selective criterion based on exposure solely from consumption of 8.5 grams of aquatic organisms was not derived.

#### Copper

# Freshwater Aquatic Life

For total recoverable copper the criterion to protect freshwater aquatic life as derived using the Guidelines is 5.6  $\mu g/l$  as a 24-hour average and the concentration (in  $\mu g/l$ ) should not exceed the numerical value given by e(0.94[ln(hardness)]-1.23) at any time. For example, at hardnesses of 50, 100, and 200 mg/l CaCO, the concentration of total recoverable copper should not exceed 12, 22, and 43  $\mu g/l$  at any time.

## Saltwater Aquatic Life

For total recoverable copper the criterion to protect saltwater aquatic life as derived using the Guidelines is 4.0  $\mu g/l$  as a 24-hour average and the concentration should not exceed 23  $\mu g/l$  at any time.

#### Human Health

Sufficient data is not available for copper to derive a level which would protect against the potential toxicity of this compound. Using available organoleptic data. for controlling undesirable taste and odor quality of ambient water, the estimated level is 1 mg/l. It should be recognized that organoleptic data as a basis for establishing a water quality criteria have limitations and have no demonstrated relationship to potential adverse human health effects.

# Cyanide

## Freshwater Aquatic Life

Eor free cyanide (sum of cyanide present as HCN and CN<sup>-</sup>, expressed as CN) the criterion to protect freshwater aquatic life as derived using the Guidelines is  $3.5 \mu g/l$  as a 24-hour average and the concentration should not exceed 52  $\mu g/l$  at any time.

# Saltwater Aquatic Life

The available data for free cyanide (sum of cyanide present as HCN and CN<sup>-</sup>, expressed as CN) indicate that acute toxicity to saltwater equatic life occurs at concentrations as low as 30  $\mu g/l$  and would occur at lower concentrations among species that are more sensitive than those tested. If the acute-chronic ratio for saltwater organisms is similar to that for freshwater organisms, chronic toxicity would occur at concentrations as low as 20  $\mu g/l$  for the tested species and at lower concentrations among species

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that are more sensitive than those tested.

#### Human Health

The ambient water quality criterion for cyahide is recommended to be identical to the existing drinking water standard which is 200  $\mu$ g/l. Analysis of the toxic effects data resulted in a calculated level which is protective of human health against the ingestion of contaminated water and contaminated aquatic organisms. The calculated val is comparable to the present standard. For this reason a selective criterion based on exposure solely from consumption of 6.5 grams of aquatic organisms was not derived.

#### DDT and Metabolites

### Freshwater Aquatic Life

#### DDT

For DDT and its metabolites the criterion to protect freshwater aquatic life as derived using the Guidelines is  $0.0010 \ \mu g/l$  as a 24-hour average and th concentration should not exceed 1.1  $\mu g/l$  at any time.

#### TDE

The available data for TDE indicate that acute toxicity to freshwater aquatic life occurs at concentrations as low as 0.6  $\mu$ g/l and would occur at lower concentrations among species that are more sensitive than those tested. No data are available concerning the chronic toxicity of TDE to sensitive freshwater aquatic life.

#### DDE

The available data for DDE indicate that acute toxicity to freshwater aquati. life occurs at concentrations as low as  $1.050 \ \mu g/l$  and would occur at lower concentrations among species that are more sensitive than those tested. No data are available concerning the chronic toxicity of DDE to sensitive freshwater aquatic life.

#### Saltwater Aquatic Life

#### DDT

For DDT and its metabolites the criterion to protect saltwater aquatic lift as derived using the Guidelines is 0.0010  $\mu$ g/l as a 24-hour average and the concentration should not exceed 0.13  $\mu$ g/l at any time.

#### TDE

The available data for TDE indicate that acute toxicity to saltwater aquatic life occurs at concentrations as low as 3.5  $\mu$ g/l and would occur at lower concentrations among species that are more sensitive than those tested. No data are available concerning the chronic toxicity of TDE to sensitive saltwater aquatic life.

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The available data for DDE indicate that acute toxicity to saltwater equatic life occurs at concentrations as low as 14  $\mu$ g/l and would occur at lower concentrations among species that are more sensitive than those tested. No data are available concerning the chronic toxicity of DDE to sensitive saltwater aquatic life.

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#### Human Health

For the maximum protection of human health from the potential carcinogenic effects due to exposure of DDT through ingestion of contaminated water and contaminated aquatic organisms, the ambient water concentration should be zero based on the non-threshold assumption for this chemical. However, zero level may not be attainable at the present time. Therefore, the levels which may result in incremental increase of cancer risk over the lifetime are estimated at 10", 10", and 10". The corresponding criteria are .24 ng/L .024 ng/L and .0024 ng/L respectively. If the above estimates are made for consumption of aquatic organisms only, excluding consumption of water, the levels are .24 ng/l, .024 ng/l, and .0024 ng/l, respectively. Other concentrations representing different risk levels may be calculated by use of the Guidelines. The risk estimate range is presented for information purposes and does not represent an Agency judgment of an "acceptable" risk level.

#### . Dichlorobenzenes

## Freshwater Aquatic Life

The available data for dichlorobenzenes indicate that acute and chronic toxicity to freshwater equatic life occurs at concentrations as low as 1,220 and 763  $\mu$ g/L respectively, and would occur at lower

concentrations among species that are more sensitive than those tested.

## Saltwater Aquatic Life

The available data for dichlorobenzenes indicate that acute toxicity to saltwater aquatic life occurs at concentrations as low as  $1.970 \ \mu g/l$ and would occur at lower concentrations among species that are more sensitive than those tested. No data are available concerning the chronic toxicity of dichlorobenzenes to sensitive saltwater aquatic life.

#### Human Health

For the protection of human health from the taxic properties of dichlorobenzenes (all isomers) ingested through water and contaminated squatic organisms, the ambient water criterion is determined to be 400  $\mu$ g/L

For the protection of human health from the toxic properties of dichlorobenzenes (all isomers) ingested through contaminated aquetic organisms alone, the ambient water criterion is determined to be 2.8 mg/l.

## Dichlorobenzidines

## Freshwater Aquatic Life

The data base available for dichlorobenzidines and freshwater organisms is limited to one test on bioconcentration of 3.3'dichlorobenzidine and no statement can be made concerning acute or chronic toxicity.

# Saltwater Aquatic Life

No saltwater organisms have been tested with any dichlorobenzidine and no statement can be made concerning acute or chronic toxicity.

### Human Health

For the maximum protection of human health from the potential carcinogenic effects due to exposure of dichlorobenzidine through ingestion of contaminated water and contaminated aquatic organisms, the ambient water concentration should be zero base on the non-threshold assumption for this chemical. However, zero level may not be attainable at the present time. Therefore, the levels which may result in incremental increase of cancer risk over the lifetime are estimated at 10<sup>-1</sup>, 10<sup>-1</sup> and 10"?. The corresponding criteria are .103 µg/l, .0103 µg/l, and .00103 µg/l, respectively. If the above estimates are made for consumption of aquatic organisms only, excluding consumption of water, the levels are .204  $\mu$ g/], .0204  $\mu g/L$  and .00204  $\mu g/L$  respectively. Other concentrations representing different risk levels may be calculated by use of the Guidelines. The risk estimate range is presented for information purposes and does not represent an Agency judgment on an "acceptable" risk level.

## Dichloroetbylenes -

## Freshwater Aquatic Life

The available data for dichloroethylenes indicate that acute toxicity to freshwater aquatic life occurs at concentrations as low as 11.600  $\mu$ g/l and would occur at lower concentrations among species that are more sensitive than those tested. No definitive data are available concerning the chronic toxicity of dichlorethylenes to sensitive freshwater aquatic life.

# Saltwater Aquatic Life

The available data for dichlorethylenes indicate that scute toxicity to saltwater equatic life occurs at concentrations as low as 224.000  $\mu$ g/ and would occur at lower concentrations among species that are more sensitive than those tested. No data are available concerning the chronic toxicity dichloroethylenes to sensitive saltwater aquatic life.

### Human Health

For the maximum protection of humar health from the potential carcinogenic effects due to exposure of 1.1-dichloroethylese through ingestion o contaminated water and contaminated aquatic organisms, the ambient water concentration should be zero based on the non-threshold assumption for this chemical However, zero level may not be attainable at the present time. Therefore, the levels which may result in incremental increase of cancer risk over the lifetime are estimated at 10<sup>-8</sup>, 10<sup>-8</sup>, and 10<sup>-7</sup>. The corresponding criteria are .33 µg/1, .033 µg/1, and .0033 µg/L respectively. If the above estimates are made for consumption of aquatic organisms only, excluding consumption of water, the levels are 18.5  $\mu$ g/l, 1.85  $\mu$ g/L and .185  $\mu$ g/L respectively. Other concentrations representing different risk levels may be calculated by use of the Guidelines. The risk estimate range is presented for information purposes and does not represent an Agency judgment on an "acceptable" nsk level.

Using the present guidelines, a satisfactory criterion cannot be derived at this time due to the insufficency in the available data for 1,2-dichloroethylene.

## 2.4-Dichlorophenol

## Freshwater Aquatic Life

The available data for 2.4dichlorophenol indicate that acute and chronic toxicity to freshwater aquatic life occurs at concentrations as low as 2.020 and 365  $\mu$ g/L respectively, and would occur at lower concentrations among species that are more sensitive that those tested. Mortality to early life stages of one species of fish occurs at concentrations as low as 70  $\mu$ g/L

#### Saltwater Aquatic Life

Only one test has been conducted with saltwater organisms on 2.4dichlorophenol and no statement can be made concerning acute or chronic toxicity.

#### Human Health

For comparison purposes, two approaches were used to derive criterion levels for 2.4-dichlorophenol.

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Based on available toxicity data, for the protection of public health, the derived level is 3.09 mg/l. Using available organoleptic data, for controlling undesirable taste and odor quality of ambient water, the estimated level is 0.3  $\mu$ g/L It should be recognized that organoleptic data as a basis for establishing a water quality criteria have limitstions and have no demonstrated relationship to potential adverse human health effects.

Dichloropropanes/Dichloropropenes

## Freshwater Aquatic Life

The available data for dichloropropanes indicate that acute and chronic toxicity to freshwater aquatic life occurs at concentrations as low as 23,000 and 5,700  $\mu g/l_{\star}$  – respectively, and would occur at lower concentrations among species that are more sensitive than those tested.

The available data for dichloropropenes indicate that acute and chronic toxicity to freshwater aquatic life occurs at concentrations as low as 6.060 and 244  $\mu$ g/l. respectively, and would occur at lower concentrations among species that are more sensitive than those tested.

## Saltwater Aquatic Life -

The available data for dichloropropanes indicate that acute and chronic toxicity to saltwater aquatic life occurs at concentrations as low as 10.300 and 3.040  $\mu g/l$ , respectively, and would occur at lower concentrations among species that are more sensitive than those tested.

The available data for dichloropropenes indicate that acute toxicity to saltwater aquatic life occurs at concentrations as low a as 790 µg/l, and would occur at lower concentrations among species that are more sensitive than those tested. No data are available concerning the chronic toxicity of dichloropropenes to sensitive saltwater aquatic life.

## Human Health

Using the present guidelines, a satisfactory criterion cannot be derived at this time due to the insufficiency in the available data for dichloropropanes.

For the protection of human health from the toxic properties of dichloropropenes ingested through water and contaminated aquatic organisms, the ambient water criterion is determined to be 87 µg/L

For the protection of human health from the toxic properties of dichloropropenes ingested through contaminated aquatic organisms alone. the ambient water criterion is determined to be 14.1 mg/L

## 2,4-Dimethylphenol

## Freshwater Aquatic Life

The available data for 2.4dimethylphenol indicate that acute toxicity to freshwater aquatic life occurs at concentrations as low as 2.120  $\mu g/l$ and would occur at lower concentrations among species that are more sensitive than those tested. No data are available concerning the chronic toxicity of dimethylphenol to sensitive freshwater aquatic life.

## Saltwater Aquatic Life

No saltwater organisms have been tested with 2.4-dimethylphenol and no statement can be made concerning acute and chronic toxicity.

## Human Health

Sufficient data are not available for 2,4-dimethylphenol to derive a level which would protect against the potential toxicity of this compound. Using available organoleptic data, for controlling undersirable taste and odor

lity of ambient water, the estimated is 400  $\mu$ g/L It should be recognized that organoleptic data as a basis for establishing a water quality criteria have limitations and have no demonstrated relationship to potential adverse human health effects.

## 2,4-Dinitrotoluene

Freshwater Aquatic Life

The available data for 2.4dinitrotoluene indicate that acute and chronic toxicity to freshwater aquatic life occurs at concentrations as low as 330 and 230 µg/L respectively, and would occur at lower concentrations among species that are more sensitive than those tested.

## Saltwater Aquatic Life

The available data for 2.4dinitrotoluenes indicate that acute  $\sim$ toxicity to saltwater aquatic life occurs at concentrations as low as 590 µg/l and would occur at lower concentrations among species that are more sensitive than those tested. No data are available concerning the chronic toxicity of 2.4dinitrotoluenes to sensitive saltwater aquatic life but a decrease in algal cell numbers occurs at concentrations as low as 370 µg/l

## Human Health

For the maximum protection of human health from the potential carcinogenic effects due to exposure of 2.4dinitrotoluene through ingestion of contaminated water and contaminated

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aquatic organisms, the ambient water concentration should be zero based o ... the non-threshold assumption for this chemical. However, zero level may nc\* be attainable at the present time. Therefore, the levels which may result ..... incremental increase of cancer risk over the lifetime are estimated at 10<sup>-4</sup>, 10<sup>-4</sup> and 10<sup>-1</sup>. The corresponding criteria a 1.1 µg/L 0.11 µg/L and 0.011 µg/L respectively. If the above estimates are made for consumption of aquatic organisms only, excluding consumptic of water, the levels are 91  $\mu$ g/L 9.1  $\mu$ g. and 0.91  $\mu$ g/l, respectively. Other concentrations representing different risk levels may be calculated by use o the Guidelines. The risk estimate rang is presented for information purposes and does not represent an Agency judgment on an "acceptable" risk leve

## 1.2-Dipbenylhydrazine

#### Freshwater Aquatic Life

The available data for 1.2diphenylhydrazine indicate that acute toxicity to freshwater aquatic life occurs at concentrations as low as 270  $\mu g/l \bar{z}$ would occur at lower concentrations among species that are more sensitive than those tested. No data are available concerning the chronic toxicity of 1.2diphenylhydrazine to sensitive freshwater aquatic life.

#### Saltwater Aquatic Life

No saltwater organisms have been tested with 1,2-diphenylhydrazine and no statement can be made concerning acute and chronic toxicity.

## Human Health

For the maximum protection of human health from the potential carcinogenic effects due to exposure of 1.2diphenylhydrazine through ingestion c. contaminated water and contaminated aquatic organisms, the ambient water concentration should be zero based o the non-threshold assumption for this chemical. However, zero level may not be attainable at the present time. Therefore, the levels which may resul incremental increase of cancer risk ov the lifetime are estimated at 10<sup>-+</sup>, 10<sup>-+</sup>, and 10".". The corresponding criteria are 422 ng/l. 42 ng/l, and 4 ng/L respectively. If the above estimates a made for consumption of aquatic organisms only, excluding consumption of water, the levels are 5.6  $\mu$ g/l. 0.56  $\mu g/L$  and 0.058  $\mu g/L$  respectively. Other concentrations representing different nsk levels may be calculated by use of the Guidelines. The risk estimate range is presented for information purposes and does not

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represent an Agency judgment on an "acceptable" risk level.

# Endoaulfan

# Freshwater Aquatic Life

For endosulfan the criterion to protect freshwater aquatic life as derived using the Guidelines is 0.056 µg/l as a 24-hour average and the concentration should not exceed 0.22 µg/l at any time.

# Saltwater Aquatic Life

For endosulfan the criterion to protect saltwater aquatic life as derived using the Guidelines is 0.0087  $\mu$ g/l as a 24hour average and the concentration should not exceed 0.034 µg/l at any time.

# Human Health

For the protection of human health from the toxic properties of endosulfan ingested through water and contaminated aquatic organisms, the ambient water criterion is determined to be 74 µg/L

For the protection of human health from the toxic properties of endosulfan ingested through contaminated aquatic organisms alone, the ambient water 1:: criterion is determined to be 159  $\mu$ g/L

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## Endrin

Freshwater Aquatic Life

For endrin the criterion to protect freshwater aquatic life as derived using the Guidelines is 0.0023  $\mu$ g/l as a 24hour average and the concentration should not exceed 0.18 µg/l at any time.

# Saltwater Aquatic Life 1-

For endrin the criterion to protect saltwater aquatic life as derived using the Guidelines is 0.0023  $\mu$ g/l as a 24hour average and the concentration should not exceed 0.037 µg/I at any hme. فيرجعه ب

## Human Health

The ambient water quality criterion /~ for endrm is recommended to be identical to the existing drinking water standard which is 1 µg/L Analysis of the toxic effects data resulted in a calculated level which is protective of human bealth against the ingestion of :-contaminated water and contaminated aquatic organisms. The calculated value is comparable to the present standard. For this reason a selective criterion based on exposure solely from consumption of 6.5 grams of aquatic organisms was not derived.

## Ethylbenzene

## Freshwater Aquatic Life

The available data for ethylbenzene indicate that acute toxicity to freshwater

aquatic life occurs at concentrations as low as 32,000  $\mu$ g/l and would occur at lower concentrations among species that are more sensitive than those tested. No definitive data are available concerning the chronic toxicity of ethylbenzene to sensitive freshwater aquatic life.

## Saltwater Aquatic Life

The available data for ethylbenzene indicate that acuts toxicity to saltwater aquatic life occurs at concentrations as low as 430 µg/l and would occur at .... lower concentrations among species that are more sensitive than those tested. No data are available concerning the chronic toxicity of ethylbenzene to sensitive saltwater aquatic life.

# Human Health

For the protection of human health from the toxic properties of ethylbenzene ingested through water and contaminated aquatic organisms. the ambient water criterion is determined to be 1.4 mg/L

For the protection of human health from the toxic properties of ethylbenzene ingested through contaminated aquatic organisms alone. the ambient water criterion is determined to be 3.28 mg/L

## Fluoranthene

## Freshwater Aquatic Life

The available data for fluoranthene indicate that acute toxicity to freshwater aquatic life occurs at concentrations as low as 3980 µg/l and would occur at lower concentrations among species that are more sensitive than those tested. No data are available concerning the chronic toxicity of fluoranthene to sensitive freshwater aquatic life.

## Saltwater Aquatic Life

The available data for fluoranthene indicate that scute and chronic toxicity to saltwater aquatic life occur at concentrations as low as 40 and 15  $\mu$ g/L respectively, and would occur at lower concentrations among species that are more sensitive than those tested.

## Human Realth

For the protection of human health from the toxic properties of fluoranthene ingested through water and contaminated acuatic organisms, the ambient water criterion is determined to be 42 µg/'

For the protection of human health from the toxic properties of fluoranthene ingested through contaminated aquatic organisms alone, the ambient water criterion is determined to be 54 µg/1.

## Haloethers

## Freshwater Aquatic Life

The available data for haloethers indicate that acute and chronic toxicity to freshwater aquatic life occur at concentrations as low as 360 and 122  $\mu$ g/L respectively, and would occur at lower concentrations among species that are more sensitive than those tested.

## Saltwater Aquatic Life

No saltwater organisms have been tested with any haloether and no statement can be made concerning acute or chronic toxicity.

#### Human Health

Using the present guidelines, a satisfactory criterion cannot be derived at this time due to the insufficiency in the available data for haloethers.

#### Halomethanes

#### Freshwater Aquatic Life

The available data for halomethanes indicate that acute toxicity to freshwater aquatic life occurs at concentrations as low as 11,000  $\mu$ g/l and would occur at lower concentrations among species that are more sensitive than those tested. No data are available concerning the chronic toxicity of halomethanes to sensitive freshwater aquatic life.

# Saltwater Aquatic Life

The available data for halomethanes indicate that acute and chronic toxicity to saltwater aquatic life occur at concentrations as low as 12,000 and 6,400 µg/l, respectively, and would occur at lower concentrations among species that are more sensitive than those tested. A decrease in algal cell numbers occurs at concentrations as low as 11.500 µg/E

#### • Human Health

For the maximum protection of huma health from the potential carcinogenic effects due to exposure of chloromethane, bromomethane, dichloromethane. bromodichloromethane. tribromomethane. dichlorodifluoromethane. trichlorofluoromethane, or combinatio of these chemicals through ingestion c contaminated water and contaminate aquatic organisms, the ambient water concentration should be zero based o the non-threshold assumption for this chemical. However, zero level may na be attainable at the present time.

Therefore, the levels which may resu incremental increase of cancer risk. c the lifetimes are estimated at 10<sup>-1</sup>, 10 and 10<sup>-1</sup>. The corresponding criteria

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1.9 µg/1 0.19 µg/1 and 0.019 µg/1 respectively. If the above estimates are made for consumption of aquatic organisms only. excluding consumption of water, the levels are 157  $\mu$ g/l, 15.7  $\mu g/l$ , and 1.57  $\mu g/l$  respectively. Other concentrations representing different risk levels may be calculated by use of the Guidelines. The risk estimate range is presented for information purposes and does not represent an Agency judgment on an "acceptable" risk level.

## -Heptachlor

## Freshwater Aquotic Life

For heptachlor the criterion to protect freshwater aquatic life as derived using the Guidelines is 0.0038 µg/l as a 24hour average and the concentration should not exceed 0.52  $\mu$ g/l at any time.

## Saltwater Aquatic Life

For heptachlor the criterion to protect saltwater aquatic life as derived using the Guidelines is 0.0036  $\mu$ g/l as a 24hour average and the concentration should not exceed 0.053  $\mu$ g/l at any and the second second time. . -

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# Human Health

For the maximum protection of human health from the potential carcinogenic effects due to exposure of heptachlor through ingestion of contaminated water and contaminated aquatic organisms. the ambient water concentration should be zero based on the non-threshold assumption for this chemical. However, zero level may not be attainable at the present time. Therefore, the levels which may result in incremental increase of cancer risk, over the lifetimes are 'estimated at 10<sup>-4</sup>, 10<sup>-4</sup>, and 10<sup>-7</sup>. The corresponding criteria are 2.78 ng/l, 28 -ng/l, and .028 ng/l, respectively. If the above estimates are made for consumption of aquatic organisms only, excluding consumption of water, the levels are 2.85 ng/l, .29 ng/l, and .029 ng/l. respectively. Other concentrations representing different risk levels may be calculated by use of the Guidelines. The risk estimate range is presented for information purposes and does not represent an Agency judgment on an "acceptable" risk level.

## Hexachlorobutadiene

## Freshwater Aquatic Life

The available data for hexachlorobutadiene indicate that acute and chronic toxicity to freshwater aquatic life occur at concentrations as low as 90 and 9.3  $\mu$ g/L respectively, and would occur at lower concentrations among species that are more sensitive than those tested.

# Saltwater Aquatic Life

The available data for hexachlorobutadiene indicate that acute toxicity to saltwater equatic life occurs at concentrations as low as  $32 \mu g/l$  and would occur at lower concentrations among species that are more sensitive that those tested. No data are available concerning the chronic toxicity of hexachlorobutadiene to sensitive saltwater aquatic life

# Human Health

For the maximum protection of human health from the potential carcinogenic effects due to exposure of hexachlorobutadiene through ingestion of contaminated water and contaminated aquatic organisms, the ambient water concentration should be zero based on the non-threshold assumption for this chemical. However, zero level may not be attainable at the present time. Therefore, the levels which may result in incremental increase of cancer risk, over the lifetimes are estimated at 10<sup>-4</sup>, 10<sup>-4</sup>, and 10<sup>-7</sup>. The corresponding criteria are 4.47  $\mu$ g/l, 0.45  $\mu g/l$  and 0.045  $\mu g/l$  respectively. If the above estimates are made for consumption of aquatic organisms only, excluding consumption of water, the levels are 500  $\mu$ g/l, 50  $\mu$ g/l, and 5  $\mu$ g/l respectively. Other concentrations representing different risk levels may be calculated by use of the Guidelines. The risk estimate range is presented for information purposes and does not represent an Agency judgment on an "acceptable" risk level.

## Hexachlorocyclobexane

# Lindane

## Freshwater Aquatic Life

For Lindane the criterion to protect freshwater aquatic life as derived using the Guidelines is 0.080 µg/l as a 24-hour average and the concentration should not exceed 2.0  $\mu g/l$  at any time.

## Saltwater Aquatic Life

For saltwater aquatic life the concentration of lindane should not exceed 0.16  $\mu$ g/l at any time. No data are available concerning the chronic toxicity of lindane to sensitive saltwater aquatic life. 11

#### BHC

#### Freshwater Aquatic Life

The available date for a mixture of isomers of BHC indicate that acute toxicity to freshwater aquatic life occurs at concentrations as low as 100  $\mu$ g/l and would occur at lower concentrations among species that are more sensitive than those tested. No data are available

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concerning the chrome toxicity of a mixture of isomers of BHC to sensitive freshwater aquatic life.

#### Saltwater Aquatic Life

The available date for a mixture of isomers of BHC indicate that scate toxicity to saltwater acuatic life occa at concentrations as low as 0.34 µg/l and would occur at lower

concentrations among species that are more sensitive than those tested. No data are available concerning the chronic toxicity of a mixture of isomers of BHC to sensitive saltwater aquatic life

#### Human Health

For the maximum protection of human health from the potential carcinogen: effects due to exposure of alpha-HCi through ingestion of contaminated water and contaminated aquatic organisms. the ambient water concentration sho be zero based on the non-threshold assumption for this chemical. However, zero level may not be attainable at the present time. Therefore, the levels w may result in incremental increase of cancer risk, over the lifetimes are estimated at 10", 10", and 10". The corresponding criteria are 92 ng/L 9.1 ng/L and .92 ng/L respectively. If the above estimates are made for consumption of equatic organisms only. excluding consumption of water, the levels are 310 ng/L 31.0 ng/L and 3. ng/l respectively. Other concentratio... representing different risk levels may be calculated by use of the Guidelines. risk estimate range is presented for information purposes and does not represent an Agency judgment on an 'acceptable" risk level

For the maximum protection of hur health from the potential carcinogenic effects due to exposure of beta-HCH through ingestion of contaminated wet and contaminated aquatic organisms the ambient water concentration sho be zero based on the non-threshold assumption for this chemical. However zero level may not be attainable at th present time. Therefore, the levels wit may result in incremental increase of cancer risk, over the lifetimes are estimated at 10", 10", and 10". The corresponding criteria are 163 ng/L 18 ng/l. and 1.83 ng/l, respectively. If the above estimates are made for consumption of equatic organisms on excluding consumption of water, the levels are 547 ng/l, 54.7 ng/L and 5 47 ng/L respectively. Other concentrations representing different risk levels may calculated by use of the Guidelines T risk estimate range is presented for information purposes and does not

represent an Agency judgment on an "acceptable" risk level.

For the maximum protection of human health from the potential carcinogenic effects due to exposure of tech-HCH through ingestion of contaminated water and contaminated squatic organisms. the ambient water concentration should be zero based on the non-thushold assumption for this chemical. However, zero level may not be attainable at the present time. Therefore, the levels which may result in incremental increase of cancer risk, over the lifetimes are estimated at 10", 10", and 10". The corresponding criteria are 123 ng/l, 12.3 ng/L and 1.23 ng/L respectively. If the above estimates are made for consumption of aquatic organisms only.

excluding consumption of water, the levels are 414 ng/l, 41.4 ng/l, and 4.14 ng/l, respectively. Other concentrations representing different risk levels may be calculated by use of the Guidelines. The risk estimate range is presented for information purposes and does not represent an Agency judgment on an "acceptable" risk level.

For the maximum protection of human health from the potential carcinogenic effects due to exposure of gamma-HCH through ingestion of contaminated water and contaminated aquatic organisms. the ambient water concentrations should be zero based on the nonthreshold assumption for this chemical. However, zero level may not be attainable at the present time.

Therefore, the levels which may result in incremental increase of cancer risk over the lifetime are estimated at  $10^{-8}$ ,  $10^{-9}$ , and  $10^{-7}$ . The corresponding criteria are . 186 ng/l, 18.8 ng/l, and 1.86 ng/l.

respectively. If the above estimates are made for consumption of aquatic organisms only, excluding consumption of water, the levels are 625 ng/L 62.5 ng/L 62.5 ng/L respectively. Other concentrations representing different risk levels may be calculated by use of the Gudelines. The risk estimate rangeis presented for information purposes and does not represent an Agency judgment on an "acceptable" risk level.

Using the present guidelines, a satisfactory criterion cannot be derived at this time due to the insufficiency in cothe available data for delta-HCH.

Using the present guidelines, a satisfactory criterion cannot be derived at this time due to the insufficiency in the available data for epsilon-HCH.

#### Haxachlorocyclopentadiene

Freshwater Aquatic Life

The available data for hexachlorocyclopentadiene indicate that acute and chronic toxicity to freshwater equatic life occurs at concentrations as low as 7.0 and 5.2  $\mu$ g/L respectively, and would occur at lower concentrations among species that are more sensitive than those tested.

## Saltwater Aquatic Life

The available data to hexachlorocyclopentadiene indicate that acute toxicity to saltwater aquatic life occurs at concentrations as low as 7.0  $\mu$ g/l and would occur at lower concentrations among species that are more sensitive than those tested. No data are available concerning the chronic toxicity of hexachlorocyclopentadiene to sensitive saltwater aquatic life.

### Human Health

For comparison purposes, two approaches were used to derive criterion levels for hexachlorocyclopentadiene. Based on available toxicity data, for the

protection of public health, the derived level is 206  $\mu$ g/L Using available organoleptic data. for controlling undesirable taste and odor quality of ambient water, the estimated level is 1.0  $\mu$ g/L It should be recognized that organoleptic data as a basis for establishing a water quality criterion have limitations and have no demonstrated relationship to potential adverse human fiealth effects.

# Isophorone - ---

## Freshwater Aquatic Life

The available data for isophorone indicate that acute toxicity to freshwater aquatic life ocurs at concentrations as low as  $117,000 \mu g/l$  and would occur at lower concentrations among species that are more sensitive than those tested. No data are available concerning the chronic toxicity of isophorone to sensitive freshwater aquatic life.

#### Saltwater Aquatic Life

The available data for isophorone indicate that acute toxicity to saltwater aquatic life occurs at concentrations aslow as 12.900  $\mu$ g/l and would occur at lower concentrations among species that are more sensitive than those tested. No data are available concerning the chronic toxicity of isophorone to sensitive saltwater aquatic life.

### Human Health

For the protection of human health from the toxic properties of isophorone ingested through water and contaminated aquatic organisms, the ambient water criterion is determined to be 5.2 mg/L<sup>-1</sup>

For the protection of human health from the toxic properties of isophorone

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ingested through contaminated aquatic organisms alone, the ambient water criterion is determined to be 520 mg/L

## Lead

## Freshwater Aquatic Life

For total recoverable lead the criterion (in  $\mu g/l$ ) to protect freshwater a, uatic life as derived using the Guidelines is the numerical value given by e(2.35[In(hardness)]-0.48) as a 24hour average and the concentration (in  $\mu g/l$ ) should not exceed the numerical value given by e(1.22[In(hardness)]-0.47) at any time. For example, at hardnesses of 50, 100, and 200 mg/l as CaCO<sub>5</sub> the criteria are 0.75, 3.8, and 20 µg/l. respectively, as 24-hour averages, and the concentrations abould not exceed 74. 170, and 400 µg/l, respectively, at any time.

## Saltwater Aquatic Life

The available data for total recoverable lead indicate that acute and chronic toxicity to saltwater aquatic life occur at concentrations as low as 668 and 25  $\mu$ g/L respectively, and would occur at lower concentrations among species that are more sensitive than those tested.

#### Human Health

The ambient water quality criterion for lead is recommended to be identical to the existing drinking water standard which is 50  $\mu g/l$ . Analysis of the toxic effects data resulted in a calculated level which is protective to human health against the ingestion of contaminated water and contaminated aquatic organisms. The calculated value is comparable to the present standard. For this reason a selective criterion based on exposure solely from consumption of 6.5 grams of aquatic organisms was not derived.

# Mercury

#### Freshwater Aquatic Life

For total recoverable mercury the criterion to protect freshwater aquatic life as derived using the Guidelines is  $0.00057 \mu g/l$  as a 24-hour average and the concentration should not exceed  $0.0017 \mu g/l$  at any time.

## Saltwater Aquatic Life

For total recoverable mercury the criterion to protect saltwater aquatic life as derived using the Guidelines is 0.025  $\mu g/l$  as a 24-hour average and the concentration should not exceed 3.7  $\mu g/l$  at any time.

#### Human Health

For the protection of human health from the toxic properties of mercury

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For the protection of human health from the toxic properties of mercury ingested through contaminated aquatic organisms alone, the ambient water criterion is determined to be 146 ng/L

Note.—These values include the consumption of freshwater, estuarine, and marine species.

#### Naphthalape

## Freshwater Aquatic Life

The available data to naphthalene indicate that acute and chronic toxicity to freshwater aquatic life occur at concentrations as low as 2,300 and 620  $\mu$ g/l. respectively, and would occur at lower concentrations among species that are more sensitive than those tested.

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#### Saltwater Aquatic Life

The available data for naphthalene indicate that acute toxicity to saltwater aquatic life occurs at concentrations as low as 2.350  $\mu$ g/l and would occur at lower concentrations among species that are more sensitive than those tested. No data are available concerning the chronic toxicity of naphthalene to sensitive saltwater aquatic life.

## Human Health

Using the present guidelines, a satisfactory criterion cannot be derived at this time due to the insufficiency in ... the available data for naphthalene.

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#### Nickel

# Freshwater Aquatic Life

For total recoverable nickel the criterion (in  $\mu g/l$ ) to protect freshwater aquatic life as derived using the Guidelines is the numerical value given by e(0.76 [In (bardness)] + 1.06) as a 24hour average and the concentration (in  $\mu g/l$ ) should not exceed the numerical value given by e(0.76[In (bardness)] + 4.02] at any time. For example, at hardnesses of 50, 100, and 200 mg/l as CaOOs the criteria are 56, 96, and 160  $\mu g/l$ , respectively, as 24-bour averages, and the concentrations should not exceed 1.100, 1.800, and 3.100  $\mu g/l$ , respectively, at any time.

#### Saltwater Aquatic Life

For total recoverable nickel the criterion to protect saltwater aquatic life as derived using the Guidelines is 7.1  $\mu g/l$  as a 24-hour average and the concentration should not exceed 140  $\mu g/l$  at any time.

## Human Health

For the protection of human health from the toxic properties of nickel ingested through water and contaminated aquatic organisms, the ambient water criterion is determined to -be 13.4 µg/L

For the protection of human health from the Toxic properties of nickel ingested through contaminated aquatic organisms alone, the ambient water criterion is determined to be  $100 \mu g/L$ 

## Nitrobenzene

## Freshwater Aquatic Life

The available data for nitrobenzene indicate that acute toxicity to freshwater aquatic life occurs at concentrations as low as 27.000 µg/l and would occur at lower concentrations among species that are more sensitive than those tested. No definitive data are available concerning the chronic toxicity of nitrobenzene to sensitive freshwater aquatic life.

## Saltwater Aquatic Life

The available data for nitrobenzene indicate that acute toxicity to saliwater aquatic life occurs at concentrations as low as 5,680  $\mu$ g/l and would occur at lower concentrations among species that are more sensitive than those tested. No data are available concerning the chromic toxicity of nitrobenzene to sensitive saltwater aquatic life.

# Human Health

For comparison purposes, two approaches were used to derive criterion levels for nitrobenzene. Besed on available toxicity data, for the protection of public health, the derived level is 19.8 mg/l. Using available organoleptic data, for controlling undesirable taste and odor quality of ambient water, the estimated level is 30  $\mu g/L$  it should be recognized that organoleptic data as a basis for establishing a water quality criteria have limitations and have no demonstrated relationship to potential adverse human health-effects.

#### Nitrophenols

#### Freshwater Aquatic Life

The available data for nitrophenols indicate that acute toxicity to freshwater aquatic life occurs at concentrations as low as 230  $\mu$ g/l and would occur at lower concentrations among species that are more sensitive than those tested. No data are available concerning the chronic toxicity of nitrophenols to sensitive freshwater aquatic life but toxicity to one species of algae occurs at concentrations as low as 150  $\mu$ g/L

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## Saltwater Aquatic Life

The available data for nitrophenols indicate that acute toxicity to saltwater aquatic life occurs at concentrations at low as 4.850  $\mu$ g/l and would occur at lower concentrations among species that are more sensitive than those tested. No data are available concerning the chronic toxicity of nitrophenols to sensitive saltwater aquatic life.

## Human Health

For the protection of human health from the toxic properties of 2.4-dinitrocresol ingested through water and contaminated aquatic organisms, the ambient water criterion is determined be 13.4  $\mu$ g/L

For the protection of human health from the toxic properties of 2.4-dimitrocresol ingested through contaminated aquatic organisms alone, the ambient water criterion is determined to be 765  $\mu$ g/L

For the protection of human health from the toxic properties of dinitrophenol ingested through water and contaminated aquatic organisms, the ambient water criterion is determined to be 70 µg/L

For the protection of human health from the toxic properties of dinitrophenol ingested through contaminated equatic organisms alon the ambient water criterion is determined to be 14.3 mg/l.

, Using the present guidelines, a satisfactory criterion cannot be deriv at this time due to the insufficiency in the available data for monomurophenol.

Using the present guidelines, a satisfactory criterion cannot be derivat this time due to the insufficiency in the available data for tri-nitrophenol.

#### Nitrosamines

#### Freshwater Aquatic Life

The available data for nitrosamines indicate that acute toxicity to freshw aquatic life occurs at concentrations low as 5.850  $\mu$ g/l and would occur at lower concentrations among species that are more sensitive than those tested. No data are available concerthe chronic loxicity of nitrosamines to sensitive freshwater aquatic life.

### Soltwater Aquatic Life

The available data for nitrosamines indicate that acute toxicity to saltwater aquatic life occurs at concentrations low as 3.300.000  $\mu$ g/l and would occlower concentrations among species that are more sensitive than those tested. No data are available concerthe chronic toxicity of nitrosamines sensitive saltwater aquatic life

# Federal Register / Vol. 45, No. 231 / Friday, November 28, 1980 / Notices

# Human Health

For the maximum protection of human health from the potential carcinogenic effects due to exposure of nnitrosodimethylamine through ingestion of contaminated water and contaminated aquatic organisms, the ambient water concentration should be zero based on the non-threshold assumption for this chemical. However. zero level may not be attainable at the present time. Therefore, the levals which may result in incremental increase of cancer risk, over the lifetimes are estimated at 10", 10", and 10". The corresponding criteria are 14 ng/l, 1.4 ng/L and .14 ng/L respectively. If the above estimates are made for consumption of aquatic organisms only, excluding consumption of water, the levels are 160,000 ng/l, 16,000 ng/l, and 1.600 ng/L respectively. Other concentrations representing different risk levels may be calculated by use of the Guidelines. The risk estimate range is presented for information purposes and does not represent an Agency judgment on an "acceptable" risk level.

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For the maximum protection of human health from the potential carcinogenic effects due to exposure of nnitrosodiethylamine through Ingestion of contaminated water and contaminated aquatic organisms, the ambient water concentration should be zero based on the non-threshold assumption for this chemical. However. zero level may not be attainable at the present time. Therefore, the levels which may result in incremental increase of cancer risk, over the lifetimes are estimated at 10<sup>-6</sup>, 10<sup>-6</sup>. and 10". The corresponding criteria are 8 ng/l, 0.8 ng/l, and 0.08 ng/l, respectively. If the above estimates are made for consumption of aquatic organisms only, excluding communition of water, the levels are 12,400 ng/L 1,240 ng/L and 124 ng/L respectively. Other concentrations representing different risk levels may be calculated by use of the Guidelines. The risk estimate range is presented for information purposes and does not represent an Agency judgment on an "acceptable" risk level.

For the maximum protection of human health from the potential carcinogenic effects due to exposure in n-nitrosodi-nbutylamine through ingestion of contaminated water and contaminated aquatic organisms, the ambient water concentration should be zero based on the non-threshold assumption for this chemical. However, zero level may not be attainable at the present time. Therefore, the levels which may result in incremental increase of cancer risk, over the lifetimes are estimated at 10<sup>-6</sup>, 10<sup>-6</sup>, and 10<sup>-7</sup>. The corresponding citeria are 64 ng/l 8.4 ng/l and .064 ng/l, respectively. If the above estimates are made for consumption of aquatic organisms only, excluding consumption of water, the levels are 5.868 ng/l. 587 ng/L and 58.7 ng/L respectively. Other concentrations representing different risk levels may be calculated by use of the Guidetines. The risk estimate range is presented for information purposes and does not represent an Agency judgment on an "acceptable" risk level.

For the maximum protection of human health from the potential carcinogenic effects due to exposure in nnitrosodiphenylamine through ingestion of contaminated water and contaminated aquatic organisms, the ambient water concentration should be zero based on the non-threshold assumption for this chemical. However, zero level may not be attainable at the present time. Therefore, the levels which may result in incremental increase of cancer risk, over the lifetimes are estimated at 10<sup>-5</sup>, 10<sup>-6</sup>, and 10<sup>-7</sup>. The corresponding criteria are 49.000 ng/l 4.900 ng/l and 490 ng/l, respectively. If the above estimates are made for consumption of aquatic organisms only, excluding consumption of water, the levels are 161,000 ng/l, 16,100 ng/l, and 1.610 ng/l. respectively. Other concentrations representing different nisk levels may be calculated by use of. the Guidelines. The risk estimate range is presented for information purposes and does not represent an Agency judgment on an "acceptable" risk level.

For the maximum protection of human health from the potential carcinogenic effects due to exposure in n-~ nitrosopyrrolidine through ingestion of contaminated water and contaminated aquatic organisms, the ambient water concentration should be zero based on the non-threshold assumption for this chemical. However, zero level may not be attainable at the present time. Therefore, the levels which may result in incremental increase of cancer risk, over the lifetimes are estimated at 10<sup>-4</sup>, 10<sup>-4</sup>, and 10"". The corresponding criteria are 160 ng/l 16.0 ng/l and 1.60 ng/l. respectively. If the above estimates are made for consumption of aquatic organisms only, excluding consumption of water, the levels are 919.000 ng/l. 91.900 ng/l, and 9.190 ng/l, respectively. Other concentrations representing different risk levels may be calculated by use of the Guidelines. The risk estimate range is presented for information purposes and does not represent an Agency judgment on an "acceptable" risk level.

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## Pantachlorophenol

# Freshwater Aquatic Life

The available data for pentachlorophenol indicate that acute and chronic toxicity to freshwater aquatic life occur at concentrations as low as 55 and 3.2 µg/l, respectively, and would occur at lower concentrations among species that are more sensitive than those tested.

## Saltwater Aquatic Life

The available data for pentachlorophenol indicate that acute \_\_ and chronic toxicity to saltwater aquatic life occur at concentrations as low as 53 and 34  $\mu$ g/l, respectively, and would occur at lower concentrations among species that are more sensitive than those tested.

## Human Health

For comparison purposes, two approaches were used to derive criterion levels for pentachlorophenol. Based on available toxicity data, for the protection of public health, the derived level is 1.01 mg/l. Using available organoleptic data, for controlling undesirable taste and odor quality of ambient water, the estimated level is 30  $\mu$ g/L lt should be recognized that organoleptic data as a basis for establishing a water quality criterion have limitations and have no demonstrated relationship to potential adverse human health effects.

## Phenol

### Freshwater Aquatic Life

The available data for phenol indicate that acute and chronic toxicity to freshwater aquatic life occur at concentrations as low as 10.200 and 2.560  $\mu$ g/l, respectively, and would occur at lower concentrations among species that are more sensitive than those tested.

#### Saltwater Aquatic Life

The available data for phenol indicate that acute toxicity to saltwater aquatic life occurs at concentrations as low as 5.800 ug/l and would occur at lower concentrations among species that are more sensitive than those tested. No data are available concerning the chronic toxicity of phenol to sensitive saltwater aquatic life.

#### Human Health

For comparison purposes, two approaches were used to derive criterion levels for phenol. Based on available toxicity data, for the protection of public health, the derived level is 3.5 mg/l. Using available organoleptic data, for controlling

undesirable tasts and odor quality of ambient water, the estimated level is 0.3 mg/L It should be recognized that organoleptic data as a basis for establishing a water quality criterion have limitations and have no demonstrated relationship to potential adverse human health effects.

## Phthalate Esters

## Freshwater Aquatic Life

The available data for phihalate esters indicate that acute and chronic toxicity to freshwater aquatic life occur at concentrations as low as 940 and 3 µg/L respectively, and would occur at lower concentrations among species that are more sensitive than those tested.

## Saltwater Aquatic Life

The available data for phthalate esters indicate that acute toxicity to saltwater aquatic life occurs at concentrations as low as 2944 µg/l and would occur at lower concentrations among species that are more sensitive than those tested. No data are available concerning the chronic toxicity of phthalate esters to sensitive saltwater aquatic life but toxicity to one species of algae occurs at concentrations as low as 3.4 µg/l. المراجع والمرجع

Human Health For the protection of human health . from the toxic properties of dimethylphthalate ingested through water and contaminated equatic organisms, the ambient water criterion is determined to be 313 mg/l.

For the protection of human health from the toxic properties of dimethylphthalate ingested through contaminated aquatic organisms alone, the ambient water criterion is determined to be 2.9 g/L

For the protection of human healthfrom the taxic properties of diethylphthalate ingested through water and contaminated aquatic organisms, the ambient water criterion is determined to be 350 mg/l.

For the protection of human health from the toxic properties of diethylphthalate ingested through contaminated aquatic organisms alone, the ambient water criterion is determined to be 1.8 g/L

For the protection of human health from the toxic properties of dibuty)phthalate ingested through water and contaminated aquatic organisms, the ambient water criterion is determined to be 34 mg/L

For the protection of human health from the toxic properties of dibutylphthalate ingested through

contaminated aquatic organisms alone, the ambient water criterion is determined to be 154 mg/l.

For the protection of human health from the toxic properties of di-Zethylhexyl-phthalate ingested through water and contaminated aquatic organisms, the ambient water criterion is determined to be 15 mg/L

For the protection of human health from the toxic properties of di-2ethylhexyl-phthalate ingested through contaminated aquatic organisms alone. the ambient water criterion is determined to be 50 mg/l.

#### **Polychlorinated Biphenyis**

## **Preshwater Aquatic Life**

For polychlorinated biphenvis the criterion to protect freshwater aquatic life as derived using the Guidelines is 0.014 µg/l as a 24-hour average. The available data indicate that acute toxicity to freshwater aquatic life probably will only occur at concentrations above 2.0 µg/l and that the 24-hour average should provide adequate protection against acute toxicity.

# Saltwater Aquatic Live

For polychlorinated hiphenyls the criterion to protect saltwater aquatic life as derived using the Guidelines is 0.030 µg/l as a 24-hour average. The available data indicate that acute toxicity to saltwater aquafic life probably will only occur at concentrations above 10 µg/l and that the 24-hour average should provide adequate protection against ÷....

# Human Health

For the maximum protection of human health from the potential carcinogenic effects due to exposure of PCBs through ingestion of contaminated water and contaminated aquatic organisms, the ambient water concentration should be zero based on the non-threshold assumption for this chemical. However, zero level may not be attainable at the present time. Therefore, the levels which may result in incremental increase of cancer risk over the lifetime are estimated at 10", 10", and 10". The corresponding criteria are .79 ng/l, 0.79 ing/L and .0079 ng/L respectively. If the above estimates are made for consumption of equatic organisms only, excluding consumption of water, the levels are .79 ng/L .079 ng/L and .0079 ng/l. respectively. Other concentrations representing different risk levels may be calculated by use of the Guidelines. The risk estimate range is presented for information purposes and does not

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represent an Agency judgment on an "acceptable" risk level.

Polynuclear Aromatic Hydrocarbons (PAHs)

## Freshwater Aquatic Life

The limited freshwater data base available for polynuclear aromatic hydrocarbons, mostly from short-tern bioconcentration studies with two compounds, does not permit a statem. concerning acute or chronic toxicity.

#### Saltwater Aquatic Life

The available data for polynuclear aromatic hydrocarbons indicate that acute toxicity to saltwater aquatic life occurs at concentrations as low as 30 ug/l and would occur at lower concentrations among species that are more sensitive than those tested. No data are available concerning the chronic toxicity of polynuclear arome hydrocarbons to sensitive saltwater aquatic life.

#### Human Health

For the maximum protection of human health from the potential carcinogenic effects due to exposure of PAHs throu ingestion of contaminated water and contaminated aquatic organisms, the ambient water concentration should be zero based on the non-threshold assumption for this chemical. Howeve zero level may not be attainable at the present time. Therefore, the levels which may result in incremental increase of cancer tisk over the lifetime are estimated at 10<sup>-4</sup>, 10<sup>-4</sup>, and 10<sup>-7</sup>. The corresponding criteria are 28 ng/l, 2.8 ng/L and .28 ng/L respectively. If the above estimates are made for consumption of aquatic organisms on . excluding consumption of water, the levels are 311 ng/L 31.1 ng/L and 3.11 ng/l. respectively. Other concentratio representing different risk levels may calculated by use of the Guidelines. The risk estimate range is presented for information purposes and does not represent an Agency judgment on an 'acceptable" risk level

#### Selenium

## Freshwater Aquatic Life

For total recoverable inorganic selenite the criterion to protect freshwater aquatic life as derived usu the Guidelines is 95 µg/l as a 24-hour average and the concentration should not exceed 260 µg/l at any time.

The available data for morganic selenate indicate that acute toxicity to freshwater aquatic life occurs at concentrations as low as 760 µg/l and would occur at lower concentrations among species that are more sensitive than those tested. No data are available concerning the chronic toxicity of inorganic selenate to sensitive freshwater aquatic life.

# Saltwater Aquatic Life

For total recoverable inorganic selenite the criterion to protect saltwater aquetic life as derived using the Guidelines is  $54 \ \mu g/l$  as a 24-hour average and the concentration should not exceed 410  $\mu g/l$  at any time.

No data are available concerning the loxicity of inorganic selenate to saltwater aquatic life.

## Human Health

The ambient water quality criterion for selenium is recommended to be identical to the existing drinking water standard which is 10  $\mu$ g/L Analysis of the toxic effects data resulted in a calculated level which is protective of human health against the ingestion of contaminated water and contaminated aquatic organisms. The calculated value is comparable to the present standard. For this reason a selective criterion based on exposure solely from consumption of 6.5 grams of aquatic organisms was not derived.

#### - . Silver

# Freshwater Aquatic Life

For freshwater aquatic life the concentration (in  $\mu g/l$ ) of total recoverable silver should not exceed the numerical value given by "e[1.72(ln (hardness)-6.52)]" at any time. For example, at hardnesses of 50, 100, 200 mg/l as CaCO- the concentration of total recoverable silver should not exceed 1.2, 4.1, and 13  $\mu g/l$ , respectively, at any time. The available data indicate that chronic toxicity to freshwater aquatic life may occur at concentrations as low as 0.12  $\mu g/l$ .

# Saltwater Aquatic Life

For saltwater aquatic life the concentration of total recoverable silver should not exceed 2.3 µg/l at any time. No data are available concerning the chronic toxicity of silver to sensitive saltwater aquatic life.

# Human Health

The ambient water quality criterion for silver is recommended to be identical to the existing drinking water standard which is 50 µg/l. Analysis of the toxic effects data resulted in a calculated level which is protective of human health against the ingestion of contaminated water and contaminated aquatic organisms. The calculated value is comparable to the present standard. For this reason a selective criterion based on exposure solely from consumption of 6.5 grams of aquatic organisms was not derived.

## Tetrachloroethylene

# Freshwater Aquatic Life

The evailable data for tetrachioroethylene indicate that acute and chronic toxicity to freshwater aquatic life occur at concentrations as low as 5.280 and 840  $\mu$ g/l, respectively, and would occur at lower concentrations among species that are more sensitive than those tested.

## Saltwater Aquatic Life

The available data for tetrachloroethylene indicate that acute and chronic toxicity to saltwater aquatic life occur at concentrations low as 10,200 and 450  $\mu g/l$ , respectively, and would occur at lower concentrations among species that are more sensitive than those tested.

#### Human Health

For the maximum protection of human health from the potential carcinogenic effects due to exposure of tetrachloroethylene through ingestion of contaminated water and contaminated aquatic organisms, the ambient water concentration should be zero based on the non-threshold assumption for this chemical. However, zero level may not be attainable at the present time. Therefore, the levels which may result in incremental increase of cancer risk over the lifetime are estimated at 10<sup>-6</sup>, 10<sup>-6</sup>, and 10<sup>-7</sup>. The corresponding criteria are  $8 \mu g/l$ ,  $.8 \mu g/l$ , and  $.08 \mu g/l$ , respectively. If the above estimates are made for consumption of aquatic organisms only, excluding consumption of water, the levels are 88.5 µg/l, 8.85 µg/l, and .88 µg/L respectively. Other concentrations representing different risk levels may be calculated by use of the Guidelines. The risk estimate range is presented for information purposes and does not represent an Agency judgment on an "acceptable" risk level.

## Thallium 👘

# Freshwater Aquatic Life

The available data for thallium indicate that acute and chronic toxicity to freshwater aquatic life occur at concentrations as low as 1.400 and 40  $\mu e/l$ , respectively, and would occur at lo ver concentrations among species that are more sensitive than those tested. Toxicity to one species of fish occurs at concentrations as low as 20  $\mu g/l$  after 2.600 hours of exposure.

# Saltwater Aquatic Life

The available data for thallium indicate that acute toxicity to saltwater

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aquatic life occurs at concentrations as low as 2,130  $\mu$ g/l and would occur at lower concentrations among species that are more sensitive than those tested. No data are available concerning the chronic toxicity of thallium to sensitive saltwater aquatic life.

#### Human Health

For the protection of human health from the toxic properties of thallium ingested through water and contaminated aquatic organisms, the ambient water criterion is determined to be 13  $\mu$ g/l.

For the protection of human health from the toxic properties of thallium ingested through contaminated aquatic organisms alone, the ambient water criterion is determined to be 48  $\mu$ g/L

#### Toluene -

#### Freshwater Aquatic Life

The available data for toluene indicate that acute toxicity to freshwater aquatic life occurs at concentrations as low as 17,500  $\mu$ g/l and would occur at lower concentrations among species that are more sensitive than those tested. No data are available concerning the chronic toxicity of toluene to sensitive freshwater aquatic life.

### Saltwater Aquatic Life

The available data for toluene indicate that acute and chronic toxicity to saltwater aquatic life occur at concentrations as low as 6.300 and 5.000  $\mu$ g/l. respectively, and would occur at lower concentrations among species that are more sensitive than those tested.

#### Human Health

For the protection of human health from the toxic properties of toluene ingested through water and contaminated aquatic organisms. the ambient water criterion is determined to be 14.3 mg/L

 For the protection of human health from the toxic properties of toluene ingested through contaminated aquatic organisms alone, the ambient water criterion is determined to be 424 mg/l.

## Toxaphene

## Freshwater Aquatic Life

For toxaphene the criterion to protect freshwater aquatic life as derived using the Guidelines is  $0.013 \ \mu g/l$  as a 24-hour average and the concentration should not exceed 1.8  $\mu g/l$  at any time.

#### Saltwater Aquatic Life

For saltwater aquatic life the concentration of toxaphene should not exceed 0.070 µg/l at any time. No data

are available concerning the chronic toxicity of toxaphene to sensitive saltwater aquatic life.

## Human Health

For the maximum protection of human bealth from the potential carcinogenic effects due to exposure of toxaphene through ingestion of contaminated water and contaminated aquatic organisms, the ambient water concentration should be zero based on the non-threshold assumption for this chemical. However, zero level may not be attainable at the present time. Therefore, the levels which may result in incremental increase of cancer risk over the lifetime are estimated at 10<sup>-5</sup>, 10<sup>-6</sup>, and 10<sup>-7</sup>. The corresponding criteria are 7.1 ng/L .71 ng/L and .07 ng/L respectively. If the above estimates are made for consumption of aquatic organisms only, excluding consumption of water, the levels are 7.3 ng/L, 73 ng/L, and .07 ng/L, respectively. Other concentrations representing different risk levels may be calculated by use of the Guidelines. The risk estimate range is presented for information purposes and does not represent an Agency judgment on an "acceptable" risk level.

## Trichloroethylene

## Freshwater Aquatic Life

13. The available data for - trichloroethylene indicate that acute toxicity to freshwater aquatic life occurs at concentrations as low as 45,000  $\mu g/1$ and would occur at lower concentrations among species that are more sensitive than those tested. No data are available concerning the chronic toxicity of trichloroethylene to sensitive freshwater aquatic life but adverse behavioral effects occurs to one species at concentrations as low as . . · · 11 Tan- 1 21.900 µg/L. 1 . . . . A.

# Saltwater Aquatic Life 🚊 🧤

The available data for trichloroethylene indicate that acute toxicity to saltwater aquatic life occurs at concentrations as low as 2.000  $\mu$ g/l and would occur at lower concentrations among species that are more sensitive than those tested. No data are available concerning the chronic toxicity of trichloroethylene to sensitive saltwater aquatic life.

## Human Health

For the maximum protection of human health from the potential carcinogenic effects due to exposure of trichloroethylene through ingestion of contaminated water and contaminated aquatic organisms, the ambient water concentration abould be zero based on

the non-threshold assumption for this chemical. However, zero level may not be attainable at the present time. Therefore, the levels which may result in incremental increase of cancer risk over the lifetime are estimated at 10<sup>-1</sup>, 10<sup>-4</sup>, and 10<sup>-1</sup>. The corresponding criteria are 27 µg/L 2.7 µg/L and .27 µg/L respectively. If the above estimates are made for consumption of aquatic organisms only, excluding consumption of water, the levels are 807  $\mu$ g/l, 80.7 µg/L and 8.07 µg/l, respectively. Other concentrations representing different risk levels may be calculated by use of the Guidelines. The risk estimate range is presented for information purposes and does not represent an Agency judgment on an "acceptable" risk level.

## Vinyl Chloride

## Freshwater Aquatic Life

No freshwater organisms have been tested with vinyl chloride and no statement can be made concerning acute or chronic toxicity.

#### Saltwater Aquatic Life

•No saltwater organisms have been tested with vinyl chloride and no statement can be made concerning acute or chronic toxicity.

#### Human Health

For the maximum protection of human health from the potential carcinogenic effects due to exposure of vinyl chloride through ingestion of contaminated water and contaminated aquatic organisms. the ambient water concentration should be zero based on the non-threshold assumption for this chemical. However, zero level may not be attainable at the present time. Therefore, the levels which may result in incremental increase of cancer risk over the lifetime are estimated at 10<sup>-6</sup>, 10<sup>-6</sup>, and 10<sup>-7</sup>. The corresponding criteria are 20 µg/L 2.0  $\mu g/L$  and  $2 \mu g/L$  respectively. If the above estimates are made for consumption of aquatic organisms only, excluding consumption of water, the levels are 5,248  $\mu$ g/l, 525  $\mu$ g/l, and 52.5 µg/L respectively. Other concentrations representing different risk levels may be calculated by use of the Guidelines. The risk estimate range is presented for information purposes and does not represent an Agency judgment on an "acceptable" risk level.

## Zinc ,

## Freshwater Aquatic Life

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For total recoverable zinc the criterion to protect freshwater aquatic life as derived using the Guidelines is  $47 \ \mu g/l$ as a 24-bour average and the concentration (in  $\mu g/l$ ) should not exceed the numerical value given by  $e^{(+3)}$  (in Ourdanni) + 1.00 at any time. For example, at hardnesses of 50, 100, an: 200 mg/l as CaCO<sub>5</sub> the concentration of total recoverable zinc should not exceed 180, 320, and \$70 µg/l at any time.

## Saltwater Aquatic Life

For total recoverable zinc the criterion to protect saltwater equatic life as derived using the Guidelines is 58  $\mu$ g, as a 24-hour average and the concentration should not exceed 170  $\mu$ g/ l at any time.

#### Human Health

Sufficient data is not available for zinc to derive a level which would protect against the potential toxicity this compound. Using available organoleptic data, for controlling undesirable taste and odor quality of ambient water, the estimated level is mg/l. It should be recognized that organoleptic data as a basis for establishing a water quality criteria have limitations and have not demonstrated relationship to potentia... adverse human health effects.

Appendix B—Guidelines for Deriving Water Quality Criteria for the Protect of Aquatic Life and Its Uses

## Introduction

Criteria may be expressed in sever forms. The numerical form is commonly used, but descriptive and procedural forms can be used if numerical criter are not possible or desirable. The purpose of these Guidelines is to describe an objective, internally consistent and appropriate way of deriving numerical water quality crit for the protection of the uses of, as well as the presence of, aquatic organisms.

A numerical criterion might be thought of as an estimate of the high: concentration of a substance in water which does not present a significant risk to the aquatic organisms in the wate: and their uses. Thus the Guidelines  $\varepsilon$ intended to derive criteria which will protect aquatic communities by protecting most of the species and th uses most of the time, but not

# DRINKING WATER

STANDARDS AND HEALTH ADVISORIES

Source:

California State Water Resources Control Board, 1985,

Interim Guidance for Hazardous Substance Site Clean-up, CWRCB Resolution No. 85-26

|                    |                  |               |             |                            |                     |                                                                                   |                                          | Public Agentical |                                                   | 12                 |
|--------------------|------------------|---------------|-------------|----------------------------|---------------------|-----------------------------------------------------------------------------------|------------------------------------------|------------------|---------------------------------------------------|--------------------|
| ſ                  | CA/IC/IO         |               | DRJ         | DRINKING WATER             | ER STANDARDS        |                                                                                   | AND HEALTH ADVISORIES                    | 10               | 1                                                 | of 10              |
| 5                  | CHEMICAL         | EPA<br>MCL    | EPA<br>RMCL | CA DOHS<br>Action<br>Level | acute<br>1 day      | <pre>IIEALTH ADVISORIES (SHARLs) subchronic chroni (no. of days) non-cancer</pre> | NIES (SNARLs)<br>chronic<br>non-cancer c | lc<br>cancer     | EPA<br>NAWOC<br>Non-cancer cancer                 | cancer             |
| 11                 | INORGANICS       |               |             |                            |                     |                                                                                   |                                          |                  |                                                   |                    |
| ~4                 | Aluminum         |               | 5           |                            | 35000*              | 5000(7)                                                                           |                                          |                  |                                                   |                    |
| 44.                | Antimony         |               | 5           |                            |                     |                                                                                   |                                          |                  | 146                                               |                    |
| 1 ***              | Arsenic          | 50            |             |                            |                     |                                                                                   |                                          |                  |                                                   | 2.2 ppt            |
| ، <sup>م</sup> ه ا | Asbestos         |               | s           |                            |                     |                                                                                   |                                          |                  |                                                   | 30,000<br>fibers/1 |
| <u>'</u>           | llarlum          | 0001          |             |                            | 6000 F              |                                                                                   | 47004                                    |                  |                                                   |                    |
|                    | Ueryllium        |               | s           |                            |                     |                                                                                   |                                          |                  |                                                   | 6.8 ppt            |
| • ••••             | Uromide          |               |             |                            | 1400pm <sup>4</sup> | * 224ppin(7)*                                                                     | 2.3ppm <sup>*</sup>                      |                  |                                                   |                    |
|                    | Cadmium          | 10            |             |                            | 150*                | 21(7)*                                                                            | 2 <b>H</b>                               |                  | 10                                                |                    |
|                    | Chloramine       |               |             |                            | 1200*               | 125 (7)*                                                                          |                                          |                  |                                                   |                    |
|                    | Chlorate         |               |             |                            | 125*                | 125 (7)*                                                                          |                                          |                  |                                                   |                    |
| ·· /               | chlor íde        | 250ppmtt      | ++          | 100ppm<br>(CA MCL)         |                     |                                                                                   |                                          |                  |                                                   |                    |
| ····· ? .          | Chlorine Dioxide |               |             |                            | 1200*               | 125 (7)*                                                                          |                                          |                  |                                                   |                    |
|                    | Chlorite         |               |             |                            | 125*                | 125 (7)*                                                                          |                                          |                  |                                                   |                    |
|                    | hromlum          | 50            |             |                            |                     |                                                                                   |                                          |                  | 170000(Cr <sup>+</sup> .<br>50(Cr <sup>+</sup> 6) |                    |
| -                  | opper            | 10001         | 5           |                            |                     |                                                                                   |                                          |                  | 1000                                              |                    |
| ر ـ.               | iyanide          |               | s           |                            | -                   |                                                                                   |                                          |                  | 200                                               |                    |
| <u>+-</u>          | luoride          | 1400-<br>2400 |             |                            |                     |                                                                                   |                                          |                  |                                                   |                    |
| _                  | ſodide           |               |             |                            | 115500              | 16500(7)*                                                                         | *0611                                    |                  |                                                   |                    |
|                    |                  |               |             |                            |                     |                                                                                   |                                          |                  |                                                   |                    |

|                |            | DRI         | NK ING WAT | ER STAN | DRINKING WATER STANDARDS AND HEALTH ADVISORIES  | LTH ADVISORI  | ES                | 2                | 2 ~E 10 |
|----------------|------------|-------------|------------|---------|-------------------------------------------------|---------------|-------------------|------------------|---------|
| CIIENICAL      | EPA<br>MCL | EPA<br>RMCL | ഗല         |         | HEALTH ADVISORIES (SNARLS)<br>subchronic chroni | RIES (SNARLS) | )<br>ic<br>cancer | EPA<br>NAMOC     | Cancer  |
| lron           | 30011      |             | Талаг      | App 1   | I STEP TO OIL                                   |               |                   |                  |         |
| Lead           | 50         |             |            |         |                                                 |               |                   | 50               |         |
| Manganesc      | 5011       | ,           |            |         |                                                 |               |                   |                  |         |
| ticrcury       | 5          |             |            |         |                                                 |               |                   | 144 ppt          |         |
| Nolybdenum     |            | s           |            |         |                                                 |               |                   |                  |         |
| Nickel         |            | 6           |            |         |                                                 |               |                   | 13.4             |         |
| Nitrate (25 N) | 10.0pm     | E           |            |         |                                                 |               |                   |                  |         |
| Selenium       | 10         |             |            |         |                                                 |               |                   | 10               |         |
| Silver         | 50         |             |            |         |                                                 |               |                   | 50               |         |
| Sodium         |            | S           |            |         |                                                 |               |                   |                  |         |
| Strontlum      |            |             |            |         | 8400(7)*                                        |               |                   |                  |         |
| Sulfate        | 250ppm11   | ntt S       |            |         |                                                 |               |                   |                  |         |
| Thallium       |            | s           |            |         |                                                 |               | _                 | 13               |         |
| Uranium        |            |             |            |         |                                                 | 35*           |                   |                  |         |
| Vanadium       |            | s           |            |         |                                                 |               |                   |                  |         |
| 2 inc          | 50001      | S           |            |         |                                                 |               |                   | 5000(tastetodor) | odor)   |
|                |            |             |            |         |                                                 |               |                   |                  |         |

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|---------------------------------------|---------|-------------|----------------------------|----------------|-------------------------------------------------------|------------------------------|--------|-----------------------------------|------------------------------------------------------------------------------------|
| CB/16/10                              |         | DRI         | INKING WAT                 | ER STAN        | DRINKING WATER STANDARDS AND HEALTH ADVISORIES        | LTH ADVISORIE                | s      | £                                 | 3 of 10                                                                            |
| CHEMICAL                              | EPA     | EPA<br>RMCL | CA DOHS<br>Action<br>Level | acute<br>I day | HEALTH ADVISORIES<br>subchronic<br>(no. of days) non- | (SNARLS)<br>chroni<br>cancer | cancer | EPA<br>NAWOC<br>non-cancer cancer | cancer                                                                             |
| ORGANICS                              |         |             |                            |                |                                                       |                              |        |                                   |                                                                                    |
| Acenaphthenc                          |         |             |                            |                |                                                       |                              |        | 20(tasterodor)                    | (or )                                                                              |
| Acrolein                              |         |             |                            |                |                                                       |                              |        | 320                               |                                                                                    |
| Acrylamide                            |         | s           |                            |                |                                                       |                              |        |                                   |                                                                                    |
| Acrylonitrile                         |         |             |                            |                | 35(10)<br>3(30)                                       |                              | • 11 • |                                   | υċ0.0                                                                              |
| Adipates                              |         | 5           |                            |                |                                                       |                              |        |                                   |                                                                                    |
| Alachlor                              |         | S           |                            |                |                                                       |                              |        |                                   |                                                                                    |
| Aldicarb                              |         | 5           | 10                         |                |                                                       | 10                           |        |                                   |                                                                                    |
| Aldrin                                |         |             | 0.05                       |                |                                                       |                              |        |                                   | 0.074ppt                                                                           |
| Atrazine                              |         | \$          |                            |                |                                                       |                              |        |                                   |                                                                                    |
| Baygon                                |         |             | 06                         |                |                                                       |                              |        |                                   |                                                                                    |
| Benzeno                               |         | 0           | 0.10                       |                | 350(7)                                                |                              | 0.67   |                                   | 0.66                                                                               |
| Benzene hexachloride<br>(BHC,Lindane) | υ       |             | 0.70 (↔)<br>0.30 (♠)       | 3500*          | 30(7)*                                                | 0.35                         | 0.54*  |                                   | 9.2ppt (~)<br>16.3ppt ( <b>p</b> )<br>12.3ppt ( <b>f</b> )<br>18.6ppt ( <b>j</b> ) |
| Benzidine                             |         |             |                            |                |                                                       |                              |        |                                   | 0.12ppt                                                                            |
| Benzo(a)pyrene                        |         |             |                            |                | 25(7)                                                 |                              |        |                                   |                                                                                    |
| Bolero(thiobencarb)                   | ļ       |             | 10 10 1<br>(1 tastefodor)  | odor)          |                                                       |                              |        |                                   | 6                                                                                  |
| Bromodichloromethane                  | e 100** |             |                            |                |                                                       |                              |        |                                   |                                                                                    |
| Bromomethane<br>(Methvl bromide)      |         |             |                            |                |                                                       |                              |        |                                   | 61.0                                                                               |
| tite the constraints                  | anes    |             |                            | 1              |                                                       |                              |        |                                   |                                                                                    |
|                                       | )       |             |                            |                |                                                       |                              |        |                                   |                                                                                    |

|                                    |            | DRI         | NKING WAT                  | ER STAN        | DARDS AND HEAL                                                 | NKING WATER STANDARDS AND HEALTH ADVISORIES |             | ¥                                   | ÷,            |
|------------------------------------|------------|-------------|----------------------------|----------------|----------------------------------------------------------------|---------------------------------------------|-------------|-------------------------------------|---------------|
| CHENICAL                           | EPA<br>MCL | EPA<br>RMCL | CA DOHS<br>Action<br>Level | acute<br>1 day | HEALTH ADVISORIES (SNARLS<br>subchronic chron<br>(no. of days) | <u> </u>                                    | c<br>cancer | EPA<br>NAMOC<br>NON-Cancer   cancer | cancer        |
| Captan                             |            |             | 350                        |                | Į                                                              |                                             |             |                                     |               |
| Carbofuran                         |            | S           |                            |                |                                                                |                                             |             |                                     |               |
| Carbon tetrachloride               | - 0 -      | 0           | 5.0                        | 2001           | 20(10)†                                                        |                                             | 0.41        |                                     | 0.40          |
| Catechol                           |            |             |                            | 2200*          |                                                                |                                             |             |                                     |               |
| Chlordane                          |            | S           | 55                         | 63             | 8(10)                                                          | 0                                           | 0.023       |                                     | 0.46ppt       |
| Chlorobenzene                      |            |             |                            |                |                                                                | 72 4.                                       | 4 . / *     | 100 tastesodor)                     | dar)          |
| <pre>bis-(2-chloroethyl)</pre>     |            |             |                            |                |                                                                |                                             |             |                                     | 0.03          |
|                                    | 100**      |             |                            | 22000*         | 3200(7)*                                                       |                                             |             |                                     | 0.19          |
| 0 bis-(2-chlorolsopropyl)          | py1)       |             |                            |                |                                                                |                                             |             | 34.7                                |               |
| Chloromethane<br>(Methyl chloride) |            |             |                            |                |                                                                |                                             |             |                                     | 0.19          |
|                                    |            |             |                            |                |                                                                |                                             |             |                                     | 0.0038<br>ppt |
| 2-Chlorophenol                     |            |             |                            |                |                                                                |                                             |             | 0.1(tastetodur)<br>                 | dur)          |
| J-Chlorophenol                     |            |             |                            |                |                                                                |                                             |             | 0.1(tastesodor)                     | dor)          |
| 4-Chlorophenol                     |            |             |                            |                |                                                                |                                             |             | 0.1(taste6odor)                     | dor)          |
| CIPC                               |            |             | 350                        |                |                                                                |                                             |             |                                     |               |
| Dalapon                            |            | S           |                            |                |                                                                |                                             |             |                                     |               |
| DDT                                |            |             |                            | -              |                                                                |                                             |             |                                     | 0.024ppt      |
| Diazinon                           |            |             | 14                         |                |                                                                |                                             |             |                                     |               |
| Dibromochloromethane               | 001 P      |             |                            | 18000*         |                                                                |                                             |             |                                     | 0.19          |
|                                    |            |             |                            |                |                                                                |                                             |             |                                     |               |

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|                                         | 10.00      | ľ           | II<br>II                   |                                                                                                                 |                                                       |                                          |          |                            |        |
|-----------------------------------------|------------|-------------|----------------------------|-----------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|------------------------------------------|----------|----------------------------|--------|
|                                         |            | DRI         | INKING WATER               |                                                                                                                 | STANDARDS AND HEALTH ADVISORIES                       | TH ADVISORI                              | ES       | ŝ                          | of 10  |
| CIIEMICAL                               | EPA<br>MCL | EPA<br>RNCL | CA DOHS<br>Action<br>Level | acute<br>1 day                                                                                                  | HEALTH ADVISORIES<br>subchronic<br>(no. of days) non- | RIES (SNARLS)<br>chronic<br>non-cancer c | <u> </u> | EPA<br>NAIWC<br>NON-CANCER | cancer |
| 1,2-Dibromo-3-chloro-<br>propane (DHCP) |            | S           | 1.0                        |                                                                                                                 | ·                                                     | 0.050                                    | 0.01     |                            |        |
| 1,2-Dibromoethane                       |            | S           | LOQ(0.05)                  | (                                                                                                               |                                                       |                                          | 0.67ppt  |                            |        |
| Di-n-butyl phthalate                    |            |             |                            |                                                                                                                 |                                                       |                                          |          | 34000                      |        |
| 1,2-Dichlorobenzene                     |            |             | 1304                       | et odor 1                                                                                                       |                                                       | 300                                      |          | 400                        |        |
| I, 3-Dichlorobunzene                    |            |             | 130 + ast                  | 130 ** 130 ** 130 ** 130 ** 130 ** 130 ** 130 ** 130 ** 130 ** 130 ** 130 ** 130 ** 130 ** 130 ** 130 ** 130 ** |                                                       |                                          |          | 400                        |        |
| I,4-Dichlorobenzene                     |            | 057         | (0.3 tas                   | tastesodor                                                                                                      |                                                       | 13)                                      |          | 400                        |        |
| Dichlorobenzidine                       |            |             |                            |                                                                                                                 |                                                       |                                          |          |                            | 6010.0 |
| Dichlorodifluoromethane                 | ane        |             |                            |                                                                                                                 |                                                       |                                          |          |                            | 0.19   |
| I,2-Dichloroethane                      |            | 0           | 1.0                        |                                                                                                                 |                                                       |                                          | 0.61     |                            | 0.94   |
| 1,1-Dichloroethylene                    |            | 0           | L00(.1                     | .4)10001                                                                                                        |                                                       | 701                                      | 0.24     |                            | 0.033  |
| cis-1,2-Dichloro-                       |            |             |                            | 40001                                                                                                           | 400(10)†                                              |                                          |          |                            |        |
| trans-1,2-Dichloro-                     |            |             |                            | 27001                                                                                                           | 270(10)†                                              |                                          |          |                            |        |
| Dichlorofluoromethane                   | 0          |             |                            | 100ppm                                                                                                          | (1) 43ppm(7)                                          | 1.6pm                                    |          |                            |        |
| Dichloromethane                         |            |             |                            |                                                                                                                 |                                                       |                                          |          |                            | 0.19   |
| 2,3-Dichlorophenol                      |            |             |                            |                                                                                                                 |                                                       |                                          |          | 0.04(tastesodor)           | sodor) |
| 2,4-Dichlorophenol                      |            |             |                            |                                                                                                                 |                                                       | 100                                      |          |                            |        |
| 2,5-Dichlorophenol                      |            |             |                            |                                                                                                                 |                                                       |                                          |          | 0.5(tasterodor)            | odor)  |
| 2,6-Dichlorophenol                      |            |             |                            |                                                                                                                 |                                                       |                                          |          | 0.2(tastetodor)            | odor)  |
| 3,4-Dichlorophenol                      |            |             |                            |                                                                                                                 |                                                       |                                          |          | 0.3(tastefodor             | odor)  |
|                                         |            |             |                            |                                                                                                                 | or sum of the three                                   |                                          |          |                            |        |

\*\*Action level is for a single isomer or sum of the three

|                                            |            | DRINI       | NKING WAT           | ER STAN | KING WATER STANDARDS AND HEALTH ADVISORILS      | LTH ADVISORI            | LS     | ٥      |          |
|--------------------------------------------|------------|-------------|---------------------|---------|-------------------------------------------------|-------------------------|--------|--------|----------|
| CHEMICAL                                   | EPA<br>MCL | EPA<br>RMCL | CA DOILS<br>Action  | sute    | HEALTH ADVISORIES (SHARLS)<br>subchronic chroni | UES (SHARLS)<br>chronic |        |        |          |
| 2,4-Dichlorophenoxy-                       | 100        |             | <u>reve 1</u>       | 1 04Y   | Isten to to to                                  | 1011-0411001            | רטוורה |        |          |
| I,2-Dichloropropane                        |            | 5           | 10                  |         |                                                 |                         |        |        |          |
| Dichloropropene                            |            |             |                     |         |                                                 |                         |        | 67     |          |
| Dieldrin                                   |            |             | (50.)001            |         |                                                 |                         |        |        | 0.071ppt |
| Di-(2-cthylhexyl)<br>Abblate or DEUP       |            |             |                     |         |                                                 | 210                     |        | 15000  |          |
| nicthyl phthalate                          |            |             |                     |         |                                                 |                         |        | 150000 |          |
| 1) imethoate                               |            |             | 140                 |         |                                                 |                         |        |        |          |
| 2,4-dimethylphenol                         |            |             | 400<br>(tastekodor) | )r)     |                                                 |                         |        |        |          |
| Dimethylphthalate                          |            |             |                     |         |                                                 |                         |        | 313000 |          |
| 2,4-Dinitro-o-creso                        |            |             |                     |         |                                                 |                         |        | 13.4   |          |
| 2,4-Dinitrophenol                          |            |             |                     |         |                                                 | 110*                    |        |        |          |
| ',4-Dinitrotoluene                         |            |             |                     |         |                                                 |                         |        |        | 0.11     |
| Dinoseb (2-sec-Buty)<br>4.6-dinitrophenol) |            | 5.          |                     |         |                                                 | 39*                     |        |        |          |
| l,4-Dioxane                                |            |             |                     |         | 20(10)                                          |                         |        |        |          |
| Diphenamlde                                |            |             | 40                  |         |                                                 |                         |        |        |          |
| l,2-Diphenylhydrazine                      | ne         |             |                     |         |                                                 |                         |        |        | 0.042    |
| Diquat                                     |            | v.          |                     |         |                                                 |                         |        |        |          |
| Endosulfan                                 |            |             |                     |         |                                                 |                         |        | 74     |          |
| Endothall                                  |            | S           |                     |         |                                                 |                         |        |        |          |

|   | 7 of 10                                     | c<br>cancer                                                               |        |                 |        |              |                    |                 |              |              |            | 0.28        |                     | 0.72              | 0.45                | odor)                    |                 |           |             |                   | 1 2 . Jppt         |
|---|---------------------------------------------|---------------------------------------------------------------------------|--------|-----------------|--------|--------------|--------------------|-----------------|--------------|--------------|------------|-------------|---------------------|-------------------|---------------------|--------------------------|-----------------|-----------|-------------|-------------------|--------------------|
|   | 7                                           | EPA<br>NAMOC<br>non-cancer   cancer                                       |        |                 |        | 1400         |                    |                 | 42           |              |            |             |                     |                   |                     | 206  <br>1.0(taste6odor) |                 |           | 5200        |                   |                    |
|   | IES                                         | )<br>ic<br>cancer                                                         |        |                 |        |              | 0.67ppt            |                 |              |              |            |             |                     | 0.54*             |                     |                          |                 |           |             |                   |                    |
|   | TH ADVISOR.                                 | (IES (SHARLS)<br>chronic<br>non-cancer c                                  |        |                 |        |              |                    | 55001           |              |              |            |             |                     | 0.35              |                     |                          | 0.35            |           |             |                   |                    |
| 1 | IKING WATER STANDARDS AND HEALTH ADVISORIES | HEALTH ADVISORIES (SHARLS<br>subchronic chron<br>(no. of days) non-cancer |        | 530(7)*         |        |              |                    |                 |              |              |            |             |                     | 30(7)*            |                     |                          |                 | 4000(10)1 |             | 1000(10)          |                    |
| 1 | ER STAN                                     | acute<br>1 day                                                            |        | 840*            |        |              |                    | 190001          |              | 3044         |            |             |                     |                   |                     |                          |                 | 129001    | -           | 1000              |                    |
|   | NKING WATE                                  | CA DOHS<br>Action<br>Level                                                |        |                 | 35     |              | (50.)QO1           |                 |              | 30           | 500        | 0.02        | 0.10                |                   |                     |                          |                 |           |             |                   |                    |
| Ţ | DRIN                                        | EPA<br>RMCL                                                               |        | s               |        |              | 5                  |                 |              |              | 5          |             |                     |                   |                     | s                        |                 |           |             |                   |                    |
| 1 |                                             | EPA                                                                       | 0.2    |                 |        |              |                    |                 |              |              |            |             |                     |                   |                     |                          |                 |           |             |                   | 4                  |
|   |                                             | Счентсас                                                                  | Endrin | Epichlorohydrin | Ethion | Ethylbenzene | Ethylene dibromide | Ethylenu glycol | Fluoranthenc | Formaldehyde | Glyphosate | lleptachlor | lleptachlor epoxide | Hexachlorobenzenc | Hexachlorobutadiene | Hexachlorocyclo-         | Hexachlorophene | n-Hexane  | I sophorone | Isopropyl alcohol | Lindane(gamma-BHC) |

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|                               |            | DRINK         | NKING WAT                  | ER STAN        | ING WATER STANDARDS AND NEALTH AUVISORIES                            | TH ADVISORI                              | ES                | 6                                 | of 10    |
|-------------------------------|------------|---------------|----------------------------|----------------|----------------------------------------------------------------------|------------------------------------------|-------------------|-----------------------------------|----------|
| снемісас                      | EPA<br>MCL | E P A<br>RMCL | CA DOHS<br>Action<br>Level | acute<br>1 day | HEALTH ADVISORIES (SNARLS)<br>subchronic<br>(no. of days) non-cancer | ULES (SNARLS)<br>chronic<br>non-cancer c | )<br>ic<br>cancer | EPA<br>NAWOC<br>non-cancer concer | Cancel   |
| Pentachlorobenzens            |            |               |                            |                |                                                                      |                                          |                   | 4                                 |          |
| Pentachlorophenol             |            | s.            | 30                         |                |                                                                      |                                          |                   |                                   |          |
| Picloram                      |            | s             |                            |                |                                                                      | 1050*                                    |                   |                                   |          |
| Phenol                        |            |               | 1.0                        |                |                                                                      |                                          |                   | 3500<br>300(tastesodor)           | dor)     |
| Phthalates                    |            | 5             |                            |                |                                                                      |                                          |                   |                                   |          |
| Polychlorinated               |            | v.            |                            | 125            | 12.'(1u)<br>1(30)                                                    |                                          | r. o              |                                   | July .   |
| Polynuclear Aromatic          |            | s             |                            |                |                                                                      |                                          |                   |                                   | 2 . nppc |
| Resorcinol                    |            |               |                            | 11700          | 500*                                                                 |                                          |                   |                                   |          |
| Rotenone                      |            |               |                            |                |                                                                      | 14*                                      |                   |                                   |          |
| Simazine                      |            | s             |                            |                |                                                                      |                                          |                   |                                   |          |
| Styrenu                       |            |               |                            |                |                                                                      | 1300                                     |                   |                                   |          |
| Terrachlor                    | (ausi      |               | 6.0                        |                |                                                                      |                                          |                   | 01                                |          |
| 1,2,4,5-Tetrachloro-          |            |               |                            |                |                                                                      |                                          |                   | 8                                 | 8-01-6   |
| 2, 3, 7, 8-Tetrachloro-       |            | S             |                            |                |                                                                      |                                          |                   |                                   |          |
| 1,1,2,2-Tetrachloro-          |            |               |                            |                |                                                                      |                                          |                   |                                   |          |
| ethane<br>Tetrachloroethylene |            | 0             | 4.0                        | 2300           | 175(10)                                                              |                                          | 6,0               |                                   | 8.0      |
| 2, 3, 4, 6-Tetrachloro-       | <u> </u>   |               |                            | -              |                                                                      |                                          |                   | 1 (tastebouor)                    |          |
| Toluene                       |            | s.            | 100                        | 1000           | 1000(10)                                                             | 100                                      |                   | 14300                             |          |
| Toxaphene                     | 2          |               |                            |                |                                                                      |                                          |                   |                                   | 0.1200   |
|                               |            |               |                            |                |                                                                      |                                          |                   |                                   |          |

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|                              |            | DRIN        | NKING WATER                |                | STANDARDS AND HEALTH ADVISURIES                                             | RIES                               | ue:                       | C1 J.        |
|------------------------------|------------|-------------|----------------------------|----------------|-----------------------------------------------------------------------------|------------------------------------|---------------------------|--------------|
| CHEMICAL                     | EPA<br>MCL | EPA<br>RMCL | CA DOHS<br>Action<br>Level | acute<br>1 day | HEALTH ADVISORIES (SYAKLS)<br>subchronic chroni<br>(no. of days) non-suncer | VANLS)<br>chronic<br>neer   cancer | N N CL                    | Sec.         |
| Malathion                    |            |             | 160                        |                |                                                                             |                                    |                           |              |
| Nethomy1<br>(Lannate)        |            |             |                            |                | 175                                                                         |                                    |                           |              |
| Methoxychlor                 | 100        |             |                            |                |                                                                             |                                    |                           |              |
| 2-methyl-4-chloro-<br>chemol |            |             |                            |                |                                                                             |                                    | 1800(tassekonor)          | 0.101)       |
| J-mcthyl-4-chloro-           |            |             |                            |                |                                                                             | 1                                  | 1000 ( taste 6000: 1      | 00001        |
| J-mathy 1-6-ch loro-         |            |             |                            |                |                                                                             |                                    | 20 ( Eastekodor )         | 061          |
| phenot<br>Nethylene chlorido |            |             | 40                         | 13000          | 1300-1500(10) + 1501                                                        |                                    |                           |              |
| Methyl ethyl ketone          |            |             |                            | 75001          | 750(10)†                                                                    |                                    |                           |              |
| Mcthyl methacrylate          |            |             |                            |                | 35                                                                          |                                    |                           |              |
| Methyl Parathion             |            |             | 30                         |                |                                                                             |                                    |                           |              |
| Mononitrophenol              |            |             |                            |                | 290(7)*                                                                     |                                    |                           |              |
| Nitrobenzeno                 |            |             |                            | 35*            | 5(7)*                                                                       |                                    | 19800  <br>30(taste£odor) | lor)         |
| n-Nitrosodi-n-butyl-         |            |             |                            |                |                                                                             |                                    |                           | 0 BODE       |
| n-Nitrosodiethlyamine        | e          |             |                            |                |                                                                             |                                    |                           |              |
| n-Nitrosodimethylamine       | ne         |             |                            |                |                                                                             |                                    |                           | Juppe 1      |
| n-NLtrosodiphenylamino       | no         |             |                            |                |                                                                             |                                    |                           |              |
| n-Nitrosopyrrolidine         |            |             |                            | -              |                                                                             |                                    |                           | - //d/ • 0 1 |
| Ordram (Molinate)            |            |             | 20                         |                |                                                                             |                                    |                           |              |
| uarathion                    |            |             | 30                         |                |                                                                             |                                    |                           |              |

| 01 :0                           |                                                                            | 0.19                           |                         | 0.6                     | 2.7              | 0.19                                              | )r)                   | 1.2                   |                                                                                |                      |          | 2.0            |        |                                  |          |          |          |       |
|---------------------------------|----------------------------------------------------------------------------|--------------------------------|-------------------------|-------------------------|------------------|---------------------------------------------------|-----------------------|-----------------------|--------------------------------------------------------------------------------|----------------------|----------|----------------|--------|----------------------------------|----------|----------|----------|-------|
| 10                              | EPA<br>NAMOC<br>NON-CANCER                                                 |                                | 18400                   |                         |                  |                                                   | 2600<br>1(taste&cdor) | 2(tasteb<br>odor)     |                                                                                |                      |          |                |        |                                  |          |          |          | _     |
| IES                             | s)<br>vic<br>cancer                                                        |                                |                         |                         | 2.8              |                                                   |                       |                       |                                                                                |                      |          | 2.0            |        |                                  |          |          |          | -     |
| TH ADVISOR                      | RIES (SNARLS)<br>chronic<br>non-cancer] c                                  |                                | 1000                    |                         | 75               |                                                   |                       |                       |                                                                                |                      |          |                |        | 6201                             |          |          |          | -     |
| STANDARDS AND HEALTH ADVISORIES | HEALTH ADVISORIES (SWARLS<br>subchronic chron<br>(no. of days) non-cancer] |                                | 20000(10)               |                         | 200(10)          | 2200(10)                                          |                       | 2500(7)*              |                                                                                | 200(7)*              |          |                |        | 1400(10)†                        | 3200(10) |          |          | -     |
|                                 | acute<br>1 day                                                             |                                | 140000                  |                         | 2000             | 25000                                             |                       | 17500*                |                                                                                | 49004                |          |                |        | 120001                           | 6100     |          |          | <br>- |
| INKING WATER                    | CA DOUS<br>Action<br>Level                                                 |                                | 200                     |                         | 5.0              |                                                   |                       |                       |                                                                                |                      | 7.0      | 2.0            |        | 620                              | 620      | 620      | 620      | -     |
| DRI                             | EPA<br>RNCL                                                                |                                | 200                     | S                       | 0                |                                                   |                       |                       |                                                                                |                      |          | 0              | s      | S                                |          |          |          | <br>- |
|                                 | EPA<br>MCL                                                                 | 100+                           |                         | Da -                    |                  | ane                                               | 01                    | 01                    | 10<br>[ 10                                                                     |                      |          |                |        |                                  |          |          |          | _     |
|                                 | HEMICAL                                                                    | [ribromomethane<br>(Bromoform) | 1, 1, 1-Trichlorocthane | I, I, 2-Trichloroethane | richloroethylene | <pre>[richlorofluoromethane<br/>[freon 11]/</pre> | 2,4,5-Trichlorophenol | 2,4,6-Trichlorophenol | 2,4,5-Trichloro-<br>2,4,5-Trichloro-<br>2,4,5-Trichloro-<br>1,2,4,5-TP Silvex) | 2,4,6-Trinitrophanol | rrithion | vinyl chloride | vydate | <i>ky</i> lones <sup>4.4.4</sup> | n-Xylene | J-Xylene | J-Xylene |       |

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APPENDIX M

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RESULTS OF VOLATILE ORGANIC SAMPLING OF PRIVATE WELLS NEAR MATHER AFB, PROVIDED BY CRWQCB-CVR, AUGUST 1984

| 1,1,1Trichloroethane1.6Perchloroethylene1.0Trichloroethylene2.4Penchloroethylene2.4Penchloroethylene1.5Perchloroethylene1.5Trichloroethylene1.5Trans-1, 2-hichloroethylene1.5Percehloroethylene1.6Trans-1, 2-hichloroethylene1.5Trans-1, 2-hichloroethylene1.5Trans-1, 2-hichloroethylene1.6Trichloroethylene1.7Trichloroethylene1.7Trichloroethylene1.7                                                                                                                                                                                                                                                                                                                                                                                                                                  |   | OUPPR/ADDRESS                              | SAMPLE<br>DATE | VOLATILE ORGANIC COMPOUND<br>DETECTED | LEVEL DETECTED<br>(ppb) | STATE ACTION LEVEL<br>(ppb) |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|--------------------------------------------|----------------|---------------------------------------|-------------------------|-----------------------------|
| 0.1 Units)     Perchloreethylene     1.0       0.2 Units)     Perchloreethylene     1.0       0.2 Jun 81     Frichloreethylene     2.4       2 Jun 81     Chloroferm     0.3       2 Jun 81     Chloroferm     1.4       1.5     Trans-1, 2-bichloroethylene     1.5       1.6     Chloroferm     1.7       1.7     Trachloroethylene     1.7       2 Jun 81     Corbor Terrachloride     1.7 | - | carollia Mather                            | 5 Feb 80       | l, l, l Trichloroethane               | 1.6                     | 300.0                       |
| 7 Apr No     Horocharlene     2.4       9 Apr No     Horocharlene     2.4       9 Apr No     Horocharlene     0.3       9 Apr No     Horocharlene     1.4       1 Arrichlorocharlene     1.4       1 Frans-1, 2-hichlorocharlene     1.5       1 Arrichlorocharlene     1.5       1 Arrichlorocharlene     1.6       1 Arrichlorocharlene     1.7                                                                                                                             |   | Meste Hone Park<br>(S) Hurts)<br>2000 - 11 |                | Perchloroethy]ene                     | 1.0                     | 4.0                         |
| .9 Apr 80     Rone       2 Jun 81     Chloroform     0.3       2 Jun 81     Carbon Tetrachloride     1.5       1 Garbon Tetrachloride     1.6       1 Frichloroethylene     1.6       16 Sep 81     Chloroform     0.8       16 Sep 81     Chloroform     0.8       16 Sep 81     Chloroform     0.8       17 Trans-1, 2-bichloroethylene     1.5       16 Sep 81     Chloroform     0.8       17 Trans-1, 2-bichloroethylene     1.7       18 Carbon Tetrachloride     1.8       19 Trichloroethylene     1.7                                                                                                                                                                                                                                                                            |   | Mather Prive                               |                | Trachloroethy]ene                     | 2.4                     | 0.5                         |
| 2. Jun 81     (hloroform     0.3       Carbon Tetrachloride     1.5       Tetrachloroethylene     1.4       Trichloroethylene     1.4       1.6 Sep 81     Chloroform     0.8       16 Sep 81     Chloroethylene     1.5       17 Carbon Tetrachloride     1.6       18 Carbon Tetrachloride     1.7       19 Carbon Tetrachloride     1.7                                                                                                                                                                                                                                                                                                                                                                                                                                                |   |                                            | ox idv oc      | Rome                                  |                         |                             |
| Carbon Tetrachloride     1.5       Tetrachloroethylene     1.4       Trichloroethylene     1.4       Trans-1,2-bichloroethylene     1.5       16 Sep 81     Chloroform     0.8       17 Serp 81     Carbon Tetrachloride     1.8       18     Carbon Tetrachloride     1.8       19     Tetrachloroethylene     1.7                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |   |                                            | 2 Jun 81       | Ch]oroform                            | 0.3                     | υυυ                         |
| Trichloroethylene 1.4<br>Trichloroethylene 1.5<br>Trans-1,2-hichloroethylene 1.5<br>Trans-1,2-hichloroethylene 1.5<br>Chloroform 0.8<br>Carbon Tetrachloride 1.8<br>Tetrachloroethylene 1.7<br>Trichloroethylene 1.7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |   |                                            |                | Carbon Tetrachloride                  | 1.5                     | 0.2                         |
| Trichloroethylene (5.)<br>Trans-1,2-hichloroethylene 1.5<br>Chloroform 0.8<br>Carbon Tetrachloride 1.8<br>Tetrachloroethylene 1.7<br>Trichloroethylene (5.6)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |   |                                            |                | Tetrachloroethy]ene                   | 1.4                     | 0.4                         |
| Trans-1, 2-bichloroethylene 1.5<br>Chloroform 0.8<br>Carbon Tetrachloride 1.8<br>Tetrachloroethylene 1.7<br>Trichloroethylene 5.6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |   |                                            |                | Trichloroethylene                     |                         | C. S                        |
| Chloroform ().8<br>Carbon Tetrachloride 1.8<br>Tetrachloroethylene 1.7<br>Trichloroethylene 5.6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |   |                                            |                | Trans-1,2-Dichloroethylene            |                         | чно<br>N                    |
| Carbon Tetrachloride<br>Tetrachloroethylene<br>Trichloroethylene                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |   |                                            | 16 Sep 81      | Chloroform                            | 0.8                     | 100.0                       |
| Tetrachloroethylene<br>Trichloroethylene<br>Carbon Terrachlorida                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |   |                                            |                | Carbon Tetrachloride                  | 1.8                     | ۍ .<br>م                    |
| Trichloroethylene (                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |   |                                            |                | Tetrachloroethylene                   | 1.7                     | 4.0                         |
| Cathon Totrohlorida                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |   |                                            |                | Trichloroethylene                     | (2)<br>(2)<br>(2)       | 0°5                         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |   |                                            | 22 Aug 83      | Carbon Tetrachloride                  | 1.1                     | 0.2                         |

VOLATILE ORGANIC SAMPLING RESULTS OF PRIVATE WELLS NEAR MATHER AFB.

Conducted by: - California Regional Water Quality Control Board - Sacramento County Health Department

|   | 4.0                 | 0.8               | 300_0                  | U`\$                 | U ' 17              | 0 · S                                                 | C<br>v               | 4.0                 | n .<br>2                                                   | 0.2                              | 0.4                 | ٥.۶                                                      | 0°5               |
|---|---------------------|-------------------|------------------------|----------------------|---------------------|-------------------------------------------------------|----------------------|---------------------|------------------------------------------------------------|----------------------------------|---------------------|----------------------------------------------------------|-------------------|
| - |                     | 4.0               | 1.1                    | 1.3                  | (2, 4)              | leak)                                                 | . 5                  |                     |                                                            | 1.3                              | (4.2)               |                                                          |                   |
|   | Tetrachloroethylene | Trichloroethylene | l,l,l, Trichloroethane | Carbon Tetrachloride | Tetrachlaraethylene | Trichloroethylene<br>(Sample taken at air valve leak) | Carbon Tetrachloride | Tetrachloroethylene | Trichloroethylene<br>(Sample taken after pressure<br>tank) | <sup>C</sup> arbon Tetrachloride | Tetrachloroethylene | Trichloroethylene<br>(Sample taken in residents<br>home) | Trichloroethylene |
|   | 22 Aug 83           |                   |                        | 2 May 84             |                     |                                                       |                      |                     |                                                            |                                  |                     |                                                          | Jun 84            |
|   | _                   |                   |                        |                      |                     |                                                       |                      |                     |                                                            |                                  |                     |                                                          |                   |

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| •                                      | SAMPLE<br>DATE | VOLATILA, ORGANIC, COMPOUND<br>DETECTED         | LEVEL DETECTED<br>(ppb) | STATE ACTION LEVEL<br>(ppb) |
|----------------------------------------|----------------|-------------------------------------------------|-------------------------|-----------------------------|
| ffernandez<br>825 Bappy Lane           | 5 Feb 80       | Bone                                            |                         |                             |
| Matsumoto<br>3851 Nappy Lane           | 22 Mar 82      | Mone (Home)<br>None (Trrigation water)          |                         |                             |
|                                        | 27 Apr 84      | Carbon Tetrachloride                            | с. Г                    | 5.0                         |
|                                        |                | Trichloroethylene<br>(Sample #1)                | 6.U                     | ۰.v                         |
|                                        |                | Carbon Tetrachloride                            | 1. U                    | 5.0                         |
| 1                                      |                | Trichloroethylene<br>(Sample #2)                | 1.1                     | 6.0                         |
| Rand<br>8000 Happy Lane                | 29 Jan 82      | ł,ł Dichloroethane                              | 1.0                     | None                        |
|                                        |                | Trans-1,2-Dichloroethylene<br>Trichloroethylene | 1.5<br>(9.)             | None<br>5.0                 |
|                                        | 26 Apr 84      | Trichloroethylene                               | 3. <i>f</i> ,           | ν. r                        |
| Kibu<br>Landscaping<br>3950 Happy Lane | 78 Oct 83      | Trichloroethylene                               | 1.3                     | c.<br>د                     |
|                                        | 26 Apr 84      | Trichtoroothylene                               | 3.3                     | ۰. د                        |

| 41 EF<br>80. | OWNER/ADDRESS               | SAMPLE<br>DATE | VOLATILE ORGANIC COMPOUND<br>DETECTED | CONCENTRATION DETECTED<br>(ppb) | STATE ACTION LEVEL<br>(ppb) |
|--------------|-----------------------------|----------------|---------------------------------------|---------------------------------|-----------------------------|
|              | Storling<br>3960 Nappy Lano | 26 Apr 84      | None                                  |                                 |                             |
|              | Gregory<br>Monthson         | 22 Mar 82      | Tetrachloroethylene                   | 2.5                             | ų . N                       |
|              | auga Addan acto             |                | Trichloroethylene                     | 2.2                             | 5.0                         |
|              |                             |                | Trans-l,2,-Dichloroethylene           | 4.9                             | None                        |
|              |                             |                | l,l,l, Trichloroethane                | 1.2                             | 300.0                       |
|              | Furuike<br>4001 Happy Lane  | 5 Feb 80       | Trichloroethylene                     | 2.0                             | 5.0                         |
|              |                             | 29 Apr 80      | None                                  |                                 |                             |
|              |                             | 18 Dec 81      | Trichloroethylene                     |                                 | 5.0                         |
|              |                             |                | Trans-1,2,-Dichloroethylene           | 22.0                            | None                        |
|              |                             |                | l,l-Dichloroethylene                  | (4)                             | 0.1                         |
|              |                             |                | Tetrachloroethylene                   | C. 1                            | 0.4                         |
|              |                             |                | l.l-Dichloroethane                    | 2.7                             | None                        |
|              |                             | 29 Jan 82      | Trichloroethylene                     | (B. 0)                          | 5.0                         |
|              |                             |                | Trans-1,2,-Dichloroethylene           | 22.0                            | None                        |
|              |                             |                | l,l,-Dichloroethylene                 | (6.1)                           | 0.1                         |

|            | OWNER/ADDRESS               | SAMPLE<br>DATE | VOLATILE ORGANIC COMPOUND<br>DETECTED | CONCENTRATION DETECTED<br>(ppb) | STATE ACTION LEVEL<br>(ppd) |
|------------|-----------------------------|----------------|---------------------------------------|---------------------------------|-----------------------------|
|            |                             | 29 Jan 82      | Tetrachloroethylene                   | ь. O                            | U. 4                        |
|            |                             |                | l, l-Dichloroethane                   | 6.1                             | None                        |
|            |                             |                | l,l,lTríchoroethane                   | U.2                             | 300.0                       |
|            |                             | 22 Aug 83      | l , l - Di ch loroethylene            | (r)                             | 0.1                         |
|            |                             |                | l,l-Díchloroethane                    | 2.6                             | None                        |
|            |                             |                | Trans-1,2-Dichloroethylene            | 28.0                            | None                        |
|            |                             |                | Trichloroethylene                     | 8.4                             | 5.0                         |
| M-         |                             |                | Tetrachloroethylene                   | ).1.5                           | 4.0                         |
| <b>-</b> 3 |                             |                |                                       |                                 |                             |
|            |                             | Jun 84         | l,l-Dichloroethylene                  | 0.9                             | 0.1                         |
|            |                             |                | l,2-Dichloroethane                    | 3.6                             | None                        |
|            |                             |                | Trichloroethylene                     | (1)                             | ۶.0                         |
| ÷          | "burch of Godatsu 22 Mar 82 | 1 22 Mar 82    | Trichloroethylene                     | 1.8                             | ٤.0                         |
|            | ouen della cree             |                | Trans-1,2-Dichloroethylene            | 9.6                             | None                        |
|            |                             |                | l,l-Díchloroethylene                  | (0. 7)                          | α.1                         |
|            |                             |                | l,l-Dichloroethane                    | 1.5                             | None                        |

|                  | OWNER/ADDRESS                                  | DATE      | DETECTED                                        | CONCENTRATION DETECTED<br>(ppb) | STATE ACTION LEVEL<br>(ppb) |
|------------------|------------------------------------------------|-----------|-------------------------------------------------|---------------------------------|-----------------------------|
| Ξ                | Cordova Truck<br>Dismantlare                   | 29 Jun 82 | Trichloroethylene                               | 0.2                             | 5.0                         |
|                  | 4075 Happy Lane                                |           | Trans-1,2-Dichloroethylene                      | 0.4                             | None                        |
|                  |                                                | 22 Aug 83 | None                                            |                                 |                             |
| 2                | Rancho Truck<br>Dismantlers<br>4079 Happy Lane | 29 Jan 84 | Tríchloroethylene<br>Trans-l,2-bíchloroethylene | 0.2<br>0.4                      | ς. η<br>Μοτο                |
|                  |                                                | 22 Aug 83 | Nono                                            |                                 |                             |
| . <sub>6</sub> ~ | Mather Auto<br>Dismantlers                     | 6 Feb 80  | Trichloroethylene                               | 1.0                             | 5.0                         |
|                  |                                                |           | l,l,l, Trichloroethane                          | 1.6                             | 300.0                       |
|                  |                                                | 29 Jan 82 | None                                            |                                 |                             |
|                  | Kobata<br>4108                                 | 14 Dec 81 | None                                            |                                 |                             |
|                  | Brupper<br>9745 Old Placer-<br>Ville Road      | 28 Oct 83 | onoN                                            |                                 |                             |

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| S I TI | MUNER / ADDRF 55 | SAMPLE
DATE | VOLATILE ORGANIC COMPOUND
DETECTED | CONCENTRATION DETECTED
(ppb) | STATE ACTION LEVEL
(ppb) |
|--------|--------------------------------------------------|----------------|-------------------------------------------------------------------------|---------------------------------|-----------------------------|
| 1 | | 26 Apr 84 | Carbon Tetrachloride | 1.1 | 5.0 |
| (| Fatyrynuik
9835 old Placer-
Ville Road | 27 Apr 84 | None | | |
| 1 | Nobel
9874 old Placer-
Ville Road | 22 Mar 82 | Carbon Tetrachloride | 1.5 | 5.n |
| 1 | corwin
9910-01d-Placer-
Ville-Road | 2 Mav 84 | Carbon Tetrachloride | (6) | 5.N |
| 1 | SMF Properties
9938 Old Placer-
Ville Road | 14 Dec 81 | Моле | | |
| 1 | Yokoi
9970 old Placer-
ville Road | 22 Mar 82 | Trichloroethylene
(West Well)
Carbon Tetrachloride
(East Well) | 1.4
2.6 | 5.n
5.n |

| 51 FI
80 | OWNER/ADDRESS | SAMPLE
DATE | VOLATILE ORGANIC COMPOUND
DETECTED | CONCENTRATION DETECTED
(ppb) | STATE ЛСТІОН LEVEL.
(ppb) |
|-------------|---------------------------------|----------------|-------------------------------------------------|---------------------------------|------------------------------|
| | | 22 Aug 83 | Trans-1,2-Dichloroethylene
(West Well) | 1.8 | None |
| | | | l,2-Dichloroethan? | <u>(0)</u> | υ. Γ |
| | | 28 Oct 83 | Carbon Tetrachloride | 3.0 | 5.0 |
| | | | Tetrachloroethylene
(No Well Location Given) | 3.1 | 4.U |
| | | Aav 84 | Carbon Tetrachloride
(West Well) | (J. B) | 0.5 |
| <u>)</u> 1 | | | Tetrachloroethylene | 9 .2 | ۰. <i>۸</i> |
| ÷ | | | Carbon Tetrachloride | 4.4 | 5.0 |
| | | | Tetrachloroethylene
(East Well) | 3.4 | ۰.0 |
| 12 | Sutter
3590 Bradshaw
Road | . 6. Apr 84 | Νοπε | | |
| 20 | Ogat i
9721 Farm Lani | 6 Feb 80 | None | | |
| 23 | Yanamura
984] Farm Lane | 5 Feb 80 | None | | |

| STH
BO. | SAMPLF
OWNER/ADDRESS DATE | VOLATILE ORGANIC COMPOUND
DETECTED | CONCENTRATION DETECTED
(ppb) | STATE ACTION LEVEL
(ppb) | 1 |
|------------|-------------------------------------------------------------------------------------------|---------------------------------------|---------------------------------|-----------------------------|---|
| | Sacramento County 28 Oct 83
Office of Educa-
tion 5308 Excel-
sior Rd | None | | | |
| С. | Kiefer (Sacramento 6 Feb 80
County) Dump East
of Sunrise-Kiefer
intersection | Such | | | · |
| E. Merik | Granite Construc - 26 Apr 86
tion Kieler/Brad-
shaw Rd | Mone | | | |
| - | Site not yet evaluated | | | | |
| а
С. | Sacramento County 28 Oct 83
Branch Center
(Two Wells)
3701 Branch Center
Road | None | | | |
| | 26. Apr. 84 | None | | | |
| 5 . | Chady Oaks - 6 Feb 80
Mobile Nome Park
1974, r.t m.elet | vnoN | | | |

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| (qdd) | | 0.1
5.0 | | | | |
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| concentration detector (ppb) | | | | | | |
| GENTRA
b) | | | | | | |
| (dqg) | | | | | | |
| = | | | | | | |
| VOLATILE ORGANIC COMPOUND
DETECTED | | ы | | | | |
| NTC C | | , thy le
y lene | | | | |
| s orda | | hloroe | | | | |
| VOLATTEE
DETECTED | None | l,2 Nichloroethylene
Trichloroethylene | | | | |
| VO
DE | No | | | | | |
| | a
a | 1.11n R4 | | | | |
| SAMPLE
DATE | 3uA 24 | - | | | | |
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| OWHER/ADDRESS | satow
10122 Ellenwood | Hayashi
1951 Happy Lang | | | | |
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0122-1 | layash
1951 H | | | | i |
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APPENDIX N

LABORATORY RESULTS - 1984 SAMPLE

NOTE: All data marked by **¥** are invalid due to missed holding times or incorrect protocol.



inter-office memorandum

TO:

Fred Bopp

DATE: May 22, 1984

Don Baker DAO FROM:

SUBJECT: Volitale Organic Analysis Mather Air Force Base, CA W. O. No.:

Please find attached the results of volatile organic analysis for Mather AFB, CA. These data were the results of analysis on groundwater samples and soil samples taken during the week of April 30, 1984. The analysis was completed by EPA methods 601 and 602.

The data reported are compounds found in detectable quantity all other 601/602 compounds are below the detection limit listed in table of 601/602 parameters attached hereto.

Note that well JTC is above the state action level of 0.1 ug/l for 1,2-Dichloroethane and well ACW approaches the TCE action level of 5.0 ug/l.

These data have been confirmed by a second column and five point calibrations were run. Appropriate blanks were run to prevent carryover.

These data have been transmitted to Dennis Korncinski at Mather per Pete Marks instructions.

DHB:mr

xc: Dennis Kurndinski

HEW 2 74-39
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| SAMPLE SITE | ANALYTE | RESULTS (ug/1) |
|-------------|----------------------------------------------------------------|----------------|
| К9 | No peaks found | |
| ACW | Trichloroethylene
Unidentified peaks | 3.6
3 |
| 310 | 1,2 Dichloroethane | 3.6 |
| FH3 | No peaks found | |
| FH4 | No peaks found | |
| FH5 | No peaks found | |
| FH6 | No peaks found | |
| GC 1 | No peaks found | |
| FH1 | No peaks found | |
| MB 4 | No peaks found | |
| MB 1 | No peaks found | |
| MB 2 | No peaks found | |
| FH2 | No peaks found | |
| DS | 1,1 Dichloroethane | 0.1 |
| Soil Sample | 1,2 Dichloroethane
Trichloroethylene
1,3 Dichlorobenzene | |
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| SAMPLE SITE | ANALYTE | RESULTS (ug/1) |
|-------------------|----------------------------|----------------|
| Soil Sample | 1,4 Dichlorobenzene | 0.8 |
| | Unidentified peaks | 1 |
| | | |
| Sorl Sample | 1,3 Dichlorobenzene | 1.4 |
| | 1,4 Dichlorobenzene | 1.2 |
| _ ' | Ethylbenzene | 16 |
| | Unidentified peaks | 0 |
| Unknown solvent : | nixture detected in sample | |
| DS-1 | 1,1 Dichloroethane | 0.9 |
| Soil Sample | 1,2 Dichloroethane | 0.3 |
| | l,l,l Trichloroethane | 0.3 |
| | 1,3 Dichlorobenzene | 2.5 |
| | 1,4 Dichlorobenzene | 0.9 |
| | Unidentified peaks | 1 |
| MB 3 | No peaks found | |
| Field Blank | No peaks found | |
| Field Blank | No peaks frund | |
| TW-8 | Methylene chloride | 4.2 |
| | l,l-Dichloroethane | 2.3 |
| | Trans-1,2-Dichloroethylene | 1.1 |
| | 1,2-Dichloroethane | 0.6 |
| | 1,1,1-Trichloroethane | 3.2 |
| | Trichloroethylene | 17 |
| | Tetra chloroethene | 2.3 |
| | Chloroebenzene | 0.9 |
| | | |

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| SAMPLE SITE | ANALYTE | RESULTS (ug/1) |
|--------------|----------------------------|----------------|
| | 1,3-Dichlorobenzene | 0.8 |
| | 1,2-Dichlorobenzene | 0.4 |
| | Unidentified Peaks | 8 |
| TW-9 | Methylene chloride | 3.2 |
| | 1,1-Dichloroethylene | 5.8 |
| | Trans 1,2 Dichloroethylene | 1.4 |
| | l,l,l-Trichloroethylene | 1.4 |
| | Trichloroethylene | 40 |
| | Unidentified Peaks | 3 |
| TW-10 | Methylene chloride | 2.4 |
| TW-11 | No peaks found | |
| TW-1 | Trans-1,2-Dichloroethylene | 0.5 |
| | Chloroform | 6.2 |
| | l,2-Dichloroethane | 0.3 |
| | l,l,l-Trichloroethane | 0.4 |
| | Carbon tetrachloride | 1.4 |
| | Trichloroethylene | 590 |
| | Tetrachloroethene | 0.1 |
| | Unidentified Peaks | 4 |
| TW- 2 | Methylene chloride | 1.0 |
| | Chloroform | 0.2 |
| | Trichloroethylene | 48 |
| | Unidentified Peaks | 1 |

7

| SAMPLE SITE | ANALYTE | RESULTS (ug/1) |
|--------------|--------------------------------------------------------------------------------------------------------|-------------------------------|
| TW-3 | Chloroform
1,1,1-Trichloroethane
Carbon tetrachloride
Trichloroethylene
Unidentified Peaks | 0.2
0.2
0.3
130
2 |
| TW-4 | Unidentified Peaks | 7 |
| TW- 5 | Tetrachlorethylene
Unidentified Peaks | 0.3
1 |
| TW-6 | Unidentified Peaks | 1 |
| TW-7 | Methylene chloride
Trans-1,2-Dichlorethylene
Trichloroethylene
Unidentified Peaks | 2.2
0.3
0.8
8 |

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EPA METHOD 601 HALL DETECTOR EPA METHOD 602 FID DETECTOR

DETECTION LIMIT ug/1

COMPOUND

Notes: FID optional detector for Method 602

Reference: EPA Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater EPA 600 14-82-057 - July 1982

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inter-office memorandum

FRED BOPP

TO:

FROM:

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DATE: JULY 30, 1984

DON BARER

SUBJECT: ANALYSIS OF MATHER AFB SAMPLES TAKEN NAY 1984 W. O. No.:

Dear Fred,

Enclosed please find the analysis for PCB's, Pesticides and Herbicides on the Mather AFB samples. Also enclosed are copies of reports we have already sent on VDA's and oil and grease.

Phenols were run on the following samples:

JTC, JTC-1, DS, DS-105, TW5, TW7, TW8, TW9, TW10, TW11

All were non-detectable at the following limits:

| | (un 1L) |
|----------------------|---------|
| 2-Chloro | 2.6 |
| 2-Nitro | 2.5 |
| PhenoL | 1.4 |
| 2,4-Dimethyl | 1.7 |
| 2,4-Dichloro | 2.1 |
| 2,4,6-Trichlero | 5.0 |
| 4-Chloro-3-methyl | 8_3 |
| 2,4-Dinitro | 7_0 |
| 2-methyl-4,6-dinitro | 10 |
| Pentachloro | 1 G |
| 4-Nitro | IC |

PCB's were run on FB1, TW3, TW2, TW1 and ATW. All were nondetectable at the following limits:

PEN 2-74-39

NER RETENTION FREE LEE FOR A SECTION FROM THE SECTION FROM

FRED BOPP Page Twc 7-30-84

PARAMETER DETECTION LIMIT (µg/1) PCB - 1016 0.04 0.10 PCB - 1221 PCB - 1232 0.10 0.05 PCB - 1242 PCB - 1248 0.08 PCB - 1254 0.08 PCB - 1260 0.15

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Field blanks and duplicates are identified as:

| FIELD # | SITE I.D. ASSIGNED | ACTUAL SITE I.D. |
|---------|--------------------|------------------|
| 0019W | T.W. 12 | T.W.4 |
| 00288 | MBW 5 | HBW 3 |
| 00406 | LTC-1 | J.T.C. |
| 00435 | DS-1 | D.S. |
| 0015W | FB1 | Field Blank |
| 0017W | FB2 | ۳ ه |

Soil samples were identified as D.S. for downstream and U.S. for upstream.

Pesticides and herbicides were run on MBW2, MBW5, TW6, TW5, TW4, MBW3, MBW1. All were non-detectable at the following limits:

| PARAMETER | DETECTION LIMIT (µg/1) |
|----------------------------------|------------------------|
| DBCP
EDB | 0.1
1.0 |
| ABHC | 0.05 |
| B-BAC
G-BAC
D-BAC | 0.05
0.05 |
| Heptachlor
Aldrin | 0.05 |
| Endosul I
Hept. Epox | 0.05
0.05 |
| 4,4 DDE
Dieldrin | 0.05
0.05 |
| Endrin
4,4 DDT
Endrin Ald. | 0.05
0.05
0.05 |
| Endos Sul
Chlordane | 0.03
0.5 |
| Toxaphene | 5.0 |
| | |



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DATE OF FINAL REPORT: 3 January 1985

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MATHER A.F.B. -1st ROUND

TOTAL METALS 🗶

| ь.) | R.F.W. NO. | SAMPLE DESCRIPTION | Ag
ug/L | Cd
ug/L | Cr
ug/L | Pb
ug/L | Ni
ug/L |
|-----|---------------------------------------------------------------------------------------|--------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|------------------------------------------------------------------|----------------------------------------------------------|--------------------------------------------------------------|
| | 8405-273-0410
-0420
-0430
-0440
-0450
-0460
-0470
-0480
-0490 | TW7
TW4
MB2
MB1
TW5
JTC
TW11
TW6
MB5 | <2.5 2.5</2.5</2.5</2.5</2.5</2.5</2.5<</th <th>12.6
<2.5
<2.5
<2.5
<2.5
<2.5
12.8
<2.5
<2.5
<2.5</th> <th><10
<10
<10
<10
<10
<10
<10
13
12
<10</th> <th>33
12
<10
<10
<10
<10
<10
<10
15</th> <th><100
<100
<100
<100
<100
<100
<100
<100</th> | 12.6
<2.5
<2.5
<2.5
<2.5
<2.5
12.8
<2.5
<2.5
<2.5 | <10
<10
<10
<10
<10
<10
<10
13
12
<10 | 33
12
<10
<10
<10
<10
<10
<10
15 | <100
<100
<100
<100
<100
<100
<100
<100 |
| | 8405-273-0530
-0540
-0550
-0560
-0570
-0580
-0590 | TW12
TW9
FB2
TW10
TW8
MB3
FB1 | <2.5
<2.5
<2.5
<2.5
<2.5
<2.5
<2.5
<2.5 | <2.5
<2.5
10.0
9.9
7.9
<2.5
<2.5 | <10
<10
<10
<10
<10
<10
<10
<10 | 21
36
<10
15
47
<10
<10 | <100
<100
<100
<100
<100
<100
<100 |
| | R.F.W. NO. | SAMPLE DESCRIPTION | | | AL CN, u | a/a | |
| | 8405-273-0500
-0510
-0520 | US (SOIL)
DS (SOIL)
DS-1 (SOIL) | | | <0.1
0.26
0.10 | | |

MATHER AFB - Scampling of May 1984 and August 1984

F

| Sample ID | Sample ID Date Sampled | Date Ext
Pesticides | bate Extracted
dicides <u>Herbicides</u> | Date Mid
Pesticides | Date Analyzed
Pesticides Herbicides | ri∕Gn
.⊥001 | chlordane
ug/li | 2,4-D
ug/L |
|--------------|----------------------------|------------------------|---------------------------------------------|------------------------|----------------------------------------|----------------|--------------------|---------------|
| Detection | Detection Limit for May s | ¥onildmes | | | | 0.05 | ن . ر | 2.0 |
| 411.1 | 677784 | 577784 | 5/8/84 | 5/8/84 | 5/9/84 | (Jr I | CII-1 | OF. |
| VII.2.2 | 5.77784 | 5/8/84 | 5/8/84 | 5/8/84 | 5/9/84 | (11) | LII I | |
| | 5/4/84 | 5/7/84 | 5/8/84 | 5/8/84 | 5/9/84 | 111 | | 111 |
| MB5 | 5/7/84 | 5/8/84 | 5/8/84 | 5/8/84 | 5/9/84 | 0H | (II) | (III) |
| 15.4.4 | 5,73784 | 577784 | 578784 | 5/8/84 | 5/9/84 | (11) | CIIN | e le t |
| TUUS | :/3/84 | 5/7/84 | 5/8/84 | 5/8/84 | 5/9/84 | LTJ | (II.) | Ê |
| TW6 | 5/3/84 | 5/7/84 | 5/8/84 | 5/8/84 | 5/9/84 | (III) | CIT: | 6R4 |
| Detection | Detection limit for August | pui lyns | | | | 0.02 | 0.02 | 90.0 |
| MAPR4 | 8716784 | 8721784 | 8/20/84 | 8/21/84 | 8/22/84 | CILL | CI:4 | 184 |
| MAFIAS | 8/16/84 | 8/21/84 | 8/20/84 | 8/22/84 | 8/22/84 | | (II. | Ê. |
| MAL-TH6 | 8/16/84 | 8/21/84 | 8/20/84 | 8/22/84 | 8/22/84 | | CIN | |

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MWTHER AFB - Extraction and analysis dates

| Sample ID | Date Lampled | Pesticides | cides | llerbicides | cides | | ~ |
|--------------------|--------------|--------------------|-----------|--------------|-------------------|--------------------|----------|
| | | Extracted Analyzed | Malyzed | Extracted | Extracted Multzes | Extracted Analyzed | Analyzed |
| FT3- 1 | 8/14/84 | I | ŝ | i | ١ | 8/17/84 | 8/20/84 |
| 1-81.IVV. | 8/12/84 | ł | ۱ | ł | ì | 8/21/84 | 8/22/84 |
| MMT3-2 | | ł | ì | ł | 1 | 2 | = |
| MMFB-3 | 2 | ť | 1 | ł | ł | Ŧ | = |
| Mather 2 | 9/27/84 | s | ١ | ı | ì | 10/1/84 | 10/3/84 |
| Muther 3 | ŧ | I | ı | 1 | 1 | : | = |
| Mather 4 | - | 10/4/84 | 10/11/84 | 10/5/84 | 10/18/84 | 1 | ł |
| Mather 5 | Ŧ | 1 | = | | = | ı | ı |
| FT3-1 | 10/5/84 | 10/5/84 | 10/11/84 | 10/5/84 | 10/18/84 | 10/5/84 | 10/11/84 |
| MAF13-1
MAF13-6 | : : | -
10/5/84 | -10/11/84 | -
10/5/84 | 10/18/84 | I | ł |

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inter-office memorandum

TO: Katherine Sheedy

DATE: October 16, 1985

cc: Alison Dunn

FROM: David Ben-Hur

SUBJECT: Determination of vinyl chloride W.O.No.: in a Mather AFB sample.

Sample MAFB-8 collected on August 15, 1984 at Mather AFB was reported to contain 170 ug/L of vinyl chloride. Reexamination of the chromatograms of that sample indicate that the identification was erroneous. The sample does not contain vinyl chloride.



inter-office memorandum

TO:

Katherine Sheedy

DATE. October 15, 1985

cc: Alison Dunn

FROM: David Ben-Hur \mathcal{H}

SUBJECT: Mather AFB

W. O. No.:

The data from the first and second rounds of sampling at Mather AFB have been reviewed. In my estimation the finding of toluene in the first round and benzene in the second round is correct. Some of the values reported, however, are incorrect. The following table is a list of the corrections. Where a dash appears, there is no change from the previously reported value.

First Round

| Samile | Benzene | <u>Toluene</u> | Ethylbenzene |
|----------------|---------|----------------|--------------|
| MAF3-1 | - | _ | - |
| MARG-2 | _ | - | - |
| MAFE-3 | - | - | - |
| MAPE-4 | - | - | - |
| M2078-3 | - | - | - |
| MAFB-K | - | | ~ |
| MAFE-1 | - | - | - |
| MAFE-8 | - | 4 · •·· | _ |
| MARE-3 | - | - | - |
| MA75-11 | - | - | - |
| MARR-11 | - | - | - |
| MA78-20 | - | - | - |
| MARES-DO | - | - | - |
| MARBER 30 | - | 2 4 m
2 4 m | - |
| MATS-110 | - | - | - |
| F5-1 | | - | - |
| 72-2 | - | - | - |
| B-1 | - | - | - |
| ē-2 | - | - | - |
| 3-3 | - | - | - |
| 2 – 4 | - | - | - |
| 2 - 4 0 | - | - | - |
| E11-1 | - | - | - |
| F H = 0 | - | - | - |
| FII-3 | - | - | - |
| E11-6 | - | - | - |
| 73430 | - | - | - |

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HEAL TALLE

First Round (continued)

| Sample | Benzene | Toluene | Ethylbenzene |
|--------------|---------|---------|--------------|
| GC-1 | - | - | ND |
| GC-2 | - | - | - |
| GC-20 | - | - | - |
| JTC | - | - | - |
| K-9 | - | - | - |
| Second Round | | | |
| MAFB-1 | 0.21 | - | - |
| MAFB-2 | 0.21 | - | - |
| MAFB-3 | - | - | - |
| MAFB-4 | - | - | |
| MAFB-5 | - | - | - |
| MAF5-6 | - | - | |
| MAFB-7 | - | - | - |
| MAFB-8 | - | - | ~ |
| MAFB-9 | 0.45 | - | - |
| MAFB-10 | - | - | ~ |
| MAFE-11 | - | - | - |
| MAFB-30 | - | - | - |
| M2 EB - 61 | - | - | - |
| MAFE-90 | 0.32 | - | - |
| MARE-100 | 0.25 | - | ~ |
| | 0.28 | - | - |
| | - | - | - |
| | - | - | - |
| 8. 14 - 1 | 0.42 | - | - |

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inter-office memorandum

TO: FRED BOPP

FROM:

DATE: 8-27-84

DON H. BAKER

SUBJECT: MATHER AFB GROUNDWATER ANALYSIS VOLATILE ORGANIC ANALYSIS (VOA)

W. O. No.:

Please find attached the results of the second round of Mather AFB Groundwater Samples for VOA's by EPA Method 601 and 602. We have reported only those compounds found above the detection limit. All other 601 and 602 parameters were not found above the attached detection limits.

It is noted that samples from Wells 1,2,3,8, and 9 indicate trichloroethylene concentrations above the 5.0 ug/l State action level and the Well 9 sample contained bromomethane. Well 8 results indicate a contamination of vinyl chloride and chlorobenzene. These results have been confirmed by second column conformation.

As the results of a phone conversation with Captain Ed Barnes in early July, I am sending copies of these data to Captain Barnes at OEHL and to Captain Jim Curran at Mather AFB.

No corrections have been made for the blanks.

cc: Capt. Ed Barnes Capt. Jim Curran

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MRIMER REE ICLATILE CRUMBIC ANALYSIS FOR WATERS EFA METHOL & 1 &L

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| 146-16 | FIELE NG. | UNIDENTIFIEL
PEAKISI | PARHMETER | RESULTS
(UB) CA |
|------------|---------------|-------------------------|----------------------------------------------------|---------------------------------------|
| | | | METHILENE CHLORIDE | v.85 |
| 5-0981-87 | MAFE-1 | * | CHLORUFORM | 1.5 |
| | | | 1.2-DICHLURGETHANE | U.49 |
| | | | CARBON TETRACHLORIDE | 0.39 |
| | | | TRICHLORŪETHENE | 1100 |
| | | | TETRACHLOROETHENE | 0.1s |
| | | | CHLOROBENZENE | ņ
• |
| | | | METHYLENE CHLOFIDE | ú.92 |
| 3 ∵P3a-33 | MAFE-1 | • | CHLOROFORM | 8.1I |
| | | | 1.2-DICHLORGETHANE | 0.14 |
| | | | TRICHLORGE THENE | 1- |
| | | | METHILENE CHLDRIDE | (r, 9] |
| 9 (79)-91 | МнЕВ-С | • | CHLOPOFOFM | 2.18 |
| | | | 1,2-DICHLORDETHANE | 1.1 |
| | | | CARBON TETRACHLOFICE | 9.12 |
| | | | TRICHLORGETHENE | B: |
| | u - 51 - 1 | | NETHTLENE CHLORIGE | - |
| 3 1 | HAFE-4 | • | TRICHLOFOETHENE | |
| | MARELS | ŕ | METHILENE CHLOFICE | |
| 5 1. 5 | <u>ан.с.с</u> | - | TETRACHLOFCETHENS | ⊕ , 4] |
| 5.13 | MAFRIS | - | METHYLENE CHLOFIDE | 0. ° |
| 2 | | | TRICHLORDETHENE | |
| 5 .FC 55 | MAFE | | METHYLENE CHLOFIDE | |
| 5 .75. 5. | 7110 X | | 1,1-DICHLOFGETHENE | |
| | | | CHLDROFORM | 0S |
| | | | 1.2-DICHLOROFROFANE | e. 85 |
| | | | CHLOPOBENCENE | |
| j., 115.42 | MARES | - | VIN: CHLOFIDE | 174 |
| 2 | | | METHALENE CHUGAIDE | -
-
 |
| | | | 1.1-DICHLORCETHENE | |
| | | | 1.1-DICHLOFCETHANE | 4,5 |
| | | | TRANS-1, 2-DICHLORDD THENE | e |
| | | | CHUGRDECEM | |
| | | | 1.1-CICHLORBETHANE | :,4 |
| | | | 1.1.1-TE1CHLOFCETH4NE | . . |
| | | | LIT-DICHLIFGERIFHME | · · · · · · · · · · · · · · · · · · · |
| | | | TRICHLORDEIHENE | · r |
| | | | TETRACHLORICTHENE | |
| | | | CH. GROPENTENE | ζ. |
| | | | JUNEDICH, TROĐENCEHE | |
| | MgD | | ECCM MECHENE | 4 - |
| | | | METHICENE (HC05111 | |
| | | | 119 11949 41145 45 4 1
119 11949 - 11948 | · · · |
| | | | • • • | |

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MATHER AFE VOLATILE ORGANIC ANALYSIS FOR WATERS EFA METHOE 601-601

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| LAE II | FIELL NO. | UNIDENTIFIED
PEAKIS | PARAMETER | RESULTS
(UG L) |
|----------------|------------|------------------------|---------------------------|------------------------|
| Elected | NAFE S | | TRANS-1, 2-DICHLORCETHENE | |
| | | | 1.1.1-TRICHLORDE CHANE | 9,75 |
| | | | TFICHLOROF THENE | 1.0
9. 4 |
| | | | TETRACHLORDETHENE | 4.4
2.4 |
| | | | CHLOROBENZENE | ··•
1. [*] |
| | | | | 4. |
| i 195.15i | MAEB-1. | 1 | METHYLENE CHLORIDE | 1.4 |
| | | | 1,1-DICHLORDETHANE | 1.4
5.19 |
| | | | 1.1-DICHLORDETHANE | 0.05 |
| | | | TRICHLORGETHENE | 0.00
(j.94 |
| | | | TETRACHLORDETHENE | 0. v=
(0. v3 |
| | | | | |
| i di c | MARE 14 | • | METHILENE CHLOFIDE | 1.1 |
| | | | 1.1-DICHLORDETHANE | 0.0T |
| | | | TFICHLORCETHENE | 1.1 |
| | | | BROMCFORM | |
| | | | | 1 |
| <u>1 na 18</u> | MARE-11 | ; | METHYLENE CHEDRIDE | 1.7 |
| | | | 1.2-DICHLORGETHANE | Ú.Ú7 |
| | | | | •••• |
| 1 : . | Marti I. | • | METHILENE CHLOFIDE | 1.3 |
| | | | CHLORDFURM | 0.14 |
| | | | TRICHLORCETHENE | 0.15
0.15 |
| | | | | |
| | MAF8-11 | • | METHYLENE CHUDRIDE | 1.7 |
| | | | | •• |
| | F 🔂 🔅 | • | METH+LENE CHLOFIDE | |
| | | | 1.1 CICHLORDETHANS | ··· |
| | | | CHL0FUF0FM | |
| | | | | |
| | ELANK BULL | | METHYLENE CHLOFICE | |
| | | | CHLURGFORM | ve |
| | | | | |



inter-office memorandum

TO: Fred Bopp

DATE: September 21, 1984

FROM: Maggie Neckels

SUBJECT: Analysis of Mather AFB Samples taken August, 1984 (ROUND2)

W. O. No.:

Dear Fred:

Enclosed please find the results for PCB, Pesticide, Herbicide, and Phenols (method 604) on the Mather AFB samples.

All data concerning field identification of samples, blanks and Suplicates has been sent to Alison Dunn per her request. PCB's were run on MAFB-1, -2, -3 and FB-1. All were not detectable at the following limits.

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| PARAMETER | DETECTION LIMIT (ug/1) |
|------------|------------------------|
| PCB - 1016 | 0.04 |
| PCB - 1221 | 0.10 |
| PCB - 1232 | 0.10 |
| PCB - 1242 | 0.05 |
| PCB - 1248 | 0.08 |
| PCB - 1254 | 0.08 |
| PCB - 1260 | 0.15 |

Pesticides and herbicides were run on MAFB-4, -5, -6 and FB-1. All were non detectable at the following limits.

| PARAMETER | DETECTION LIMIT (ug/1) |
|-------------|------------------------|
| DBCP | 0.3 |
| EDB | 0.1
1.0 |
| ABHC | |
| B-BHC | 0.05 |
| G-BHC | 0.05 |
| D-BHC | 0.05 |
| Heptachlor | 0.05 |
| Aldrin | 0.05 |
| Endosul I | 0.05 |
| Hept. Epox | 0.05 |
| 4,4 DDE | 0.05 |
| | 0.05 |
| Dieldrin | 0.05 |
| Endrin | 0.05 |
| 4,4 DDT | 0.05 |
| Endrin Ald. | 0.05 |
| Endos Sul | 0.05 |
| Chlordane | 0.5 |
| Toxaphene | 5.0 |
| | 2.0 |



Date of Final Report: January 2, 1985

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MATHER A.F.B 2nd ROUND SAMPLING RESULTS SAMPLES COLLECTED: AUGUST 14 TO AUGUST 20, 1984

I. TOC ANALYSIS

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A] These samples were received by the laboratory on August 22, 1984 and analyzed on August 27, 1984. The detection limit for these samples was 1 mg/L. The found values follow:

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| | SAMPLE | SITE | | |
|---------------|----------|-----------------|-----------|--|
| R.F.W.NO. | <u> </u> | <u>ID</u> | TOC, mg/L | |
| 8408-588-0010 | 0129 | MAFB-1 | <1.0 | |
| 8408-588-0020 | 0130 | MAFB-2 | <1.0 | |
| 8408-588-0030 | 0131 | MAFE-3 | <1.0 | |
| 8408-588-0040 | 0132 | MAFB-7 | 10.3 | |
| 8408-588-0050 | 0133 | MAFB-8 | 6.3 | |
| 8408-588-0060 | 0134 | MAFB-9 | 7.8 | |
| 8408-588-0070 | 0135 | MAFB-10 | 1.4 | |
| 8408-588-0080 | 0136 | MAFB-11 | <1.0 | |
| 8408-588-0090 | 0137 | MAFB-4 | 1.5 | |
| 8408-588-0100 | 0138 | MAFB-5 | 1.5 | |
| 8408-588-0110 | 0139 | MAFB-6 | 2.0 | |
| 8408-588-0120 | 0140 | FB-1 | 1.0 | |
| 8408-588-0130 | 0144 | FB-2 | <1.0 | |
| 8408-588-0140 | 0145 | MAFB-4(dup) | <1.0 | |
| 8408-588-0150 | 0146 | MAFB-6(dup) | 1.8 | |
| 8408-588-0160 | 0147 | MB-1 | 1.3 | |
| 8408-588-0170 | 0148 | MB-2 | <1.0 | |
| 8408-588-0180 | 0149 | MB-3 | 10.3 | |
| 8408-588-0190 | 0150 | MB-+ | <1.0 | |
| 8408-588-0200 | 0151 | FH-1 | 4.8 | |
| 8408-588-0210 | 0152 | FH-2 | 1.3 | |
| 8408-588-0220 | 0153 | FH-3 | 2.7 | |
| 8408-588-0230 | 0155 | FH-5 | <1.0 | |
| 8408-588-0240 | 0156 | FH-0 | < 1.0 | |
| 8408-588-0250 | 0157 | GG -1 | <1.C | |
| 8408-588-0260 | .0158 | GC-2 | 9.0 | |
| 8408-588-0270 | 0159 | K -9 | <1.0 | |
| 8408-588-0280 | 0160 | ACW | 3.6 | |
| 8408-588-0290 | 0161 | JTC | 2.0 | |
| | | | | |

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Date of Final Report: January 2, 1985

Mather A.F.B. - 2nd Round (con't)

IV. DIMETHYLNITROSAMINE (DMN) ANALYSIS

a) These samples were received by the laboratory on August 21, 1984 and were extracted August 24, 1984. Analysis was completed October 3, 1984. There is a 40 day holding time between date of extraction and date of analysis. Holding times were not exceeded. As noted in the <u>lst</u> round, the l ug/L requested detection limit was not met in some cases .

Sample concentration values follow:

| R.F.W. NO: | SAMPLE_NO. | SITE ID | DMN, ug/L | |
|---------------|------------|---------|-----------|--|
| 8408-588-0090 | 0137 | MAFB-4 | <1 | |
| 8408-588-0100 | 0138 | MAFB-5 | <2 🕊 | |
| 8408-588-0110 | 0139 | MAFB-6 | <1 | |
| 8408-588-0120 | 01+0 | FB-1 | <1 | |
| 8408-588-0130 | 0144 | FB-2 | <1 | |
| 8408-588-0160 | 0147 | MB-1 | <1 | |
| 8408-588-0170 | 0148 | MB-2 | <1 | |
| 8408-588-0180 | 0149 | MB-3 | < 1 | |
| 8408-588-0190 | 0150 | MB-4 | < 2 🗡 | |

OIL AND GREASE RESULTS

MATHER AIR FORCE BASE

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| Site Identification | Oil 6 Grease $\frac{mg}{L}$ | Extraction Date | Weston Lab
No. |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MAFB-1
MAFB-1 D
MAFB-2 D
MAFB-3 D
MAFB-3 D
MAFB-4
MAFB-4
MAFB-4
MAFB-5
MAFB-6
MAFB-7
MAFB-7
MAFB-8
MAFB-9
MAFB-10
MAFB-11
MAFB-12 | 0.76
< 0.33
0.86
0.68
0.52
< 0.33
< 0.33
0.48
0.55
0.39
< 0.33
< 0.33 | 8/29/84
8/30
8/29
8/30
8/30
8/29
8/30
8/29
8/29
8/29
8/29
8/29
8/29
8/29
8/29
8/29
8/29
8/29
8/29
8/29
8/29
8/29 | S-0984
S-1128
S-0989
S-1129
S-1130
S-0994
S-1024
S-1014
S-1018
S-0977
S-0999
S-1004
S-0979
S-0975
S-0975
S-1020
S-1019 |
| MAFB-13 | | , | |

mg/kg #

| 0141 Ditch upstream | 600 | 8/29 | S-0954 |
|---------------------|-----|------|----------------|
| 0142 Downstream | 700 | 8/29 | S-0956 |
| 0143 Downstream | 550 | 8/29 | S-09 55 |

ROUND 3



inter-office memorandum

TO: FRED BOPP

;

DATE: 11-05-84

FROM: MAGGIE NECKELS

SUBJECT: MATHER AFB THIRD ROUND RESULTS W. O. No.:

Enclosed please find the analytical results for the third round sampling at Mather A.F.B.

⊐FW _ 1-39

- 11.-

Wells 4, 5, 6, and FB1 were run for 4-4 DDT, 2,4-D and chlordane. All were not detected at the following limits.

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0.02 My 1-4-4 DDT C.O2 " 2,4-D Chlordane 0.06"

Wells 1, 2, 3, and FB1 were run for PCB's. All were not detected at the following limits:

PCB 1016 0.4 mg/l PCB 1221 1.0 PCB 1232 1.0 PCB 1242 0.5 PCB 1245 0.8 PCB 1254 0.8 PCB 1260 1.5



DATE OF INTERIM REPORT: 18 January, 1985

MATHER A.F.B Brd ROUND SAMPLING RESULTS - SOIL SAMPLES DATE SAMPLES COLLECTED: 27 SEPTEMBER, 1984

11. TOC ANALYSIS#

a. These samples were received by the laboratory on 4 October, 1984 and analyses was completed on 17 January, 1985. Sample concentrations follow:

| b. | R.F.W. NO: | SAMPLE DESCRIPTION | (mg/ka) |
|----|---------------|------------------------------|---------|
| | 8-10-768-0010 | 0206 West Ditch - Upstream | 67-0 |
| | 8410-708-0020 | 0207 West Ditch - Downstream | 4270 |
| | 8410-708-0030 | 0208 West Ditch - Downstream | 821 |

DATE OF INTERIM REPORT: 3 January 1985



b.

MATTER A.F.B.-3RD ROUND WATER SAMPLES (cont.)

III. Soluble Metals Analysis

a. These samples were received by the laboratory on 6 October 1984 and analyzed within recommended holding times. Reguested detection limits were met and are indicated by "less than" signs. These samples were field filtered prior to receipt by the laboratory. Sample concentrations follow.

| | | SOLUB | SOLUBLE METALS | | | |
|---------------|--------------|-------|----------------|------|-------|--------|
| | SAMPLE | Cr | Pb | Cd | Ni | Aq |
| R.F.W. NO. | DESCRIPTION | ug/Ľ | µg/L | ug/L | µg/L | l ⊒a l |
| | 4 | | | | | |
| 8410-720-0040 | 0212 MAFB-4 | <50 | <10 | <2.5 | <100 | < 2.5 |
| -0050 | 0213 MAFB-5 | < 50 | <10 | <2.5 | < 100 | · 2.5 |
| -0060 | 0214 MAFB-6 | < 50 | <10 | <2.5 | <100 | <2.5 |
| -0070 | 0215 MAFB-7 | < 50 | <10 | <2.5 | <100 | < 2.5 |
| -0080 | 0216 MAFB-8 | < 50 | <10 | <2.5 | <100 | < 2.5 |
| -0090 | 0217 MAFB-9 | < 50 | <10 | <2.5 | <100 | <2.5 |
| -0100 | 0218 MAFB-10 | < 50 | <10 | <2.5 | <100 | < 2.5 |
| -0110 | 0219 MAFB-11 | < 50 | <10 | <2.5 | <100 | <2. |
| -0140 | 0222 FB-1 | < 50 | <10 | <2.5 | <100 | < 2 . |

No results for DMN reported as of the date of this report.

DATE OF INTERIM REPORT: 3 January 1985



b.

MATHER A.F.B. 3RD ROUND SAMPLING RESULTS-SOIL SAMPLES DATE SAMPLES COLLECTED: 27 SEPTEMBER 1984

I Total Phenolics Analysis 🗶

a. These samples were received by the laboratory on 4 October 1984. Sample number 0205 JTC was analyzed on 21 November 1984 and samples 0206, 0207, and 0208 on 31 December 1984. EPA Method 420.1 is applicable to the analysis of drinking, surface, and saline waters and specifies a holding time of 28 days. The method is sensitive to 5 µg/L for water samples. Therefore, sample 0205 JTC exceeded recommended holding times and does not meet the requested detection limit of 1 µg/L. Sample concentrations follow.

| R.F.W. NO. | SAMPLE DESCRIPTION | CONCENTRATION
OF PHENOLICS |
|---------------|----------------------------|-------------------------------|
| 8410-708-0010 | 0206 West ditch-upstream | 0.5 µg/g |
| 8410-708-0020 | 0207 West ditch-downstream | <0.2 µg/g |
| 8410-708-0030 | 0208 West ditch-downstream | 0.3 ug/g |
| 8410-708-0040 | 0205 JTC | <5 µg/L |

NOTE: TOC, chromium, cadmium, lead, nickel and silver results have not been reported as of this date.

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Date of Final Report: 24 January 1985



b)

MATHER A.F.B. 3RD ROUND SAMPLING RESULTS-SOIL SAMPLES DATE SAMPLES COLLECTED: 27 SEPTEMBER, 198-

III TOTAL METALS ANALYSIS

a) These samples were received by the laboratory on 4 October 1984 and analysis was completed on 23 January 1985. Requested detection limits and recommended EPA holding times were met. Sample concentrations follow.

| R.F.W. NO. | SAMPLE
DESCRIPTION | TOTAL METALS | | | | |
|---------------|-------------------------------|--------------|-------------|------------|-------------|------------------|
| | | Ag
lig/g | Cd
ug (g | Cr
ue/g | Pb
g/g | Ni
<u>_e_</u> |
| 8-10-708-0010 | 020b West Ditch
Upstream | ٤.٤ | 5.2 | 70.→ | 184.8 | 10 |
| -0020 | 0207 West Ditch
Downstream | <0.07 | 1.9 | 28.0 | 35.0 | 26.8 |
| -0330 | 0208 West Ditch
Downstream | <0.07 | 3.4 | -3.0 | 60.1 | 32.4 |

ROUND 4

DATE OF INTERIM REPORT: 3 January 1985



b.

MATHER A.F.B. 4TH ROUND SAMPLING SAMPLES COLLECTED: 14 to 19 NOVEMBER 1984

I. Total Metals Analysis

a. These samples were received by the laboratory on 27 November 1984 and were analyzed within the recommended holding times. Chain-of-Custody forms did not specify whether these samples were to be analyzed for total or soluble metals and they were logged in for total metals analyses. Since these samples were field filtered prior to receipt by the laboratory, this should not affect the scope of work. Detection limits are indicated by "less than" signs and all requested detection limits were met. Sample concentrations follow.

| SAMPLE
DESCRIPTION | | TOTAL METALS | | | | |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|---------------------------------------------------|------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|--|
| | Cr
µg∕L | Pb
ug/L | Cd
Lg/L | Ni
µg/L | Ag
ug/L | |
| MAFB-1 | < 50 | <10 | <2.5 | <100 | <2.5 | |
| MAFB-2 | < 50 | <10 | <2.5 | <100 | <2.5 | |
| MAFB-3 | < 50 | <10 | <2.5 | <100 | <2.5 | |
| MAFB-4 | < 50 | <10 | <2.5 | <100 | <2.5 | |
| MAFB-5 | < 50 | <10 | <2.5 | <100 | <2.5 | |
| MAFB-6 | < 50 | <10 | <2.5 | <100 | <2.5 | |
| MAFB-7 | < 50 | <10 | <2.5 | <100 | <2.5 | |
| MAFB-8 | < 5 0 | <10 | <2.5 | <100 | <2.5 | |
| MAFB-9 | < 50 | < 10 | 4 | <100 | <2.5 | |
| MAFB-10 | < 50 | <10 | <2.5 | <100 | <2.5 | |
| MAFB-11 | < 50 | 16 | <2.5 | <100 | <2.5 | |
| MAFB-12 MFB- | < 50 | <10 | <2.5 | <100 | < 2.5 | |
| FB-1 aup | ·/ <50 | <10 | <2.5 | <100 | < 2.5 | |
| | DESCRIPTION
MAFB-1
MAFB-2
MAFB-3
MAFB-4
MAFB-5
MAFB-5
MAFB-6
MAFB-7
MAFB-7
MAFB-7
MAFB-7
MAFB-10
MAFB-11
MAFB-12(MAFB-1) | DESCRIPTION µg/L MAFB-1 <50 | SAMPLE Cr Pb DESCRIPTION µg/L µg/L MAFB-1 <50 | SAMPLE Cr Pb Cd DESCRIPTION µg/L µg/L µg/L µg/L MAFB-1 <50 | SAMPLE Cr Pb Cd NiDESCRIPTION $\mu g/L$ $\mu g/L$ $\mu g/L$ $\mu g/L$ $\mu g/L$ MAFB-1<50 | |

As of this date no results have been reported for TOC or total phenolics



MATHER A.F.B. 4TH ROUND SAMPLING SAMPLES COLLECTED: 14 to 19 NOVEMBER 1984

- II. TOC ANALYSIS *
 - a) These samples were received by the laboratory on 27 November 1984 and analyzed on 4 January 1985 with a detection limit of 1 mg/L. The recommended EPA holding time of 28 days was therefore exceeded by 10 days. The requested detection limit of 1 mg/L was met. Sample concentrations follow.

| b) <u>R.F.W. NO.</u> | SAMPLE DESCRIPTION | TOC, mg/L |
|----------------------|--------------------|-----------|
| | | |
| 8411-882-0010 | MAFB-1 | < 1 |
| -0020 | MAFB-2 | <1 |
| -0030 | MAFB-3 | <1 |
| -0040 | MAFB-4 | < 1 |
| -0050 | MAFB-5 | <1 |
| -0060 | MAFB-6 | < 1 |
| -0070 | MAFB-7 | 9 |
| -0080 | MAFB-8 | 4 |
| -0090 | MAFB-9 | 5 |
| -0100 | MAFB-10 | •] |
| -0110 | MAFB-11 | • |
| -0120 | MAFB-12 | • |
| -0130 | FB-1 | |

As of this date no total phenolics results have is reported.

- III. DIMETHYLNITROSAMINE (DMN) ANALYSIS
 - a) These samples were received by the last of 1984 and extracted on 29 November last Analysis was completed on 10 January limit of 1 mg/L using EPA METH 1 mended holding times for extract exceeded and the requested between concentrations follow:





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| b. <u>R.F.W. NO.</u> | SAMPLE DESCRIPTION | DMN, mg/L |
|----------------------|--------------------|-----------|
| 0.413 000 0010 | | . 1 |
| 8411-882-0010 | MAFB-1 | <1 |
| -0020 | MAFB-2 | <1 |
| -0030 | MAFB-3 | <1 |
| -0040 | MAFB-4 | <1 |
| -0050 | MAFB-5 | <1 |
| -0060 | MAFB-6 | <1 |
| -0070 | MAFB-7 | <1 |
| -0080 | MAFB-8 | <1 |
| -0090 | MAFB-9 | <1 |
| -0100 | MAFB-10 | <1 |
| -0110 | MAFB-11 | <1 |
| -0120 | MAFB-12 | <1 |
| -0130 | FB-1 | <1 |

