AD-A184 581 INSTALLATION RESTORATION PROGRAM PHASE 2 CONFIRMATION/QUANTIFICATION STAGE 1 VOLUME 2 APPENDICES (U) WESTON (ROY F) INC WEST CHESTER PA JUN 86 1/5

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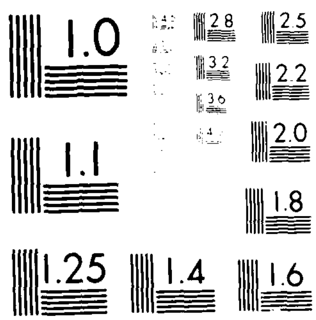
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INSTALLATION RESTORATION PROGRAM PHASE II - CONFIRMATION/QUANTIFICATION STAGE 1

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

APPENDIX A

ACRONYMS, DEFINITIONS, NOMENCLATURE, UNITS OF MEASUREMENT

APPENDIX A

ACRONYMS, DEFINITIONS, NOMENCLATURE, UNITS OF MEASUREMENT

ACW	Air Command and Warning
AFFF	Aqueous film forming foam
ASTM	American Society for Testing and Materials
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 capable of producing water for a well
artesian	Groundwater condition in which pressure within an aquifer causes groundwater 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

WESTON

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 pressures cause water to rise in wells to levels above the base of the upper confining stratum
connate water	Interstitial water trapped in sedimentary rock at the time it was deposited
Cretaceous	The third and last period of the Mesozoic 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

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 instrument 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 hydraulic 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
K	Common symbol for hydraulic conductivity
lens	A body of sediment or rock thick in the middle and thin at the edges
lenticular	Lens-shaped

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 pronounced changes in temperature, pressure, 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 saturated groundwater flow zone or aquifer, and separated from the main aquifer by a zone of low permeability
P.G.	Registered Professional Geologist
Ph.D.	Doctor of Philosophy degree
POL	Petroleum oil and lubricants

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 Cenozoic Era, subdivided in Pleistocene and Holocene (or Recent) epochs, occurring 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 deposition of transported material that has accumulated in layers
semi-confined	An aquifer condition in which the confining 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 obtained (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

storativity (storage coefficient)	Volume of water than an aquifer releases from or takes into storage per unit surface area of aquifer per unit change in hydraulic head
TCE	Trichloroethylene
terrigenous	Deposited in or on the earth's crust, not in a marine environment
tertiary	The first of two periods in the Cenozoic Era, occurring approximately 66 to 1.6 million years ago
TOC	Total organic carbon
transmissivity	The volume of water moving per unit 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
unconfined	An aquifer in which the water table 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 hydrocarbon compounds
water table	The level below which earth materials are saturated with water

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. General

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

D. West Ditch Area

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

E. Northeast and East Base Perimeter

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. Collect one sample per well during each sampling round. Analyze samples for dimethylnitrosamine (DMN); oil and greases (IR), TOC, VOC, Cr, Pb, Cd, Ni, Ag, DDT, Chlordane, 2,4-D.

F. Base Production Wells

1. All 15 base production wells shall be sampled one time, and analyses performed for TOC, VOC, 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-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: Standard Methods for The Examination of Water and Wastewater, 15th Ed., (1980), pp 35-42; ASTM, Part 31, pp 72-82, (1976), Method D-3370; and Methods for Chemical Analysis of Waters and Wastes, EPA Manual 600/4-79-020, pp xiii to xix (1979). Minimum detection limit for analyses are shown in Attachment 1.

H. Well Installation and Cleanup

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

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 ea[illegible] well 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 completi[illegible] of the well. Drill cuttings shall be removed and the general area cleaned[illegible]

I. <u>Data Review</u>

Results of <u>each round of</u> sampling and analysis shall be tabulated [illegible] 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 [illegible] Item VI below. This report shall include a discussion of the regional hydr[illegible] geology, well logs of all project wells, data from water level surveys, wa[illegible] quality analysis results, available geohydrologic cross sections, groundwa[illegible] surface and gradient vector maps, vertical and horizontal flow vectors and Laboratory quality assurance information. The report shall follow the USA[illegible] OEHL supplied format (mailed under separate cover).

2. Estimates shall be made of the magnitude, extent and direction [illegible] movement of contaminants discovered. Potential environmental consequences [illegible] discovered contamination must be identified. Where survey data are insuffi[illegible] cient to properly determine or estimate the magnitude, extent and directio[illegible] movement of discovered contaminants, specific recommendations, fully justi[illegible] shall be made for additional efforts required to properly evaluate contami[illegible] tion migration and included in a separately bound appendix to the draft fi[illegible] report (see K 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 recommenda[illegible] tions provided shall include all efforts required to determine the magnitu[illegible] and direction of movement of discovered contaminants along with an estimate [illegible] the time required to accomplish the proposed effort. This information sha[illegible] be provided in a separately bound appendix to the draft final report.

L. <u>Meetings</u>

The contractor's project leader shall attend two meetings, to be he[illegible] 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
USAF OEHL/CVT
Brooks AFB TX 78235
(512) 536-2158
AV 240-2158

2. Capt Dennis Korycinski
USAF Hospital Mather/SGPB
Mather AFB CA 95655
(916) 364-2284
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
4	CNE/R	~~12 MAC~~ 15 MAC	~~15 MAC~~ 16 MAC	21 MAC	*
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 forwarded 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.

Attachment 1
Required Sample Detection Limits

Parameter	Soil/Sediment	Water
*Total Organic Carbon (TOC)	1.0 milligram/gram	1.0 milligram/L
Oils and Greases (IR Method 412.3)	100 micrograms/gram	10 micrograms/L
Phenol	1 microgram/gram	1.0 microgram/L
Cyanide	1 microgram/gram	10 micrograms/L
Lead	2 micrograms/gram	20 micrograms/L
Chromium	5 micrograms/gram	50 micrograms/L
Cadmium	1 microgram/gram	10 micrograms/L
Nickel	10 micrograms/gram	100 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	---	0.06 microgram/L
Volatile Organic Compounds (VOC)	**	**

*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 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.

Table 3: SUMMARY OF ANALYTICAL REQUIREMENTS

Analyte	Sampled Medium	AC&W	7100	W. Ditch	Perimeter	Base Wells	QA	Total Samples
VOA	Water	9	9	6	9	15	10	58
VOA	Soil	0	0	2	0	0	1	3
TOC	Water	9	9	6	9	15	10	58
O & G	Water	9	9	6	9	15	10	58
O & G	Soil	0	0	2	0	0	1	3
PCB	Water	9	0	0	0	1	2	12
Phenol	Water	0	9	6	0	1	3	19
Phenol	Soil	0	0	2	0	0	1	3
Cyanide	Water	0	9	6	0	1	2	18
Cyanide	Soil	0	0	2	0	0	1	3
Metals[1]	Water	0	9	6	9	5	6	35
Metals[1]	Soil	0	0	2	0	0	1	3
DMN[2]	Water	0	0	0	9	4	3	16
Pesticides[3]	Water	0	0	0	9	4	3	16

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

STAGED

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

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Mather AFB, California*

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*Highlight of modification underlined

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J. Report Preparation

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

K. Cost Estimates

The contractor shall provide [illegible] for all [illegible] work recommended to permit [illegible] of [illegible]. The [illegible] [illegible] effort [illegible] and direction of [illegible] of the time required to accomplish the [illegible] effort. This information shall be provided in a separately bound appendix to the draft final report.

L. Meetings

The contractor's project leader shall [illegible], to be held at Mather AFB to discuss [illegible] later. [illegible]

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Building, Time &
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3	AS REQ	**	**		

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Volatile Organic Compounds (VOC)	**	**

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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 contaminants you may be asked to show both chromatograms used to rule out possible interferences.

F[illegible]

APPENDIX C

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
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 10^6 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, SO_2 SO_3 H_2SO_4, chlorides, hydrocarbons, aldehydes, organic acids, total reduced sulfur, permanent gases, odor, mercury, particle size, resistivity, hydrogen sulfide, chloride, ozone, metals, sulfates, vinyl chloride, 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 SO_2 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.

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

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

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 heavily-pumped 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.

Katherine A. Sheedy

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

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 aquifer 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 disposal site in Canonsburg, Pennsylvania.

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

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 irrigation 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.

Walter M. Leis, P.G.

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

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 Fellow, 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.

Professional Profile

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)."

James S. Smith, Ph.D.

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, electrochemical, thermal techniques and surface methodologies (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. In-depth 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)

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.

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. Smith, "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, effecting, 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.

Professional Profile

"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 Arizona (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 Arizona Dept of Hydrology Environmental Research Laboratory and Office of Arid Land Studies
1978 (Summer	Office of the State Geologist Montpelier 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 remedial measures on a computer groundwater flow model

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 seal 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 Ohio including a metal detector 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 Anisotropic Bedrock A Case Study" Co author David L Kraus in Proceedings of the Third National Symposium and Exposition on Aquifer Restoration and Groundwater Monitoring National Water Well Association Columbus OH 1983

"The Impact of Top Sealing on the Windham Connecticut Landfill" Co authors R M Schuller and W W Beck Jr in Proceedings of the 9th Annual U S EPA MERL/SHWRD Conference 1983

"Leachate Quality Improvements after Top Sealing" Co authors 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 Completion 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.

"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 superfund 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., Civil 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.

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.

APPENDIX D

MONITOR WELL LOGS AND CONSTRUCTION DIAGRAMS

WESTON

DRILLING LOG

WELL NUMBER MAFB-1 OWNER USAF

LOCATION ACW Area ADDRESS Mather AFB

TOTAL DEPTH 128'

SURFACE ELEVATION WATER LEVEL

DRILLING COMPANY Stang DRILLING METHOD Mud Rotary DATE DRILLED 3/7/84

DRILLER J. Kirby HELPER

LOG BY SIM/ALD

SKETCH MAP

NOTES:

DEPTH FEET	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS	DESCRIPTION SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0					0-8" brown Gravelly topsoil
					8"-2' red CLAY and SILT some Sand and Gravel (dense)
					2'-6' red SILT & GRAVEL, little Clay, Sand, Cobbles
					6'-15' Orange-red SILT and SAND, some gravel, little clay
10					
					15-41' brown, GRAVEL and COBBLES, some SAND little Silt and Clay (very difficult drilling)
20					
30					
40					

SHEET 1 OF 3

WESTON

DRILLING LOG

WELL NUMBER: MAFB-1 OWNER:
LOCATION: ADDRESS:
TOTAL DEPTH
SURFACE ELEVATION: WATER LEVEL:
DRILLING COMPANY: DRILLING METHOD: DATE DRILLED:
DRILLER: HELPER:
LOG BY:

SKETCH MAP

NOTES:

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
40					41'-51' GRAVEL and COBBLES, layers of soft tan Silt and Clay less than 1' thick with little Sand (could be cemented)
50					
					51'-76' Tan, CLAY, some Silt, little fine Sand, few bands of Gravel less than 1' thick
60					
70					
					76'-110' CLAY and SILT little fine Sand, trace Gravel (clean)
80					

* ASTM D1586

WESTON

DRILLING LOG

WELL NUMBER: MAFB-1
OWNER:
LOCATION:
ADDRESS:
TOTAL DEPTH
SURFACE ELEVATION:
WATER LEVEL:
DRILLING COMPANY:
DRILLING METHOD:
DATE DRILLED:
DRILLER:
HELPER:
LOG BY

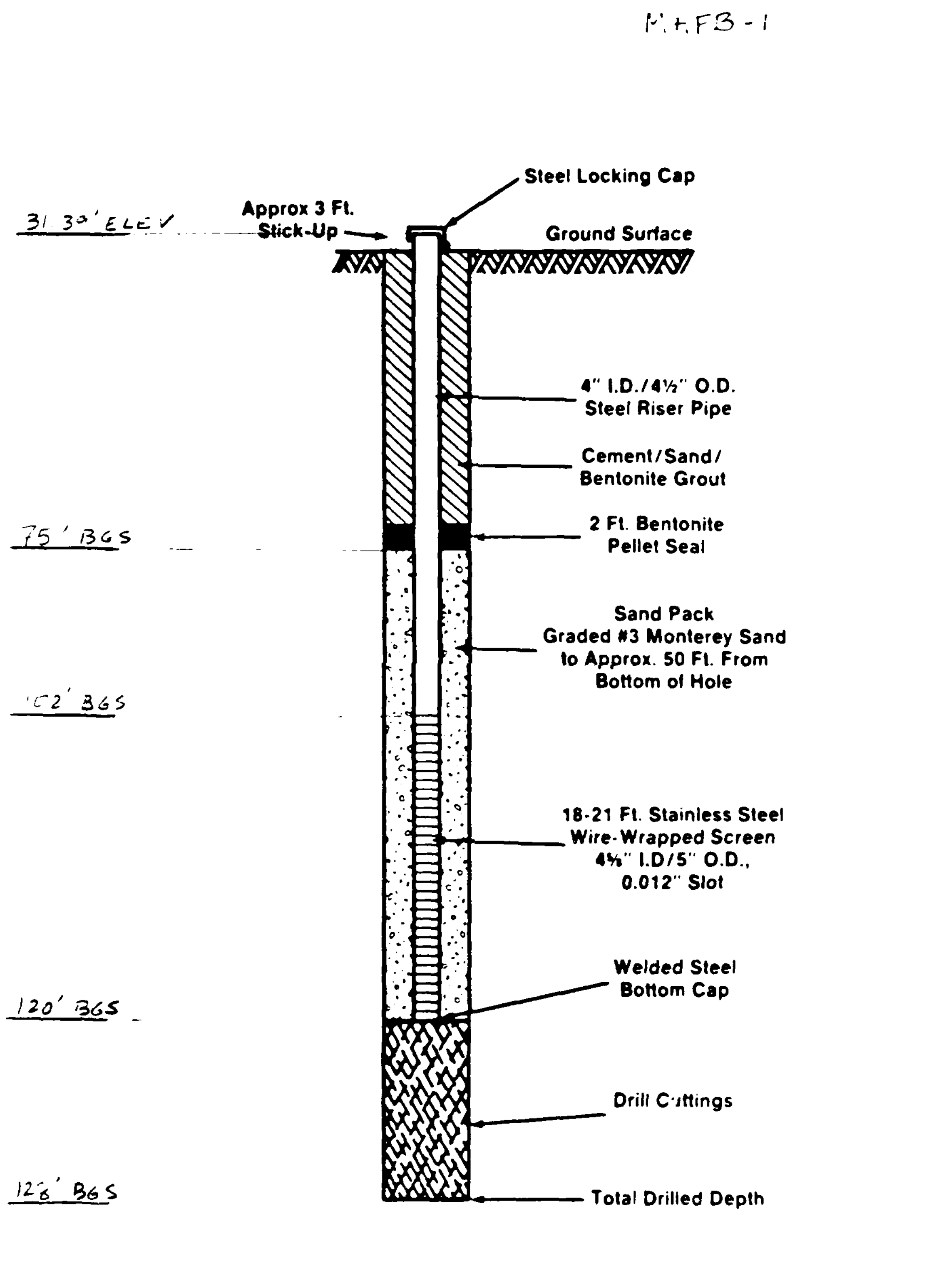
SKETCH MAP

NOTES:

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
80					
90					
100					
110					110'-126' brown, SILT and coarse GRAVEL, some Clay and Sand (dense)
					126'-128' brown, fine SAND and SILT, some Gravel
					128' End of Hole
120					

* A.S.T.M. D1586

SHEET 3 OF 3


M.+.FB-1
Steel Locking Cap
Approx 3 Ft.
Stick-Up
31 30' ELEV
Ground Surface
4" I.D./4½" O.D.
Steel Riser Pipe
Cement/Sand/
Bentonite Grout
75' BGS
2 Ft. Bentonite
Pellet Seal
Sand Pack
Graded #3 Monterey Sand
to Approx. 50 Ft. From
Bottom of Hole
102' BGS
18-21 Ft. Stainless Steel
Wire-Wrapped Screen
4⅝" I.D/5" O.D.,
0.012" Slot
Welded Steel
Bottom Cap
120' BGS
Drill Cuttings
128' BGS
Total Drilled Depth

WESTON

DRILLING LOG

WELL NUMBER MAFB-2 OWNER USAF
LOCATION ACW Area ADDRESS Mather AFB
TOTAL DEPTH 131'
SURFACE ELEVATION WATER LEVEL
DRILLING COMPANY Stang DRILLING METHOD Mud Rotary DATE DRILLED 3/3/84
DRILLER Cliff Patrick HELPER
LOG BY SIM/ALD

SKETCH MAP

NOTES

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0					0-1½' red fine-medium SAND, some Silt/Clay
					1½-2' red CLAY, little Silt
					2-6' red fine to medium SAND and GRAVEL
					some Silt and Clay
10					
					6-15' red, GRAVEL and COBBLES
					little Silt and Clay (difficult drilling)
20					
30					
40					

* ASTM D1586

SHEET 1 OF 3

WESTON

DRILLING LOG

WELL NUMBER MAFB-2 OWNER ____
LOCATION ____ ADDRESS ____

TOTAL DEPTH ____
SURFACE ELEVATION ____ WATER LEVEL ____
DRILLING COMPANY ____ DRILLING METHOD ____ DATE DRILLED ____
DRILLER ____ HELPER ____
LOG BY ____

SKETCH MAP

NOTES

DEPTH FEET	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION SOIL CLASSIFICATION (COLOR TEXTURE STRUCTURES)
40					
					15-59' red-brown GRAVEL and COBBLES, clean trace fine Sand and Silt (very difficult drilling)
50					
					59-65' brown, CLAY and SILT, some Gravel little Sand (easy drilling)
60					
					65-66' COBBLES (difficult drilling)
					66-68' brown, CLAY, some Sand, little Silt and Gravel trace Cobbles
70					
					68-80 COBBLES, GRAVEL, SAND some Silt and Clay (difficult drilling)
80					

* ASTM D1586

WESTON

DRILLING LOG

WELL NUMBER MAFB-2 OWNER ______

LOCATION ______ ADDRESS ______

TOTAL DEPTH ______

SURFACE ELEVATION ______ WATER LEVEL ______

DRILLING COMPANY ______ DRILLING METHOD ______ DATE DRILLED ______

DRILLER ______ HELPER ______

LOG BY ______

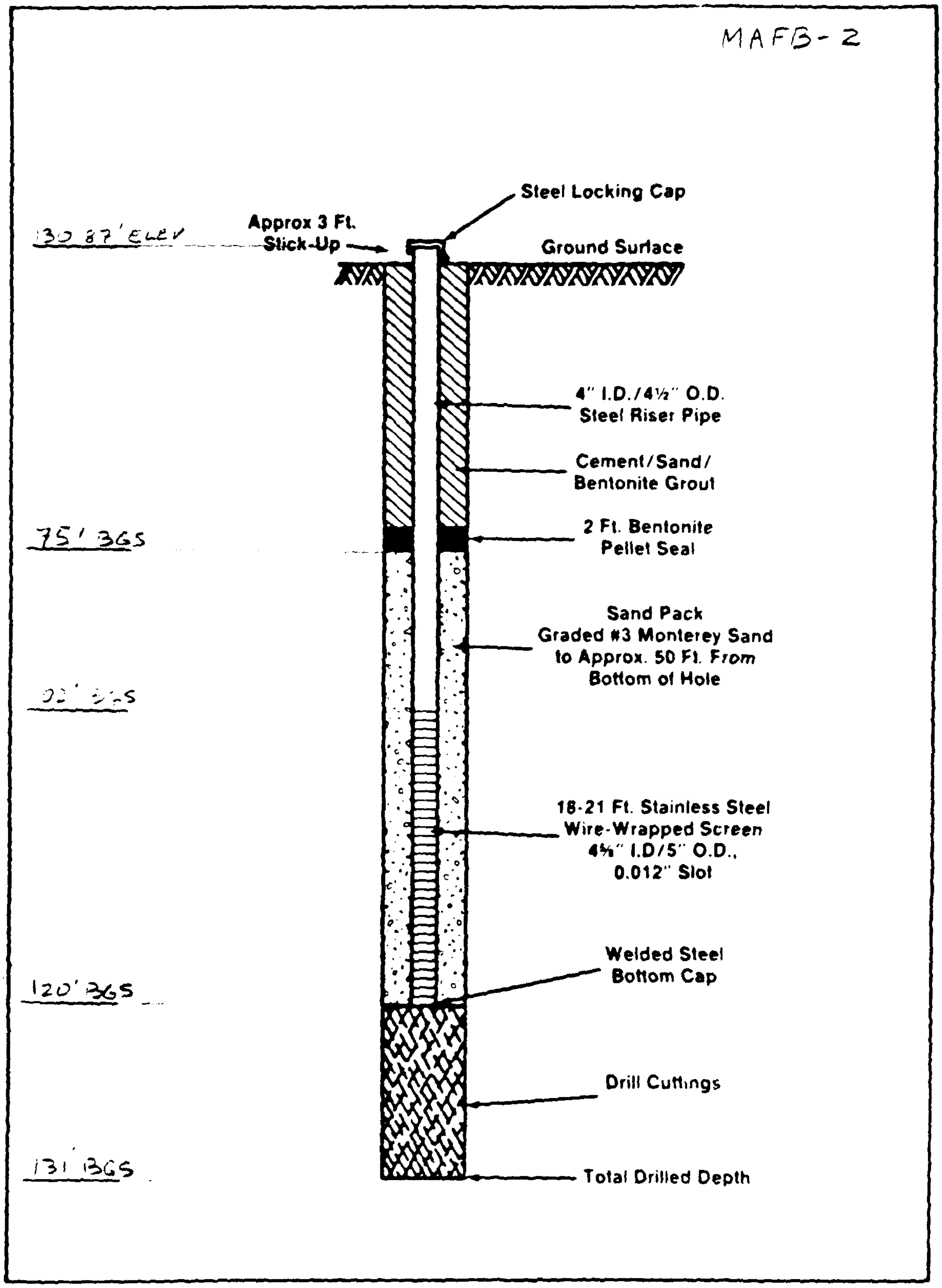
SKETCH MAP

NOTES

DEPTH FEET	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
80					80-100' brown SILT and CLAY and SAND
					little Gravel
					gravel content decreasing with depth
					(smooth drilling)
90					
100					100-131' brown, fine SAND, SILT, CLAY
					little fine Gravel
					Gravel content increasing with depth
110					
					131' End of Hole
120					

* ASTM D1586

SHEET 3 OF 3


MAFB-2
130.87' ELEV
Approx 3 Ft. Stick-Up
Steel Locking Cap
Ground Surface
4" I.D./4½" O.D. Steel Riser Pipe
Cement/Sand/ Bentonite Grout
75' BGS
2 Ft. Bentonite Pellet Seal
Sand Pack Graded #3 Monterey Sand to Approx. 50 Ft. From Bottom of Hole
18-21 Ft. Stainless Steel Wire-Wrapped Screen
I.D/5" O.D.,
0.012" Slot
120' BGS
Welded Steel Bottom Cap
Drill Cuttings
131' BGS
Total Drilled Depth

WESTON

DRILLING LOG

WELL NUMBER: MAFB-3
OWNER: USAF
LOCATION: ACW Area
ADDRESS: Mather AFB
TOTAL DEPTH: 136'
SURFACE ELEVATION:
WATER LEVEL:
DRILLING COMPANY: Stang
DRILLING METHOD: Mud Rotary
DATE DRILLED: 3/8/84
DRILLER: J. Kirby
HELPER:
LOG BY: SIM/ALD

SKETCH MAP

NOTES

DEPTH FEET	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION SOIL CLASSIFICATION (COLOR TEXTURE STRUCTURES)
0					0-3' red-brown TOPSOIL
					CLAY, some Sand and Gravel
					3-8' red, SILT and COBBLES
					little Sand
					local green mottling
10					
					8-24' COBBLES and GRAVEL
					little Silt, Clay, and Sand (difficult drilling)
20					
					24-30' brown, fine SAND
					little Silt, trace fine Gravel (easy drilling)
30					
					30-36' COBBLES and GRAVEL
					little Silt, Clay, and Sand (difficult drilling)
					36-42' brown-gray fine SAND and SILT, little Clay
40					trace fine Gravel (hard pan)

* A.S.T.M. D1586

WESTON

DRILLING LOG

WELL NUMBER MAFB-3 OWNER

LOCATION ADDRESS

TOTAL DEPTH

SURFACE ELEVATION WATER LEVEL

DRILLING COMPANY DRILLING METHOD DATE DRILLED

DRILLER HELPER

LOG BY

SKETCH MAP

NOTES

DEPTH FEET	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS	DESCRIPTION SOIL CLASSIFICATION (COLOR TEXTURE STRUCTURES)
40					42-44' COBBLES and GRAVEL and SAND
					little Silt and Clay (difficult drilling)
50					
					44-66' brown-gray SILT and CLAY
					trace fine Gravel
					little fine Sand
60					Gravel content increasing
					with depth (easy drilling)
					66-75' SAND - (gradual from above,
					SAND content increasing with depth)
70					little Gravel
					little Clay, Silt (smooth, easy drilling)
80					

ASTM D1586

SHEET 2 OF 3

WESTON

DRILLING LOG

WELL NUMBER MAFB-3 OWNER

LOCATION ADDRESS

TOTAL DEPTH

SURFACE ELEVATION WATER LEVEL

DRILLING COMPANY DRILLING METHOD DATE DRILLED

DRILLER HELPER

LOG BY

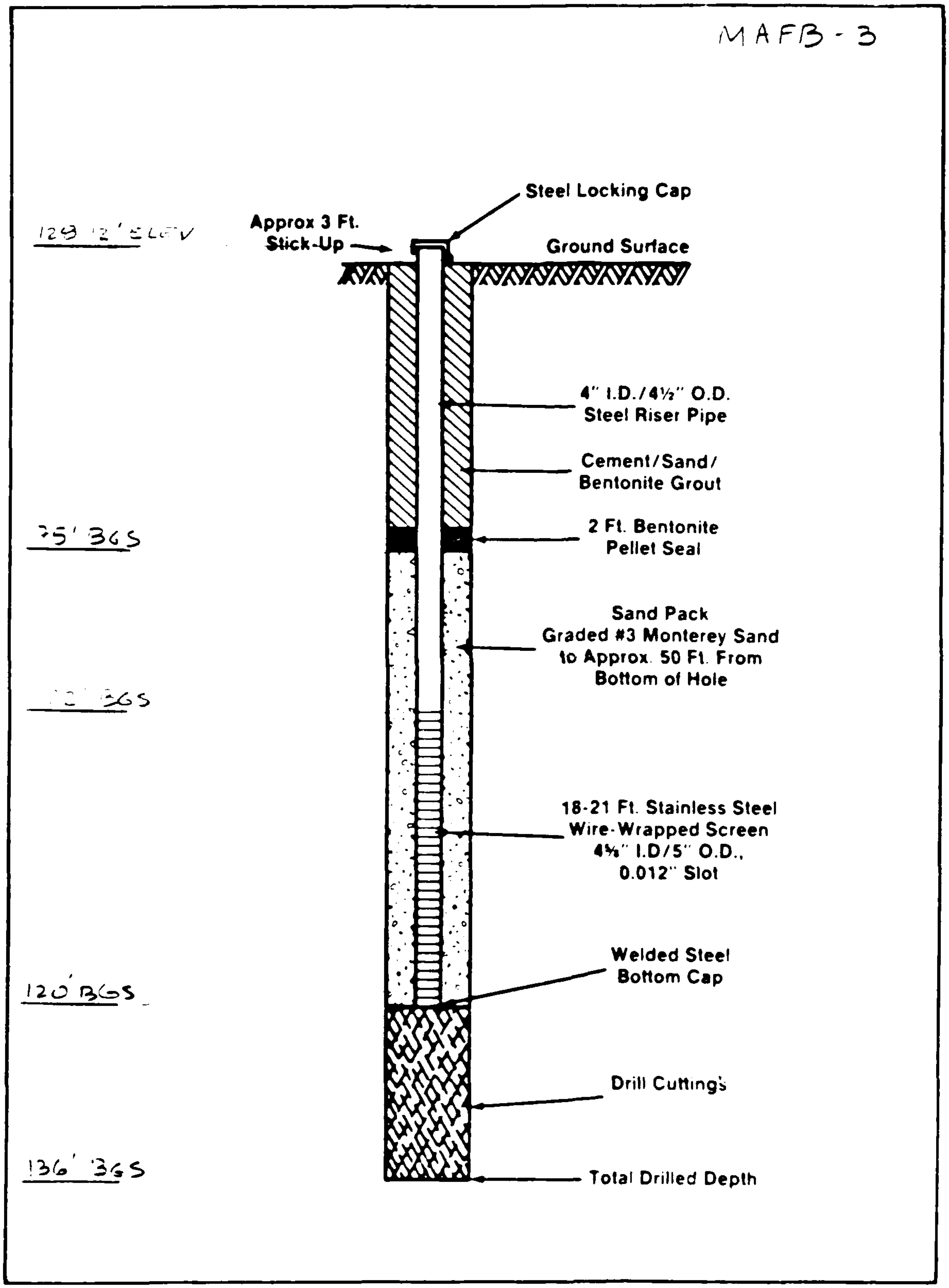
SKETCH MAP

NOTES

DEPTH FEET	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
80					
					75-136' fine to medium SAND
					some Silt and Clay
90					trace Gravel
100					
110					
					136' End of Hole
120					

SHEET 3 OF 3

WESTON



MAFB-3
Steel Locking Cap
Approx 3 Ft.
Stick-Up
Ground Surface
4" I.D./4½" O.D.
Steel Riser Pipe
Cement/Sand/
Bentonite Grout
75' BGS
2 Ft. Bentonite
Pellet Seal
Sand Pack
Graded #3 Monterey Sand
to Approx. 50 Ft. From
Bottom of Hole
18-21 Ft. Stainless Steel
Wire-Wrapped Screen
4⅝" I.D/5" O.D.,
0.012" Slot
120' BGS
Welded Steel
Bottom Cap
Drill Cuttings
136' BGS
Total Drilled Depth

WESTON

DRILLING LOG

WELL NUMBER: MAFB-4
OWNER: USAF
LOCATION: NE Perimeter near Mather Lake
ADDRESS: Mather AFB
TOTAL DEPTH: 166'
SURFACE ELEVATION:
WATER LEVEL:
DRILLING COMPANY: Stang
DRILLING METHOD: Mud Rotary
DATE DRILLED: 2/29/84
DRILLER: Cliff Patrick
HELPER:
LOG BY: SIM/ALD

SKETCH MAP

NOTES

DEPTH FEET	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS	DESCRIPTION SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0					0-3" brown top soil
					3-5" green SILT, little fine Sand
					5"-18' red, GRAVEL
10					some Silt
					18-42' brown to tan
20					SILT
					little Clay
					trace fine Sand
30					
40					

WESTON

DRILLING LOG

WELL NUMBER	MAFB-4	OWNER	
LOCATION		ADDRESS:	
		TOTAL DEPTH	
SURFACE ELEVATION		WATER LEVEL:	
DRILLING COMPANY		DRILLING METHOD	
DATE DRILLED			
DRILLER		HELPER:	
LOG BY			

SKETCH MAP

NOTES:

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
40					42-45' tan SILT, little Gravel and Clay
					trace fine Sand
					45-58' tan SAND and GRAVEL, little cobbles
50					trace Silt and Clay
					few zones of SILT and
					fine SAND, little Gravel
					1'-1½' thick
60					58-78' fine to coarse SAND and fine GRAVEL
					little Silt
					trace Clay (red and Cobbles)
70					
80					

WESTON

DRILLING LOG

WELL NUMBER: MAFB-4 OWNER
LOCATION: ADDRESS
TOTAL DEPTH
SURFACE ELEVATION: WATER LEVEL:
DRILLING COMPANY: DRILLING METHOD: DATE DRILLED:
DRILLER: HELPER:
LOG BY

SKETCH MAP

NOTES:

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
80					
					78-91' SAND and fine GRAVEL
					little Silt
90					
					91-99' coarser material
					GRAVEL and COBBLES
					trace Silt and Clay
					few zones of no cobbles - Silt/Clay - about 1'
					thick (difficult drilling)
100					99-105' CLAY and SILT
					trace Gravel, Cobbles, Sand (easy drilling)
110					
120					

SHEET 3 OF 4

WESTON

DRILLING LOG

WELL NUMBER: MAFB-4 OWNER:

LOCATION: ADDRESS:

TOTAL DEPTH:

SURFACE ELEVATION: WATER LEVEL:

DRILLING COMPANY: DRILLING METHOD: DATE DRILLED:

DRILLER: HELPER:

LOG BY:

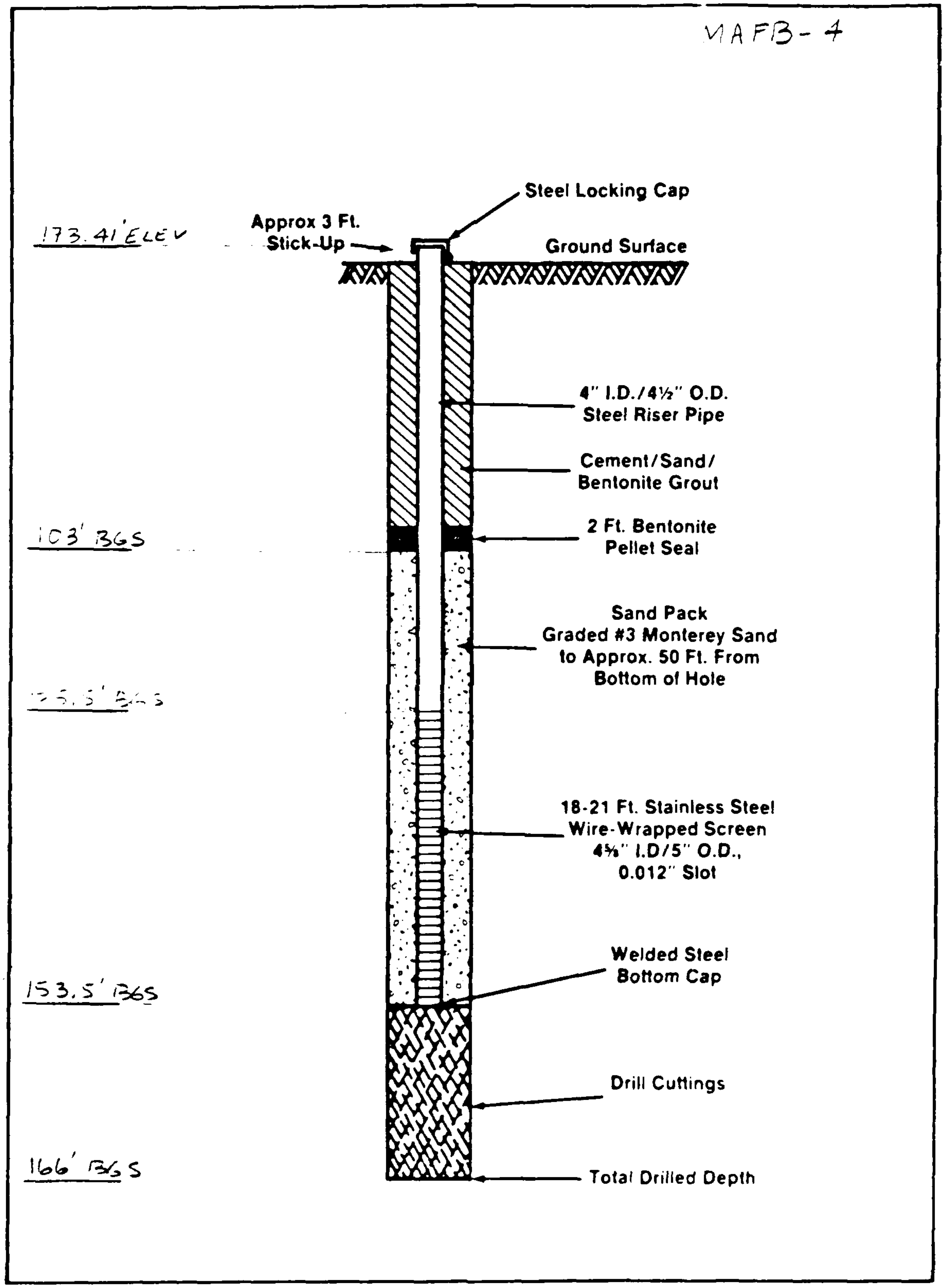
SKETCH MAP

NOTES:

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
120					
130					105'-146' tan, brown
					CLAY
					little fine Sand, Gravel and Silt
140					
					146-166' blue-gray CLAY
					little fine Sand and Gravel
150					
					166' End of Hole
160					

* ASTM D1586

WESTON



MAFB-4
173.41' ELEV
103' BGS
153.5' BGS
166' BGS
Steel Locking Cap
Approx 3 Ft. Stick-Up
Ground Surface
4" I.D./4½" O.D. Steel Riser Pipe
Cement/Sand/ Bentonite Grout
2 Ft. Bentonite Pellet Seal
Sand Pack Graded #3 Monterey Sand to Approx. 50 Ft. From Bottom of Hole
18-21 Ft. Stainless Steel Wire-Wrapped Screen 4⅝" I.D/5" O.D., 0.012" Slot
Welded Steel Bottom Cap
Drill Cuttings
Total Drilled Depth

WESTON

DRILLING LOG

WELL NUMBER: MAFB-5 OWNER: USAF

LOCATION: NE Perimeter near Folsom Canal ADDRESS: Mather AFB

TOTAL DEPTH: 146'

SURFACE ELEVATION: WATER LEVEL:

DRILLING COMPANY: Stang DRILLING METHOD: Mud Rotary DATE DRILLED: 3/1/84

DRILLER: Cliff Patrick HELPER:

LOG BY: SIM/ALD

SKETCH MAP

NOTES:

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION/SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0					0-1' red-brown CLAY, little Sand, Gravel, Cobbles
					1-1½' red, stratified Hardpan, SILT, little Gravel,
					Cobbles, wood fibers and roots (cemented)
					1½-2½' red, SILT, some Gravel and Cobbles, Little
					Clay (slightly unconsolidated)
10					2½-5' red SILT, little Gravel (massive)
					5-6' green SILT, little Gravel (mottled)
					6-9' red, SILT and CLAY, little Sand and Gravel
					9-16' Cobbles (difficult drilling)
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					

*ASTM D1586

SHEET 1 OF 3

WESTON

DRILLING LOG

WELL NUMBER: MAFB-5 OWNER:

LOCATION: ADDRESS:

TOTAL DEPTH

SURFACE ELEVATION: WATER LEVEL:

DRILLING COMPANY: DRILLING METHOD: DATE DRILLED:

DRILLER: HELPER:

LOG BY:

SKETCH MAP

NOTES:

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
40					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					68-90' brown, SAND and GRAVEL
					some Cobbles
					trace Silt and Clay (difficult drilling)
80					

* A S T M D1586

WESTON

DRILLING LOG

WELL NUMBER: MAFB-5
OWNER:
LOCATION:
ADDRESS:
TOTAL DEPTH:
SURFACE ELEVATION:
WATER LEVEL:
DRILLING COMPANY:
DRILLING METHOD:
DATE DRILLED:
DRILLER:
HELPER:
LOG BY:

SKETCH MAP

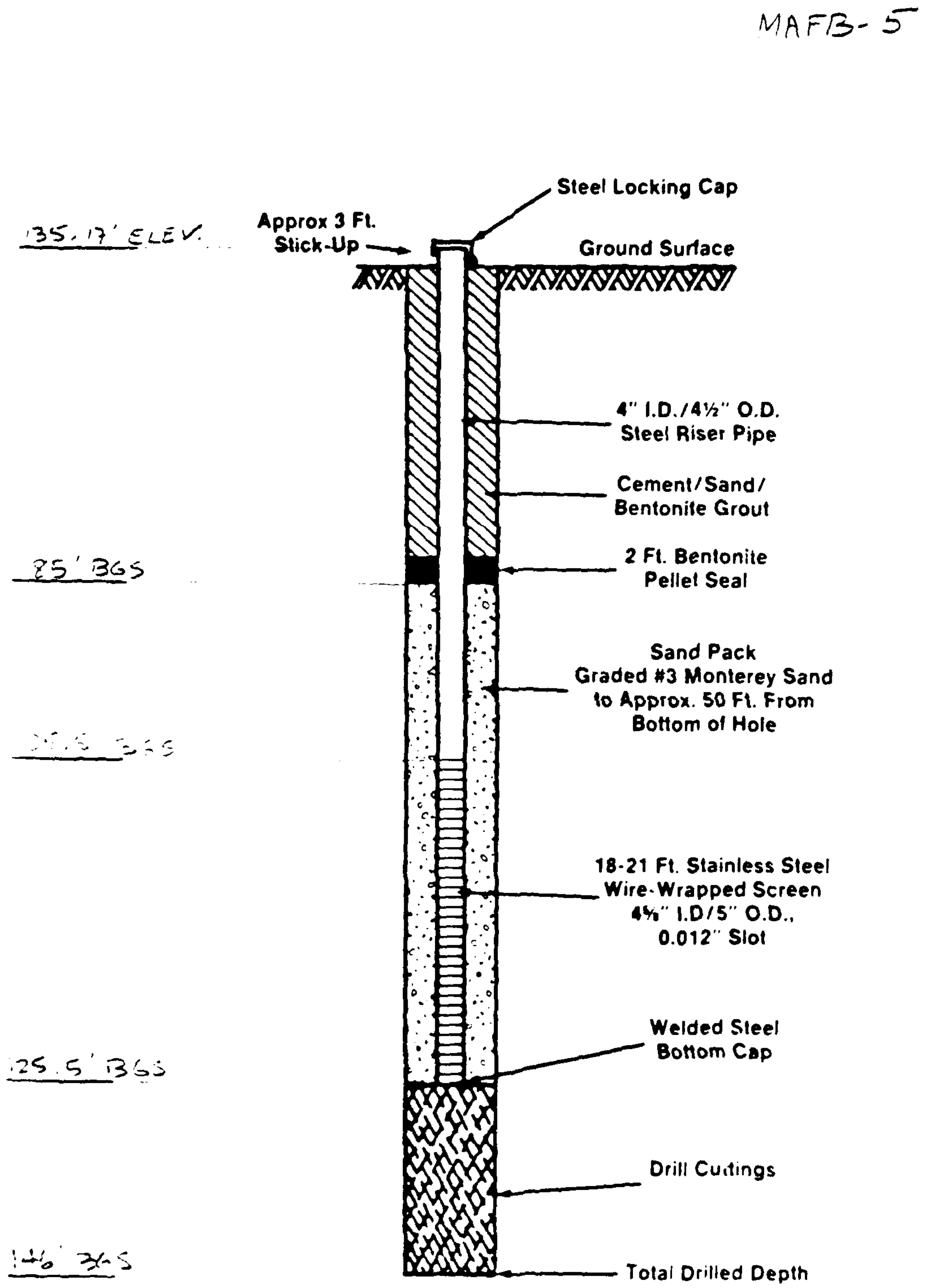
NOTES:

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION/SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
80					
					90-93' brown, SAND and GRAVEL, little clay (losing circulation)
90					
					93-98' brown COBBLES, little Gravel, some Clay (probably in a water zone)
					98-146' brown, CLAY and SILT little Sand and Gravel (easy drilling, dense)
100					
110					
					146' End of Hole
120					

* A.S.T.M. D1586

SHEET 3 OF 3

WESTON


MAFB-5
135.17' ELEV.
Approx 3 Ft. Stick-Up
Steel Locking Cap
Ground Surface
4" I.D./4½" O.D. Steel Riser Pipe
Cement/Sand/ Bentonite Grout
85' BGS
2 Ft. Bentonite Pellet Seal
Sand Pack Graded #3 Monterey Sand to Approx. 50 Ft. From Bottom of Hole
18-21 Ft. Stainless Steel Wire-Wrapped Screen 4⅝" I.D/5" O.D., 0.012" Slot
125.5' BGS
Welded Steel Bottom Cap
Drill Cuttings
146' BGS
Total Drilled Depth

WESTON

DRILLING LOG

WELL NUMBER: MAFB-6
OWNER: USAF
LOCATION: NE Perimeter on Main Base
ADDRESS: Mather AFB
TOTAL DEPTH: 128'
SURFACE ELEVATION:
WATER LEVEL:
DRILLING COMPANY: Stang
DRILLING METHOD: Mud Rotary
DATE DRILLED: 3/12/84
DRILLER: J. Kirby
HELPER:
LOG BY: SIM/ALD

SKETCH MAP

NOTES:

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION SOIL CLASSIFICATION (COLOR, TEXTURE STRUCTURES)
0					0-1½' red-brown TOPSOIL
					silt, some coarse Gravel
					1½-8' SILT, some Clay and coarse Gravel
					layers of coarse Gravel, some Clay
10					little Sand
					8-34' COBBLES and GRAVEL
					LITTLE Sand, Silt, and Clay (difficult drilling,
20					may have some cobble cementation)
30					
					34-87' brown, SILT
					some clay, little Sand and fine Gravel
					grading to tan CLAY
40					some Silt, little Sand and Gravel

* A.S.T.M. D1586

WESTON

DRILLING LOG

WELL NUMBER MAFB 6 OWNER: ________

LOCATION ________ ADDRESS: ________

TOTAL DEPTH ________

SURFACE ELEVATION: ________ WATER LEVEL: ________

DRILLING COMPANY ________ DRILLING METHOD: ________ DATE DRILLED: ________

DRILLER ________ HELPER: ________

LOG BY ________

SKETCH MAP

NOTES:

DEPTH FEET	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
40					
50					
60					
70					
					87'-105' brown, Gravel
					some Silt and Sand
80					

WESTON

DRILLING LOG

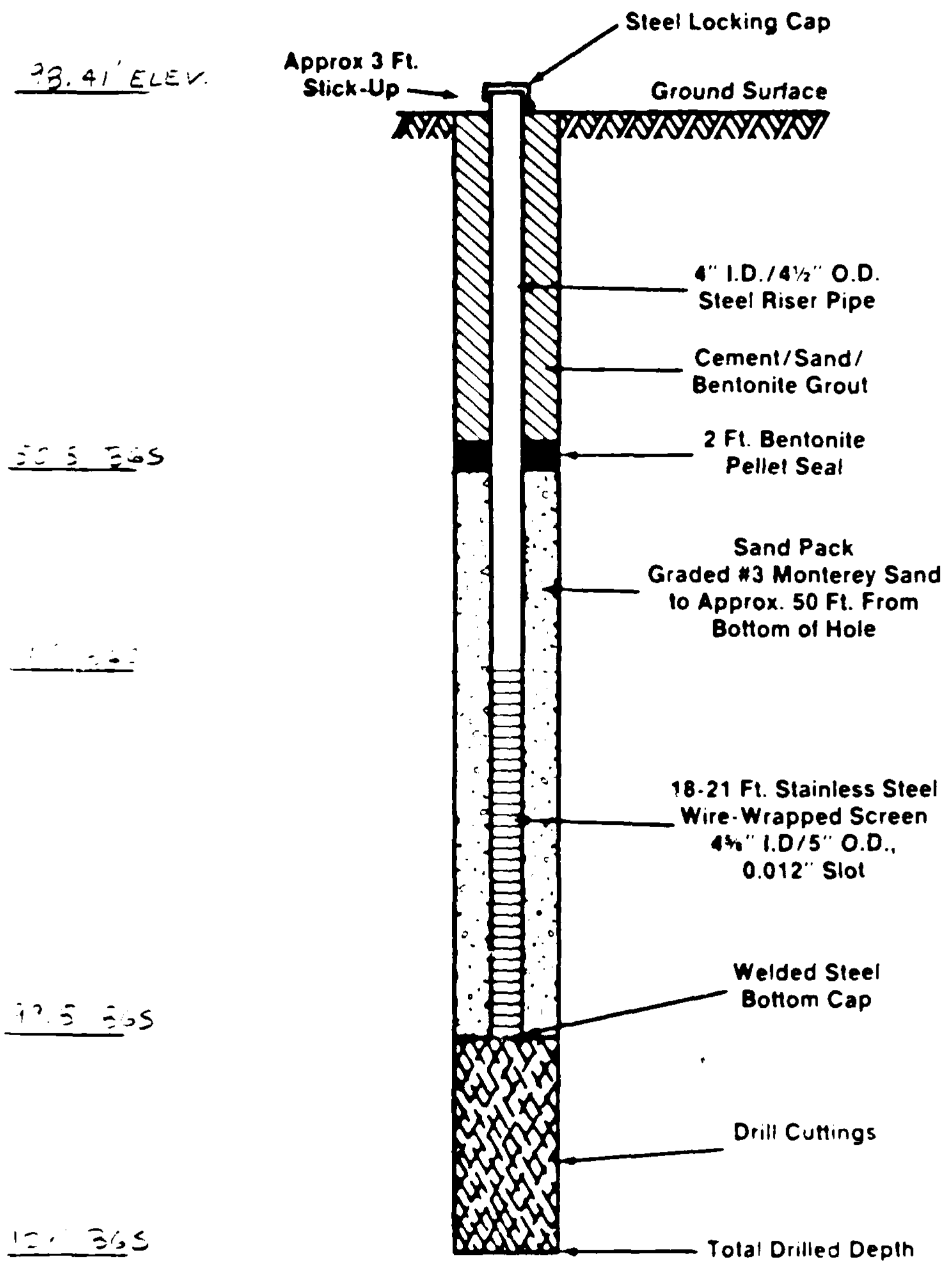
WELL NUMBER MAFB-6 OWNER ____
LOCATION ____ ADDRESS ____
TOTAL DEPTH ____
SURFACE ELEVATION ____ WATER LEVEL ____
DRILLING COMPANY ____ DRILLING METHOD ____ DATE DRILLED ____
DRILLER ____ HELPER ____
LOG BY ____

SKETCH MAP

NOTES:

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
80					
90					
100					105-128' GRAVEL
					little Sand
					little Silt and Clay
110					
120					128' End of Hole

MAFB-6


ELEV.
Steel Locking Cap
Approx 3 Ft. Stick-Up
Ground Surface
4" I.D./4½" O.D. Steel Riser Pipe
Cement/Sand/ Bentonite Grout
2 Ft. Bentonite Pellet Seal
Sand Pack Graded #3 Monterey Sand to Approx. 50 Ft. From Bottom of Hole
18-21 Ft. Stainless Steel Wire-Wrapped Screen 4⅝" I.D/5" O.D., 0.012" Slot
Welded Steel Bottom Cap
Drill Cuttings
Total Drilled Depth

WESTON

DRILLING LOG

WELL NUMBER: MAFB-7 OWNER: USAF

LOCATION: 7100 Area ADDRESS: Mather AFB

TOTAL DEPTH: 128'

SURFACE ELEVATION: WATER LEVEL:

DRILLING COMPANY: Stang DRILLING METHOD: Mud Rotary DATE DRILLED: 3/15/84

DRILLER: J. Kirby HELPER:

LOG BY: SIM/ALD

SKETCH MAP

NOTES

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS	DESCRIPTION SOIL CLASSIFICATION (COLOR TEXTURE. STRUCTURES)
0					0-1' coarse GRAVEL and COBBLES, little Sand and Silt
					(road base, little demolition debris, asphalt)
					1-4' brown-red, SILT and CLAY, little fine Sand
					trace fine Gravel (very dense)
					4-4½' cemented COBBLES & GRAVEL - rounded
10					Clay & Silt matrix
					4½-6' COBBLES, some Gravel, little Silt & Clay matrix
					(compacted, stratified)
					6-27' COBBLES and GRAVEL
20					little Sand, Clay, and Silt (difficult drilling)
					27-40' brownish-gray fine to medium SAND
30					little Silt and Clay, trace Gravel
					(easy drilling) - organic chemical odor below 30'-
					HNU: 0-1.5 ppm with probe near drilling mud
					effluent
40					

WESTON

DRILLING LOG

WELL NUMBER MAFB-7 OWNER
LOCATION ADDRESS
TOTAL DEPTH
SURFACE ELEVATION WATER LEVEL
DRILLING COMPANY DRILLING METHOD DATE DRILLED
DRILLER HELPER
LOG BY

SKETCH MAP

NOTES

DEPTH FEET	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS	DESCRIPTION SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
40					40-42' CLAY & GRAVEL
					some Silt and little Sand
					42-78' Tan SILT
					some Clay
					little Sand and Gravel
50					grading to
					medium to coarse SAND
					Some Silt and Gravel
					little Clay
					grading to
60					fine to medium SAND and SILT
					little Clay
					(strong chemical odor, solvent or
					fuel, below 50')
70					
80					

WESTON

DRILLING LOG

WELL NUMBER: MAFB-7 OWNER:

LOCATION: ADDRESS:

TOTAL DEPTH:

SURFACE ELEVATION: WATER LEVEL:

DRILLING COMPANY: DRILLING METHOD: DATE DRILLED:

DRILLER: HELPER:

LOG BY:

SKETCH MAP

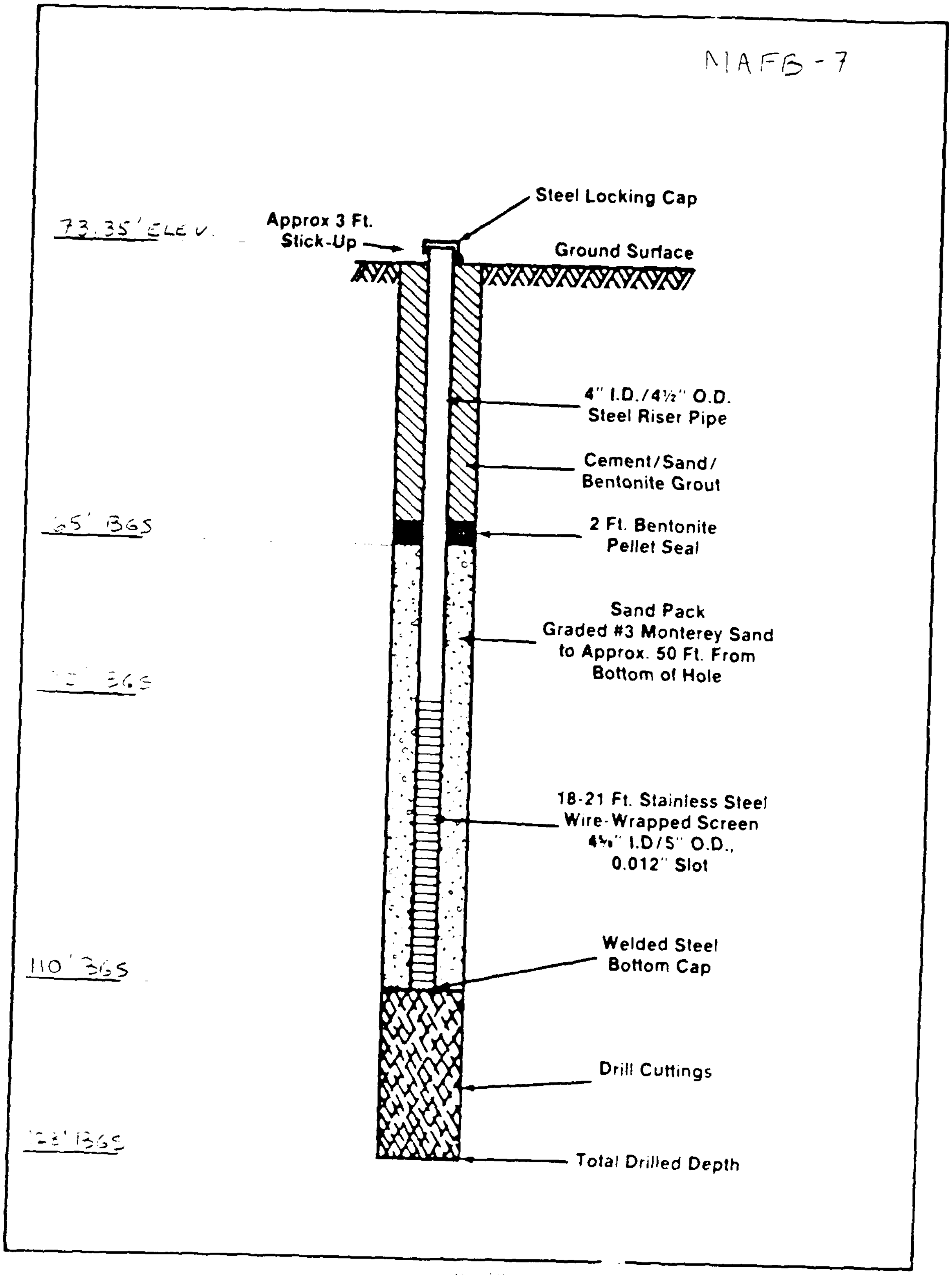
NOTES:

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
80					
					78-106' black medium GRAVEL
					some fine to medium Sand
					tan silt/Clay matrix
					Gravel content increases with
90					depth (smooth drilling)
100					
					106-115' brown-gray, stiff, CLAY and SILT
					some fine to medium Sand
					little fine Gravel (easy drilling)
110					115-128' tan, soft, SILT
					and fine to medium SAND
					Some clay
					little gravel
120					becomes denser with depth

128' End of Hole D-28

SHEET 3 OF 3

WESTON



MAFB-7
73.35' ELEV.
Approx 3 Ft.
Stick-Up
Steel Locking Cap
Ground Surface
4" I.D./4½" O.D.
Steel Riser Pipe
Cement/Sand/
Bentonite Grout
65' BGS
2 Ft. Bentonite
Pellet Seal
Sand Pack
Graded #3 Monterey Sand
to Approx. 50 Ft. From
Bottom of Hole
18-21 Ft. Stainless Steel
Wire-Wrapped Screen
0.012" Slot
110' BGS
Welded Steel
Bottom Cap
Drill Cuttings
128' BGS
Total Drilled Depth

WESTON

DRILLING LOG

WELL NUMBER: MAFB-8
OWNER: USAF
LOCATION: 7100 Area
ADDRESS: Mather AFB
TOTAL DEPTH: 128'
SURFACE ELEVATION:
WATER LEVEL:
DRILLING COMPANY: Stang
DRILLING METHOD: Mud Rotary
DATE DRILLED: 3/17/84
DRILLER: J. Kirby
HELPER:
LOG BY: SIM/ALD

SKETCH MAP

NOTES:

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION · SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0					0-8" TOP SOIL
					8"-2½' red brown, fine SAND and SILT
					little clay roots
					2½-3' 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 clay
40					and tan Silt, some fine to medium Sand

* ASTM D1586

WESTON

DRILLING LOG

WELL NUMBER: MAFB-8 OWNER:

LOCATION: ADDRESS:

TOTAL DEPTH:

SURFACE ELEVATION: WATER LEVEL:

DRILLING COMPANY: DRILLING METHOD: DATE DRILLED:

DRILLER: HELPER:

LOG BY:

SKETCH MAP

NOTES:

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
40					
50					
					60-94' red-brown SILT
60					some Clay
					fine-medium Sand
70					
80					

* A.S.T.M. D1586

SHEET 2 OF 3

WESTON

DRILLING LOG

WELL NUMBER MAFB-8 OWNER:

LOCATION ADDRESS:

TOTAL DEPTH

SURFACE ELEVATION: WATER LEVEL:

DRILLING COMPANY: DRILLING METHOD: DATE DRILLED:

DRILLER HELPER:

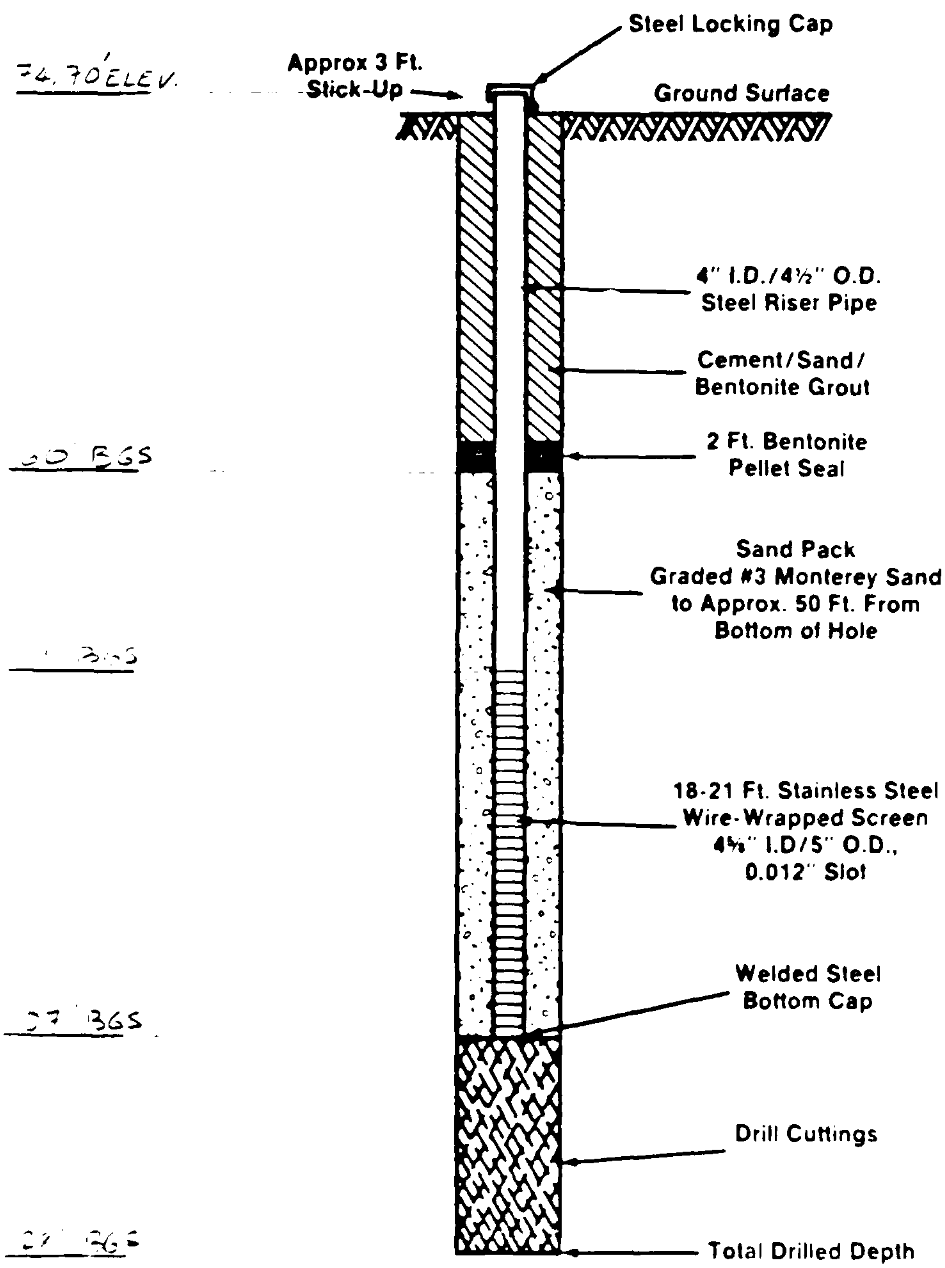
LOG BY

SKETCH MAP

NOTES

DEPTH FEET	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION SOIL CLASSIFICATION (COLOR, TEXTURE STRUCTURES)
80					
90					
					94-107' fine to medium SAND
					some Gravel and tan Silt
					little Clay
					interlayered with CLAY
					some medium black Gravel
100					
					107-128' coarse GRAVEL
					little Sand, Silt
					and Clay
110					
					128' End of Hole

MAFB-8



74.70' ELEV.
Approx 3 Ft. Stick-Up
Steel Locking Cap
Ground Surface
4" I.D./4½" O.D. Steel Riser Pipe
Cement/Sand/ Bentonite Grout
BGS
2 Ft. Bentonite Pellet Seal
Sand Pack Graded #3 Monterey Sand to Approx. 50 Ft. From Bottom of Hole
18-21 Ft. Stainless Steel Wire-Wrapped Screen 4⅝" I.D/5" O.D., 0.012" Slot
Welded Steel Bottom Cap
BGS
Drill Cuttings
Total Drilled Depth

WESTON

DRILLING LOG

WELL NUMBER: MAFB-9
OWNER: USAF
LOCATION: 7100 Area
ADDRESS: Mather AFB
TOTAL DEPTH: 128'
SURFACE ELEVATION:
WATER LEVEL:
DRILLING COMPANY: Stang
DRILLING METHOD: Mud Rotary
DATE DRILLED: 3/20/84
DRILLER: J. Kirby
HELPER:
LOG BY: SIM/ALD

SKETCH MAP

NOTES:

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0					0-1' red TOPSOIL
10					1-15' COBBLES and GRAVEL matrix-red, fine to coarse SAND and SILT little Clay
20					15-45' COBBLES and GRAVEL some Sand little Silt, trace Clay (may have some cementation of cobbles to 21').
30					
40					

SHEET 1 OF 3

WESTON

DRILLING LOG

WELL NUMBER MAFB-9 OWNER
LOCATION ADDRESS
TOTAL DEPTH
SURFACE ELEVATION WATER LEVEL
DRILLING COMPANY DRILLING METHOD DATE DRILLED
DRILLER HELPER
LOG BY

SKETCH MAP

NOTES

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION SOIL CLASSIFICATION (COLOR TEXTURE, STRUCTURES)
40					
					45-48' tan, SILT
					some Clay and fine Sand (soft)
					48-69' tan, SILT
50					some Clay and fine Sand
					little Gravel
					becomes coarser
					with Depth
					some coarse Sand and Gravel
60					
					69-96' red-brown SILT and
					fine to medium SAND
70					little Clay and Gravel
80					

SHEET 2 OF 3

WESTON

DRILLING LOG

WELL NUMBER: MAFB-9 OWNER:

LOCATION: ADDRESS:

TOTAL DEPTH

SURFACE ELEVATION: WATER LEVEL:

DRILLING COMPANY: DRILLING METHOD: DATE DRILLED:

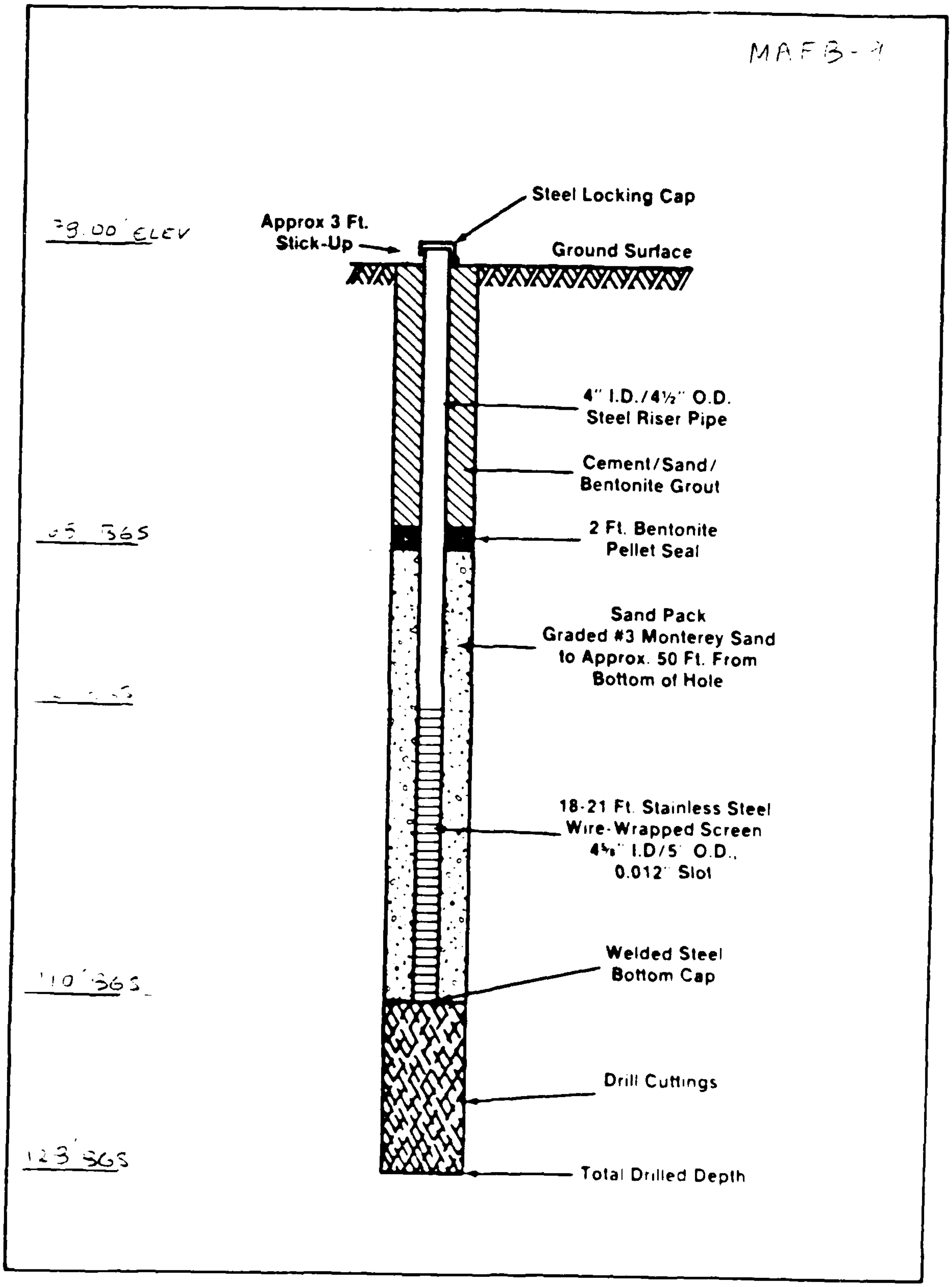
DRILLER: HELPER:

LOG BY:

SKETCH MAP

NOTES:

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS	DESCRIPTION SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
80					
90					96-128' tan, Silt and fine SAND
					little Clay and Gravel
					some Gravel zones
					approx. 6" thick
100					
110					
120					128' End of hole



Steel Locking Cap
Approx 3 Ft. Stick-Up
Ground Surface
4" I.D./4½" O.D. Steel Riser Pipe
Cement/Sand/ Bentonite Grout
2 Ft. Bentonite Pellet Seal
Sand Pack Graded #3 Monterey Sand to Approx. 50 Ft. From Bottom of Hole
18-21 Ft. Stainless Steel Wire-Wrapped Screen 4⅝" I.D/5" O.D., 0.012" Slot
Welded Steel Bottom Cap
Drill Cuttings
Total Drilled Depth

WESTON

DRILLING LOG

WELL NUMBER MAFB-10 OWNER USAF

LOCATION West Ditch ADDRESS Mather AFB

TOTAL DEPTH 120'

SURFACE ELEVATION WATER LEVEL

DRILLING COMPANY Stang DRILLING METHOD Mud Rotary DATE DRILLED 8/31/84

DRILLER J. Kirby HELPER

LOG BY SIM/ALD

SKETCH MAP

NOTES

DEPTH FEET	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS	DESCRIPTION SOIL CLASSIFICATION (COLOR TEXTURE STRUCTURES)
					0-1' TOPSOIL
					1-3' red, fine SAND and SILT
					little clay
					3-9' red, Silt/Clay and fine SAND
					brittle hardpan
					9-18' COBBLES and GRAVEL
					matrix-red, fine SAND and SILT
					little Clay (difficult drilling)
					18-42' COBBLES and GRAVEL-black (mafic)
					one foot thick zones of
					brown, dense, fine SAND/SILT
					little Clay (difficult drilling)

SHEET 1 OF 2

WESTON

DRILLING LOG

WELL NUMBER MAFB-10 OWNER ____
LOCATION ____ ADDRESS ____
TOTAL DEPTH ____
SURFACE ELEVATION ____ WATER LEVEL ____
DRILLING COMPANY ____ DRILLING METHOD ____ DATE DRILLED ____
DRILLER ____ HELPER ____
LOG BY ____

SKETCH MAP

NOTES

DEPTH FEET	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS	DESCRIPTION SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
40				42-45' brown, CLAY, little Silt
				trace fine Sand grading to
				little Gravel (moderately dense, easy drilling)
				45-50 brown, CLAY
				little Silt, little Gravel
50				trace fine Sand (easy drilling)
				50-60' tan, GRAVEL and medium to coarse
				SAND,
				matrix - silt/Clay, trace
60				fine Sand (difficult drilling)
				60-63' brown-black, fine SAND, little Silt
				trace Clay and Gravel (easy drilling)
				63-67' tan, fine to coarse SAND and SILT,
				trace fine Gravel and Clay (easy drilling)
70				67-77' dark brown, fine to medium SAND and GRAVEL
				little Silt, trace Clay ([illegible] drilling)
80				

WESTON

DRILLING LOG

WELL NUMBER MAFB-10 OWNER

LOCATION ADDRESS

TOTAL DEPTH

SURFACE ELEVATION WATER LEVEL

DRILLING COMPANY DRILLING METHOD DATE DRILLED

DRILLER HELPER

LOG BY

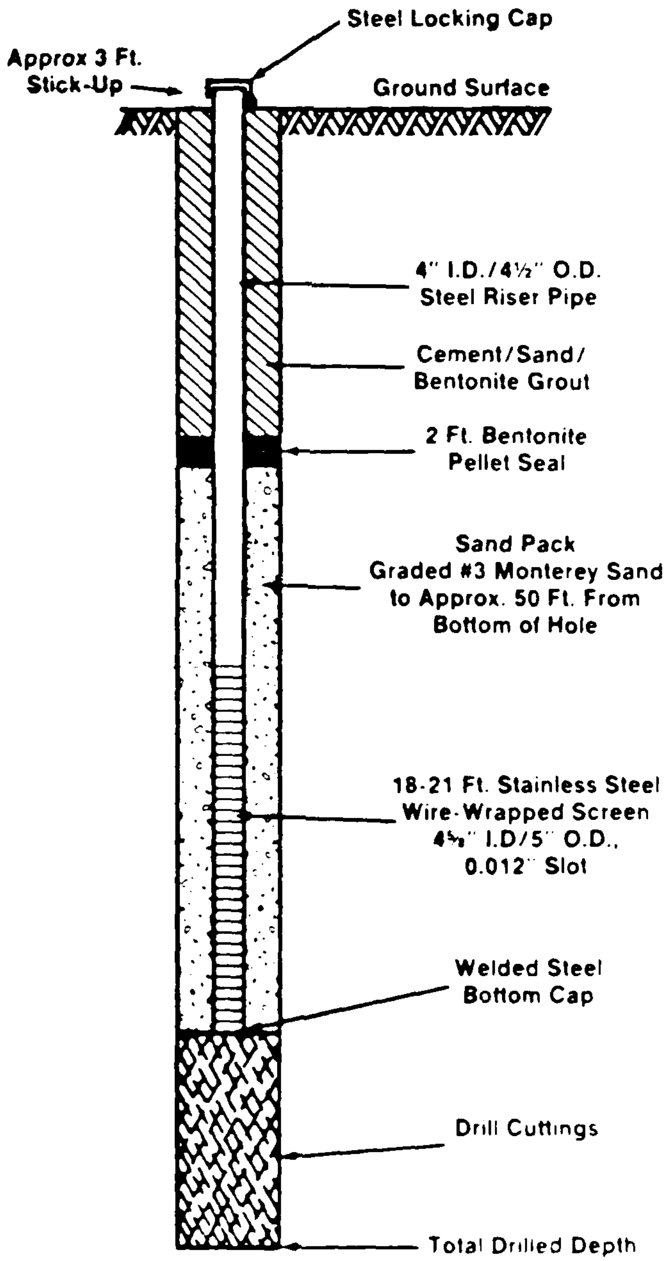
SKETCH MAP

NOTES

DEPTH FEET	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS	DESCRIPTION SOIL CLASSIFICATION (COLOR TEXTURE STRUCTURES)
80					
					77-120' brown SILT, CLAY
					and fine SAND
					lenses of medium to coarse SAND
					(easy drilling)
					120 End of hole

WESTON

MAFB-10



WESTON

DRILLING LOG

WELL NUMBER MAFB-11
OWNER USAF
LOCATION West Ditch
ADDRESS Mather AFB
TOTAL DEPTH 118'
SURFACE ELEVATION
WATER LEVEL
DRILLING COMPANY Stang
DRILLING METHOD Mud Rotary
DATE DRILLED 3/22/84
DRILLER J. Kirby
HELPER
LOG BY SIM/ALD

SKETCH MAP

NOTES

DEPTH FEET	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS	DESCRIPTION SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0					0-6" red-brown TOPSOIL
					6"-3' red, fine SAND and SILT, little Clay
					3-6' red, SILT, little Clay and fine Sand,
					trace Gravel
					6-42' COBBLES and GRAVEL
10					red, Silt and fine Sand matrix
					little Boulders
					Gravel is black,
					mostly mafic
					(At 19' bit ground on boulder
20					for 105 minutes before breaking
					through)
30					

WESTON

DRILLING LOG

WELL NUMBER: MAFB-11 OWNER: ______

LOCATION: ______ ADDRESS: ______

TOTAL DEPTH: ______

SURFACE ELEVATION: ______ WATER LEVEL: ______

DRILLING COMPANY: ______ DRILLING METHOD: ______ DATE DRILLED: ______

DRILLER: ______ HELPER: ______

LOG BY: ______

SKETCH MAP

NOTES:

DEPTH FEET	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
40					
50					
					42-113 tan, SILT and fine SAND
					little Clay
60					
					Occasional seams of Gravel

WESTON

DRILLING LOG

WELL NUMBER: MAFB-11 OWNER:

LOCATION: ADDRESS:

TOTAL DEPTH:

SURFACE ELEVATION: WATER LEVEL:

DRILLING COMPANY: DRILLING METHOD: DATE DRILLED:

DRILLER: HELPER:

LOG BY:

SKETCH MAP

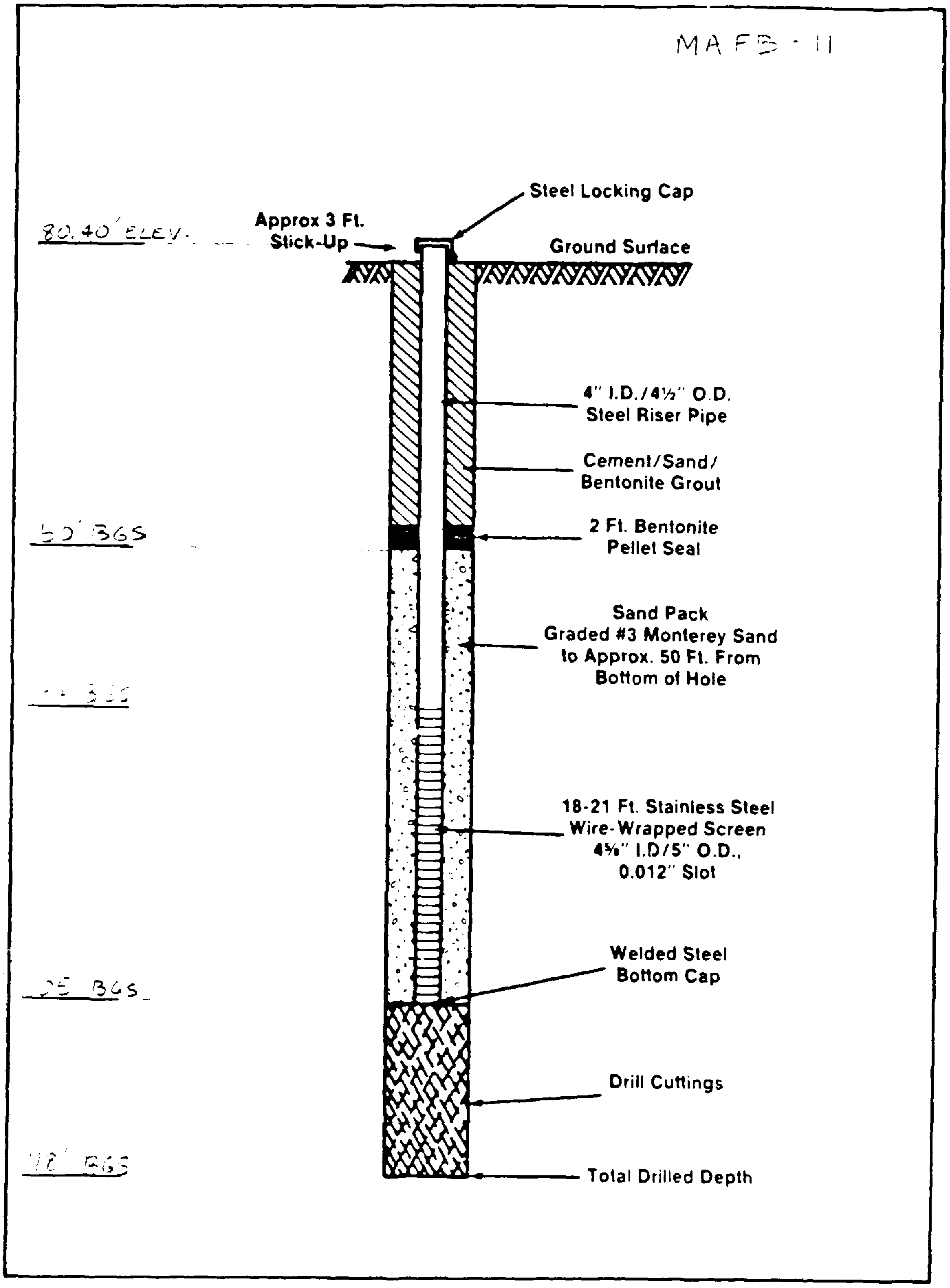
NOTES:

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
80					
90					
					42-118' tan, SILT and
					fine SAND
					little Clay
					Occasional seams of Gravel
100					
110					
					118' End of Hole
120					

* ASTM D1586

SHEET 3 OF 3

WESTON


MAFB-11
80.40' ELEV.
50' BGS
Steel Locking Cap
Approx 3 Ft. Stick-Up
Ground Surface
4" I.D./4½" O.D. Steel Riser Pipe
Cement/Sand/ Bentonite Grout
2 Ft. Bentonite Pellet Seal
Sand Pack Graded #3 Monterey Sand to Approx. 50 Ft. From Bottom of Hole
18-21 Ft. Stainless Steel Wire-Wrapped Screen 4⅝" I.D/5" O.D., 0.012" Slot
Welded Steel Bottom Cap
Drill Cuttings
Total Drilled Depth

APPENDIX E

AQUIFER RECOVERY TESTS

WESTON

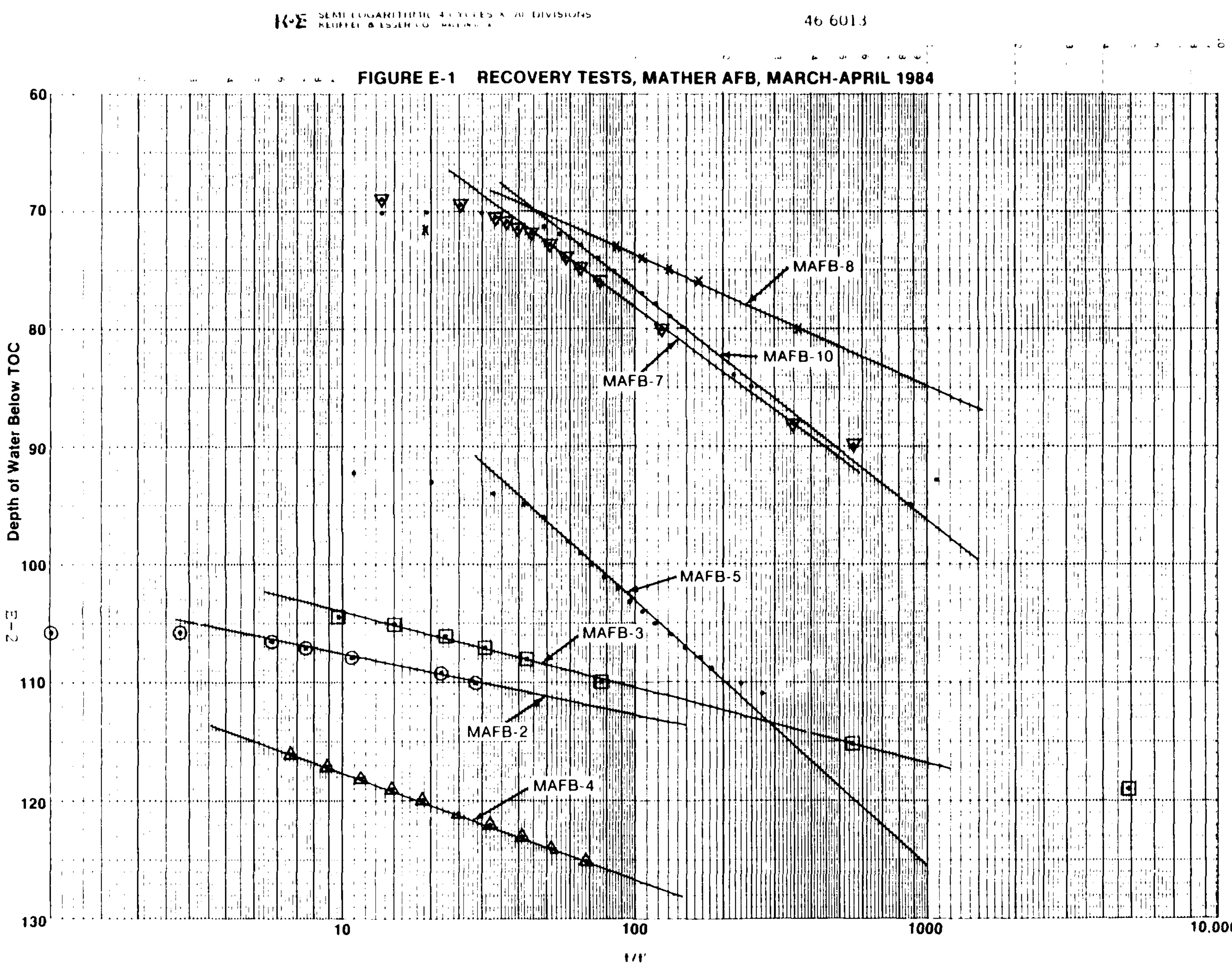
TABLE E-1

SUMMARY OF RECOVERY TEST RESULTS

WELL NUMBER	RESIDUAL DRAWDOWN Over One Log Cycle, $\Delta s'$ (feet)	PUMPING RATE, Q (gpm)	(ft^3/day)	TRANSMISSIVITY T (1) (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
9	35	15	2,887	15.10
10	19.6	20	3,850	35.95

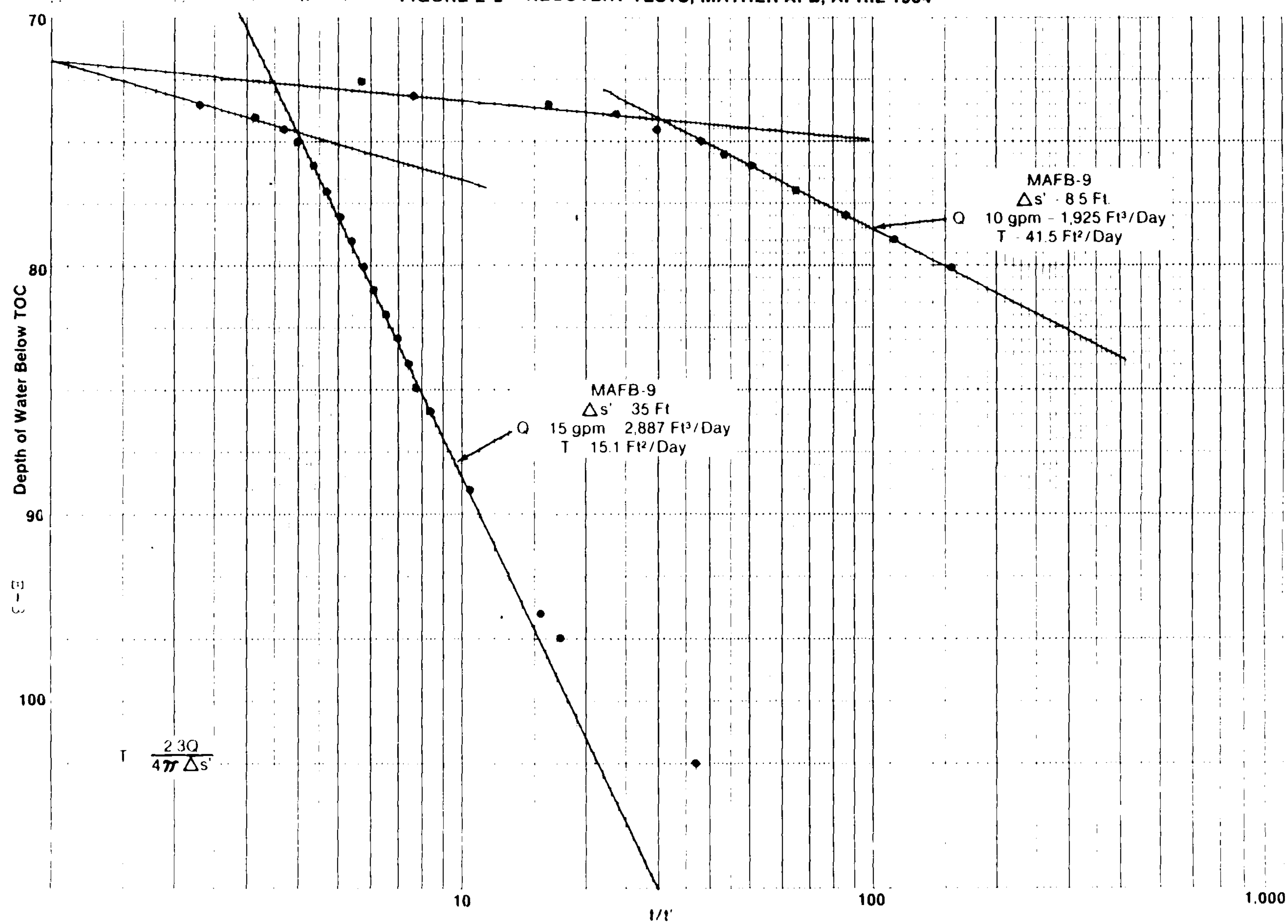
(1) Formula : $T = \frac{2.3\,Q}{4\,\pi\,\Delta s'}$

FIGURE E-1 RECOVERY TESTS, MATHER AFB, MARCH-APRIL 1984



46 5492

FIGURE E-2 RECOVERY TESTS, MATHER AFB, APRIL 1984



APPENDIX F

FIELD SAMPLING AND QA/QC PLAN

SAMPLING AND QA/QC PLAN

Base Well Pumping

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

1. 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, if possible. 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.

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® 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 $4^{o}C$.

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).

1. 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 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.

- ATTACHMENT 1, Table 1

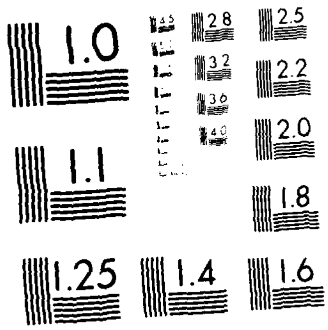
WESTON

BY A-D DATE 4-10-84 DIV ____ SHEET ____ OF ____
CHKD BY ____ DATE ____ DEPT ____ W.O. NO. 0628-05-26
PROJECT ____
SUBJECT SUMMARY OF WELL SPECS - MATHER AFB BASE WELLS

WELL NAME	FACILITY #	TOTAL DEPTH (FEET BELOW G.S.)	PERFORATED INTERVAL	ORIGINAL YIELD (GPM)	CURRENT CAPACITY (GPM)
GC-1	8867	561	302-462	2400	—
GC-2	8880	403	—	—	—
FH-1	14418	531	262-517	1500	550
FH-2	14147	400	348-400	1100	635
FH-3	14488	500	280-500	1020	600
FH-4	14987	500	205-500	825	575
FH-5	17757	550	452-550	1100	955
FH-6	16000	499	246-500	3400	—
B-1	3476	532	262-532	1225	365
B-2	3795	584	186-404	1400	616
B-3	2795	501	294-500	1,000	600
B-4	2930	500	246-422	1,200	49[illegible]
ACW	10151	250	200-220	140	?
K-9	18005	250	—	50	
JTC	7098	~250	—		

AD-A184 581 INSTALLATION RESTORATION PROGRAM PHASE 2 CONFIRMATION/QUANTIFICATION STAGE 1 VOLUME 2 APPENDICES (U) WESTON (ROY F) INC WEST CHESTER PA JUN 86 2/5

UNCLASSIFIED F33615-80-D-4006 F/G 24/4 NL


1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0

ATTACHMENT 3: Analytical Methods and Required Holding Times (W. O. #0623-05-26)

Parameter	EPA Method (Reference [(1)])	Sample Holding Time
1. Water Samples		
VOA	601 and 602	14 days
TOC	415.1	28 days
Oils & Greases	413.2	28 days
Phenols	420.1	28 days
Cyanides	335.2	14 days
Lead	239.2	6 months
Chromium	ICP Optical Emission Spectrometic Method	6 months
Cadmium	213.2	6 months
Nickel	ICP Optical Emission Spectrometic Method	6 months
Silver	272.2	6 months
Dimethylnitrosamine (DMN)	625	7 days before extrac., 30 days thereafter
PCB	608	"
DDT isomers	608	"
Chlordane	608	"
2,4-D	600/4-81-053	"
2. Soil Samples		
VOA	5020	14 days
Oils & Greases	Modifield 3540 (Soxhlet Extraction)	28 days
Phenols	420.1	28 days
Cyanide	9010	14 days
Metals (Pb, Cr, Cd, Ni, Ag)	ICP Optical Emission Spectrometic Method	6 months

(1) It is assumed that the methods listed will meet the required detection limits given on the next page. Please notify me if any modification is made to meet the requirements.

Attachment 3
Required Sample Detection Limits

Parameter	Soil/Sediment	Water
*Total Organic Carbon (TOC)	1.0 milligram/gram	1.0 milligram/L
Oils and Greases (IR Method 412.3)	100 micrograms/gram	10 micrograms/L
Phenol	1 microgram/gram	1.0 microgram/L
Cyanide	1 microgram/gram	10 micrograms/L
Lead	2 micrograms/gram	20 micrograms/L
Chromium	5 micrograms/gram	50 micrograms/L
Cadmium	1 microgram/gram	10 micrograms/L
Nickel	10 micrograms/gram	100 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	---	0.06 microgram/L
Volatile Organic Compounds (VOC)	**	**

*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 items:

Item 1.4 - This method is recommended by EPA for use only by experienced residue analysts or under the close 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 secondary gas chromatographic column that will be helpful in resolving the compounds of interest from interferences. This must 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 strictly followed.

Items 8.3 - All samples must be analyzed within the recommended holding time. This must 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.

APPENDIX G

FIELD SAMPLE LOG SHEETS

ROUND 85-1

WESTON

GROUNDWATER WELL LOG SHEET

Site: Mather AFB Samplers: Begnor/Noxes

Field #: ________

Sample I.D.: FB-1 Date: 5-31-85 Time: 1600

TOTAL WELL DEPTH ________ FT.

S.W.L. ________ FT.

WATER COLUMN ________ FT.

WATER VOLUME ________ G.

X3= ________ G.

FLOW RATE ________ G.P.M.

PUMPING TIME REQUIRED ________ MINS.

ACTUAL PUMPING TIME ________ MINS.

BAILED ________

SAMPLES TAKEN:

VOA
TOC
Oil & Grease
PCB

________ °C (Immediate)

16.9 Conductivity (umhos)

6.2 pH

18.4 °C (at pH Cond. Readings)

Duplicate Taken: Yes No

I.D. Assigned ________

Field # ________

________ °C (Immediate)

________ Conductivity (umhos)

________ pH

________ °C (at pH Cond. Readings)

SAMPLES TAKEN:

Field Blank [illegible]
[illegible]
[illegible]
[illegible]
from [illegible]

WESTON

GROUNDWATER WELL LOG SHEET

Site Mather AFB — Samplers DB/NT

Field # ______

Sample I.D. 10-2 — Date 5 30 85 — Time 1:55

TOTAL WELL DEPTH ______ FT.

S.W.L. ______ FT.

WATER COLUMN ______ FT.

WATER VOLUME ______ G.

X3= ______ G.

FLOW RATE ______ G.P.M.

PUMPING TIME REQUIRED ______ MINS.

ACTUAL PUMPING TIME ______ MINS.

BAILED ______

SAMPLES TAKEN:

______ °C (Immediate)

______ Conductivity (umhos)

______ pH

______ °C (at pH Cond. Readings)

Duplicate Taken: Yes No

I.D. Assigned ______

Field # ______

______ °C (Immediate)

______ Conductivity (umhos)

______ pH

______ °C (at pH Cond. Readings)

SAMPLES TAKEN:

WESTON

GROUNDWATER WELL LOG SHEET

Site Mather AFB Samplers [illegible]

Field #

Sample I.D. FB 3 Date 5-30-85 Time 1225

TOTAL WELL DEPTH ______ FT.	SAMPLES TAKEN:
S.W.L. ______ FT.	Metals [illegible]
WATER COLUMN ______ FT.	
WATER VOLUME ______ G.	
X3= ______ G.	
FLOW RATE ______ G.P.M.	
PUMPING TIME REQUIRED ______ MINS.	15 °C (Immediate)
ACTUAL PUMPING TIME ______ MINS.	11,7[illegible] Conductivity (umhos)
	[illegible] pH
BAILED ______	15.3 °C (at pH Cond. Readings)

Duplicate Taken: Yes No	SAMPLES TAKEN:
I.D. Assigned ______	[illegible]
Field # ______	Building 7021
______ °C (Immediate)	
______ Conductivity (umhos)	
______ pH	
______ °C (at pH Cond. Readings)	

WESTON

PRODUCTION WELL

Site Mather AFB Samplers LB/DT

Field # ______ 6-3-85

Sample I.D. FH-1 ✓ Date ~~5-30-85~~ Time 0855

STATIC ______

TOTAL WELL DEPTH 531 FT.

S.W.L. ______ FT.

WATER COLUMN ______ FT.

WATER VOLUME ______ G.

X3= ______ G.

FLOW RATE ______ G.P.M.

PUMPING TIME REQUIRED ______ MINS.

ACTUAL PUMPING TIME ______ MINS.

SAMPLES TAKEN:

VOA (601 + 602)

TOC

O+G

12" screen

OPERATING X

WATER LEVEL ~170 FT.

PUMPING RATE 1050 ~~540~~ G.P.M.

TOTAL GALLONS PUMPED 269362 G.

22 °C (Immediate)

.68 Conductivity (umnos)

7.3 pH

19.1 °C (at pH Cond. Readings)

DUPLICATE TAKEN YES (NO)

I.D. ASSIGNED ______

FIELD # ______

21.2 °C

.29 CONDUCTIVITY (umhos)

7.4 pH

SAMPLES TAKEN:

WESTON

PRODUCTION WELL

Site Mather AFB Samplers DE/BJ

Field # 6-3-85

Sample I.D. PH-2 Date ~~5-30-85~~ Time 1040

STATIC

TOTAL WELL DEPTH 400 FT.

S.W.L. FT.

WATER COLUMN FT.

WATER VOLUME G.

X3= G.

FLOW RATE G.P.M.

PUMPING TIME REQUIRED MINS.

ACTUAL PUMPING TIME MINS.

12" screen

OPERATING X

WATER LEVEL FT.

PUMPING RATE 900 G.P.M.

TOTAL GALLONS PUMPED 144,569,000

SAMPLES TAKEN:

VOA (001 + 002)

TOC

O+G

21 °C (Immediate)

43 Conductivity (umnos)

7.3 pH

21.0 °C (at pH Cond. Readings)

DUPLICATE TAKEN YES NO

I.D. ASSIGNED

FIELD #

°C

CONDUCTIVITY (umhos)

pH

SAMPLES TAKEN:

WESTON

PRODUCTION WELL

Site Mather AFB Samplers LB/DJT

Field # ____

Sample I.D. FH-3 Date ~~5-2-85~~ 6-3-85 Time 1000

STATIC ____	SAMPLES TAKEN:
TOTAL WELL DEPTH 500 FT.	VOA (601+602)
	TOC
S.W.L. ____ FT.	O+G
WATER COLUMN ____ FT.	
WATER VOLUME ____ G.	
X3= ____ G.	
FLOW RATE ____ G.P.M.	Samples were extremely [illegible]
PUMPING TIME REQUIRED ____ MINS.	[illegible]
ACTUAL PUMPING TIME ____ MINS.	[illegible]
12" Screen	
OPERATING ✓	[illegible] °C (Immediate)
WATER LEVEL 170 FT.	[illegible]10 Conductivity (umnos)
PUMPING RATE 1120 G.P.M.	7.2 pH
TOTAL GALLONS PUMPED [illegible]	[illegible].3 °C (at pH Cond. Readings)

DUPLICATE TAKEN (YES) NO

I.D. ASSIGNED FH-30

FIELD # ____

21.7 °C

212 CONDUCTIVITY (umhos)

7.3 pH

SAMPLES TAKEN:

WESTON

PRODUCTION WELL

Site Mather AFB Samplers DB/JT

Field #

Sample I.D. FH-6 Date ~~5-30-85~~ 6-3-85 Time 1320

STATIC		SAMPLES TAKEN:	
TOTAL WELL DEPTH	500 FT.	VOA (601 & 602)	
		TOC	
S.W.L.	FT.	O+G	
WATER COLUMN	FT.		
WATER VOLUME	G.		
X3=	G.		
FLOW RATE	G.P.M.		
PUMPING TIME REQUIRED	MINS.		
ACTUAL PUMPING TIME	MINS.		
OPERATING 16" screen		21.5	°C (Immediate)
WATER LEVEL	FT.	129	Conductivity (umnos)
PUMPING RATE	1600 G.P.M.	7.45	pH
TOTAL GALLONS PUMPED	45849 G.	21.2	°C (at pH Cond. Readings)

DUPLICATE TAKEN YES (NO)

I.D. ASSIGNED

FIELD #

°C

CONDUCTIVITY (umhos)

pH

SAMPLES TAKEN:

Probe very oily when trying to take WL.

WESTON

PRODUCTION WELL

Site Mather AFB Samplers DB/DJ

Field #

Sample I.D. B-1 Date 6-3-85 Time 1305

STATIC	SAMPLES TAKEN:
TOTAL WELL DEPTH 532 FT.	VOA
S.W.L. FT.	TOC
WATER COLUMN FT.	O+G
WATER VOLUME G.	Metals
X3= G.	DMN
FLOW RATE G.P.M.	Pest/Herbic
PUMPING TIME REQUIRED MINS.	
ACTUAL PUMPING TIME MINS.	
12" OPERATING	51 °C (Immediate)
WATER LEVEL 120 FT.	Conductivity (umnos)
PUMPING RATE 8 G.P.M.	pH
TOTAL GALLONS PUMPED 1340 G.	°C (at pH Cond. Readings)

DUPLICATE TAKEN YES NO	SAMPLES TAKEN:
I.D. ASSIGNED	
FIELD #	
°C	
CONDUCTIVITY (umhos)	
pH	

WESTON

PRODUCTION WELL

Site Mather AFB Samplers DB/DJT

Field #

Sample I.D. B-2 Date 6-3-85 Time

STATIC

TOTAL WELL DEPTH 584 FT.

S.W.L. FT.

WATER COLUMN FT.

WATER VOLUME G.

X3= G.

FLOW RATE G.P.M.

PUMPING TIME REQUIRED MINS.

ACTUAL PUMPING TIME MINS.

SAMPLES TAKEN:

VOA
TOC
C+G
Metals
DMN
Pest/Herb

12" Screen

OPERATING

WATER LEVEL 175 FT.

PUMPING RATE 1140 G.P.M.

TOTAL GALLONS PUMPED 304,110,000 G.

21.5 °C (Immediate)

Conductivity (umnos)

pH

°C (at pH Cond. Readings)

DUPLICATE TAKEN YES NO

I.D. ASSIGNED

FIELD #

°C

CONDUCTIVITY (umhos)

pH

SAMPLES TAKEN:

WESTON

PRODUCTION WELL

Site Mather AFB Samplers [illegible]

Field #

Sample I.D. B-3 Date ~~5-30~~ 6-3-85 Time

STATIC

TOTAL WELL DEPTH 501 FT.

S.W.L. 90 FT.

WATER COLUMN FT.

WATER VOLUME G.

X3= G.

FLOW RATE G.P.M.

PUMPING TIME REQUIRED MINS.

ACTUAL PUMPING TIME MINS.

SAMPLES TAKEN:

VOA
TOC
O+G
Metals
DMN
Pest/Herb

12" [illegible]

OPERATING

WATER LEVEL 110 FT.

PUMPING RATE 590 G.P.M.

TOTAL GALLONS PUMPED [illegible] G.

°C (Immediate)

Conductivity (umnos)

pH

°C (at pH Cond. Readings)

DUPLICATE TAKEN YES NO (circled)

I.D. ASSIGNED

FIELD #

°C

CONDUCTIVITY (umhos)

pH

SAMPLES TAKEN:

WESTON

PRODUCTION WELL

Site Mather AFB Samplers DB DJ

Field #

Sample I.D. B-4 Date 6-3-85 Time

STATIC

TOTAL WELL DEPTH 500 FT.

S.W.L. 90 FT.

WATER COLUMN FT.

WATER VOLUME G.

X3= G.

FLOW RATE G.P.M.

PUMPING TIME REQUIRED MINS.

ACTUAL PUMPING TIME MINS.

12" screen

OPERATING

WATER LEVEL FT.

PUMPING RATE G.P.M.

TOTAL GALLONS PUMPED G.

SAMPLES TAKEN:

VOA (3 ea.)
TOC
O+G
Metals
DMN
Pest/Herb (3)

°C (Immediate)

Conductivity (umnos)

pH

°C (at pH Cond. Readings)

DUPLICATE TAKEN YES NO

I.D. ASSIGNED B-4D

FIELD #

°C

CONDUCTIVITY (umhos)

pH

SAMPLES TAKEN:

VOA
TOC
O+G
Metals
DMN
Pest/Herb

WESTON

PRODUCTION WELL

Site Mather AFB Samplers DB

Field #

Sample I.D. JTC Date 6-3-85 Time 1505

STATIC

TOTAL WELL DEPTH 300 FT.

S.W.L. FT.

WATER COLUMN FT.

WATER VOLUME G.

X3= G.

FLOW RATE G.P.M.

PUMPING TIME REQUIRED MINS.

ACTUAL PUMPING TIME MINS.

SAMPLES TAKEN:

VOA (
TOC
O+G
Phenolics
Cyanide
Metals

OPERATING

WATER LEVEL FT.

PUMPING RATE G.P.M.

TOTAL GALLONS PUMPED G.

°C (Immediate)

Conductivity (umnos)

pH

°C (at pH Cond. Readings)

DUPLICATE TAKEN YES NO

I.D. ASSIGNED JTC-1

FIELD #

°C

CONDUCTIVITY (umhos)

pH

SAMPLES TAKEN:

Phenolics
Cyanide

WESTON

PRODUCTION WELL

Site Mather AFB Samplers [illegible]

Field #

Sample I.D. K-9 ✓ Date 6-3-85 Time 1240

STATIC	SAMPLES TAKEN:
TOTAL WELL DEPTH 300 FT.	VOA
	TOC
S.W.L. FT.	Oil + Grease
WATER COLUMN FT.	
WATER VOLUME G.	
X3= G.	
FLOW RATE G.P.M.	
PUMPING TIME REQUIRED MINS.	
ACTUAL PUMPING TIME MINS.	
"7"	
OPERATING ✓	22 °C (Immediate)
WATER LEVEL 110 FT.	Conductivity (umnos)
PUMPING RATE 30 G.P.M.	7.54 pH
TOTAL GALLONS PUMPED 249,000 G.	°C (at pH Cond. Readings)

DUPLICATE TAKEN YES (NO)	SAMPLES TAKEN:
I.D. ASSIGNED	
FIELD #	
°C	
CONDUCTIVITY (umhos)	
pH	

WESTON

PRODUCTION WELL

Site Mather AFB   Samplers DB/DJ

Field # ____

Sample I.D. GC-1   Date ~~5-31-85~~ 6-3-85   Time ____

STATIC ____

TOTAL WELL DEPTH 562 FT.

S.W.L. ____ FT.

WATER COLUMN ____ FT.

WATER VOLUME ____ G.

X3= ____ G.

FLOW RATE ____ G.P.M.

PUMPING TIME REQUIRED ____ MINS.

ACTUAL PUMPING TIME ____ MINS.

SAMPLES TAKEN:

VOA (GC1 & GC2)
TOC
O + G

16" Screen

OPERATING ____   ____ °C (Immediate)

WATER LEVEL ____ FT.   .45 Conductivity (umnos)

PUMPING RATE ____ G.P.M.   7.4 pH

TOTAL GALLONS PUMPED ____ G.   20.6 °C (at pH Cond. Readings)

DUPLICATE TAKEN YES NO

I.D. ASSIGNED ____

FIELD # ____

____ °C

____ CONDUCTIVITY (umhos)

____ pH

SAMPLES TAKEN:

WESTON

PRODUCTION WELL

Site [illegible] AFB Samplers [illegible]

Field #

Sample I.D. GL-2 ✓ Date 6-3-85 Time 1215

STATIC

TOTAL WELL DEPTH 403 FT.

S.W.L. FT.

WATER COLUMN FT.

WATER VOLUME G.

X3= G.

FLOW RATE G.P.M.

PUMPING TIME REQUIRED MINS.

ACTUAL PUMPING TIME MINS.

SAMPLES TAKEN:

VOA (GL-2 GL-2)
[illegible]
[illegible]

OPERATING X

WATER LEVEL 80 FT.

PUMPING RATE [illegible] G.P.M.

TOTAL GALLONS PUMPED G.

21 °C (Immediate)

Conductivity (umhos)

[illegible].5 pH

21.5 °C (at pH Cond. Readings)

DUPLICATE TAKEN (YES) NO

I.D. ASSIGNED [illegible]

FIELD #

23 °C

41 CONDUCTIVITY (umhos)

7.78 pH

SAMPLES TAKEN:

[illegible]

WESTON

GROUNDWATER WELL LOG SHEET

Site Mather AFB Samplers DB/JT

Field #

Sample I.D. MAFB-3 Date [illegible]-85 Time 1703

TOTAL WELL DEPTH ~~[illegible]~~ 23.5 FT.

S.W.L. 110.08 FT.

WATER COLUMN 13.42 FT.

WATER VOLUME 8.8 G.

X3= 26.4 G.

FLOW RATE G.P.M.

PUMPING TIME REQUIRED MINS.

ACTUAL PUMPING TIME MINS.

BAILED

[illegible] [illegible]-120

SAMPLES TAKEN:

VOA

TOC

Oil & Grease

PCB

°C (Immediate)

139 Conductivity (umhos)

7.5 pH

20.8 °C (at pH Cond. Readings)

Duplicate Taken: Yes No

I.D. Assigned

Field #

°C (Immediate)

Conductivity (umhos)

pH

°C (at pH Cond. Readings)

SAMPLES TAKEN:

WESTON

GROUNDWATER WELL LOG SHEET

Site Mather AFB Samplers DB DT

Field # ____

Sample I.D. MAFB-2 Date 5-31-85 Time ____

TOTAL WELL DEPTH ~~120~~ 123.7 FT.	SAMPLES TAKEN:
S.W.L. 99.47 FT.	VOA
WATER COLUMN 24.23 FT.	TOC
WATER VOLUME 9.6 G.	Oil and Grease
X3= 27.9 G.	PCB
FLOW RATE ____ G.P.M.	
PUMPING TIME REQUIRED ____ MINS.	____ °C (Immediate)
ACTUAL PUMPING TIME ____ MINS.	134 Conductivity (umhos)
	7.3 pH
BAILED ____	20.1 °C (at pH Cond. Readings)
screen 102-120	

Duplicate Taken: Yes (circled) No	SAMPLES TAKEN:
I.D. Assigned MAFB-2D	VOA
Field # ____	TOC
____ °C (Immediate)	Oil & Grease
128 Conductivity (umhos)	PCB
~~6.7~~ 7.3 pH	
17.0 °C (at pH Cond. Readings)	

WESTON

GROUNDWATER WELL LOG SHEET

Site: Mather AFB Samplers: DB/DJ

Field #: ______

Sample I.D.: MAFB-3 Date: 5-31-85 Time: [illegible]35

TOTAL WELL DEPTH: 120 FT.	SAMPLES TAKEN: VOA, TOC, Oil and Grease, PCB
S.W.L.: 107.18 FT.	
WATER COLUMN: 12.82 FT.	
WATER VOLUME: 84 G.	
X3 = 252 G.	
FLOW RATE: 3.0 G.P.M.	
PUMPING TIME REQUIRED: 85 MINS.	______ °C (Immediate)
ACTUAL PUMPING TIME: 85 MINS.	120 Conductivity (umhos)
	7.6 pH
BAILED: ______	20.5 °C (at pH Cond. Readings)
Screen 102-120	

Duplicate Taken: Yes (No)	SAMPLES TAKEN:
I.D. Assigned: ______	
Field #: ______	
______ °C (Immediate)	
______ Conductivity (umhos)	
______ pH	
______ °C (at pH Cond. Readings)	

WESTON

GROUNDWATER WELL LOG SHEET

Site Mather AFB Samplers Bognar/[illegible]

Field #

Sample I.D. MAFB-4 Date 5-31-85 Time 0955

TOTAL WELL DEPTH 153.5 FT.

S.W.L. 109.36 FT.

WATER COLUMN 44.14 FT.

WATER VOLUME 29 G.

X3= 87 G.

FLOW RATE 3 G.P.M.

PUMPING TIME REQUIRED 29 MINS.

ACTUAL PUMPING TIME 31 MINS.

BAILED

Screen 135.5-153.5

SAMPLES TAKEN:

VOA
TOC
Oil & Grease
Metals
DMN
Pest/Herb

18 °C (Immediate)

205 Conductivity (umhos)

6.63 pH

18.3 °C (at pH Cond. Readings)

Duplicate Taken: Yes (No)

I.D. Assigned

Field #

°C (Immediate)

Conductivity (umhos)

pH

°C (at pH Cond. Readings)

SAMPLES TAKEN:

WESTON

GROUNDWATER WELL LOG SHEET

Site: Mather AFB Samplers: CB/JJ

Field #: ______

Sample I.D.: MAFB-~~#~~5 Date: 5-31-85 Time: ~~0955~~

TOTAL WELL DEPTH: 128.5 ~~[illegible]~~ FT.	SAMPLES TAKEN: VOA, TOC, Oil & Grease, Metals, DMN, Pesticide/Herbicide
S.W.L.: 79.18 FT.	
WATER COLUMN: 39.32 FT.	
WATER VOLUME: 25.7 G.	
X3 = 77.1 G.	
FLOW RATE: 3.3 G.P.M.	
PUMPING TIME REQUIRED: 25 MINS.	[illegible] °C (Immediate)
ACTUAL PUMPING TIME: ______ MINS.	[illegible] Conductivity (umhos)
	7.1 ~~[illegible]~~ pH
BAILED: ______	[illegible] °C (at pH Cond. Readings)
Screen 110.5 - 128.5 Ft	

Duplicate Taken: (Yes) No	SAMPLES TAKEN: VOA, TOC, Oil & Grease, Metals, DMN, Pest/Herb
I.D. Assigned: MAFB-5C	
Field #: ______	
[illegible] °C (Immediate)	
[illegible] Conductivity (umhos)	
7.1 ~~[illegible]~~ pH	
[illegible] °C (at pH Cond. Readings)	

WESTON

GROUNDWATER WELL LOG SHEET

Site *Mather AFB* Samplers *DB DC*

Field #

Sample I.D. *MAFB-6* Date *5-30-85* Time *1000*

TOTAL WELL DEPTH ~~*128.5*~~ *99.5* FT.	SAMPLES TAKEN: *VOA* *TOC* *O+G* *Metals* *DMN* *Pest/Herb*
S.W.L. *71.37* FT.	
WATER COLUMN ~~*28*~~ *23* FT.	
WATER VOLUME ~~*...*~~ *18.5* G.	
X3= ~~*...*~~ *55.5* G.	
FLOW RATE *3.5* G.P.M.	
PUMPING TIME REQUIRED *16* MINS.	*20.5* °C (Immediate)
ACTUAL PUMPING TIME *20* MINS.	*953* Conductivity (umhos)
	7.17 pH
BAILED *—*	*21.1* °C (at pH Cond. Readings)

Duplicate Taken: Yes No (circled)	SAMPLES TAKEN:
I.D. Assigned	
Field #	
______ °C (Immediate)	
______ Conductivity (umhos)	
______ pH	
______ °C (at pH Cond. Readings)	

WESTON

GROUNDWATER WELL LOG SHEET

Site Mather AFB Samplers

Field # —

Sample I.D. MAFB-7 Date Time

TOTAL WELL DEPTH 110 FT.	SAMPLES TAKEN:
S.W.L. 72.55 FT.	ICA
WATER COLUMN 37.45 FT.	
WATER VOLUME 24.5 G.	
X3= 73.5 G.	
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 No	SAMPLES TAKEN:
I.D. Assigned	
Field #	
°C (Immediate)	
Conductivity (umhos)	
pH	
°C (at pH Cond. Readings)	

WESTON

GROUNDWATER WELL LOG SHEET

Site [illegible] AFB Samplers [illegible]

Field # ______

Sample I.D. MAFB-8 Date 5-29-85 Time 1455

TOTAL WELL DEPTH	107	FT.
S.W.L.	77.49	FT.
WATER COLUMN	29.51	FT.
WATER VOLUME	19.3	G.
X3=	57.9	G.
FLOW RATE	4	G.P.M.
PUMPING TIME REQUIRED	15	MINS.
ACTUAL PUMPING TIME	15	MINS.
BAILED		

Screen 87-107

SAMPLES TAKEN:

[illegible]

[illegible]	°C (Immediate)
986	Conductivity (umhos)
6.6	pH
21.2	°C (at pH Cond. Readings)

Duplicate Taken: Yes No

I.D. Assigned MAFB 8D

Field # —

19	°C (Immediate)
987	Conductivity (umhos)
6.6	pH
[illegible]	°C (at pH Cond. Readings)

SAMPLES TAKEN:

[illegible]

WESTON

GROUNDWATER WELL LOG SHEET

Site Mather AFB Samplers [illegible]

Field #

Sample I.D. MAFB-9 Date 5-29-85 Time [illegible]30

TOTAL WELL DEPTH 110 FT.

S.W.L. 65.65 FT.

WATER COLUMN 44.35 FT.

WATER VOLUME 29 G.

X3= 87 G.

FLOW RATE 4.1 G.P.M.

PUMPING TIME REQUIRED 21 MINS.

ACTUAL PUMPING TIME [illegible] MINS.

BAILED

Screen 92-110

SAMPLES TAKEN:

[illegible]

[illegible] °C (Immediate)

1012 Conductivity (umhos)

6.6 pH

24.1 °C (at pH Cond. Readings)

Duplicate Taken: Yes No

I.D. Assigned MAFB-90

Field #

°C (Immediate)

Conductivity (umhos)

pH

°C (at pH Cond. Readings)

SAMPLES TAKEN:

[illegible]

WESTON

GROUNDWATER WELL LOG SHEET

Site Mather AFB Samplers [illegible]

Field # ______

Sample I.D. MAFB-10 Date 5 30 85 Time 1320

TOTAL WELL DEPTH 105 FT.

S.W.L. 74.71 FT.

WATER COLUMN 30.29 FT.

WATER VOLUME 20 G.

X3= 60 G.

FLOW RATE 3.3 G.P.M.

PUMPING TIME REQUIRED 18 MINS.

ACTUAL PUMPING TIME 20 MINS.

BAILED ______

[illegible]

SAMPLES TAKEN:

[illegible]

TOC

O+G

Phenol

Cyanide

Metals

20 °C (Immediate)

207 Conductivity (umhos)

7.4 pH

18.4 °C (at pH Cond. Readings)

Duplicate Taken: Yes No

I.D. Assigned MAFB-110

Field # ______

______ °C (Immediate)

______ Conductivity (umhos)

______ pH

______ °C (at pH Cond. Readings)

SAMPLES TAKEN:

Phenols

Cyanide

WESTON

GROUNDWATER WELL LOG SHEET

Site Mather AFB Samplers TB/LT

Field #

Sample I.D. MAFB-11 Date 5-30-85 Time 1145

TOTAL WELL DEPTH 105 FT.	SAMPLES TAKEN:
S.W.L. 73.37 FT.	VOA
WATER COLUMN 31.63 FT.	TOC
WATER VOLUME 20.7 G.	O+G
X3= 61 G.	Phenols
FLOW RATE 3.5 G.P.M.	Cyanide
PUMPING TIME REQUIRED 18 MINS.	Metals
ACTUAL PUMPING TIME 20 MINS.	19.5 °C (Immediate)
BAILED	68 Conductivity (umhos)
	7.0 pH
	3 °C (at pH Cond. Readings)

Duplicate Taken: Yes No	SAMPLES TAKEN:
I.D. Assigned MAFB-11D	
Field #	
°C (Immediate)	
7 Conductivity (umhos)	
7.5 pH	
°C (at pH Cond. Readings)	

ROUND 85-2

WESTON

GROUNDWATER WELL LOG SHEET

Site Mather AFB, CA Samplers [illegible]

Field # ____

Sample I.D. FB-1 Date 6-27-85 Time 1515

TOTAL WELL DEPTH ____ FT.

S.W.L. ____ FT.

WATER COLUMN ____ FT.

WATER VOLUME ____ G.

X3= ____ G.

FLOW RATE ____ ____ G.P.M.

PUMPING TIME REQUIRED ____ MINS.

ACTUAL PUMPING TIME ____ MINS.

BAILED ____

SAMPLES TAKEN:

____ °C (Immediate)

1.3 Conductivity (umhos)

8.31 pH

11.2 °C (at pH Cond. Readings)

Duplicate Taken: Yes No

I.D. Assigned ____

Field # ____

____ °C (Immediate)

____ Conductivity (umhos)

____ pH

____ °C (at pH Cond. Readings)

SAMPLES TAKEN:

WESTON

PRODUCTION WELL

Site [illegible] AFB Samplers [illegible]

Field # —

Sample I.D. FH-5 Date [illegible]-85 Time [illegible]

STATIC ______

TOTAL WELL DEPTH ______ FT.

S.W.L. ______ FT.

WATER COLUMN ______ FT.

WATER VOLUME ______ G.

X3= ______ G.

FLOW RATE ______ G.P.M.

PUMPING TIME REQUIRED ______ MINS.

ACTUAL PUMPING TIME ______ MINS.

SAMPLES TAKEN:

VOA

TOC

[illegible]

OPERATING ______

WATER LEVEL 75 FT.

PUMPING RATE ______ G.P.M.

TOTAL GALLONS PUMPED ______ G.

[illegible] °C (Immediate)

______ Conductivity (umhos)

7.40 pH

______ °C (at pH Cond. Readings)

DUPLICATE TAKEN YES NO

I.D. ASSIGNED ______

FIELD # ______

______ °C

______ CONDUCTIVITY (umhos)

______ pH

SAMPLES TAKEN:

WESTON

PRODUCTION WELL

Site [illegible] Samplers [illegible]

Field # ______

Sample I.D. ACW Date [illegible] Time [illegible]

STATIC ______

TOTAL WELL DEPTH ______ FT.

S.W.L. ______ FT.

WATER COLUMN ______ FT.

WATER VOLUME ______ G.

X = ______ G.

FLOW RATE ______ G.P.M.

PUMPING TIME REQUIRED ______ MINS.

ACTUAL PUMPING TIME ______ MINS.

SAMPLES TAKEN:

VOA's

[illegible]

[illegible]

[illegible]

OPERATING ______

WATER LEVEL 30 FT.

PUMPING RATE ______ G.P.M.

TOTAL GALLONS PUMPED ______ G.

[illegible] °C TEMPERATURE

[illegible] CONDUCTIVITY (umhos)

[illegible] pH

[illegible] °C (at pH Cond. Readings)

DUPLICATE TAKEN YES NO

I.D. ASSIGNED [illegible]

FIELD # ______

11.3 °C

[illegible] CONDUCTIVITY (umhos)

[illegible] pH

SAMPLES TAKEN:

[illegible]

WESTON

GROUNDWATER WELL LOG SHEET

Site Mather AFB CA Samplers

Field # —

Sample I.D. MAFB-1 Date Time

TOTAL WELL DEPTH	123.5 FT.	SAMPLES TAKEN:	
S.W.L.	FT.	VOAs	
WATER COLUMN	FT.		
WATER VOLUME	G.		
X3 =	G.		
FLOW RATE	G.P.M.		
PUMPING TIME REQUIRED	MINS.		°C (Immediate)
ACTUAL PUMPING TIME	MINS.		Conductivity (umhos)
		7.33 ~~7.28~~	pH
BAILED			°C (at pH Cond. Readings)

Duplicate Taken: Yes (No)		SAMPLES TAKEN:	
I.D. Assigned			
Field #			
	°C (Immediate)		
	Conductivity (umhos)		
	pH		
	°C (at pH Cond. Readings)		

WESTON

GROUNDWATER WELL LOG SHEET

Site: MAFB CA   Samplers: [illegible]

Field #:

Sample I.D.: MAFB - 2   Date: [illegible]   Time: 1000

TOTAL WELL DEPTH 123.7 FT.

S.W.L. 110.6 FT.

WATER COLUMN 13.1 FT.

WATER VOLUME 8.6 G.

X3= 26 G.

FLOW RATE 3 3 [illegible] G.P.M.

PUMPING TIME REQUIRED 7 MINS.

ACTUAL PUMPING TIME 10 MINS.

BAILED

SAMPLES TAKEN:

VOA
[illegible]
[illegible]
PCB

22 °C (Immediate)

510 Conductivity (umhos)

~~[illegible]~~ 6.75 pH

12.1 °C (at pH Cond. Readings)

Duplicate Taken: Yes No

I.D. Assigned

Field #

°C (Immediate)

Conductivity (umhos)

pH

°C (at pH Cond. Readings)

SAMPLES TAKEN:

[illegible]

WESTON

GROUNDWATER WELL LOG SHEET

Site Mather AFB, CA Samplers DB/[illegible]

Field # —

Sample I.D. MAFB-3 Date 6-27-85 Time 0920

TOTAL WELL DEPTH 123.6 FT.

S.W.L. 105.44 FT.

WATER COLUMN 15.16 FT.

WATER VOLUME [illegible] G.

X3= [illegible] G.

FLOW RATE [illegible] G.P.M.

PUMPING TIME REQUIRED [illegible] MINS.

ACTUAL PUMPING TIME [illegible] MINS.

BAILED

SAMPLES TAKEN:

22.5 °C (Immediate)

317 Conductivity (umhos)

7.55 pH

9.8 °C (at pH Cond. Readings)

Duplicate Taken: (Yes) No

I.D. Assigned MAFB-30

Field #

°C (Immediate)

233 Conductivity (umhos)

7.62 pH

[illegible] °C (at pH Cond. Readings)

SAMPLES TAKEN:

WESTON

GROUNDWATER WELL LOG SHEET

Site Mather AFB   Samplers DB/JT

Field # —

Sample I.D. MAFB-4   Date 6-27-85   Time 1310

TOTAL WELL DEPTH 156.4 FT.	SAMPLES TAKEN: VOA, TOC, O+G, Metals, DMN, Pest/Herbic
S.W.L. 108.47 FT.	
WATER COLUMN 47.93 FT.	
WATER VOLUME 31 G.	
X3= 93 G.	
FLOW RATE 3.3 G.P.M.	
PUMPING TIME REQUIRED 28 MINS.	22 °C (Immediate)
ACTUAL PUMPING TIME ____ MINS.	163 Conductivity (umhos)
	6.91 pH
BAILED ____	27.1 °C (at pH Cond. Readings)

Duplicate Taken: Yes (No)	SAMPLES TAKEN:
I.D. Assigned ____	
Field # ____	
____ °C (Immediate)	
____ Conductivity (umhos)	
____ pH	
____ °C (at pH Cond. Readings)	

WESTON

GROUNDWATER WELL LOG SHEET

Site: Mather AFB   Samplers: ZB/DJ

Field #: —

Sample I.D.: MAFB-5   Date: 6-27-85   Time: 1430

TOTAL WELL DEPTH: 127.9 FT.

S.W.L.: 90.4 FT.

WATER COLUMN: 37.5 FT.

WATER VOLUME: 24.5 G.

X3 = 73.5 G.

FLOW RATE: 3.3 G.P.M.

PUMPING TIME REQUIRED: 22 MINS.

ACTUAL PUMPING TIME: ______ MINS.

BAILED: ______

SAMPLES TAKEN:

VOA
TOC
O+G
Metals
CMAS
Pest/Herb.

21 °C (Immediate)

132 Conductivity (umhos)

7.1 pH

26.6 °C (at pH Cond. Readings)

Duplicate Taken: Yes **No** (circled)

I.D. Assigned: ______

Field #: ______

______ °C (Immediate)

______ Conductivity (umhos)

______ pH

______ °C (at pH Cond. Readings)

SAMPLES TAKEN:

WESTON

GROUNDWATER WELL LOG SHEET

Site Mather AFB Samplers LB/JT

Field # —

Sample I.D. MAFB-6 Date 5-07-85 Time 1610

TOTAL WELL DEPTH 102.5 FT.

S.W.L. 72.11 FT.

WATER COLUMN 30.39 FT.

WATER VOLUME 20 G.

X3= 60 G.

FLOW RATE 3.3 G.P.M.

PUMPING TIME REQUIRED 18 MINS.

ACTUAL PUMPING TIME ______ MINS.

BAILED ______

SAMPLES TAKEN:

VOA
TOC
O+G
Metals
CMN
Pesticides.

21 °C (Immediate)

242 Conductivity (umhos)

6.9 pH

25.3 °C (at pH Cond. Readings)

Duplicate Taken: Yes (circled) No

I.D. Assigned MAFB-60

Field # ______

______ °C (Immediate)

238 Conductivity (umhos)

6.9 pH

24.4 °C (at pH Cond. Readings)

SAMPLES TAKEN:

WESTON

GROUNDWATER WELL LOG SHEET

Site *Mather AFB, CA* Samplers *DB/DT*

Field # *—*

Sample I.D. *MAFB-7* Date *6-26-85* Time *1350*

TOTAL WELL DEPTH *112.8* FT.	SAMPLES TAKEN:
S.W.L. *74.83* FT.	*VOA*
WATER COLUMN *37.97* FT.	*TOC*
WATER VOLUME *24.8* G.	*OHC*
X3= *74.4* G.	*Metals*
FLOW RATE *3.3* G.P.M.	*Phenol*
	Cyanide
PUMPING TIME REQUIRED *22.5* MINS.	*21.5* °C (Immediate)
ACTUAL PUMPING TIME *22* MINS.	*1005* Conductivity (umhos)
	6.7 pH
BAILED ______	*29.4* °C (at pH Cond. Readings)

Duplicate Taken: Yes ~~No~~ (circled)	SAMPLES TAKEN:
I.D. Assigned *MAFB-70*	*Very dirty → orangey brown discharge at first. Ran clear after ~3-4 min.*
Field # ______	*Phenolics*
	Cyanide
______ °C (Immediate)	
______ Conductivity (umhos)	
______ pH	
______ °C (at pH Cond. Readings)	

WESTON

GROUNDWATER WELL LOG SHEET

Site Mather AFB, CA Samplers D. Jones / D. [illegible]

Field # ______

Sample I.D. MAFB-8 Date 6-26-85 Time 1220

TOTAL WELL DEPTH 109.8 FT.	SAMPLES TAKEN:
S.W.L. 79.3' FT.	VOAs
WATER COLUMN 30.49 FT.	TOC
WATER VOLUME 20 G.	Oil & Grease
X3= 60 G.	Metals
FLOW RATE 3.3 G.P.M.	Phenolics
	Cyanide
PUMPING TIME REQUIRED ______ MINS.	20 °C (Immediate)
ACTUAL PUMPING TIME ______ MINS.	1293 Conductivity (umhos)
	6.89 pH
BAILED ______	26.4 °C (at pH Cond. Readings)

Duplicate Taken: Yes No	SAMPLES TAKEN:
I.D. Assigned MAFB-80	Phenolics
Field # ______	Cyanide
______ °C (Immediate)	
______ Conductivity (umhos)	
______ pH	
______ °C (at pH Cond. Readings)	

WESTON

GROUNDWATER WELL LOG SHEET

Site Mather AFB   Samplers DB/DT

Field #

Sample I.D. MAFB-9   Date 6-26-85   Time 1110

TOTAL WELL DEPTH 113.8 FT.	SAMPLES TAKEN:
S.W.L. 68.21 FT.	VOA
WATER COLUMN 45.59 FT.	TOC
WATER VOLUME 29.78 G.	Oil & Grease
X3= 89.34 G.	Phenolics
FLOW RATE 3.3 G.P.M.	Cyanide
	Metals
PUMPING TIME REQUIRED 27 MINS.	20.5 °C (Immediate)
ACTUAL PUMPING TIME 27 MINS.	1093 Conductivity (umhos)
	6.7 pH
BAILED	27.5 °C (at pH Cond. Readings)

Duplicate Taken: (Yes) No	SAMPLES TAKEN:
I.D. Assigned MAFB-90	Same as above
Field #	
20.5 °C (Immediate)	
1097 Conductivity (umhos)	
6.7 pH	
27.9 °C (at pH Cond. Readings)	

WESTON

GROUNDWATER WELL LOG SHEET

Site Mather AFB Samplers DB [illegible]

Field #

Sample I.D. MAFB-10 Date 6-26-85 Time 1635

TOTAL WELL DEPTH 107.9 FT.

S.W.L. 74.32 FT.

WATER COLUMN 33.58 FT.

WATER VOLUME 22 G.

X3= 66 G.

FLOW RATE 3.3 G.P.M.

PUMPING TIME REQUIRED 20 MINS.

ACTUAL PUMPING TIME ____ MINS.

BAILED ____

SAMPLES TAKEN:

VOA
TOC
O+G
Metals
Phenolics
Cyanide

20 °C (Immediate)

280 Conductivity (umhos)

7.6 pH

23.4 °C (at pH Cond. Readings)

Duplicate Taken: Yes No

I.D. Assigned MAFB-100

Field #

20 °C (Immediate)

283 Conductivity (umhos)

7.5 pH

23.6 °C (at pH Cond. Readings)

SAMPLES TAKEN:

Same as above

Cloudy and brown at first
Slightly cloudy after purge time

WESTON

GROUNDWATER WELL LOG SHEET

Site Mather AFB, CA Samplers [illegible]

Field # ______

Sample I.D. MAFB-11 Date 6-26-85 Time 1530

TOTAL WELL DEPTH 108 FT.

S.W.L. 73.79 FT.

WATER COLUMN 34.2 FT.

WATER VOLUME 22.3 G.

X3= 67 G.

FLOW RATE 3.3 G.P.M.

PUMPING TIME REQUIRED 20 MINS.

ACTUAL PUMPING TIME 20 MINS.

BAILED O&G

SAMPLES TAKEN:

VOA
TOC
O&G
Metals
Phenolics
Cyanide

20 °C (Immediate)

316 Conductivity (umhos)

7.5 pH

24.2 °C (at pH Cond. Readings)

Duplicate Taken: Yes No

I.D. Assigned MAFB-110

Field # ______

______ °C (Immediate)

______ Conductivity (umhos)

______ pH

______ °C (at pH Cond. Readings)

SAMPLES TAKEN:

Very orange brown discharge at first, cleared after a few minutes

Phenolics
Cyanide

APPENDIX H

SAMPLE CHAIN-OF-CUSTODY RECORDS

ROUND 85-1

WESTON DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Deborah L. Jones

Phone:

SHIP TO:

Roy F Weston Inc.

Weston Way Rd.

Westville PA 19353

ATTENTION: Judy Pirola

Phone No. 215 524-0180

SHIPPING INFORMATION

Location Mather AFB

Shipper Roy F Weston Inc.

Address 7720 Lorraine Ave Ste 105

Stockton CA 95210

Date Shipped 3 June 85

Shipment Service Federal Express

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Deborah L. Jones		
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* Victoria L. Yoncluro	Date/Time 6/4/85 10:00

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
—	1	[illegible]	[illegible]	[illegible]	Good

Remarks:

H-1

WESTON

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Deborah L. Jones

Phone:

SHIP TO:

ATTENTION:

Phone No.

SHIPPING INFORMATION

Location Mather AFB

Shipper Roy F. Weston Inc.

Address 7720 Lorraine Ave Ste 115
Stockton CA 95210

Date Shipped 31 May 85

Shipment Service Hand Carried

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Deborah L. Jones		
	Received for laboratory by: *(Signature)* Kathy N. Schilley	6/3 8:2

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
—	2	3 FF-1	—		OK
—	2	↓	↓	VOA (EPA 602)	↓
—	1	↓	↓	PCB's	↓

Remarks:

H-2

WESTON

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* [signature]

Phone: 201-957-3405

SHIP TO:

Roy F. Weston Inc.
256 Welsh Pool Rd
Lionville PA 19353

ATTENTION: Judy Horta

Phone No. 215-524-0181

SHIPPING INFORMATION

Location: Mather AFB CA

Shipper: Roy F. Weston Inc.

Address: 7720 Lorraine Ave #105
Stockton CA

Date Shipped: 3 June 85

Shipment Service: Federal Express

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
[signature]		
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* [signature]	Date/Time 6/4/85 1000

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
—	1	PS-2	5-30-85	TOC	good
—	1	↓	↓	Oil and Grease	↓
—	1	↓	↓	Phenolics	↓
—	1	↓	↓	Cyanide	↓

Remarks

WESTON DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Deborah L. [illegible]

Phone: 209-957 3405

SHIP TO:

ATTENTION:

Phone No.

SHIPPING INFORMATION

Location: Mather AFB CA

Shipper: Roy F Weston Inc.

Address: 7720 Lorraine Ave #105
Stockton CA 95210

Date Shipped: 30 May 95

Shipment Service: Hand Carried

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Deborah L. [illegible]		
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* Kathy N. Schultz	Date/Time 5/31 9:00

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
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
—	~	↓	↓	VOA (8010 ...)	
—	1	↓	↓	Metals (Cr Cd Pb Ni Hg)	

Remarks

H-4

WESTON
DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Deborah L. Jones

Phone: 209-957-3405

SHIP TO:

ATTENTION:

Phone No.

SHIPPING INFORMATION

Location: Mather AFB CA

Shipper: Roy F. Weston Inc.

Address: 7720 Lorraine Ave. #105, Stockton CA 95210

Date Shipped: 30 May 85

Shipment Service: Hand Carried

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Deborah L. Jones		
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* Kathryn M. Schilling	Date/Time 5/31 9:00

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
—	1	[illegible]	5 30 85	[illegible]	OK

Remarks:

WESTON DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Deborah L. Jones

Phone:

SHIP TO:

~~ROY F. WESTON INC.~~
~~7720 LORRAINE AVE. #105~~
~~STOCKTON, CA 95210~~

ATTENTION:

Phone No.

SHIPPING INFORMATION

Location: Mather AFB

Shipper: ROY F. WESTON INC.

Address: 7720 LORRAINE AVE. #105
STOCKTON, CA 95210

Date Shipped: 3 June 85

Shipment Service: Hand Carried

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Deborah L. Jones		
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* Kathryn N. Schultz	6/4 11:[illegible]

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
—	2	[illegible]	[illegible]-3-85	[illegible]	OK
—	2	"	"	VOA (EPA 602)	✓

Remarks:

H-6

WESTON
DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Deborah L. Jones

Phone:

SHIP TO:
Roy F. Weston Inc.
Weston Way
West Chester, PA 19380

ATTENTION: Judy Porta

Phone No. 215-524-0180

SHIPPING INFORMATION

Location Mather AFB

Shipper ~~ROY F. WESTON INC.~~

Address ~~7720 LORRAINE AVE. #105~~
~~STOCKTON, CA 95210~~

Date Shipped 4 June 85

Shipment Service Fed Ex

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Deborah L. Jones		
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* Victoria K. Dondero	Date/Time 6/5/85 9:30

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
—	1	GW-1	6-3-85	TOC	Good
—	1	"	"	Oil and Grease	Good

Remarks:

WESTON DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Deborah L. Jones

Phone:

SHIP TO:

ROY F. WESTON INC.
7720 LORRAINE AVE #105
STOCKTON, CA 95210

ATTENTION:

Phone No.

SHIPPING INFORMATION

Mather AFB

Location ~~ROY F. WESTON INC.~~

Shipper ~~7720 LORRAINE AVE #105~~

Address ~~STOCKTON, CA 95210~~

Date Shipped 3 June 85

Shipment Service Hand Carried

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Deborah L. Jones		
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* Kathy D. Schulz	Date/Time 6/4 11:0–

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
—	2	6C-2	6-3-85	VOA (EPA 601)	O/C
—	2	"	"	VOA (EPA 602)	
—	2	6C-20	6-3-85	VOA (EPA 601)	
—	2	"	"	VOA (EPA 602)	↓

Remarks

WESTON DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Deborah L. Jones

Phone:

SHIP TO:
Roy F. Weston, Inc.
Weston Way
West Chester, PA 19380

ATTENTION: Judy Porta

Phone No. 215-524-0180

SHIPPING INFORMATION

Location: Mather AFB

Shipper: ROY F. WESTON INC.

Address: 7720 LORRAINE AVE. #105
STOCKTON, CA 95210

Date Shipped: 4 June 85

Shipment Service: Federal EX

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Deborah L. Jones		
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* Victoria K. Dendiro	Date/Time 6/5/85 9:30

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
—	1	GC-2	6-3-85	TOC	good
—	1	"	"	Oil and Grease	
—	1	GC-20	6-3-85	TOC	
—	1	"	"	Oil and Grease	

Remarks:

H-9

WESTON DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Deborah L. Jones

Phone:

SHIP TO:

ROY F. WESTON INC.
7720 LORRAINE AVE. #105
STOCKTON, CA 95210

ATTENTION:

Phone No.

SHIPPING INFORMATION

Location: Mather AFB

Shipper Address: ~~ROY F. WESTON INC.~~ ~~7720 LORRAINE AVE. #105~~ ~~STOCKTON, CA 95210~~

Date Shipped: 3 June 85

Shipment Service: Hand Carried

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Deborah L. Jones		
	Received for laboratory by: *(Signature)* Kathy D. Schuley	6/3/85 11:0

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
—	2	K-9	6-3-85	VOA (EPA GC1)	OK
—	2	"	"	VOA (EPA GC2)	✓

Remarks

H-10

WESTON DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Deborah L. Jones

Phone:

SHIP TO:
Roy F. Weston Inc.
Weston Way
West Chester, PA 19380

ATTENTION: Judy Porta

Phone No. 215-524-0180

SHIPPING INFORMATION

Location: ~~ROY F. WESTON INC.~~ Mather AFB

Shipper: 7720 LORRAINE AVE #105

Address: STOCKTON, CA 95210

Date Shipped: 4 June 85

Shipment Service: Fed EX

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Deborah L. Jones		
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* Victoria K. Dondero	6/5/85 9:30

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
—	1	A-9	6-3-85	TOC	good
—	1	"	"	Oil and Grease	"

Remarks:

H-11

WESTON
DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Deborah A. Jones

Phone:

SHIP TO:

~~ROY F. WESTON INC.~~
~~7720 LORRAINE AVE. #105~~
~~STOCKTON, CA 95210~~

ATTENTION:

Phone No.

SHIPPING INFORMATION MATHER AFB

Location ~~ROY F. WESTON INC.~~

Shipper ~~7720 LORRAINE AVE. #105~~

Address ~~STOCKTON, CA 95210~~

Date Shipped June 3 1985

Shipment Service Hand - Carried

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Deborah A. Jones		
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* Kathy N. Schultz	Date/Time 6/4 11:0

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
—	2	JTC	6-3-85	VOA (EPA-601)	OK
—	2	↓	↓	VOA (EPA-602)	↓
		~~[illegible]~~			
	1	JTC	6-3-85	Metals: Cr, Pb, Cd, Ni, Ag	↓

Remarks

H-12

WESTON
DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Debrah L. Jones

Phone:

SHIP TO:
Roy F Weston
Weston Way
West Chester, PA 19380

ATTENTION: Judy Porta

Phone No. 215-579-0180

SHIPPING INFORMATION

Location: Mather AFB

Shipper: ROY F. WESTON INC.

Address: 7720 LORRAINE AVE. #105
STOCKTON, CA 95210

Date Shipped: June 4 '85

Shipment Service: Fed - X

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Debrah L. Jones		
	Received for laboratory by: *(Signature)* Victoria K. Dondero	6/5/85 9:30

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
—	1	JTC	6-3-85	TOC	good
—	1	↓	↓	O+G	↓
—	1	↓	↓	Phenolics	↓
—	1	↓	↓	Cyanide	↓
—	1	JTC-1	6-3-85	Phenolics	↓
—	1	↓	↓	Cyanide	

Remarks:

WESTON
DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Deborah L. Jones

Phone:

SHIP TO:

ROY F. WESTON INC.
7720 LORRAINE AVE. #105
STOCKTON, CA 95210

ATTENTION:

Phone No.

SHIPPING INFORMATION

Location: MATHER AFB

Shipper: ~~ROY F. WESTON INC.~~

Address: ~~7720 LORRAINE AVE. #105~~ ~~STOCKTON, CA 95210~~

Date Shipped: June 3, 1985

Shipment Service: hand-carried

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Deborah L. Jones		
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* Kathy D. Schulz	6/4 11:3

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
—	2	[illegible]	6-3-85	[illegible]	O/K
—	2	↓	↓	VOA (EPA-602)	↓
—	1	↓	↓	Metals: Cr, Pb, Cd, Ni, As	↓
—	3	↓	↓	Pest/Herb	↓

Remarks

WESTON
DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Deborah J. Jones

Phone:

SHIP TO:
Roy F Weston
Weston Way
West Chester, Pa 19380

ATTENTION: Judy Porta

Phone No. 215-524-0180

SHIPPING INFORMATION

Location: Mather AFB

Shipper: ROY F. WESTON INC.

Address: 7720 LORRAINE AVE. #105
STOCKTON, CA 95210

Date Shipped: June 4 1985

Shipment Service: Fed-X

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Deborah J. Jones		
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* Victoria K. Dondero	Date/Time 6/5/85 9:30

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
—	1	G-1	6-3-85	TOC	good
—	1	↓	↓	O+G	↓
—	1	↓	↓	DMN	

Remarks

H-15

WESTON

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* [signature]

Phone:

SHIP TO:

ROY F. WESTON INC.
7720 LORRAINE AVE. #105
STOCKTON, CA 95210

ATTENTION:

Phone No.

SHIPPING INFORMATION

Location: Mather AFB

Shipper: ROY F. WESTON INC.

Address: 7720 LORRAINE AVE. #103
STOCKTON, CA 95210

Date Shipped: June 3, 1985

Shipment Service: hand carried

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
[signature]		
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)*	Date/Time
	[signature]	6/4 11:3[illegible]

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
—	2	[illegible]	5-[illegible]-85	VOA (EPA [illegible])	OK
—	2	↓	↓	VOA (EPA 602)	↓
—	1	↓	↓	Metals: Cr, Pb, Cd, Ni, Ag	↓
—	3	↓	↓	Pest Herbs	↓

Remarks

WESTON

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Deborah F. Jones

Phone:

SHIP TO:
Roy F Weston
Weston Way
West Chester, PA 19380

ATTENTION: Judy Porta

Phone No. 215-524-0180

SHIPPING INFORMATION

Location Mather AFB ~~ROY F. WESTON INC.~~

Shipper ~~7720 LORRAINE AVE. #105~~

Address ~~STOCKTON, CA 95210~~

Date Shipped June 4, 1985

Shipment Service Fed-X

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Deborah F. Jones		
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* Victoria K. Dadino	Date/Time 6/5/85 9:30

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
—	1	B-2	5-3-85	TOC	Good
—	1	↓	↓	O+G	↓
—	1	↓	↓	DMN	↓

Remarks:

H-17

WESTON
DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Deborah L. Jones

Phone:

SHIP TO:

ROY F. WESTON INC.
7720 LORRAINE AVE. #105
STOCKTON, CA 95210

ATTENTION:

Phone No.

SHIPPING INFORMATION MATHER AFB

Location

Shipper ROY F. WESTON INC.

Address 7720 LORRAINE AVE. #105
STOCKTON, CA 95210

Date Shipped June 3 1985

Shipment Service hand carried

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Deborah L. Jones		
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* Kathy M. Schulz	Date/Time 6/4 11:3

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
—	2	[illegible]	5-31-85	[illegible] (EPA-[illegible])	OK
—	2	↓	5-31-85	VOA (EPA-602)	↓
—	1	↓	↓	Metal: Cr, Pb, Cd, Ni, Ag	↓
—	3	↓	↓	Pest, Herb	↓

Remarks:

WESTON DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Deborah L. Jones

Phone:

SHIP TO:

Roy F Weston
Weston Way
West Chester, PA 19380

ATTENTION: Judy Porta

Phone No. 215-574-0180

SHIPPING INFORMATION

Location: MATHER AFB

Shipper: ROY F. WESTON INC.

Address: 7720 LORRAINE AVE. #105
STOCKTON, CA 95210

Date Shipped: June 4, 1985

Shipment Service: Fed-X

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Deborah L. Jones		
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* Victoria K. Dondero	Date/Time 6/5/85 9:30

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
—	1	C-3	5-30-85	TOC	good
—	1	↓	↓	O+G	↓
—	1	↓	↓	DMN	↓

Remarks

H-19

WESTON
DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Deborah L. Jones

Phone:

SHIP TO:

~~ROY F. WESTON INC.~~
~~7720 LORRAINE AVE. #105~~
~~STOCKTON, CA 95210~~

ATTENTION:

Phone No.

SHIPPING INFORMATION

Location: MATHER AFB

Shipper: ~~ROY F. WESTON INC.~~

Address: ~~7720 LORRAINE AVE. #105~~ ~~STOCKTON, CA 95210~~

Date Shipped: June 3 1985

Shipment Service: hand carried

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Deborah L. Jones		
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* Philip N. Schultz	Date/Time 6/4 11:0

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
—	2	[illegible]	[illegible]	VOA (EPA 601)	OK
—	2	↓	↓	VOA (EPA 602)	↓
—	1	↓	↓	Metals: Cr, Pb, Cd, Ni, Ag	↓
—	3	↓	↓	Pest/Herb	↓
—	2	B40	6-3 85	VOA (EPA 601)	↓
—	2	↓	↓	VOA (EPA 602)	↓
—	1	↓	↓	Metal: Cr, Pb, Cd, Ni, Ag	↓
—	3	↓	↓	Pest/Herb	↓

Remarks

WESTON
DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Deborah A. Jones

Phone:

SHIP TO:
ROY F WESTON
WESTON WAY
WEST CHESTER, PA 19380

ATTENTION: JUDY PORTA

Phone No. 215-524-0180

SHIPPING INFORMATION

Location Mather AFB

Shipper ROY F. WESTON INC.

Address 7720 LORRAINE AVE. #105
STOCKTON, CA 95210

Date Shipped June 4, 1985

Shipment Service Fed-X

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Deborah A. Jones		
	Received for laboratory by: *(Signature)* Victoria K. Donders	6/5/85 9:50

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
—	1	B-4	5-31-85	TOC	good
—	1	↓	↓	O+G	↓
—	1	↓	↓	DMN	↓
—	1	B-40	6-3-85	TOC	↓
—	1	↓	↓	O+G	↓
—	1	↓	↓	DMN	↓
	4				

Remarks:

WESTON
DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Deborah S. Jones

Phone:

SHIP TO:
Roy F. Weston Inc.
Weston Way
West Chester, PA 19380

ATTENTION: Judy Porta

Phone No. 215-524-0180

SHIPPING INFORMATION
Mather AFB

Location ~~ROY F. WESTON INC.~~

Shipper ~~7720 LORRAINE AVE #105~~

Address ~~STOCKTON, CA 95210~~

Date Shipped 4 June 85

Shipment Service Fed EX

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Deborah S. Jones		
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* Victoria K. [illegible]	6/5/85 9:3[illegible]

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
—	1	FH-1	6-3-85	TOC	good ~~[illegible]~~
—	1	↓	↓	Oil and Grease	good

Remarks:

WESTON
DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* [signature]

Phone:

SHIP TO:

ROY F. WESTON INC.
7720 LORRAINE AVE. #105
STOCKTON, CA 95210

ATTENTION:

Phone No.

SHIPPING INFORMATION

Location: Mather AFB

Shipper: ROY F. WESTON INC.

Address: 7720 LORRAINE AVE. #105
STOCKTON, CA 95210

Date Shipped: 3 June 85

Shipment Service: Hand Carried

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
[signature]		
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* [signature]	Date/Time 6/4 11:30

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
—	2	FH-1	[illegible]	VOA (EPA 601)	OK
—	2	↓	↓	VOA (EPA 602)	↓

Remarks:

H-23

WESTON
DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Deborah Jones

Phone:

SHIP TO:

ROY F. WESTON INC.
7720 LORRAINE AVE. #105
STOCKTON, CA 95210

ATTENTION:

Phone No.

SHIPPING INFORMATION

Location Mather AFB

Shipper ~~ROY F. WESTON INC.~~

Address ~~7720 LORRAINE AVE. #105~~
~~STOCKTON, CA 95210~~

Date Shipped 5 June 85

Shipment Service Hand Carried

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Deborah Jones		
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* Kathy N Schultz	Date/Time 6/4 11:30

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
—	2	FH-2	6-5-85	[illegible]	OK
—	2	"	"	VCA/EPA 602	✓

Remarks:

H-24

WESTON
DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Deborah L. Jones

Phone:

SHIP TO:
Roy F. Weston Inc.
Weston Way
West Chester, PA 19380

ATTENTION: Judi Porta

Phone No. 215-524-0180

SHIPPING INFORMATION

Location: Mather AFB

Shipper Address: ~~ROY F. WESTON INC.~~ ~~7720 LORRAINE AVE. #105~~ ~~STOCKTON, CA 95210~~

Date Shipped: 3 JUNE 85

Shipment Service: Fed EX

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Deborah L. Jones		
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* Victoria K. Dondero	6/5/85 9:30

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
—	1	FH-2	6-3-85	TOC	good
—	1	↓	↓	Oil and Grease	⊥

Remarks

H-25

WESTON
DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Debrah A. Jones

Phone:

SHIP TO:

ROY F. WESTON INC.
7720 LORRAINE AVE. #105
STOCKTON, CA 95210

ATTENTION:

Phone No.

SHIPPING INFORMATION

Location: Mather AFB

Shipper:

Address: ROY F. WESTON INC.
7720 LORRAINE AVE. #105
STOCKTON, CA 95210

Date Shipped: 3 June 85

Shipment Service: Hand Carried

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Debrah A. Jones		
	Received for laboratory by: *(Signature)* Kathryn N. Schulez	4/4 11:…

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
—	2	FH-3	6-3-85	VOA (EPA 601)	O/C
—	2	↓	↓	VOA (EPA 602)	↓
—	2	FH-30	↓	VOA (EPA 601)	↓
—	2	↓	↓	VOA (EPA 602)	↓

Remarks:

WESTON
DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Deborah L. Jones

Phone:

SHIP TO:
Roy F. Weston Inc.
Weston Way
West Chester, PA 19330

ATTENTION: Judy Porta

Phone No. 215-524-0180

SHIPPING INFORMATION

Location ~~ROY F. WESTON INC.~~ Mather AFB

Shipper ~~7720 LORRAINE AVE. #105~~

Address ~~STOCKTON, CA 95210~~

Date Shipped 4 June 85

Shipment Service ~~[illegible]~~ Fed Ex

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Deborah L. Jones		
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* Victoria K. Dowling	Date/Time 6/5/85 9:30

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
—	1	FH-3	6-3-85	TOC	good
—	1	↓	"	Oil and Grease	
—	1	FH-30	"	TOC	
—	1	↓	"	Oil & Grease	

Remarks

WESTON

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Deborah L. Jones

Phone:

SHIP TO.

ROY F. WESTON INC.
7720 LORRAINE AVE. #105
STOCKTON, CA 95210

ATTENTION:

Phone No.

SHIPPING INFORMATION

Location ROY F. WESTON INC.

Shipper 7720 LORRAINE AVE #105

Address STOCKTON, CA 95210

Date Shipped 5 June 85

Shipment Service Hand Carried

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Deborah L. Jones		
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* Kathryn N. Schultz	Date/Time 6/4 11:

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
—	2	[illegible]	[illegible]	[illegible]	OK
—	2	"	"	(CATERA ...)	"

Remarks:

H-28

WESTON

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Deborah J. Jones

Phone:

SHIP TO:

Roy F. Weston Inc
Weston Way
West Chester, PA 19380

ATTENTION: Judy Porta

Phone No. 215-524-0180

SHIPPING INFORMATION Palmer AFB

Location ROY F. WESTON INC.

Shipper 7720 LORRAINE AVE. #105

Address STOCKTON, CA 95210

Date Shipped 4/ / 85

Shipment Service Fed EX

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Deborah J. Jones		
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by *(Signature)*	Received for laboratory by: *(Signature)* Victoria K. Sanders	Date/Time 4/5/85 9:30

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
			4-3-85	TOC	Good
	1	"	"	Oil and Grease	

Remarks:

H-29

WESTON

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* [signature]

Phone:

SHIP TO:

ATTENTION:

Phone No.

SHIPPING INFORMATION

Location Mather AFB

Shipper Roy F. Weston Inc.

Address [illegible] Lorraine Ave [illegible]

Stockton CA [illegible]

Date Shipped 31 May 85

Shipment Service Hand [illegible]

Airbill No

Cooler No

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
[signature]		
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* [signature]	Date/Time 6/3 8:2

* 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
[illegible]	[illegible]	[illegible]		[illegible]	OK
[illegible]	2	↓	↓	[illegible]	↓
[illegible]	1	↓	↓	PCB	↓

WESTON

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* [signature]

Phone: 0

SHIP TO:

Roy F. Weston Inc.
[illegible] Road
[illegible] PA 19[illegible]

ATTENTION: [illegible]

Phone No 215 / 524 0181

SHIPPING INFORMATION

Location: Mather AFB

Shipper: Roy F. Weston Inc.

Address: 7120 Lorraine Ave #105
Stockton CA 95210

Date Shipped: 3 June 85

Shipment Service: Federal Express

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
[signature]		
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* [signature]	Date/Time 6/4/85 10:50

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
—	1	✓	✓	[illegible] B	good

Remarks:

H-31

WESTON

CHAIN OF CUSTODY RECORD

SAMPLERS: (Signature) [signature]

Phone

SHIP TO:

ATTENTION:

Phone No

SHIPPING INFORMATION

Location Mather AFB

Shipper Roy F. Weston Inc.

Address 7720 Lorraine Ave Ste 105 Stockton CA 95210

Date Shipped 31 May 85

Shipment Service Hand Carried

Airbill No

Cooler No

Relinquished by: (Signature)	Received by: (Signature)	Date/Time
[signature] Jones		
	Received for laboratory by: (Signature) [signature] Schulley	6/3 8:2

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
—	2	[illegible]	5-31-85	[illegible]	Ok
—	2	↓	↓	VOA (EPA 602)	↓
—	1	↓	↓	PCBs	↓
—	2	MAFB-30	5-31-85	VOA (EPA 601)	↓
—	2	↓	↓	VOA (EPA 602)	↓
—	1	↓	↓	PCBs	↓

WESTON
DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* [illegible signature]

Phone:

SHIP TO:

Roy F. Weston Inc.

[illegible]

[illegible] PA [illegible]

ATTENTION: [illegible]

Phone No 515 524-0180

SHIPPING INFORMATION

Location [illegible] AFB

Shipper Roy F. Weston Inc.

Address 7720 [illegible] Ave. Ste. 105

[illegible]

Date Shipped [illegible]

Shipment Service [illegible] Fed Ex

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
[illegible signature]		
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* [illegible signature]	Date/Time 6/4/85 10:00

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
—		MAFB-2	[illegible]		Good
—	1	MAFB-2	5-31-85	[illegible]	
—	1	MAFB-20		TOC	
—	1	MAFB-20		[illegible]	

B-[illegible]

WESTON

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* [illegible signature]

Phone

SHIP TO:

ATTENTION:

Phone No.

SHIPPING INFORMATION

Location Mather AFB

Shipper Roy F. Weston Inc.

Address 7720 Lorraine Ave Ste 10[illegible]
Stockton CA 95210

Date Shipped 31 May 85

Shipment Service ~~Fed Express~~ Hand Carried

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
[illegible signature]		
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* Kathryn N. Schultz	Date/Time 6/3 8:2[illegible]

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
—	2				OK
—	2			VOA (601/602)	
—	1			PCB's	

WESTON
DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Deborah L. Jones

Phone:

SHIP TO:
Roy F. Weston Inc.
Weston Way
West Chester PA 19380

ATTENTION: Judy Porta

Phone No. 215-524-0150

SHIPPING INFORMATION

Location Mather AFB

Shipper Roy F. Weston Inc.

Address 7720 Lorraine Ave Ste 105
Stockton CA 95210

Date Shipped 3 Jun 85

Shipment Service Federal Express

Airbill No.

Cooler No

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Deborah L. Jones		
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* [signature]	Date/Time 6/4/85 10:00

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
[illegible]	1	[illegible]	[illegible]	[illegible]	good
[illegible]	1			[illegible]	

Remarks

WESTON
DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Deborah A. Jones

Phone:

SHIP TO:

ATTENTION:

Phone No.

SHIPPING INFORMATION

Location: Mather AFB

Shipper: Roy F. Weston, Inc.

Address: 7720 Lorraine Ave. #105
Stockton CA 95210

Date Shipped: 31 May 85

Shipment Service: Hand Carried

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Deborah A. Jones		
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* Arthur N. Schultz	Date/Time 6/3 8:10

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
[illegible]	2	[illegible]	5-31-85	[illegible]	O/C
[illegible]	2	↓	↓	[illegible]	↓
[illegible]	1	↓	↓	Metals (Cd, Cr, Pb, Ni, Ag)	↓
[illegible]	3	↓	↓	Pest/Herb	↓

WESTON
DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Deborah J. Jones

Phone:

SHIP TO:
Roy F Weston Inc
256 Welsh Pool Rd.
Lionville PA 19353

ATTENTION: Judy Perta

Phone No. 215-524-0180

SHIPPING INFORMATION

Location: Mather AFB

Shipper: Roy F. Weston Inc.

Address: 7720 Lorraine Ave. St 105
Stockton, CA 95210

Date Shipped: 3 June 85

Shipment Service: Federal Express

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Deborah J. Jones		
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* Victoria K. Dowling	Date/Time 6/4/85 10:00

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
	1	[illegible]	[illegible]	[illegible]	good
	1	↓	↓	Oil and Grease	
	1	↓	↓	DMN	

Remarks:

H-37

WESTON
DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Rebekah J. Jones

Phone:

SHIP TO:

ATTENTION:

Phone No.

SHIPPING INFORMATION

Location Mather AFB

Shipper Roy F. Weston, Inc.

Address 7720 Lorraine Ave Ste 105, Stockton CA 95210

Date Shipped 31 May 85

Shipment Service Hand Carried

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Rebekah J. Jones		
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* Marilyn M. Schultz	6/3 8:2

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
—	2	MAFB-5	5-31-85		OK
—	2	↓	↓	VOA (EPA 602)	↓
—	1	↓	↓	Metals (Cr, Cd, Pb, Ni, Ag)	↓
—	3	↓	↓	Pest/Herb	↓
—	2	MAFB-50	5-31-85	VOA (EPA 601)	↓
—	2	↓	↓	VOA (EPA 602)	↓
—	1	↓	↓	Metals (Cr, Cd, Pb, Ni, Ag)	↓
—	3	↓	↓	Pest/Herbic.	✓

Remarks:

WESTON DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* [signature]

Phone:

SHIP TO:

Roy F. Weston Inc.

[illegible]

[illegible] PA

ATTENTION: Judy [illegible]

Phone No. 215-524-0180

SHIPPING INFORMATION

Location: Mather AFB

Shipper: Roy F Weston Inc.

Address: 7720 Lorraine Ave. #105

Stockton CA 95210

Date Shipped: ~~[illegible]~~ 3[illegible]85

Shipment Service: ~~[illegible]~~ Fed Ex

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
[signature]		
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* [signature]	Date/Time 6/4/85 10:10

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
—	1	[illegible]	[illegible]	[illegible]	good
—	1	↓	↓	Oil + Grease	
—	1	↓	↓	DMN	
—	1	MAFB-50	5-31-85	TOC	
—	1	↓	↓	Oil and Grease	
—	1	↓	↓	DMN	

Remarks:

H-39

WESTON DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Deborah L. Jones

Phone:

SHIP TO:

ATTENTION:

Phone No.

SHIPPING INFORMATION

Location: Mather AFB

Shipper: Roy F. Weston, Inc

Address: 7720 Lorraine Ave #105, Stockton CA 95210

Date Shipped: 30 May 85

Shipment Service: Hand Carried

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Deborah L. Jones		
	Received for laboratory by: *(Signature)* Kathryn N. Schultz	5/31 9:00

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
—	2	MAFB-6	5 30 85	[illegible]	Ok
—	2	↓	↓	VOA (EPA 602)	↓
—	1	↓	↓	Metals (Cr, Cd, Pb, Ni, Ag)	↓
—	3	↓	↓	Pesticide / Herbicide	↓

Remarks:

WESTON

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Rebecca R. F. Jones

Phone: (209) 957-3403

SHIP TO:
Roy F. Weston Inc.
- 856 Welsh Pool Rd.
Lionville PA 19353

ATTENTION: Judy Porta

Phone No. 215-524-0181

SHIPPING INFORMATION

Location: Mather AFB

Shipper: Roy F. Weston Inc.

Address: 7720 Lorraine Ave #105
Stockton CA 95210

Date Shipped: 3 June 85

Shipment Service: Federal Express

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Rebecca R. F. Jones		
	Received for laboratory by: *(Signature)* Victoria K. [illegible]	6/4/85 10:00

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
[illegible]	1	[illegible]	[illegible]	[illegible]	good
[illegible]	1	↓	↓	Oil and Grease	↓
[illegible]	1	↓	↓	DMN	

Remarks:

H-41

WESTON
DESIGNERS CONSULTANTS

CHAIN OF COUSTODY RECORD

SAMPLERS (Signature) Deborah L. Jones

Phone 209-957-34050

SHIP TO:

ATTENTION:

Phone No

SHIPPING INFORMATION

Location Mather AFB

Shipper Roy F. Weston, Inc

Address 7720 [illegible] Ave #[illegible]
[illegible]

Date Shipped [illegible]

Shipment Service Hand Carried

Airbill No.

Cooler No

Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Deborah L. Jones		
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received for laboratory by: (Signature) Phillip N. Schultz	Date/Time 5/31 9:00

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
—	2	[illegible]	[illegible]	[illegible]	OK
—	2	↓	↓	VOA EPA 602	↓
[illegible]	—	↓	↓	[redacted] DJ	↓
—	—	↓	↓	[redacted]	↓
—	1	↓	↓	Metals (Cd Cr Pb, Ni, Ag)	↓

Remarks:

H-42

WESTON

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Rebeccah L. Jones

Phone: 209-957-3405

SHIP TO:

Roy F Weston Inc

Weston Way

West Chester, PA 19380

ATTENTION: Amy Porta

Phone No 215 524-0181

SHIPPING INFORMATION

Location: Mather AFB

Shipper: Roy F Weston Inc.

Address: 7720 Lorraine Ave #105

Stockton CA 95210

Date Shipped: 3 June 85

Shipment Service: Federal Express

Airbill No.

Cooler No.

Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Rebeccah L. Jones		
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received for laboratory by: (Signature) [signature]	Date/Time 6/4/85 10:00

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
—	1	MAFB-7	5-30-85	TOC	Good
—	1	↓	↓	Oil and Grease	↓
—	1	↓	↓	Phenolic	↓
—	1	↓	↓	Cyanide	↓
—	1	MAFB-70	↓	Phenolic	↓
—	1	↓	↓	Cyanide	↓

Remarks

H-43

WESTON

CHAIN OF CUSTODY RECORD

SAMPLERS: (Signature) [signature]

Phone:

SHIP TO:

Roy F. Weston Inc.
7720 Lorraine Ave #105
Stockton CA 95210

ATTENTION:

Phone No.

SHIPPING INFORMATION

Location Mather AFB, CA

Shipper

Address

Date Shipped 29 May 85

Shipment Service Hand Carried

Airbill No. —

Cooler No —

Relinquished by: (Signature)	Received by: (Signature)	Date/Time
[signature]		
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received for laboratory by: (Signature) [signature]	Date/Time 5/30 10:[illegible]

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
—	1	MAFB-8	5-29-85	Metals (Cd, Cr, Pb, Ni, Ag)	OK
—	2	↓	↓	VOA (EPA 601)	↓
—	2			VOA (EPA 602)	

Remarks:

WESTON
DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: (Signature) [signature]

Phone:

SHIP TO:
Roy F. Weston Inc.
Weston Way
West Chester, PA 19380

ATTENTION:

Phone No.

SHIPPING INFORMATION

Location: Mather AFB, CA

Shipper: Roy F. Weston Inc.

Address: 7720 [illegible] Ave #305
Stockton CA 95210

Date Shipped: 30 May 85

Shipment Service: Federal Express

Airbill No.

Cooler No.

Relinquished by: (Signature)	Received by: (Signature)	Date/Time
[signature]		
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received for laboratory by: (Signature)	Date/Time
	[signature]	[illegible]

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
—	1	HAFB-8	5-29-85	TOC	good
—	1	↓	↓	Oil and Grease	↓
—	1			Phenolics	
—	1			Cyanide	

Remarks:

WESTON

DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* [illegible]

Phone:

SHIP TO:

Roy F. Weston, Inc.
7720 Lorraine Ave. #105
Stockton CA 95210

ATTENTION:

Phone No.

SHIPPING INFORMATION

Location [illegible] AFB [illegible]

Shipper

Address

Date Shipped 29 May 85

Shipment Service Hand [illegible]

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
[illegible signature]		
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)*	Date/Time
	[signature] Schiller	5/30 10:[illegible]

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
—	1	MAFB-80	5-29-85	Metals (Cd, Cr, Pb, Ni, Ag)	OK
—	2	↓	↓	VOA (EPA 601)	↓
—	2	↓	↓	VOA (EPA 602)	↓

Remarks:

WESTON DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: (Signature) [signature]

Phone:

SHIP TO: Roy F. Weston Inc.
Weston Way Rd.
[illegible]ville PA 19380

ATTENTION:

Phone No.

SHIPPING INFORMATION

Location: Mather AFB CA

Shipper: Roy F. Weston Inc.

Address: 7170 [illegible] Ave #105
Stockton CA 95210

Date Shipped: 30 May 85

Shipment Service: [illegible]

Airbill No.

Cooler No.

Relinquished by: (Signature)	Received by: (Signature)	Date/Time
[signature]		
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received for laboratory by: (Signature)	Date/Time
	[signature]	5/31/85 1015

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
—	1	MAFB 80	5-29-85	TOC	Good
—	1	↓	↓	oil and grease	↓
	1	↓	↓	Phenolics	↓
	1	↓	↓	Cyanide	

Remarks:

WESTON

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* [illegible]

Phone [illegible]

SHIP TO

[illegible]

[illegible] AFB

[illegible]

ATTENTION:

Phone No

SHIPPING INFORMATION

Location [illegible] AFB

Shipper [illegible]

Address

Date Shipped [illegible] May 85

Shipment Service [illegible]

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
[illegible signature]		
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* Kathy D. Schultz	Date/Time 5/30 10:

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
[illegible]	1	[illegible]	[illegible]	[illegible]	OK
[illegible]	2	↓	↓	VOA (EPA 601)	↓
[illegible]	2	↓	↓	VOA (EPA 602)	↓

[illegible]

WESTON
DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: (Signature) [signature]
Phone: 209 957 3405
SHIP TO:
Roy F. Weston Inc.
5 Weston Way
Lionville PA 19353

ATTENTION:
Phone No.

SHIPPING INFORMATION
Location: Mather AFB, CA
Shipper: Roy F. Weston Inc.
Address: 4770 Lorraine Ave #105
Stockton CA 95210
Date Shipped: 30 May 85
Shipment Service: Federal Express
Airbill No.
Cooler No.

Relinquished by: (Signature)	Received by: (Signature)	Date/Time
[signature]		
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received for laboratory by: (Signature)	Date/Time
	[signature]	5/31/85 1015

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
—	1	MAFB-9	5-29-85	TOC	Good
—	1	↓	↓	Oil & Grease	
—	1	↓	↓	Phenolics	
—	2	↓	↓	Cyanide	
—	1	MAFB-90	5-29-85	Phenolics	
—	1	↓	↓	Cyanide	

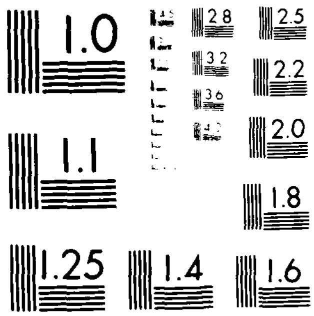
Remarks:

AD-A184 581 INSTALLATION RESTORATION PROGRAM PHASE 2 3/5

CONFIRMATION/QUANTIFICATION STAGE 1 VOLUME 2 APPENDICES

(U) WESTON (ROY F) INC WEST CHESTER PA JUN 86

UNCLASSIFIED F33615-80-D-4006 F/G 24/4 NL



MICROCOPY RESOLUTION TEST CHART

WESTON DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Deborah A. Jones

Phone:

SHIP TO:

ATTENTION:

Phone No.

SHIPPING INFORMATION

Location [illegible] AFB OH

Shipper Roy F. Weston Inc.

Address 7720 [illegible] Ave #105 [illegible] OH [illegible]

Date Shipped 30 MAY 85

Shipment Service Hand Carried

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Deborah A. Jones		
	Received for laboratory by: *(Signature)* Kathryn N. Schuller	5/31 9:0

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
—	2	[illegible]-10	5-30-85	VOA (EPA 601)	O/K
—	2	↓	↓	VOA (EPA 602)	↓
—	1	↓	↓	Metals (Cd, Cr, Pb, Ni, Ag)	↓

Remarks:

H-50

WESTON DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* [illegible]

Phone: (?) 957-3405

SHIP TO:

Roy F. Weston Inc.

[illegible]

[illegible] PA [illegible]

ATTENTION: Judy Porta

Phone No. 215-524-0181

SHIPPING INFORMATION

Location: [illegible] AFB CA

Shipper: Roy F. Weston Inc

Address: 7720 [illegible] Ave. #105

Stockton CA [illegible]

Date Shipped: 3 June 85

Shipment Service: Federal Express

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
[illegible]		
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* [illegible]	Date/Time 6/4/85 10:00

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
					good
	1		↓	[illegible]	
	1	↓		[illegible]	
	1	↓		[illegible]	
	1	MAFB-100		[illegible]	
	1	↓	↓	[illegible]	

Remarks.

WESTON DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: (Signature) Deborah L. Jones

Phone:

SHIP TO:

ATTENTION:

Phone No.

SHIPPING INFORMATION

Location: Mather AFB CA

Shipper: Roy F. Weston, Inc

Address: 7720 Lorraine Ave #105, Stockton CA 95210

Date Shipped: 30 May 85

Shipment Service: Hand Carried

Airbill No.

Cooler No.

Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Deborah L. Jones		
	Received for laboratory by: (Signature) Kathy N. Schuler	5/31 9:10

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
—	2	MAFB-11	5-30-85	[illegible]	OK
—	2	↓	↓	VOA - EPA 602	↓
—	1	↓	↓	Metals (Cr, Cd, Pb, Ni, Ag)	↓

Remarks:

WESTON
DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Deborah L. Jones

Phone: 209-957-3405

SHIP TO:
Roy F. Weston, Inc
256 Welsh Pool Rd.
Lionville PA 19353

ATTENTION: Judy Porta

Phone No. 215-524-0181

SHIPPING INFORMATION

Location: Mather AFB

Shipper: Roy F. Weston, Inc.

Address: 7720 Lorraine Ave. #105
Stockton, CA 95210

Date Shipped: 3 June 85

Shipment Service: Federal Express

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Deborah L. Jones		
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* [signature]	Date/Time 6/4/85 10:00

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
—	1	MAFB-11	5-30-85	TOC	good
—	1	↓	↓	Oil and Grease	↓
—	1	↓	↓	Phenolic	↓
—	1	↓	↓	Cyanide	↓
—	1	MAFB-110	5-30-85	TOC	↓
—	1	↓	↓	Oil and Grease	↓
—	1	↓	↓	Phenolic	↓
—	1	↓	↓	Cyanide	↓

Remarks:

WESTON
DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Deborah L. Jones	**SHIPPING INFORMATION**
Phone:	Location Mather AFB
SHIP TO:	Shipper Roy F. Weston, Inc.
Roy F Weston Inc.	Address 7720 Lorraine Ave. Ste. 1[illegible]
[illegible] Ave. Ste. 105	Stockton CA 95210
[illegible] CA 95210	Date Shipped 30 May 85
	Shipment Service Hand Carried
ATTENTION:	Airbill No.
Phone No.	Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Deborah L. Jones		
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* Kathy N. Schilling	Date/Time 6/3 8:[illegible]

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
—	2	MAFB-110	5-30-85	[illegible] (EPA 601)	OK
[illegible]	2	↓	↓	VOA (EPA 602)	↓
[illegible]	1	↓	↓	Metals (Cr, Cd, Pb, Ni, Ag)	↓

Remarks:

WESTON
DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: (Signature) [signature: Deborah L. Jones]
Phone: 209-957-3405

SHIP TO:
Roy F Weston Inc.
256 Welsh Pool Rd.
Lionville, PA 19353

ATTENTION: Judy Porta
Phone No. 215-524-0181

SHIPPING INFORMATION

Location: Mather AFB
Shipper: Roy F. Weston, Inc.
Address: 7720 Lorraine Ave #105
Stockton CA 95210
Date Shipped: 3 June 85
Shipment Service: Federal Express
Airbill No.
Cooler No.

Relinquished by: (Signature)	Received by: (Signature)	Date/Time
[signature: Deborah L. Jones]		
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received for laboratory by: (Signature) [signature]	Date/Time 6/4/85 10:00

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
—	1	USD	[illegible]	[illegible]	good
—	1	USD	↓	Phenolics	↓
—	1	USD	↓	Cyanide	↓
~~—~~	~~1~~	~~USD~~	↓	~~Metals (Cr, Cd, Pb, Ni, Ag)~~	↓
—	1	US	↓	Oil and Grease	↓
—	1	US	↓	Phenolics	↓
—	1	US	↓	Cyanide	↓
~~—~~	~~1~~	~~US~~	↓	~~[illegible]~~	↓
—	1	DS	5 20 85	Oil and Grease	↓
—	1	DS	↓	Phenolics	↓
—	1	DS	↓	Cyanide	↓
~~—~~	~~1~~	~~DS~~	↓	~~[illegible]~~	

Remarks: [illegible]

WESTON DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* [illegible signature]

Phone: ( )

SHIP TO:

ATTENTION:

Phone No.

SHIPPING INFORMATION

Location: Mather AFB CA

Shipper: Roy F. Weston Inc.

Address: 7720 Lorraine Ave #105, Stockton CA 95210

Date Shipped: 30 May 85

Shipment Service: Hand Carried

Airbill No. —

Cooler No. —

Relinquished by: (Signature)	Received by: (Signature)	Date/Time
[signature]		
	Received for laboratory by: (Signature) [signature]	5/31 9:00

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
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	OK
[illegible]	1	USD	↓	[illegible]	↓
[illegible]	1	DS	↓	VOA, Metals (Cr, Cd, Pb, Ni, Ag)	↓

Remarks

WESTON DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)*

Phone:

SHIP TO: Lionville Labs

ATTENTION:

Phone No.

SHIPPING INFORMATION

Location:

Shipper: Roy F. Weston

Address: 4720 ... Ave #105 ..., Ca. 95210

Date Shipped: 6-17-85

Shipment Service: ... Express

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
... Schultz		6/17 3:...
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* ... Sanders	Date/Time 6/19/85 1000

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
...5-4401	1	U.S	5/30/85	Metals - Pb, Cr, Cd, Ni, Ag	good
...5-4402	1	U.S.D.	↓	↓	↓
...5-4403	1	D.S	↓	↓	

Remarks: ...

ROUND 85-2

WESTON DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: (Signature) Deborah Jones

Phone:

SHIP TO:

ROY F. WESTON INC.
7720 LORRAINE AVE. #105
STOCKTON, CA 95210

ATTENTION:

Phone No.

SHIPPING INFORMATION

Location Mather AFB

Shipper ROY F. WESTON INC.

Address 7720 LORRAINE AVE. #105
STOCKTON, CA 95210

Date Shipped 27-June 85

Shipment Service hand carried

Airbill No.

Cooler No.

Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Deborah Jones		6/27/85
	Received for laboratory by: (Signature) M. Maldonado	6/28 7 AM

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
	2	FB-1	[illegible]	EPA 601	OK
	2	↓	↓	EPA 602	↓
	1	↓	↓	PCB	↓
	3	↓	↓	Pest/Herb	↓

Remarks

WESTON DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Deborah Jones

Phone:

SHIP TO:
Roy F. Weston Inc
Lionville Lab
256 Welsh Pool Rd.
Lionville PA 19353

ATTENTION: Judy Porta

Phone No. 215-524-0180

SHIPPING INFORMATION

Location: Mather AFB

Shipper: ROY F. WESTON INC.

Address: 7720 LORRAINE AVE. #105, STOCKTON, CA 95210

Date Shipped: 1 July 85

Shipment Service: Fed Ex

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Deborah Jones		6/27/85
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* [signature]	Date/Time 7/2/85 930

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
	1	FB-1	6-27-85	TOC	Good
	1	↓	↓	Oil + Grease	↓
	1	↓	↓	Phenolics	↓
	1	↓	↓	Cyanide	↓
	1	↓	↓	Metals (Cd Cr Pb Ni Ag)	↓
	1	↓	↓	DMN	↓

Remarks: Metals field filtered + acidified

H-60

WESTON DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Deborah L. Jones

Phone:

SHIP TO:

~~ROY F. WESTON INC.~~
~~7720 LORRAINE AVE. #105~~
~~STOCKTON, CA 95210~~

ATTENTION:

Phone No.

SHIPPING INFORMATION

Location Mather AFB

Shipper ROY F. WESTON INC.

Address 7720 LORRAINE AVE. #105
STOCKTON, CA 95210

Date Shipped 27 June 85

Shipment Service hand carried

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Deborah L. Jones		6/27/85
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* M. Maldonado	Date/Time 6/28 7AM

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
	2	FH-5	27 JUN	EPA 601	OK
	2	✓	"	EPA 602	✓

Remarks:

H-61

WESTON
DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Debrah L. Jones

Phone:

SHIP TO:

Roy F. Weston Inc.
Lionville Lab
256 Welsh Pool Rd.
Lionville, PA 19353

ATTENTION: Judy Arta

Phone No 215-524-0180

SHIPPING INFORMATION

Location: Mather AFB

Shipper: ROY F. WESTON INC.

Address: 7720 LORRAINE AVE. #105
STOCKTON, CA 95210

Date Shipped: 1 July 85

Shipment Service: Fed. Ex

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Debrah L. Jones		6/27/85
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* [illegible]	Date/Time 7/2/85 9:00

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
	1	FH-5	[illegible] 85	TOC	Good
	1	↓	"	Oil & Grease	

Remarks:

H-62

WESTON DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Deborah L. Jones

Phone:

SHIP TO:

Roy F. Weston, Inc
Lionville Lab
255 Welch Pool Rd.
Lionville PA 19353

ATTENTION: Judy Porta

Phone No. 215-524-0180

SHIPPING INFORMATION

Location Mather AFB

Shipper ROY F. WESTON INC.

Address 7720 LORRAINE AVE. #105
STOCKTON, CA 95210

Date Shipped [illegible] 85

Shipment Service Fed Ex

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Deborah L. Jones		6/27/85
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* [signature]	Date/Time 7/2/85 9:30

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
	1	ACW	[illegible] 85	TOC	Good
	1	↓	"	Oil + Grease	
	1	ACW-1	6-27-85	TOC	
	1	↓	"	Oil + Grease	

Remarks:

H-63

WESTON DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Deborah L. Jones

Phone:

SHIP TO:

ROY F. WESTON INC.
7720 LORRAINE AVE. #105
STOCKTON, CA 95210

ATTENTION:

Phone No.

SHIPPING INFORMATION

Location Mather AFB

Shipper ROY F. WESTON INC.

Address 7720 LORRAINE AVE. #105
STOCKTON, CA 95210

Date Shipped 27 June 85

Shipment Service hand carried

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Deborah L. Jones		6/27/85
	Received for laboratory by: *(Signature)* M. Maldonado	6/28 7AM

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
	2	ACW	6-27-85	EPA 601	OK
	2	↓	↓	EPA 602	↓
	1	↓	↓	PCB	↓
	2	ACW-1	6-27-85	EPA 601	↓
	2	↓	↓	EPA 602	↓
	1	↓	↓	PCB	↓

Remarks:

WESTON DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Deborah L. Jones

Phone:

SHIP TO:

ROY F. WESTON INC.
7720 LORRAINE AVE. #105
STOCKTON, CA 95210

ATTENTION:

Phone No.

SHIPPING INFORMATION

Location Mather AFB

Shipper ROY F. WESTON INC.

Address 7720 LORRAINE AVE. #105 STOCKTON, CA 95210

Date Shipped 27 June 85

Shipment Service Fed Ex

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Deborah L. Jones		6/27/85
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* M. Maldonado	Date/Time 6/28 7AM

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
[illegible]	2	MAFB-1	[illegible]	EPA 601	OK
[illegible]	2	↓	↓	EPA 602	↓
[illegible]	1	↓	↓	PCB	↓

Remarks:

H-65

WESTON DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: (Signature) Deborah L. Jones

Phone:

SHIP TO:

Roy F. Weston, Inc.

Lionville Lab

256 Welsh Pool Rd

Lionville PA. 19353

ATTENTION: Judy Porta

Phone No. 0215-524-0180

SHIPPING INFORMATION

Location Mather AFB

Shipper ROY F. WESTON INC.

Address 7720 LORRAINE AVE #105

STOCKTON, CA 95210

Date Shipped [illegible]

Shipment Service Fed Ex

Airbill No.

Cooler No.

Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Deborah L. Jones		6/27/85
	Received for laboratory by: (Signature) [illegible]	7/2/85 9:20

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
	1	MAFB-1	[illegible]	TOC	good
	↓	↓	11	Oil + Grease	↓

Remarks:

H-66

WESTON
DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Deborah L. Jones

Phone:

SHIP TO:

ROY F. WESTON INC.
7720 LORRAINE AVE. #105
STOCKTON, CA 95210

ATTENTION:

Phone No.

SHIPPING INFORMATION

Location Mather AFB

Shipper ROY F. WESTON INC.

Address 7720 LORRAINE AVE. #105
STOCKTON, CA 95210

Date Shipped 27 June 85

Shipment Service hand carried

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Deborah L. Jones		6/27/85
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* M. Maldonado	Date/Time 6/28 7AM

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
	2	MAFB-2	6-27-85	EPA 601	
	2	↓	↓	EPA 602	
	1			PCB	

Remarks:

WESTON DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Deborah d. Jones

Phone:

SHIP TO:

Roy F. Weston, Inc.

Lionville Lab

256 Welsh Pool Rd.

Lionville, PA. 19353

ATTENTION: Judy Porta

Phone No. 215-524-0180

SHIPPING INFORMATION

Location Mather AFB

Shipper ROY F. WESTON INC.

Address 7720 LORRAINE AVE. #105

STOCKTON, CA 95210

Date Shipped 1 July 85

Shipment Service Fed Ex

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Deborah d. Jones		6/27/85
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)*	Date/Time
	[signature]	7/2/85 930

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
	1	MAFB-2	6-27-85	TOC	Good
	↓	↓	"	Oil + Grease	OK

Remarks:

WESTON
DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Deborah Jones

Phone:

SHIP TO:

~~ROY F. WESTON INC.~~
~~7720 LORRAINE AVE. #105~~
~~STOCKTON, CA 95210~~

ATTENTION:

Phone No.

SHIPPING INFORMATION

Location Mather AFB

Shipper ROY F. WESTON INC.

Address 7720 LORRAINE AVE. #105
STOCKTON, CA 95210

Date Shipped 27 June 85

Shipment Service Hand carried

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Deborah Jones		6/27/85
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* M. Maldonado	Date/Time 6/28 7AM

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
	2	MAFB-3	6-27-85	EPA 601	OK
	2	↓	↓	EPA 602	↓
	1	↓	↓	PCB	↓
	2	MAFB-30	6-27-85	EPA 601	↓
	2	↓	↓	EPA 602	↓
	1	↓	↓	PCB	↓

Remarks:

WESTON
DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Deborah A. Jones

Phone:

SHIP TO:

Roy F. Weston, Inc.
Lionville Lab
256 Welsh Pool Rd.
Lionville PA 19353

ATTENTION: Judy Priva

Phone No 215-524-0180

SHIPPING INFORMATION

Location Mather AFB

Shipper ROY F. WESTON INC.

Address 7720 LORRAINE AVE. #105
STOCKTON, CA 95210

Date Shipped 6/27/85

Shipment Service Fed Ex

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Deborah A. Jones		6/27/85
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)*	Date/Time
	R. Valero	7/2/85 9:20

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
	1	MAFB-3	6-27-85	TOC	Good
	↓	↓	"	Oil + Grease	
	1	MAFB-30	6-27-85	TOC	
	1	↓	"	Oil + Grease	

Remarks:

WESTON
DESIGNERS CONSULTANTS

CHAIN OF COUNTODY RECORD

SAMPLERS: *(Signature)* Deborah L. Jones

Phone:

SHIP TO:

ROY F. WESTON INC.
7720 LORRAINE AVE. #105
STOCKTON, CA 95210

ATTENTION:

Phone No.

SHIPPING INFORMATION

Location Mather AFB

Shipper ~~ROY F. WESTON INC.~~

Address ~~7720 LORRAINE AVE. #105~~
~~STOCKTON, CA 95210~~

Date Shipped 27 JUN 85

Shipment Service hand carried

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Deborah L. Jones		6/27/85
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* M. Maldonado	Date/Time 6/28 7AM

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
	[illegible]	MAFB-4	6-27-85	EPA601	OK
	2	↓	↓	EPA602	↓
	3	↓	↓	Pest/Herb	↓

Remarks

H-71

WESTON DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Deborah L. Jones

Phone:

SHIP TO:

Roy F Weston, Inc.

Lionville Lab

255 Welsh Pool Rd

Lionville, PA. 19353

ATTENTION: Judy Porta

Phone No. 215-524-0180

SHIPPING INFORMATION

Location: Mather AFB

Shipper: ROY F. WESTON INC.

Address: 7720 LORRAINE AVE. #108
STOCKTON, CA 95210

Date Shipped: 1 July 85

Shipment Service: Fed Ex

Airbill No.

Cooler No.

Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Deborah L. Jones		6/27/85
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received for laboratory by: (Signature) [signature]	Date/Time 7/2/85 920

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
	1	MAFB-4	[illegible]	TOC	good
	1	↓	↓	Oil + Grease	↓
	1	↓	↓	Metals (Cd Cr Pb Ni Ag)	↓
	1	↓	↓	DMN	↓

Remarks: Metals field filtered + acidified

H-72

WESTON
DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Deborah K. Jones

Phone:

SHIP TO:

ROY F. WESTON INC.
7720 LORRAINE AVE. #105
STOCKTON, CA 95210

ATTENTION:

Phone No.

SHIPPING INFORMATION

Location Mather AFB

Shipper ~~ROY F. WESTON INC.~~

Address ~~7720 LORRAINE AVE. #105~~
~~STOCKTON, CA 95210~~

Date Shipped 27 June 85

Shipment Service hand carried

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Deborah K. Jones		6/27/85
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* M. Maldonado	Date/Time 6/28 7AM

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
	2	MAFB-5	[illegible]	EPA 601	OK
	2	↓	↓	EPA 602	↓
	3	↓	↓	Pest/Herb	↓

Remarks:

WESTON DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Deborah L. Jones

Phone:

SHIP TO:

R. F. Weston Inc

[illegible]

[illegible] Paoli Rd.

[illegible] PA 19353

ATTENTION: Judy Porter

Phone No. 215-524-0180

SHIPPING INFORMATION

Location Mather AFB

Shipper ROY F. WESTON INC.

Address 7720 LORRAINE AVE. #105

STOCKTON, CA 95210

Date Shipped 1 July 85

Shipment Service Fed. Ex.

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Deborah L. Jones		6/27/85
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* [signature]	7/2/85 9:30

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
	1	MAFB-5	[illegible]	TOC	Good
	1	↓	↓	Oil + Grease	↓
	1	↓	↓	Metals (Cd Cr Pb Ni As)	↓
	1	↓	↓	DMN	↓

Remarks: Metals field filtered + acidified

H-74

WESTON DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Debrah Jones

Phone:

SHIP TO:

~~ROY F. WESTON INC.~~
~~7720 LORRAINE AVE. #105~~
~~STOCKTON, CA 95210~~

ATTENTION:

Phone No.

SHIPPING INFORMATION

Location Mather AFB

Shipper ~~ROY F. WESTON INC.~~

Address ~~7720 LORRAINE AVE. #105~~
~~STOCKTON, CA 95210~~

Date Shipped

Shipment Service hand carried

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Debrah Jones		6/27/85
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* M. Maldonado	Date/Time 6/28 7 AM

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
	2	MAFB-6	6-27-85	EPA 601	OK
	2	↓	↓	EPA 602	↓
	3	↓	↓	Pest/Herb	
	2	MAFB-60	6-27-85	EPA 601	
	2	↓	↓	EPA 602	↓
	3	↓	↓	Pest/Herb	

Remarks:

WESTON
DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Deborah Jones

Phone:

SHIP TO:

Roy F. Weston, Inc.
Lionville Lab
356 Welsh Pool Rd.
Lionville, PA. 19353

ATTENTION: Judy Porta

Phone No. 215-524-0180

SHIPPING INFORMATION

Location Mather AFB

Shipper ROY F. WESTON INC.

Address 7720 LORRAINE AVE #105
STOCKTON, CA 95210

Date Shipped 1 July 85

Shipment Service Fed. Ex.

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Deborah Jones		6/27/85
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* [signature]	Date/Time 7/2/85 920

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
	1	MAFB-6	6-27-85	TOC	Good
	1	↓	↓	Oil + Grease	
	1			Metals (Cd Cr Pb Ni Ag)	
	1			DMN	
	1	MAFB-60	6-27-85	TOC.	
	1	↓	↓	Oil + Grease	
	1			Metals (Cd Cr Pb Ni Ag)	
	1			DMN	

Remarks: Metals field filtered + acidified

H-76

WESTON DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Debrah L. Jones

Phone:

SHIP TO:

~~ROY F. WESTON INC.~~
~~7720 LORRAINE AVE. #105~~
~~STOCKTON, CA 95210~~

ATTENTION:

Phone No.

SHIPPING INFORMATION

Location: Mather AFB

Shipper: ROY F. WESTON INC.

Address: 7720 LORRAINE AVE. #105
STOCKTON, CA 95210

Date Shipped: 26 June 85

Shipment Service: hand carried

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Debrah L. Jones		6/26/85
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)*	Date/Time
	Kathryn Schultz	6/27 6:00

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
	2	MAFB-7	-26-85	EPA 601 (VOAs)	OK
	2	↓	〃	EPA 602 (VOAs)	↓

Remarks:

H-77

WESTON DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Deborah L. Jones

Phone:

SHIP TO:

Roy F. Weston, Inc

Lionville Lab

256 Welsh Pool Rd.

Lionville, PA 19353

ATTENTION: Judy Porta

Phone No. 215-524-0180

SHIPPING INFORMATION

Location Mather AFB

Shipper ROY F. WESTON INC.

Address 7720 LORRAINE AVE. #105 STOCKTON, CA 95210

Date Shipped 27 June 85

Shipment Service Fed. Ex

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Deborah L. Jones		6/26/85
	Received for laboratory by: *(Signature)* Victoria K. Dondero	6/28/85 9:30

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
	1	MAFB-7	6-26-85	TOC	good
	1	↓	↓	Oil + Grease	↓
	1	↓	↓	Phenolics	↓
	1	↓	↓	Cyanide	↓
	1	↓	↓	Metals (Cd Cr Pb Ni Ag)	↓
	1	MAFB-70	6-26-85	Phenolics	↓
	1	↓	"	Cyanide	

Remarks: Metals field filtered + acidified

WESTON DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Deborah d. Jones

Phone:

SHIP TO:

ROY F. WESTON INC.
7720 LORRAINE AVE. #105
STOCKTON, CA 95210

ATTENTION:

Phone No.

SHIPPING INFORMATION

Location Mather AFB

Shipper ROY F. WESTON INC.

Address 7720 LORRAINE AVE. #105
STOCKTON, CA 95210

Date Shipped 26 June 85

Shipment Service hand carried

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Deborah d. Jones		6/26/85
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* Kathy N. Schultz	Date/Time 6/27 [illegible]

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
	2	MAFB-5	6-2-85	EPA 601	OK
	2	✓	"	EPA 602	✓

Remarks:

H-79

WESTON DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Deborah Jones

Phone:

SHIP TO:

Roy F Weston, Inc.

Lionville Lab

254 Welsh Pool Rd.

Lionville, PA. 19353

ATTENTION: Judy Porta

Phone No. 215-524-0180

SHIPPING INFORMATION

Location Mather AFB

Shipper ROY F. WESTON INC.

Address 7720 LORRAINE AVE #105

STOCKTON, CA 95210

Date Shipped 6/26/85

Shipment Service Fed. Ex

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Deborah Jones		6/26/85
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* [signature]	Date/Time 6/27/85 9:30

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
	1	MAFB-8	[illegible]	TOC	Good
	1	↓	↓	Oil + Grease	↓
	1	↓	↓	Phenolics	↓
	1	↓	↓	Cyanide	↓
	1	↓	↓	Metals (Cd Cr Pb Ni Ag)	↓
	1	MAFB-80	6-26-85	Phenolics	↓
	1	↓	〃	Cyanide	↓

Remarks:

H-80

WESTON DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Deborah L. Jones

Phone:

SHIP TO:

~~ROY F. WESTON INC.~~
~~7720 LORRAINE AVE. #105~~
~~STOCKTON, CA 95210~~

ATTENTION:

Phone No.

SHIPPING INFORMATION

Location Mather AFB

Shipper ~~ROY F. WESTON INC.~~

Address ~~7720 LORRAINE AVE. #105~~
~~STOCKTON, CA 95210~~

Date Shipped June 26 1985

Shipment Service hand carried

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Deborah L. Jones		6/26/85
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* Kathleen Schultz	Date/Time 6/27 6:00

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
	2	MAFB-9	6-26-85	EPA 601	OK
	2	↓	6-26-85	EPA 602	↓
	2	MAFB-90	6-26-85	EPA 601	↓
	2	↓	6-26-85	EPA 602	↓

Remarks:

H-81

WESTON DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* Deborah Jones

Phone:

SHIP TO:

Roy F Weston, Inc.

Lionville Lab

256 Welsh Pool Rd

Lionville PA 19353

ATTENTION: Judy Porta

Phone No. 215-524-0180

SHIPPING INFORMATION

Location Muller AFB ~~ROY F. WESTON INC.~~

Shipper ~~7720 LORRAINE AVE. #105~~

Address ~~STOCKTON, CA 95210~~

Date Shipped 27 June 85

Shipment Service Fed Ex.

Airbill No.

Cooler No.

Relinquished by (Signature)	Received by: (Signature)	Date/Time
Deborah d. Jones		6/26/85
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received for laboratory by: (Signature) Victoria R Dinduno	Date/Time 6/28/85 9:30

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
	1	MAFB-9	6-26-85	TOC	Good
	1	↓	↓	Oil + Grease	↓
	1	↓	↓	Phenolics	↓
	1	↓	↓	Cyanide	↓
	1	↓	↓	Metals (Cd Cr Pb Ni Ag)	↓
	1	MAFB-90	6-26-85	TOC	↓
	1	↓	↓	Oil + Grease	↓
	1	↓	↓	Phenolics	↓
	1	↓	↓	Cyanide	↓
	1	↓	↓	Metals (Cd Cr Pb Ni Ag)	↓

Remarks: Metals field filtered + acidified

WESTON
DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: *(Signature)* [signature]

Phone:

SHIP TO:

~~ROY F. WESTON INC.~~
~~7720 LORRAINE AVE. #105~~
~~STOCKTON, CA 95210~~

ATTENTION:

Phone No.

SHIPPING INFORMATION

Location Mather AFB

Shipper ROY F. WESTON INC.

Address 7720 LORRAINE AVE. #105
STOCKTON, CA 95210

Date Shipped 26 June 85

Shipment Service hand carried

Airbill No.

Cooler No.

Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
[signature]		6/26/85
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received by: *(Signature)*	Date/Time
Relinquished by: *(Signature)*	Received for laboratory by: *(Signature)* [signature] Schultz	Date/Time 6/27 6:00

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
	2	MAFB-10	6-26-85	EPA 601	OK
	2	↓	"	EPA 602	
	2	MAFB-100	6-26-85	EPA 601	
	2	↓	"	EPA 602	↓

Remarks:

H-83

WESTON DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: (Signature) [illegible signature]

Phone:

SHIP TO:

R. F. Weston, Inc
[illegible] Lab
254 Welsh Pool Rd.
Lionville, PA 19353

ATTENTION: Judy Porta

Phone No. 215-524-0180

SHIPPING INFORMATION

Location Mather AFB

Shipper ROY F. WESTON INC.

Address 7720 LORRAINE AVE. #105
STOCKTON, CA 95210

Date Shipped 27 June 85

Shipment Service Fed Ex

Airbill No.

Cooler No.

Relinquished by: (Signature)	Received by: (Signature)	Date/Time
[signature] Jones		6/26/85
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received for laboratory by: (Signature) [signature]	Date/Time 6/28/85 9:30

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
	1	MAFB-10	[illegible]-85	TOC	Good
	1	↓	↓	Oil + Grease	↓
	1	↓	↓	Phenolics	↓
	1	↓	↓	Cyanide	↓
	1	↓	↓	Metals (Cd Cr Ni Pb Ag)	↓
	1	MAFB-100	6-26-85	TOC	↓
	1	↓	↓	Oil + Grease	↓
	1	↓	↓	Phenolics	↓
	1	↓	↓	Cyanide	↓
	1	↓	↓	Metals (Cd Cr Pb Ni Ag)	↓

Remarks: Metals field filtered + acidified

WESTON

CHAIN OF CUSTODY RECORD

SAMPLERS (Signature) [signature]

Phone:

SHIP TO:

ROY F. WESTON INC.
7720 LORRAINE AVE. #105
STOCKTON, CA 95210

ATTENTION:

Phone No.

SHIPPING INFORMATION

Location: Mather AFB

Shipper: ~~ROY F. WESTON INC.~~

Address: ~~7720 LORRAINE AVE. #105~~
~~STOCKTON, CA 95210~~

Date Shipped:

Shipment Service:

Airbill No.

Cooler No.

Relinquished by: (Signature)	Received by: (Signature)	Date/Time
[signature]		6/26/85
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received for laboratory by: (Signature) [signature]	Date/Time 6/27 6:00

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
	[illegible]	[illegible]	[illegible]	[illegible]	OK
	2	↓	"	EPA 602	↓

Remarks.
H-85

WESTON
DESIGNERS CONSULTANTS

CHAIN OF CUSTODY RECORD

SAMPLERS: (Signature) Deborah J. Jones

Phone:

SHIP TO:

Roy F. Weston Inc.

Lionville Lab

256 Welsh Pool Rd.

Lionville PA 19353

ATTENTION: Judy Porta

Phone No 215-524-0180

SHIPPING INFORMATION

Location: Mather AFB

Shipper: ROY F. WESTON INC.

Address: 7720 LORRAINE AVE. #105 STOCKTON, CA 95210

Date Shipped: 27 June 85

Shipment Service: Fed Ex

Airbill No.

Cooler No.

Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Deborah Jones		6/26/85
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received for laboratory by: (Signature) [signature]	Date/Time 6/28/85 9:80

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
	1	MAFB-11	6-26-85	TOC	Good
	1	↓	↓	Oil & Grease	↓
	1	↓	↓	Phenolics	↓
	1	↓	↓	Cyanide	↓
	1	↓	↓	Metals (Cd Cr Ni Pb Ag)	↓
	1	MAFB-110	6-26-85	Phenolics	↓
	1	↓	"	Cyanide	↓

Remarks

H-86

APPENDIX I

ANALYTICAL METHODS AND REQUIRED DETECTION LIMITS

APPENDIX I

ANALYTICAL METHODS AND REQUIRED DETECTION LIMITS

Analyte	Water Samples		Soil Samples	
	Detection Limit	Method	Detection Limit	Method
Volatile organic compounds	Specified by compound in method	EPA Methods 601 and 602	Specified by compound in method	EPA Methods 8010 and 8020
Total organic carbon (TOC)	1 mg/L	EPA Method 415.1	---	---
Oils and grease	0.1 mg/L	EPA Method 413.2	100 ug/g	Standard Method 503D
Phenol (total)	1 ug/L	EPA Method 420.1	1 ug/g	EPA Method 420.1
Cadmium (Cd)	10 ug/L	EPA Method 213.2	1 ug/g	ICP Optical
Lead (Pb)	20 ug/L	EPA Method 239.2	2 ug/g	ICP Optical
Chromium (Cr)	50 ug/L	ICP Optical	5 ug/g	ICP Optical
Nickel (Ni)	100 ug/L	ICP Optical	10 ug/g	ICP Optical
Silver (Ag)	10 ug/L	EPA Method 272.2	1 ug/g	ICP Optical
Cyanide	10 ug/L	EPA Method 335.2	1 ug/g	EPA Method 9010
PCB	0.25 ug/L	EPA Method 608	---	---
DMN	1 ug/L	EPA Method 625	---	---
DDT	0.02 ug/L	EPA Method 608	---	---
Chlordane	0.02 ug/L	EPA Method 608	---	---
2,4-D	0.06 ug/L	EPA Method 608	---	---

APPENDIX J

LABORATORY QA/QC PLAN

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. The Laboratory QA/QC Manual (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 EPA Handbook for Analytical Quality Control in Waste 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. 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.

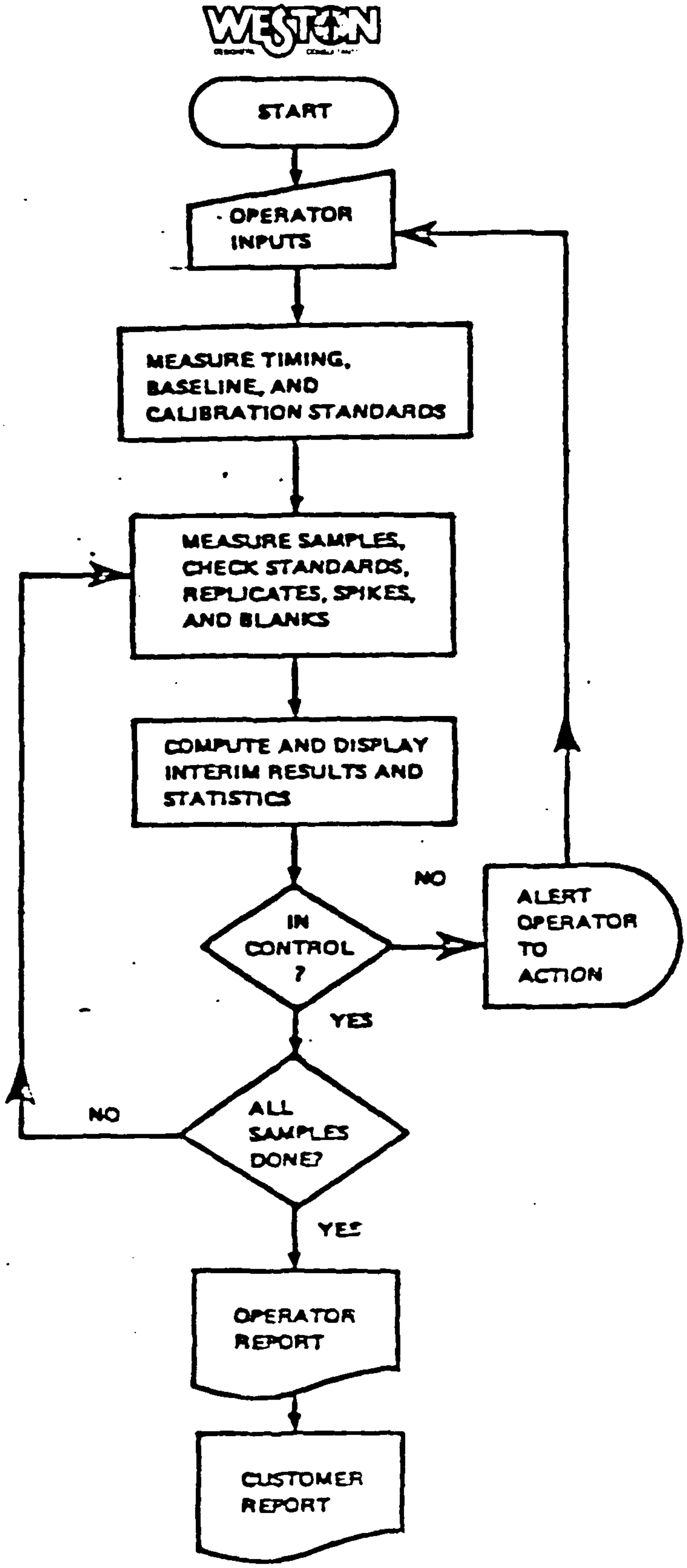


Figure J-1: Flow Chart of the Sequence of Events during a Controlled Series of Laboratory Measurements.

WESTON

J.3 VERIFICATION/VALIDATION

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

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

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

- Field Blanks - 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:

- Accuracy - 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.

- Completeness - Are the data sufficient for the planned use? QA/QC shall identify the quantity of data needed to match the goals.

- Representativeness -Do the data accurately reflect actual site conditions, sampling procedures, and analytical method? QA/QC shall ensure this.

- Comparability - 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

WESTON

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

$$\frac{\text{Linear-Regressed Raw Concentration from Calibration Curve} \quad \text{Solid Sample Extract Volume If Solid} \quad \text{Concentration or Dilution Factor}}{\text{Solid Sample Mass If Solid} \quad \text{Fraction Solids If Solid}} = \text{Final Concentration}$$

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 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 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.)

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 QA/QC OFFICER

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.

ATTACHMENT 1

LABORATORY QUALITY ASSURANCE MANUAL

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APPENDIX K

LABORATORY ANALYTICAL REPORTS

5586A

ROUND 85-1

WESTON

inter-office memorandum

TO: [redacted])
Allison Dunn (Concord)
Kass Sheedy
Rich Johnson
cc: Les Eng (Memo Only)
Carter Nulton (Memo Only)

FROM: Judy Porta *jd*

SUBJECT: MATHER A.F.B. REPORT

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

RFW 2-74-39

DATE OF REPORT: JULY 11, 1985

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^-) ANALYSIS

a)

R.F.W. NO.	SAMPLE DESCRIPTION	DATE COLLECTED	DATE RECEIVED	DATE ANALYZED	TOTAL CYANIDE, 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	6-12-85	<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
8506-583-0070	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^- 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 μg/L) was acheived.

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 DESCRIPTION	DATE COLLECTED	DATE RECEIVED	DATE ANALYZED	O/G, mg/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	0.38
-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	6-8-85	0.52
-0030	MAFB-9	5-29-85	5-31-85	6-8-85	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-80	5-29-85	5-31-85	6-8-85	0.56
8506-579-0190	MAFB-110	5-30-85	6-4-85	6-8-85	0.17
8506-583-0010	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-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
8506-579-0070	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
8506-583-0130	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	6-5-85	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
8506-583-0100	GC-20	6-3-85	6-5-85	6-8-85	0.22
-0070	JTC	6-3-85	6-5-85	6-8-85	0.10
-0060	K-9	6-3-85	6-5-85	6-8-85	0.10

OIL & GREASE ANALYSIS was not requested for samples identified as MAFB 70, MAFB 90, MAFB 100 and JTC-1.

b) All samples were analyzed using EPA METHOD 413.2 within the EPA recommended holding time of 28 days. The requested 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 DESCRIPTION	DATE COLLECTED	DATE RECEIVED	DATE ANALYZED	TOTAL PHENOLI , mg/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	0.007
-0030	MAFB-9	5-29-85	5-31-85	6-10-85	0.005
-0030 DUP	MAFB-9 (LAB DUPLICATE)	5-29-85	5-31-85	6-10-85	<0.005
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 (LAB DUPLICATE)	5-30-85	6-4-85	6-10-85	<0.005
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 (LAB DUPLICATE)	6-3-85	6-5-85	6-10-85	0.006
8505-564-0000	LAB BLANK	DNA	DNA	6-10-85	<0.005
8505-564-SPIKE	BLANK SPIKE	DNA	DNA	6-10-85	84% RECOVERY
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% RECOVERY

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 µg/L; therefore the requested detection limit of 1 µg/L was not achieved.

WESTON

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 DESCRIPTION	DATE COLLECTED	DATE RECEIVED	DATE ANALYZED	TOTAL PHENOLICS 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

COMPILED BY: [signature]
Judith A. Porta
Laboratory Operations Manager
WESTON Analytical Laboratories

APPROVED BY: [signature]
Earl M. Hansen, Ph.D.
Manager
WESTON Analytical Laboratories

DATE OF REPORT: JULY 11, 1985

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

IV. TOTAL ORGANIC CARBON (TOC) ANALYSIS

a)

R.F.W. NO.	SAMPLE DESCRIPTION	DATE COLLECTED	DATE RECEIVED	DATE ANALYZED	TOC, mg/L
8506-579-0140	MAFB-1	5-31-85	6-4-85	6-11-85	<0.5
-0080	MAFB-2	5-31-85	6-4-85	6-11-85	2.4
-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	<0.5
-0120	MAFB-5	5-31-85	6-4-85	6-11-85	<0.5
-0150	MAFB-6	5-30-85	6-4-85	6-11-85	<0.5
-0020	MAFB-7	5-30-85	6-4-85	6-11-85	9.0
8505-564-0020	MAFB-8	5-29-85	5-31-85	6-6-85	4.4
-0020 DUP	MAFB-8 (LAB DUPLICATE)	5-29-85	5-31-85	6-6-85	4.6
8505-564-0030	MAFB-9	5-29-85	5-31-85	6-6-85	5.7
8506-579-0160	MAFB-10	5-30-85	6-4-85	6-6-85	<0.5
-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
-0130	MAFB-50	5-31-85	6-4-85	6-11-85	<0.5
8505-564-0010	MAFB-80	5-29-85	5-31-85	6-6-85	4.5
8506-579-0190	MAFB-110	5-30-85	6-4-85	6-11-85	0.7
-0190 DUP	MAFB-110 (LAB DUPLICATE)	5-30-85	6-4-85	6-11-85	1.0
-0190 SPIKE	MAFB-110 (MATRIX SPIKE)	5-30-85	6-4-85	6-11-85	104% RECOVERY
8506-583-0010	B-1	6-3-85	6-5-85	6-11-85	<0.5
-0020	B-2	6-3-85	6-5-85	6-11-85	<0.5
-0030	B-3	6-3-85	6-5-85	6-11-85	<0.5
-0040	B-4	6-3-85	6-5-85	6-11-85	<0.5
-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-1	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	6-3-85	6-5-85	6-11-85	<0.5
-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	17.8
-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	K-9	6-3-85	6-5-85	6-11-85	<0.5
8506-579-0000	LAB BLANK	DNA	DNA	6-6-85	<0.5
8506-579-SPIKE	BLANK SPIKE	DNA	DNA	6-6-85	98% RECOVERY
8506-583-0000	LAB BLANK	DNA	DNA	6-11-85	<0.5
8506-583-SPIKE	BLANK SPIKE	DNA	DNA	6-11-85	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 µg/L was achieved.

COMPILED BY: Judith A. Porta
Judith A. Porta
Laboratory Support Manager
WESTON Analytical Laboratories

Approved By:
Earl M. Hansen, Ph.D.
Manager
WESTON Analytical Laboratories

WESTON

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

I.

R.F.W. NO.	SAMPLE DESCRIPTION	TOTAL Cd ug/L	Cr ug/L	Pb ug/L	Ni ug/L	Ag ug/L
8506-611-0110	MAFB 4	<2.5	<50	<10	<100	<2.5
-0120	MAFB 5	<2.5	<50	<10	<100	<2.5
-0060	MAFB 6	<2.5	<50	<10	<100	<2.5
-0060 SPIKE	MAFB 6	88%	75%	88%	75%	104%
	(MATRIX SPIKE)	RECOVERY	RECOVERY	RECOVERY	RECOVERY	RECOVERY
-0070	MAFB 7	<2.5	<50	<10	<100	<2.5
-0010	MAFB 8	<2.5	60	<10	150	<2.5
-0020	MAFB 9	<2.5	<50	<10	<100	<2.5
-0020 DUP	MAFB 9	<2.5	<50	<10	<100	---
	(LAB DUPLICATE)					
-0080	MAFB 10	<2.5	<50	<10	<100	<2.5
-0090	MAFB 11	<2.5	<50	<10	<100	<2.5
-0130	MAFB 50	<2.5	<50	<10	<100	<2.5
-0030	MAFB 80	<2.5	<50	<10	<100	<2.5
-0030 DUP	MAFB 80	---	---	---	---	<2.5
	(LAB DUPLICATE)					
-0100	MAFB 110	<2.5	<50	<10	<100	<2.5
-0100 DUP	MAFB 110	<2.5	<50	<10	<100	<2.5
	(LAB DUPLICATE)					
-0140	B-1	<2.5	<50	<10	<100	<2.5
-0150	B-2	<2.5	<50	<10	<100	<2.5
-0160	B-3	<2.5	<50	<10	<100	<2.5
-0160 SPIKE	B-3	92%	92	148%	92	108%
	(MATRIX SPIKE)	RECOVERY	RECOVERY	RECOVERY	RECOVERY	RECOVERY

WESTON

MATHER A.F.B. (CON'T) PG. 2 DATE OF REPORT: July 15, 1985

R.F.W. NO.	SAMPLE DESCRIPTION	TOTAL Cd ug/L	Cr ug/L	Pb ug/L	Ni ug/L	Ag ug/L
8506-611-0170	B-4	<2.5	<50	<10	<100	<2.5
-0180	B-40	<2.5	<50	<10	<100	<2.5
-0040	FB-2	<2.5	<50	<10	<100	<2.5
-0050	FB-3	<2.5	<50	<10	<100	<2.5
-0190	JTC	<2.5	<50	<10	<100	<2.5
8506-611-0000	LAB BLANK	<2.5	<50	<10	<100	<2.5
8506-611-SPIKE	BLANK SPIKE	100% RECOVERY	92% RECOVERY	100% RECOVERY	90% RECOVERY	104% 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 DETECTION LIMIT	ACHIEVED 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: Judith A. Porta
Judith A. Porta
Laboratory Operations Manager
WESTON Analytical Laboratories

APPROVED BY:
Earl M. Hansen, Ph.D.
Manager
WESTON Analytical Laboratories

WESTON

DATE OF REPORT: JUNE 10, 1985

MATHER A.F.B.
DMN SUMMARY REPORT
W.O. NO. 0628-05-26

DIMETHYLNITROSAMINE (DMN) ANALYSIS

R.F.W. NO.	SAMPLE DESCRIPTION	DATE COLLECTED	DATE REC'D	DATE EXTRACTED	DATE ANALYZED	DMN, µg/L
8506-579-0110	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% RECOVERY
8506-579&583/	S.D. D.I. SPIKE DUP.	-----	------	6-5-85	6-7-85	46% RECOVERY

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 1µg/L was achieved.

method 607 is correct not 605 as specified in a memo & this verified by Carter Hilton [illegible]

Approved By: Earl M. Hansen

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

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 DESCRIPTION	TOTAL CN^-, ug/g	OIL & GREASE ug/g	TOTAL PHENOLICS ug/g
8506-579-0040	USD	<0.13	2,140	0.357
-0050	US	<0.13	3,840	0.395
-0050 DUP	US (LAB DUPLICATE)	---	3,800	---
-0060	DS	<0.13	302	0.234
8506-579-0000	LAB BLANK	---	12.0	---

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

	TOTAL CN^-	OIL & GREASE	TOTAL PHENOLICS
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: *Judith A. Porta*
Judith A. Porta
Laboratory Operations Manager
WESTON Analytical Laboratories

APPROVED BY: [signature]
Earl M. Hansen, Ph.D.
Manager
WESTON Analytical Laboratories

WESTON
DESIGNERS CONSULTANTS

inter-office memorandum

TO: Katherine Sheedy

[redacted]

DATE: June 27, 1985

FROM: David Ben-Hur, Stockton Laboratory DB

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

W. O. No.:

RECEIVED
JUL 3 1985
GEOSCIENCES DEPT

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.

RFW 2-74-39

MATHER AFB
Sampling and Analysis Chronology

Sample ID	Date Sampled	Date Analyzed							
		EPA 601	EPA 602	Pesticides		Herbicides		PCB's	
				Extracted	Analyzed	Extracted	Analyzed	Extracted	Analyzed
MAFB-8	5/29/85	6/12/85	6/4/85	–	–	–	–	–	–
MAFB-9	"	"	"	–	–	–	–	–	–
MAFB-80	"	"	"	–	–	–	–	–	–
MAFB-6	5/30/85	"	"	6/5/85	6/7/85	6/6/85	6/12/85	–	–
MAFB-7	"	"	"	–	–	–	–	–	–
MAFB-10	"	"	"	–	–	–	–	–	–
MAFB-11	"	"	"	–	–	–	–	–	–
FB-2	"	"	"	–	–	–	–	–	–
US (soil)	"	6/18/85	6/20/85	–	–	–	–	–	–
USD (soil)	"	"	"	–	–	–	–	–	–
DS (soil)	"	"	"	–	–	–	–	–	–
MAFB-1	5/31/85	6/13/85	6/4/85	–	–	–	–	6/7/85	6/11/85
MAFB-2	"	"	"	–	–	–	–	"	"
MAFB-3	"	"	"	–	–	–	–	"	"
MAFB-4	"	"	"	6/5/85	6/7/85	6/6/85	6/12/85	–	–
MAFB-5	"	"	"	"	"	"	"	–	–
MAFB-20	"	"	"	–	–	–	–	6/7/85	6/11/85
MAFB-50	"	"	"	6/5/85	6/7/85	6/6/85	6/12/85	–	–
MAFB-110	"	"	"	–	–	–	–	–	–
FB-1	"	"	"	–	–	–	–	6/7/85	6/11/85

MATHER AFB
Sampling and Analysis Chronology

Sample ID	Date Sampled	Date Analyzed							
		EPA 601	EPA602	Pesticides		Herbicides		PCB's	
				Extracted	Analyzed	Extracted	Analyzed	Extracted	Analyzed
B-1	6/3/85	6/17/85	6/6/85	6/5/85	6/7/85	6/6/85	6/12/85	-	-
B-2	"	"	"	"	"	"	"	-	-
B-3	"	"	"	"	"	"	"	-	-
B-4	"	"	"	6/7/85	"	"	"	-	-
B-40	"	6/13/85	"	"	"	"	"	-	-
FH-1	"	"	"	-	-	-	-	-	-
FH-2	"	"	"	-	-	-	-	-	-
FH-3	"	"	"	-	-	-	-	-	-
FH-6	"	6/14/85	"	-	-	-	-	-	-
FH-30	"	"	"	-	-	-	-	-	-
GC-1	"	"	"	-	-	-	-	-	-
GC-2	"	"	"	-	-	-	-	-	-
GC-20	"	"	"	-	-	-	-	-	-
JTC	"	"	6/7/85	-	-	-	-	-	-
K-9	"	"	"	-	-	-	-	-	-

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 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

Method 601

Sample ID: MAFB-9

Compound	Concentration, ug/L First	Concentration, ug/L Second
Trichloroethene	4.8	7.0
Tetrachloroethene	1.3	2.4

Sample ID: GC-20

Compound	First	Second
1,1,1-Trichloroethane	9.5	ND

Method 602

Compound	MAFB-8 Concentration, ug/L		MAFB-9 Concentration, ug/L		MAFB-80 Concentration, u	
	First	Second	First	Second	First	Sec
Chlorobenzene	1.7	0.94	ND	ND	1.7	0.
1,3,-Dichlorobenzene	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	1.2	1.0	ND	ND	1.2	1.
1,4-Dichlorobenzene	0.32	ND	ND	ND	0.61	0.
Benzene	ND	ND	ND	ND	ND	ND
Toluene	0.47	0.33	ND	ND	0.40	0.
Ethylbenzene	ND	ND	ND	ND	ND	ND

MATHER AFB
QA/QC Data

3. Matrix Spikes for volatile compounds

Compound	Spike, ug/L	Percent Recovery			
		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
1,2-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

NS = Not spiked

4. Pesticide and herbicide matrix spike

Compound	Spike, ug/L	Percent Recovery		
		B-2	B-40	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

Pesticide and Herbicide Analysis
Mather AFB
Sample: MAFB-6

Compound	Detection Limit, ug/L	Found ug/L
o,p'-DDT	0.02	ND
p,p'-DDT	0.02	ND
Chlordane	0.02	ND
2,4-D	0.06	ND

LAB NO. 85-06-001

Pesticide and Herbicide Analysis
Mather AFB

Compound	Detection Limit, ug/L	Concentration, 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	ND	ND	ND

LAB NO. 85-06-001

PCB Analysis
Mather AFB

Parameter	Detection Limit, ug/L	Concentration, ug/L				
		MAFB-1	MAFB-2	MAFB-3	MAFB-20	FB-1
PCB 1016	0.04	ND	ND	ND	ND	ND
PCB 1221	0.10	ND	ND	ND	ND	ND
PCB 1232	0.10	ND	ND	ND	ND	ND
PCB 1242	0.05	ND	ND	ND	ND	ND
PCB 1248	0.08	ND	ND	ND	ND	ND
PCB 1254	0.05	ND	ND	ND	ND	ND
PCB 1260	0.15	ND	ND	ND	ND	ND

LAB NO. 85-06-004

Pesticide and Herbicide Analysis
Mather AFB

Compound	Detection Limit, ug/L	Concentration, ug/L				
		B-1	B-2	B-3	B-4	B-40
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	ND

WESTON
DESIGNERS CONSULTANTS

inter-office memorandum

TO: Katherine Sheedy

DATE: November 4, 1985

cc: Alison Dunn, Concord Office

FROM: David Ben-Hur DB

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.

REW 2 71-39

LAB NO. 85-06-004

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

Component	Detection Limit, ug/L	Concentration, ug/L GC-1	GC-2	GC-20	JTC	K-9
Chloromethane	1.0	ND	ND	ND	ND	ND
Bromomethane	1.2	ND	ND	ND	ND	ND
Dichlorodifluoromethane	1.8	ND	ND	ND	ND	ND
Vinyl chloride	0.2	ND	ND	ND	ND	ND
Chloroethane	0.5	ND	ND	ND	ND	ND
Methylene chloride	0.2	ND	ND	ND	ND	ND
Trichlorofluoromethane	2.0	ND	ND	ND	ND	ND
1,1-Dichloroethene	0.2	ND	ND	ND	ND	ND
1,1-Dichloroethane	0.1	ND	ND	ND	ND	ND
Trans-1,2-dichloroethene	0.1	ND	ND	ND	ND	ND
Chloroform	0.1	ND	ND	ND	ND	ND
1,2-Dichloroethane	0.02	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	0.1	ND	6.2	9.5	ND	ND
Carbon tetrachloride	0.1	ND	ND	ND	ND	ND
Bromodichloromethane	0.1	ND	ND	ND	ND	ND
1,2-Dichloropropane	0.1	ND	ND	ND	ND	ND
Cis-1,3-dichloropropene	0.3	ND	ND	ND	ND	ND
Trichloroethene	0.1	ND	ND	ND	ND	ND
Dibromochloromethane	0.1	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	0.05	ND	ND	ND	ND	ND
Trans-1,3-dichloropropene	0.2	ND	ND	ND	ND	ND
2-Chloroethylvinyl ether	0.2	ND	ND	ND	ND	ND
Bromoform	0.2	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	0.05	ND	ND	ND	ND	ND
Tetrachloroethene	0.05	ND	ND	ND	ND	ND
Chlorobenzene	0.3	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	0.3	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	0.2	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	0.2	ND	ND	ND	ND	ND
Benzene	0.2	ND	ND	ND	ND	ND
Toluene	0.2	0.31	ND	0.84	1.2	0.66
Ethylbenzene	0.2	ND	ND	ND	0.67	ND

ND - Not Detected

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

Component	Detection Limit, ug/L	Concentration, ug/L								
		MAFB-1	MAFB-2	MAFB-3	MAFB-4	MAFB-5	MAFB-20	MAFB-50	MAFB-110	FB-1
Chloromethane	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromomethane	1.2	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dichlorodifluoromethane	1.8	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl chloride	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene chloride	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane	2.0	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trans-1,2-dichloroethene	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cis-1,3-dichloropropene	0.3	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	0.1	7.7	13.	33.	ND	ND	5.1	ND	ND	ND
Dibromochloromethane	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trans-1,3-dichloropropene	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Chloroethylvinyl ether	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromoform	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	0.3	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	0.3	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	0.2	2.0	0.74	0.94	1.2	0.69	0.84	0.84	ND	ND
Ethylbenzene	0.2	ND	ND	ND	0.35	ND	ND	ND	ND	ND

ND - Not detected

LAB NO. 85-05-044

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

Component	Detection Limit, ug/L	Concentration, ug/L MAFB-6	MAFB-7	MAFB-10	MAFB-11	FB-2
Chloromethane	1.0	ND	ND	ND	ND	ND
Bromomethane	1.2	ND	ND	ND	ND	ND
Dichlorodifluoromethane	1.8	ND	ND	ND	ND	ND
Vinyl chloride	0.2	ND	ND	ND	ND	ND
Chloroethane	0.5	ND	ND	ND	ND	ND
Methylene chloride	0.2	ND	ND	ND	ND	ND
Trichlorofluoromethane	2.0	ND	ND	ND	ND	ND
1,1-Dichloroethene	0.2	ND	ND	ND	ND	ND
1,1-Dichloroethane	0.1	ND	ND	ND	ND	ND
Trans-1,2-dichloroethene	0.1	ND	ND	ND	ND	ND
Chloroform	0.1	ND	ND	ND	ND	ND
1,2-Dichloroethane	0.02	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	0.1	ND	ND	ND	ND	ND
Carbon tetrachloride	0.1	ND	ND	ND	ND	ND
Bromodichloromethane	0.1	ND	ND	ND	ND	ND
1,2-Dichloropropane	0.1	ND	ND	ND	ND	ND
Cis-1,3-dichloropropene	0.3	ND	ND	ND	ND	ND
Trichloroethene	0.1	ND	ND	ND	ND	ND
Dibromochloromethane	0.1	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	0.05	ND	ND	ND	ND	ND
Trans-1,3-dichloropropene	0.2	ND	ND	ND	ND	ND
2-Chloroethylvinyl ether	0.2	ND	ND	ND	ND	ND
Bromoform	0.2	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	0.05	ND	ND	ND	ND	ND
Tetrachloroethene	0.05	ND	ND	ND	ND	ND
Chlorobenzene	0.3	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	0.3	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	0.2	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	0.2	ND	ND	ND	ND	ND
Benzene	0.2	ND	ND	ND	ND	ND
Toluene	0.2	ND	ND	ND	ND	ND
Ethylbenzene	0.2	ND	ND	ND	ND	ND

ND = Not detected

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

Component	Detection Limit, ug/L	Concentration, ug/L MAFB-8	MAFB-9	MAFB-80
Chloromethane	1.0	ND	ND	ND
Bromomethane	1.2	ND	ND	ND
Dichlorodifluoromethane	1.8	ND	ND	ND
Vinyl chloride	0.2	ND	ND	ND
Chloroethane	0.5	ND	ND	ND
Methylene chloride	0.2	ND	ND	ND
Trichlorofluoromethane	2.0	ND	ND	ND
1,1-Dichloroethene	0.2	ND	ND	ND
1,1-Dichloroethane	0.1	ND	ND	ND
Trans-1,2-dichloroethene	0.1	ND	ND	ND
Chloroform	0.1	ND	ND	ND
1,2-Dichloroethane	0.02	ND	ND	ND
1,1,1-Trichloroethane	0.1	ND	ND	ND
Carbon tetrachloride	0.1	ND	ND	ND
Bromodichloromethane	0.1	ND	ND	ND
1,2-Dichloropropane	0.1	ND	ND	ND
Cis-1,3-dichloropropene	0.3	ND	ND	ND
Trichloroethene	0.1	87.	4.8	34.
Dibromochloromethane	0.1	ND	ND	ND
1,1,2-Trichloroethane	0.05	ND	ND	ND
Trans-1,3-dichloropropene	0.2	ND	ND	ND
2-Chloroethylvinyl ether	0.2	ND	ND	ND
Bromoform	0.2	ND	ND	ND
1,1,2,2-Tetrachloroethane	0.05	ND	ND	ND
Tetrachloroethene	0.05	20.	1.3	13.
Chlorobenzene	0.3	1.7	ND	1.7
1,3-Dichlorobenzene	0.3	ND	ND	ND
1,2-Dichlorobenzene	0.2	1.2	ND	1.2
1,4-Dichlorobenzene	0.2	0.32	ND	0.61
Benzene	0.2	ND	ND	ND
Toluene	0.2	ND	ND	ND
Ethylbenzene	0.2	ND	ND	ND

ND = Not Detected

LAB NO. 85-05-042

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

Component	Detection Limit, ug/L	Concentration, ug/L									
		B-1	B-2	B-3	B-4	B-40	FH-1	FH-2	FH-3	FH-6	FH-30
Chloromethane	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromomethane	1.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dichlorodifluoromethane	1.8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl chloride	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene chloride	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane	2.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trans-1,2-dichloroethene	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cis-1,3-dichloropropene	0.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trans-1,3-dichloropropene	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Chloroethylvinyl ether	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromoform	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	0.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	0.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	0.2	[illegible]	0.84	ND	1.9	1.1	0.74	0.94	0.69	0.74	0.94
Ethylbenzene	0.2	ND	ND	0.3[illegible]	ND	ND	ND	ND	ND	ND	ND

ND = Not detected

Mather AFB - May 1985 Sampling

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

Component	Detection Limit, ug/L	Concentration, ug/L						
		Blank 6/4	Blank 6/6	Blank 6/7	Blank 6/12	Blank 6/13	Blank 6/14	Blank 6/17
Chloromethane	1.0	-	-	-	ND	ND	ND	ND
Bromomethane	1.2	-	-	-	ND	ND	ND	ND
Dichlorodifluoromethane	1.8	-	-	-	ND	ND	ND	ND
Vinyl chloride	0.2	-	-	-	ND	ND	ND	ND
Chloroethane	0.5	-	-	-	ND	ND	ND	ND
Methylene chloride	0.2	-	-	-	0.32	0.25	0.20	0.38
Trichlorofluoromethane	2.0	-	-	-	ND	ND	ND	ND
1,1-Dichloroethene	0.2	-	-	-	ND	ND	ND	ND
1,1-Dichloroethane	0.1	-	-	-	ND	ND	ND	ND
Trans-1,2-dichloroethene	0.1	-	-	-	ND	ND	ND	ND
Chloroform	0.1	-	-	-	ND	ND	ND	0.17
1,2-Dichloroethane	0.02	-	-	-	ND	ND	ND	ND
1,1,1-Trichloroethane	0.1	-	-	-	ND	ND	ND	ND
Carbon tetrachloride	0.1	-	-	-	ND	ND	ND	ND
Bromodichloromethane	0.1	-	-	-	ND	ND	ND	ND
1,2-Dichloropropane	0.1	-	-	-	ND	ND	ND	ND
Trans-1,3-dichloropropene	0.3	-	-	-	ND	ND	ND	ND
Trichloroethene	0.1	-	-	-	ND	ND	ND	ND
Dibromochloromethane	0.1	-	-	-	ND	ND	ND	ND
1,1,2-Trichloroethane	0.05	-	-	-	ND	ND	ND	ND
cis-1,3-dichloropropene	0.2	-	-	-	ND	ND	ND	ND
2-Chloroethylvinyl ether	0.2	-	-	-	ND	ND	ND	ND
Bromoform	0.2	-	-	-	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	0.05	-	-	-	ND	ND	ND	ND
Tetrachloroethene	0.05	-	-	-	ND	ND	ND	ND
Chlorobenzene	0.3	ND	ND	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	0.3	ND	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	0.2	ND	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	0.2	ND	ND	ND	ND	ND	ND	ND
Benzene	0.2	ND	ND	ND	-	-	-	-
Toluene	0.2	0.21	0.23	ND	-	-	-	-
Ethylbenzene	0.2	ND	ND	ND	-	-	-	-

ND = Not Detected

ROUND 85-2

WESTON

inter-office memorandum

TO: [redacted]
Allison Dunn (Concord Office)
Kass Sheedy
Rich Johnson
cc: Earl Hansen (Memo Only)
Les Eng (Memo Only)

DATE: August 2, 1985

FROM: Judy Porta

SUBJECT: FINAL REPORT
MATHER A.F.B.

W. O. No.: 0628-09-05

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

WESTON

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

R.F.W. NO.	SAMPLE DESCRIPTION	SOLUBLE Cd ug/L	Cr ug/L	Pb ug/L	Ni ug/L	Ag ug/L
8506-660-0010	MAFB-7	<2.5	<10	31.8*	<40	<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	MAFB-10	<2.5	<10	<10	41	<2.5
-0070 DUP	MAFB-10 (LAB DUPLICATE)	<2.5	<10	<10	<40	<2.5
-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.
8506-660-000C	LAB BLANK	---	<10	---	---	---
-000K	BLANK SPIKE	---	118% RECOVERY	---	---	---

N.R. = NOT REQUESTED

EPA METHOD:		213.2	218.2	239.2	249.1	272.2
DATE OF ANALYSIS:		7-19-85	7-24-85	7-12-85	6-18-85	7-22-85

COMPILED BY: Judith A. Porta
Judith A. Porta
Laboratory Operations Manager
WESTON Analytical Laboratories

APPROVED BY: Earl M. Hansen
Earl M. Hansen, Ph.D.
Manager
WESTON Analytical Laboratories

*Corrected value per phone conversation with Leslie Eng, Inorganic Lab. Supervisor
[illegible]-5. [illegible]

WESTON

Date of Report: August 2, 1985

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 DESCRIPTION	CN mg/L	O/G mg/L	PHENOLICS mg/L	TOC 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 DUP	MAFB-9 (LAB DUPLICATE)	---	---	<0.005	---
-0060	MAFB-90	<0.01	0.57	0.006	5.7
-0060 DUP	MAFB-90 (LAB DUPLICATE)	---	---	---	5.5
-006K SPIKE	MAFB-90 (MATRIX SPIKE)	---	---	---	106 RECOVERY
-0070	MAFB-10	<0.01	0.33	0.007	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 SPIKE	MAFB-110 (MATRIX SPIKE)	---	---	91 RECOVERY	---
-0000 BLANK	LAB BLANK	---	---	<0.005	<0.5
-000K SPIKE	BLANK SPIKE	---	---	93 RECOVERY	98 RECOVERY
METHOD (EPA)		335.2	413.2	420.1	415.2
DATE OF ANALYSIS:		7-3-85	7-2-85	7-1-85	7-1-85

N.R. = NOT REQUIRED

COMPILED BY: Judith A. Porta
Judith A. Porta
Laboratory Operations Manager
WESTON Analytical Laboratories

APPROVED BY: Earl M. Hansen
Earl M. Hansen, Ph.D.
Manager
WESTON Analytical Laboratorie

WESTON

Date of Report: August 2, 1985

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

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

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

	Cd	Cr	Pb	Ni	Ag
E.P.A. METHOD:	213.2	218.2	239.2	249.1	272.2
DATE OF ANALYSIS:	7-19-85	7-24-85	7-12-85	6-18-85	7-22-85

COMPILED BY: Judith A. Porta
Judith A. Porta
Laboratory Operations Manager
WESTON Analytical Laboratories

APPROVED BY: Earl M. Hansen
Earl M. Hansen, Ph.D.
Manager
WESTON Analytical Laboratories

WESTON

Date of Report: August 2, 1985

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 DESCRIPTION	CN^- mg/L	O/G mg/L	PHENOLICS mg/L	TOC 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 DUP	MAFB-4 (LAB DUPLICATE)	---	---	---	0.8
-0000	LAB BLANK	---	---	---	<0.5
-000K	BLANK SPIKE	---	---	---	96 RECOVERY
E.P.A. METHOD:		335.2	413.2	420.1	415.2
DATE OF ANALYSIS:		7-9-85	7-2-85	7-16-85	7-5-85

N.R. = NOT REQUESTED

COMPILED BY: Judith A. Porta
Judith A. Porta
Laboratory Operations Manager
WESTON Analytical Laboratories

APPROVED BY: Earl M. Hansen
Earl M. Hansen, Ph.D.
Manager
WESTON Analytical Laboratories

WESTON

Date of Report: August 2, 1985

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

R.F.W. NO.	SAMPLE DESCRIPTION	TOTAL Pb mg/Kg	Cr mg/Kg	Cd mg/Kg	Ni mg/Kg	Ag 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 DUPLICATE)	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 RECOVERY
DATE OF ANALYSIS:		6-22-85	6-29-85	6-29-85	8-1-85	7-25-85

COMPILED BY: Judith A. Porta (signature)
Judith A. Porta
Laboratory Operations Manager
WESTON Analytical Laboratories

APPROVED BY: Earl M. Hansen (signature)
Earl M. Hansen, Ph.D.
Manager
WESTON Analytical Laboratorie

WESTON

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 DESCRIPTION	DIMETHYLNITROSAMINE ug/L	SURROGATE RECOVERY (D_5-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: Judith A. Porta
Lab Support Manager
WESTON Analytical Laboratories

Approved by: Earl M. Hansen, Ph.D.
Manager
WESTON Analytical Laboratories

WESTON

inter-office memorandum

TO: Katherine Sheedy

[redacted]

DATE: July 16, 1985

FROM: David Ben-Hur, Stockton Laboratory

SUBJECT: Analytical Results, Mather AFB, Second Sampling Round, June 1985

W. O. No.:

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

MATHER AFB
Sampling and Analysis Chronology

Sample ID	Date Sampled	Date Analyzed							
		EPA 601	EPA 602	Pesticides		Herbicides		PCB's	
				Extracted	Analyzed	Extracted	Analyzed	Extracted	Analyzed
MAFB-7	6/26/85	7/10/85	7/9/85	–	–	–	–	–	–
MAFB-8	"	"	"	–	–	–	–	–	–
MAFB-9	"	"	"	–	–	–	–	–	–
MAFB-10	"	"	"	–	–	–	–	–	–
MAFB-11	"	"	"	–	–	–	–	–	–
MAFB-90	"	"	"	–	–	–	–	–	–
MAFB-100	"	"	"	–	–	–	–	–	–
MAFB-1	6/27/85	"	"	–	–	–	–	7/3/85	7/9/85
MAFB-2	"	"	"	–	–	–	–	"	"
MAFB-3	"	"	"	–	–	–	–	"	"
MAFB-4	"	"	"	7/3/85	7/9/85	7/1/85	7/8/85	–	–
MAFB-5	"	"	"	"	"	"	"	–	–
MAFB-6	"	"	"	"	"	"	"	–	–
MAFB-30	"	"	"	–	–	–	–	7/3/85	7/9/85
MAFB-60	"	"	"	7/3/85	7/9/85	7/1/85	7/8/85	–	–
FH-5	"	"	"	–	–	–	–	–	–
ACW	"	"	"	–	–	–	–	7/3/85	7/9/85
ACW-1	"	"	"	–	–	–	–	"	"
FB-1	"	"	"	7/3/85	7/9/85	7/1/85	7/8/85	"	"

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.

Sample ID
MAFB-8
MAFB-9
MAFB-11
MAFB-90
MAFB-1
MAFB-2
MAFB-3
MAFB-5
MAFB-6
MAFB-30
MAFB-60
ACW
ACW-1

2. Laboratory Duplicate for Volatile Compounds

Sample ID: MAFB-8

Compound	Concentration, ug/L	
	First	Second
1,1-Dichloroethene	1.4	1.7
1,1-Dichloroethane	1.6	2.0
Trans-1,2-Dichloroethene	2.0	2.1
1,2-Dichloroethane	0.16	ND
1,1,1-Trichloroethane	0.71	0.53
Trichloroethene	100.	120.
Tetrachloroethene	5.4	7.1
Chlorobenzene	3.0	1.3
1,2-Dichlorobenzene	1.0	0.76
Benzene	0.99	0.52

3. Matrix Spike for Volatile Compounds

Compound	Spike ug/L	Percent Recovery 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

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

4. Water Spike for Pesticides and Herbicides

Compound	Spike, ug/L	Percent Recovery
o,p'-DDT	0.15	73
Chlordane	0.14	86
2,4-D	0.18	92

LAB NO. 85-06-035

MATHER AFB - Second Round, June 1985
PCB Analysis

Parameter	Detection Limit, ug/L	MAFB-1	MAFB-2	MAFB-3	MAFB-30	ACW	ACW-1	FB-1
		Concentration, ug/L						
PCB 1016	0.04	ND	ND	ND	ND	ND	ND	ND
PCB 1221	0.10	ND	ND	ND	ND	ND	ND	ND
PCB 1232	0.10	ND	ND	ND	ND	ND	ND	ND
PCB 1242	0.05	ND	ND	ND	ND	ND	ND	ND
PCB 1248	0.08	ND	ND	ND	ND	ND	ND	ND
PCB 1254	0.05	ND	ND	ND	ND	ND	ND	ND
PCB 1260	0.15	ND	ND	ND	ND	ND	ND	ND

LAB NO. 85-06-035

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

Compound	Detection Limit, ug/L	Concentration, ug/L MAFB-4	MAFB-5	MAFB-6	MAFB-60	FB-1
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	ND

WESTON

inter-office memorandum

TO: Katherine Sheedy

DATE: November 4, 1985

cc: Alison Dunn, Concord Office

FROM: David Ben-Hur DB

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.

RF A 2 74 39

LAB NO. 85-06-037

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

Component	Detection Limit, ug/L	Concentration, ug/L FB-5	ACW	ACW-1	FB-1
Chloromethane	1.0	ND	ND	ND	ND
Bromomethane	1.2	ND	ND	ND	ND
Dichlorodifluoromethane	1.8	ND	ND	ND	ND
Vinyl chloride	0.2	ND	ND	ND	ND
Chloroethane	0.5	ND	ND	ND	ND
Methylene chloride	0.2	ND	ND	ND	ND
Trichlorofluoromethane	2.0	ND	ND	ND	ND
1,1-Dichloroethene	0.2	ND	ND	ND	ND
1,1-Dichloroethane	0.1	ND	ND	ND	ND
Trans-1,2-dichloroethene	0.1	ND	ND	ND	ND
Chloroform	0.1	ND	ND	ND	ND
1,2-Dichloroethane	0.02	ND	ND	ND	ND
1,1,1-Trichloroethane	0.1	ND	3.7	3.7	ND
Carbon tetrachloride	0.1	ND	ND	ND	ND
Bromodichloromethane	0.1	ND	ND	ND	ND
1,2-Dichloropropane	0.1	ND	ND	ND	ND
Cis-1,3-dichloropropene	0.3	ND	ND	ND	ND
Trichloroethene	0.1	ND	67.	76.	ND
Dibromochloromethane	0.1	ND	ND	ND	ND
1,1,2-Trichloroethane	0.05	ND	ND	ND	ND
Trans-1,3-dichloropropene	0.2	ND	ND	ND	ND
2-Chloroethylvinyl ether	0.2	ND	ND	ND	ND
Bromoform	0.2	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	0.05	ND	ND	ND	ND
Tetrachloroethene	0.05	ND	ND	ND	ND
Chlorobenzene	0.3	ND	ND	ND	ND
1,3-Dichlorobenzene	0.3	ND	ND	ND	ND
1,2-Dichlorobenzene	0.2	ND	ND	ND	ND
1,4-Dichlorobenzene	0.2	ND	ND	ND	ND
Benzene	0.2	ND	ND	0.43	0.28
Toluene	0.2	0.60	0.30	ND	ND
Ethylbenzene	0.2	ND	ND	ND	ND

ND = Not detected

Mather AFB - June 1985 Sampling

Revised Report
Volatiles Analysis by EPA Methods 601 (GC/Hall Detector) and 602 (GC/PID)

Component	Detection Limit, ug/L	Concentration, ug/L							
		MAFB-1	MAFB-2	MAFB-3	MAFB-4	MAFB-5	MAFB-6	MAFB-30	MAFB-6?
Chloromethane	1.0	ND	ND	ND	ND	ND	ND	ND	ND
Bromomethane	1.2	ND	ND	ND	ND	ND	ND	ND	ND
Dichlorodifluoromethane	1.8	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl chloride	0.2	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane	0.5	ND	ND	ND	ND	ND	ND	ND	ND
Methylene chloride	0.2	ND	ND	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane	2.0	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	0.2	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	0.1	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-dichloroethene	0.1	0.43	ND	ND	ND	ND	ND	ND	ND
Chloroform	0.1	ND	ND	ND	ND	ND	ND	ND	ND
[illegible]ichloroethane	0.02	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	0.1	4.5	ND	2.5	ND	1.6	1.4	ND	1.7
Carbon tetrachloride	0.1	ND	ND	ND	ND	ND	ND	ND	ND
[illegible]chloromethane	0.1	ND	ND	ND	ND	ND	ND	ND	ND
[illegible]propane	0.1	ND	ND	ND	ND	ND	ND	ND	ND
[illegible]dichloropropene	0.3	ND	ND	ND	ND	ND	ND	ND	ND
[illegible]	0.1	460.	36.	27.	ND	ND	ND	120.	ND
[illegible]ethane	0.1	ND	ND	ND	ND	ND	ND	ND	ND
[illegible]	0.05	ND	ND	ND	ND	ND	ND	ND	ND
[illegible]	0.2	ND	ND	ND	ND	ND	ND	ND	ND
[illegible]	0.2	ND	ND	ND	ND	ND	ND	ND	ND
[illegible]	0.2	ND	ND	ND	ND	ND	ND	ND	ND
[illegible]	0.05	ND	ND	ND	ND	ND	ND	ND	ND
[illegible]	0.05	ND	ND	ND	ND	0.13	ND	ND	ND
[illegible]	0.3	ND	ND	ND	ND	ND	ND	ND	ND
[illegible]	0.3	ND	ND	ND	ND	ND	ND	ND	ND
[illegible]	0.2	ND	ND	ND	ND	ND	ND	ND	ND
[illegible]	.2	ND	ND	ND	ND	ND	ND	ND	ND
[illegible]	.2	0.21	0.21	0.22	0.57	0.27	ND	0.40	ND
[illegible]	[illegible]	0.44	ND	ND	ND	ND	ND	ND	0.31
[illegible]	[illegible]	ND	ND	ND	ND	ND	ND	ND	ND

LAB NO. 85-06-035

AD-A184 581 INSTALLATION RESTORATION PROGRAM PHASE 2 CONFIRMATION/QUANTIFICATION STAGE 1 VOLUME 2 APPENDICES (U) WESTON (ROY F) INC WEST CHESTER PA JUN 86 4/5

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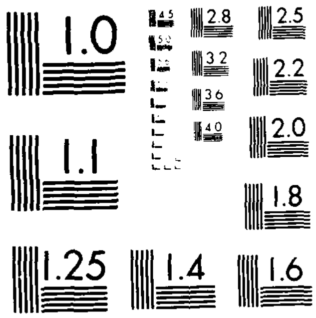

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963 A

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

Component	Detection Limit, ug/L	Concentration, ug/L						
		MAFB-7	MAFB-8	MAFB-9	MAFB-10	MAFB-11	MAFB-90	MAFB-100
Chloromethane	1.0	ND	ND	ND	ND	ND	ND	ND
Bromomethane	1.2	ND	ND	ND	ND	ND	ND	ND
Dichlorodifluoromethane	1.8	ND	ND	ND	ND	ND	ND	ND
Vinyl chloride	0.2	ND	ND	ND	ND	ND	ND	ND
Chloroethane	0.5	ND	ND	ND	ND	ND	ND	ND
Methylene chloride	0.2	ND	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane	2.0	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	0.2	ND	1.4	0.64	ND	ND	0.64	ND
1,1-Dichloroethane	0.1	ND	1.6	0.34	ND	ND	0.31	ND
Trans-1,2-dichloroethene	0.1	ND	2.0	0.15	ND	ND	0.14	ND
Chloroform	0.1	ND	ND	ND	ND	0.32	ND	ND
1,2-Dichloroethane	0.02	ND	0.16	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	0.1	0.15	0.71	0.89	ND	0.52	3.7	ND
Carbon tetrachloride	0.1	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	0.1	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	0.1	ND	ND	ND	ND	ND	ND	ND
Cis-1,3-dichloropropene	0.3	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	0.1	0.79	100.	5.4	ND	ND	5.5	0.26
Dibromochloromethane	0.1	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	0.05	ND	ND	ND	ND	ND	ND	ND
Trans-1,3-dichloropropene	0.2	ND	ND	ND	ND	ND	ND	ND
2-Chloroethylvinyl ether	0.2	ND	ND	ND	ND	ND	ND	ND
Bromoform	0.2	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	0.05	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	0.05	ND	5.4	0.95	ND	ND	0.98	ND
Chlorobenzene	0.3	ND	3.0	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	0.3	ND	ND	ND	ND	ND	0.55	ND
1,2-Dichlorobenzene	0.2	ND	1.0	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	0.2	0.54	ND	ND	ND	1.9	2.7	ND
Benzene	0.2	ND	0.99	0.45	0.25	0.32	0.32	0.25
Toluene	0.2	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	0.2	ND	ND	ND	ND	ND	ND	ND

ND = Not detected

LAB NO. 85-06-033

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

Component	Detection Limit ug/L	Concentration, ug/kg US	USD	DS
Chloromethane	1.0	ND	ND	ND
Bromomethane	1.2	ND	ND	ND
Dichlorodifluoromethane	1.8	ND	ND	ND
Vinyl chloride	0.2	ND	ND	ND
Chloroethane	0.5	ND	ND	ND
Methylene chloride	0.2	ND	ND	ND
Trichlorofluoromethane		ND	ND	ND
1,1-Dichloroethene	0.2	ND	ND	ND
1,1-Dichloroethane	0.1	ND	ND	ND
Trans-1,2-dichloroethene	0.1	ND	ND	ND
Chloroform	0.1	ND	ND	ND
1,2-Dichloroethane	0.02	ND	ND	ND
1,1,1-Trichloroethane	0.1	ND	ND	ND
Carbon tetrachloride	0.1	ND	ND	ND
Bromodichloromethane	0.1	ND	ND	ND
1,2-Dichloropropane	0.1	ND	ND	ND
Trans-1,3-dichloropropene	0.3	ND	ND	ND
Trichloroethene	0.1	ND	ND	ND
Dibromochloromethane	0.1	ND	ND	ND
1,1,2-Trichloroethane	0.05	ND	ND	ND
Cis-1,3-dichloropropene	0.2	ND	ND	ND
2-Chloroethylvinyl ether	0.2	ND	ND	ND
Bromoform	0.2	ND	ND	ND
1,1,2,2-Tetrachloroethane	0.05	ND	ND	ND
Tetrachloroethene	0.05	ND	ND	ND
Chlorobenzene	0.3	ND	ND	ND
1,3-Dichlorobenzene	0.3	ND	ND	ND
1,2-Dichlorobenzene	0.2	ND	ND	ND
1,4-Dichlorobenzene	0.2	1.1	1.9	ND
Benzene	0.2	ND	ND	ND
Toluene	0.2	ND	ND	ND
Ethylbenzene	0.2	ND	ND	ND

Mather AFB - June 1985 Sampling

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

Component	Detection Limit, ug/L	Concentration, ug/L Blank 7/9	Blank 7/10
Chloromethane	1.0	-	ND
Bromomethane	1.2	-	ND
Dichlorodifluoromethane	1.8	-	ND
Vinyl chloride	0.2	-	ND
Chloroethane	0.5	-	ND
Methylene chloride	0.2	-	0.32
Trichlorofluoromethane	2.0	-	ND
1,1-Dichloroethene	0.2	-	ND
1,1-Dichloroethane	0.1	-	ND
Trans-1,2-dichloroethene	0.1	-	ND
Chloroform	0.1	-	ND
1,2-Dichloroethane	0.02	-	ND
1,1,1-Trichloroethane	0.1	-	0.17
Carbon tetrachloride	0.1	-	ND
Bromodichloromethane	0.1	-	ND
1,2-Dichloropropane	0.1	-	ND
Cis-1,3-dichloropropene	0.3	-	ND
Trichloroethene	0.1	-	ND
Dibromochloromethane	0.1	-	ND
1,1,2-Trichloroethane	0.05	-	ND
Trans-1,3-dichloropropene	0.2	-	ND
2-Chloroethylvinyl ether	0.2	-	ND
Bromoform	0.2	-	ND
1,1,2,2-Tetrachloroethane	0.05	-	ND
Tetrachloroethene	0.05	-	ND
Chlorobenzene	0.3	ND	ND
1,3-Dichlorobenzene	0.3	ND	ND
1,2-Dichlorobenzene	0.2	ND	ND
1,4-Dichlorobenzene	0.2	ND	ND
Benzene	0.2	ND	-
Toluene	0.2	0.23	-
Ethylbenzene	0.2	ND	-

ND = Not detected

APPENDIX L

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

GUIDE TO GROUND-WATER STANDARDS OF THE UNITED STATES

API PUBLICATION 4366

JULY 1983

Prepared by
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3. FEDERAL PROTECTION OF GROUND-WATER QUALITY

The federal programs dealing with the protection of ground-water quality are administered largely by the Environmental Protection Agency (EPA). The federal 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
2. 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)]
3. 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 excavations, 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)]
4. 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)]
6. Determine information necessary to restore and maintain chemical, physical, and biological integrity of ground water [Section 304(a)]
7. 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.

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 Safe Drinki 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 maximu permissible level of a contaminant in water which is delivered to the free-flowing outlet of the ultimate user o public water system, except in the case of turbidity (applicable to surface water only) where the maximu permissible level is measured at the point of entry to the distribution system. The MCLs are provided with the sta summaries.

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 proj 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
Buried Valley Aquifer - New Jersey
Edwards Aquifer - Texas
Camano Island—Whidbey Island Aquifer - Washington
Spokane-Rathdrum Aquifer - Washington and Idaho
Nassau and Suffolk counties - New York
Cape Cod - Massachusetts
Fresno - California
Ten Mile Creek - Maryland
Northern Guam Lens - Guam

The following eighteen are under consideration:

Arizona
- 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
- Coastal Plain
- Ridgewood
- Upper Rockaway

New York
- Kings and Queens counties
- Sardinia
- Schenectady
- Vestal

Pennsylvania
- Seven Valleys

Texas
- Carrizo-Wilcox Aquifer

Texas and New Mexico
- Delaware Basin

Wisconsin
- Niagara Aquifer

3.3.4 Underground Injection Control

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

1. 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

1. 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
3. 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;
2. 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 ground 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 environmental 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.

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

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. Postclosure 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:

1. 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 II 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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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 us 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 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 license 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 monitorin 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 ar generally equivalent to EPA requirements.

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

Geological Surveys–

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Department of Conservation
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State Geologist:
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U.S. Geological Survey
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916-484-4606
District Chief:
T.J. Durbin

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)

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

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

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Parameter (mg/l unless noted)	Drinking Water Standards		Quality Standards	Monitoring Requirements	
	Federal	State		Solid Waste	Hazardous 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	0.1	0.1			
Turbidity (TU)	1.0	1.0			
Coliform bacteria — 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	M			
Chloride	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			
Phenols					
Specific conductance					
Total organic carbon					
Total organic halogen					

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

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

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" m 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 sys 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 adequa such source, facilities, equipment eration and maintenance for prod and distributing safe drinking wate

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

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

(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 th ternational Commission on Radiolo 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.

(l) "Picocurie (pCi)" means that q tity 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 ton emitters" means all radionuc emitting beta particles and or phot

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listed in Maximum Permissible Body Burdens and Maximum Permissible Concentration of Radionuclides in Air or Water for Occupational Exposure, NBS 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)-(t) 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.

§ 141.3 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 storage 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. Provisions under Part 142, *National Interim 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 financial 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 earthquakes, 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

§ 141.11 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:

Contaminant	Level, milligrams per liter
Arsenic	0.05
Barium	1.
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:

Temperature Degrees Fahrenheit	Degrees Celsius	Level, milligrams per liter
53.7 and below	12.0 and below	2.4
53.8 to 58.3	12.1 to 14.6	2.2
58.4 to 63.8	14.7 to 17.6	2.0
63.9 to 70.6	17.7 to 21.4	1.8
70.7 to 79.2	21.5 to 26.2	1.6
79.3 to 90.5	26.3 to 32.5	1.4

(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 6 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, 1980]

§ 141.12 Maximum contaminant levels for organic 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 contaminant 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, milligrams per liter
(a) Chlorinated hydrocarbons:	
Endrin (1,2,3,4,10, 10-hexachloro-6,7-epoxy-1,4, 4a,5,6,7,8,8a-octahydro-1,4-endo, endo-5,8-dimethano naphthalene).	0.0002 (0.2 ppb)
Lindane (1,2,3,4,5,6-hexachlorocyclohexane, gamma isomer).	0.004 (4 ppb)
Methoxychlor (1,1,1-Trichloro-2, 2-bis [p-methoxyphenyl] ethane)	0.1 (100 ppb)
Toxaphene ($C_{10}H_{10}Cl_8$-Technical chlorinated camphene, 67-69 percent chlorine)	0.005 (5 ppb)
(b) Chlorophenoxys:	
2,4-D, (2,4-Dichlorophenoxyacetic acid).	0.1 (100 ppb)
2,4,5-TP Silvex (2,4,5-Trichlorophenoxypropionic acid).	0.01 (10 ppb)

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

[141.12(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 determined by a monthly average pursuant to § 141.22, except that five or fewer turbidity units may be allowed if the supplier of water can demonstrate to the State that the higher turbidity does not do any of the following:

(1) Interfere with disinfection;

(2) Prevent maintenance 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 contaminant levels.

The maximum contaminant levels for coliform bacteria, applicable to community water systems and non-community water systems, are as follows:

(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 that, at the primacy Agency's discretion systems required to take 10 or fewer samples per month may be authorized to exclude one positive routine sample per month from the monthly calculation if: (i) 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: (A) the system 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 more than one sample when less than 20 are examined per month; or

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

(b)(1) When the fermentation tube method and 10 milliliter standard portions pursuant to § 141.21(a) are used, coliform bacteria shall not be present in 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

federal register

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 these documents are also available for review in the EPA Regional Office libraries.

[redacted] below. Requests 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, PB81-117301.
5. Antimony, PB81-117319.
6. Arsenic, PB81-117327.
7. Asbestos, PB81-117335.
8. Benzene, PB81-117293.
9. Benzidine, 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, PB81-117418.
17. Chlorinated naphthalene, PB81-117426.
18. Chlorinated phenols, PB81-117434.
19. Chloroform, PB81-117442.
20. 2-chlorophenol, 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, PB81-117558.
31. Dinitrotoluene, PB81-117566.
32. Diphenylhydrazine, PB81-117731.
33. Endosulfan, PB81-117574.
34. Endrin, PB81-117582.
35. Ethylbenzene, PB81-117590.
36. Fluoranthene, PB81-117608.
37. Haloethers, PB81-117616.
38. Halomethanes, PB81-117624.
39. Heptachlor, PB81-117632.
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, PB81-117806.
56. Selenium, PB81-117814.
57. Silver, PB81-117822.
58. Tetrachloroethylene, PB81-117830.
59. Thallium, PB81-117848.
60. Toluene, PB81-117855.
61. Toxaphene, PB81-117863.
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 [redacted]

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 biological, 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 15926, 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 obligations on the Agency, it does not create additional authority.

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 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 Quality 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 impact. Rather, these criteria present scientific data and guidance on the enviromental 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 307. States are encouraged to begin to modify or, if necessary, develop new programs necessary to support the implementation of regulatory controls for toxic pollutants. As appropriate, States may incorporate criteria for to[xic] 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[R] 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[ia] 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 intend[ed] as guidance on the possible uses of these criteria and an indication of fut[ure] rulemaking the Agency may undertak[e]. 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[nd] (2) "criteria" which are numerical pollutant concentration limits or narrative statements necessary to preserve or achieve the designated us[e]. A water quality standard is developed through State or Federal rulemaking proceedings and must be translated i[nto] enforceable effluent limitations in a point source (NPDES) permit or may form the basis of best management practices applicable to nonpoint sour[ces] under 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 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 fish consumption should be used.

2. *Protection and Propagation of Fish and Other Aquatic Life:* The section 304(a)(1) criteria based on toxicity to aquatic 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-of-tap") 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 human drinking water intake. These numbers were not developed to serve as "end of tap" drinking water standards, and they have no regulatory significance under 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 health-based 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 stigent contaminant level than the former two options.

For treated drinking water supplies serving less than 25 people, States may choose toxics control through application of MCLs (if they exist for the pollutants 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 *must* control toxics down to levels at least as stringent as MCLs (where they exist for 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 reduces 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 standards. Although all States have established standards for most conventional pollutants, the treatment of toxic 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 promulgate 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 pollutants for which States would have had to develop water quality standards. This list might have contained some (or 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 adopting the published criteria or of adjusting those criteria based on site-specific analysis.

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 reflect 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 reach, 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 laboratory-derived water quality criterion 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 criterion recommendation if necessary.

The Guidelines for deriving criteria 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 of 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 State-established 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 protection of aquatic life specify pollutant concentrations which, if not exceeded, should protect most, but not necessarily all, aquatic life and its uses. The Guidelines specify that criteria should be based on an array of data from organisms, both plant and animal, occupying various trophic levels. Based on these data, criteria can be derived which should be adequate to protect the types of organisms necessary to support an aquatic community.

The Guidelines are not designed to derive criteria which will protect all life stages of all species under all conditions. Generally some life stage of one or more tested species, and 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 pollutants 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 excursions 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 variety 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 (Final 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 criterion is reasonable. If sound scientific evidence indicates that the criterion should be raised or lowered, appropriate changes are made as necessary.

The present Guidelines have been revised from the earlier published versions (43 FR 21506, May 18, 1978; 43 FR 29028, July 5, 1978; 44 FR 15926, March 15, 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 versions of the Guidelines. These comments and the Resultant modifications are addressed fully in Appendix D to this notice.

Criteria 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 aquatic 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 toxic 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 organisms found in ambient waters. criterion developed in this manner is judged to be as useful as other types of 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 the most sensitive use will be applied. Finally, for several pollutants no criteria are recommended due to a lack of information sufficient for quantitative criterion formulation.

Risk Extrapolation

Because methods do not now exist to establish the presence of a threshold carcinogenic effects, EPA's policy is that there is no scientific basis for estimating "safe" levels for carcinogens. The criteria for carcinogens, therefore, state that the recommended concentration for maximum protection of human health is zero. In addition, the Agency has presented a range of concentrations corresponding to incremental cancer risks of 10^{-7} to 10^{-5} (one additional case of cancer in populations ranging from ten million to 100,000, 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.

Summary of the Human Health Guidelines

The health assessments and corresponding criteria published today were derived based on *Guidelines and Methodology Used in the Preparation of Health Effect Assessment Chapters of the Consent Decree Water Criteria Documents* (the Guidelines), developed 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 up to a lifetime in duration. A combination of epidemiological and animal dose/response data is considered the preferred basis for quantitative criteria derivation. The complete Guidelines are presented as Appendix C. Major issues associated with these Guidelines and responses to public comments are presented as Appendix E.

No-effect (non-carcinogen) 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 non-threshold model as was the "one-hit" model originally used in the proposed criteria documents. The linearized multi-stage 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 Liaison 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 variety of assumptions are built into any model. Models using widely different assumptions may produce estimates ranging over several orders of magnitude. Since there is at present no 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 non-threshold 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 no-observed-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, 6.5 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 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 acenaphthene to sensitive freshwater aquatic animals but toxicity to freshwater algae occur at concentrations as low as 520 μg/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 μg/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 μg/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 μg/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 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 acrolein indicate that acute toxicity to saltwater aquatic life occurs at concentrations as low as 55 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 acrolein to sensitive saltwater aquatic life.

Human Health

For the protection of human health from the toxic properties of acrolein 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 780 μg/l.

Acrylonitrile

Freshwater Aquatic Life

The available data for acrylonitrile indicate that acute toxicity to freshwater aquatic life occurs at concentrations as low as 7,550 $\mu g/l$ 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 acrylonitrile to sensitive freshwater aquatic life but mortality occurs at concentrations as low as 2,600 $\mu g/l$ 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^{-5}, 10^{-6}, and 10^{-7}. The corresponding criteria are .58 $\mu g/l$, .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 $\mu g/l$, .65 $\mu g/l$ and .065 $\mu g/l$ 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.

Aldrin-Dieldrin

Dieldrin

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 24-hour average and the concentration should not exceed 2.5 $\mu g/l$ at any time.

Saltwater Aquatic Life

For dieldrin the criterion to protect saltwater aquatic life as derived using the Guidelines is 0.0019 $\mu g/l$ as a 24-hour 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^{-5}, 10^{-6}, and 10^{-7}. 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 .76 ng/l, .076 ng/l, and .0076 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 aquatic 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 aquatic 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^{-5}, 10^{-6}, and 10^{-7}. 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" risk level.

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[illegible] $\mu g/l$, 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 $\mu g/l$.

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 μ.

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-te[illegible] effects on embryos and larvae of aqu[illegible] vertebrate species have been shown occur at concentrations as low as 40 $\mu g/l$.

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 508 $\mu g/l$ and would occur at lower concentrations among species that are more sensitive than those tested. No data are available concer[illegible] the chronic toxicity of trivalent inorganic arsenic to sensitive saltwater aquatic life.

Human Health

For the maximum protection of huma[illegible] health from the potential carcinoger[illegible] effects due to exposure of arsenic through ingestion of contaminated w[illegible] and contaminated aquatic organisms, the ambient water concentration sh[illegible] be zero based on the non-threshold assumption for this chemical. Howe[illegible] zero level may not be attainable at the present time. Therefore, the levels wh[illegible] may result in incremental increase [illegible] cancer risk over the lifetime are estimated at 10^{-5}, 10^{-6}, and 10^{-7}. 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

No saltwater organisms have been tested with any asbestiform mineral 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 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^{-5}, 10^{-6}, and 10^{-7}. 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.

Benzene

Freshwater Aquatic Life

The available data for benzene indicate that acute toxicity to freshwater aquatic life occurs at concentrations as low as 5,300 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 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 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 benzene to sensitive saltwater aquatic life, but adverse effects occur at concentrations as low as 700 μg/l 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^{-5}, 10^{-6}, and 10^{-7}. The corresponding criteria are 6.6 μg/l, .66 μg/l, and .066 μg/l, respectively. If the above estimates are made for consumption of aquatic organisms only, excluding consumption of water, the levels are 400 μg/l, 40.0 μg/l, and 4.0 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.

Benzidine

Freshwater Aquatic Life

The available data for benzidine indicate that acute toxicity to freshwater aquatic life occurs at concentrations as low as 2,500 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 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.

Human Health

For the maximum protection of human health from the potential carcinogenic effects due to exposure of benzidine 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^{-5}, 10^{-6}, and 10^{-7}. 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 μg/l, respectively, and would occur at lower concentrations among species that are more sensitive than those tested. Hardness has a substantial effect on acute toxicity.

Saltwater 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^{-5}, 10^{-6}, and 10^{-7}. 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 μg/l) to protect freshwater aquatic life as derived using the Guidelines is the numerical value given by $e^{(1.05 \ln(\text{hardness}) - 8.53)}$ as a 24-hour average and the concentration (in µg/l) should not exceed the numerical value given by $e^{(1.05 \ln(\text{hardness}) - 3.73)}$ at any time. For example, a hardnesses of 50, 100, and 200 mg/l as $CaCO_3$ 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 µg/l as a 24-hour average and the concentration should not exceed 59 µg/l 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 µg/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 sensitive saltwater 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 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^{-5}, 10^{-6}, and 10^{-7}. 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 µg/l, and .69 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.

Chlordane

Freshwater Aquatic Life

For chlordane the criterion to protect freshwater aquatic life as derived using the Guidelines is 0.0043 µg/l as a 24-hour average and the concentration should not exceed 2.4 µg/l at any time.

Saltwater Aquatic Life

For chlordane the criterion to protect saltwater aquatic life as derived using the Guidelines is 0.0040 µg/l as a 24-hour average and the concentration should not exceed 0.09 µg/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^{-5}, 10^{-6}, and 10^{-7}. 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.

Chlorinated Benzenes

Freshwater Aquatic Life

The available data for chlorinated benzenes indicate that acute toxicity to freshwater aquatic life occurs at 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 but toxicity occurs at concentrations as low as 50 µg/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 life occur at concentrations as low as 160 and 129 µg/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 hexachlorobenzene 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^{-5}, 10^{-6}, and 10^{-7}. 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 only, 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 1,2,4,5-tetrachlorobenzene ingested through water and contaminated aquatic organisms, the ambient water criterion is determined to be 38 µg/l.

For the protection of human health from the toxic properties of 1,2,4,5-tetrachlorobenzene ingested through contaminated aquatic organisms alone, the ambient water criterion is determined to be 48 µg/l.

For the protection of human health from the toxic properties of pentachlorobenzene 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 pentachlorobenzene ingested through contaminated aquatic organisms alone, the ambient water criterion is determined to be 85 µg/l.

Using the present guidelines, a satisfactory criterion cannot be derived 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 488 μg/l. Using available organoleptic data, for controlling undesirable taste and odor quality of ambient water, the estimated level is 20 μg/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 μg/l for two trichloroethanes, 9,320 μg/l for two tetrachloroethanes, 7,240 μg/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 μg/l for 1,1,2,2,-tetrachloroethane, 1,100 μg/l for pentachloroethane, and 540 μg/l for hexachloroethane. 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 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 μg/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 hexachloroethane. Chronic toxicity occurs at concentrations as low as 281 μg/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 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^{-5}, 10^{-6}, and 10^{-7}. 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 μg/l, and 24.3 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 toxic properties of 1,1,1-trichloroethane 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 1,1,2-trichloroethane 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^{-5}, 10^{-6}, and 10^{-7}. The corresponding criteria are 6.0 μg/l, .6 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 μg/l, 41.8 μg/l, and 4.18 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 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^{-5}, 10^{-6}, and 10^{-7}. The corresponding criteria are 1.7 μg/l, .17 μg/l, and .017 μg/l, respectively. If the above estimates are made for consumption of aquatic organisms only, excluding consumption of water, the levels are 107 μg/l, 10.7 μg/l, and 1.07 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.

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^{-5}, 10^{-6}, and 10^{-7}. The corresponding criteria are 19 μg/l, 1.9 μg/l, and .19 μg/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 μg/l, and .87 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.

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 1,1,1,2-tetrachloroethane.

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* aquatic life.

Saltwater Aquatic Life

The available data for chlorinated napthalenes indicate that acute toxicity to saltwater aquatic life occurs at concentrations as low as 7.5 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 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 μg/l for 4-chloro-3-methylphenol to greater than 500,000 μg/l for other compounds. Chronic toxicity occurs at concentrations as low as 970 μg/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 μg/l for 2,3,5,6-tetrachlorophenol and 29,700 μg/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 3-monochlorophenol 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 demonstrated relationship to potential adverse human health effects.

Sufficient data is not available for 4-monochlorophenol 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 demonstrated relationship to potential adverse human health effects.

Sufficient data is not available for 2,3-dichlorophenol 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 μg/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 2,5-dichlorophenol 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 μg/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 2,6-dichlorophenol 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 μg/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 3,4-dichlorophenol 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 μg/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 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 μg/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-trichlorophenol. 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 μg/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 human health from the potential carcinogenic effects due to exposure of 2,4,6-trichlorophenol 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^{-5}, 10^{-6}, and 10^{-7}. The corresponding criteria are 12 μg/l, 1.2 μg/l, and .12 μg/l respectively. If the above estimates are made for consumption of aquatic organisms only, excluding consumption of water, the levels are 36 μg/l, 3.6 μg/l, and .36 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.

Using available organoleptic data, for controlling undesirable taste and odor quality of ambient water, the estimate level is 2 μg/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 2-methyl-4-chlorophenol to derive a level which would protect against any potential toxicity of this compound. Using available organoleptic data, for controlling undesirable taste and odor quality of ambient water, the estimate level is 1800 μg/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 3-methyl-4-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 3000 μg/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 3-methyl-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 μg/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 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 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.

Human Health

For the maximum protection of human health from the potential carcinogenic effects due to exposure of bis-(chloromethyl)-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^{-5}, 10^{-6}, and 10^{-7}. 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 (2-chloroethyl) 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^{-5}, 10^{-6}, and 10^{-7}. The corresponding criteria are .3 μg/l, .03 μg/l, and .003 μg/l, respectively. If the above estimates are made for consumption of aquatic organisms only, excluding consumption of water, the levels are 13.6 μg/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 toxic properties of bis (2-chloroisopropyl) ether ingested through water and contaminated aquatic organisms, the ambient water criterion is determined to be 34.7 μg/l.

For the protection of human health from the toxic properties of bis (2-chloroisopropyl) ether ingested through contaminated aquatic organisms alone, the ambient water criterion is determined to be 4.36 mg/l.

Chloroform

Freshwater Aquatic Life

The available data for choloroform indicate that acute toxicity to freshwater aquatic life occurs at concentrations as low as 28,900 μg/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 μg/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 trout.

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^{-5}, 10^{-6}, and 10^{-7}. The corresponding criteria are 1.90 μg/l, .19 μg/l, and .019 μg/l, respectively. If the above estimates are made for consumption of aquatic organisms only, excluding consumption of water, the levels are 157 μg/l, 15.7 μg/l, and 1.57 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.

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 μg/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 2-chlorophenol to sensitive freshwater aquatic life but flavor impairment occurs in one species of fish at concentrations as low as 2,000 μg/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 2-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 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 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 μg/l as a 24-hour average and the concentration should not exceed 21 μg/l at any time.

For freshwater aquatic life the concentration (in μg/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 $CaCO_3$ 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 μg/l and would occur at lower concentrations among species that are more sensitive than those tested.

Saltwater Aquatic Life

For total recoverable hexavalent chromium the criterion to protect saltwater aquatic life as derived using the Guidelines is 18 μg/l as a 24-hour average and the concentration should not exceed 1,260 μg/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 μg/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 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.

Copper

Freshwater Aquatic Life

For total recoverable copper the criterion to protect freshwater aquatic life as derived using the Guidelines is 5.6 μg/l as a 24-hour average and the concentration (in μg/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 $CaCO_3$ the concentration of total recoverable copper should not exceed 12, 22, and 43 μg/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 μg/l as a 24-hour average and the concentration should not exceed 23 μg/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

For free cyanide (sum of cyanide present as HCN and CN^-, expressed as CN) the criterion to protect freshwater aquatic life as derived using the Guidelines is 3.5 μg/l as a 24-hour average and the concentration should not exceed 52 μg/l at any time.

Saltwater Aquatic Life

The available data for free cyanide (sum of cyanide present as HCN and CN^-, expressed as CN) indicate that acute toxicity to saltwater aquatic life occurs at concentrations as low as 30 μg/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 2.0 μg/l for the tested species and at lower concentrations among species that are more sensitive than those tested.

Human Health

The ambient water quality criterion for cyanide is recommended to be identical to the existing drinking water standard which is 200 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 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 μg/l as a 24-hour average and th concentration should not exceed 1.1 μg/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 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 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 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 DDE to sensitive freshwater aquatic life.

Saltwater Aquatic Life

DDT

For DDT and its metabolites the criterion to protect saltwater aquatic lif as derived using the Guidelines is 0.0010 μg/l as a 24-hour average and the concentration should not exceed 0.13 μg/l at any time.

TDE

The available data for TDE indicate that acute toxicity to saltwater aquatic life occurs at concentrations as low as 3.6 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 TDE to sensitive saltwater aquatic life.

DDE

The available data for DDE indicate that acute toxicity to saltwater aquatic life occurs at concentrations as low as 14 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 DDE to sensitive saltwater aquatic life.

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^{-5}, 10^{-6}, and 10^{-7}. 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 aquatic life occurs at concentrations as low as 1,120 and 763 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 dichlorobenzenes indicate that acute toxicity to saltwater aquatic life occurs at concentrations as low as 1,970 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 dichlorobenzenes to sensitive saltwater aquatic life.

Human Health

For the protection of human health from the toxic properties of dichlorobenzenes (all isomers) ingested through water and contaminated aquatic organisms, the ambient water criterion is determined to be 400 μg/l.

For the protection of human health from the toxic properties of dichlorobenzenes (all isomers) ingested through contaminated aquatic organisms alone, the ambient water criterion is determined to be 2.6 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^{-5}, 10^{-6}, and 10^{-7}. 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 μg/l, .0204 μg/l, and .00204 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.

Dichloroethylenes

Freshwater Aquatic Life

The available data for dichloroethylenes indicate that acute toxicity to freshwater aquatic life occurs at concentrations as low as 11,600 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 dichlorethylenes to sensitive freshwater aquatic life.

Saltwater Aquatic Life

The available data for dichlorethylenes indicate that acute toxicity to saltwater aquatic life occurs at concentrations as low as 224,000 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 dichloroethylenes to sensitive saltwater aquatic life.

Human Health

For the maximum protection of human health from the potential carcinogenic effects due to exposure of 1,1-dichloroethylene 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^{-5}, 10^{-6}, and 10^{-7}. The corresponding criteria are .33 μg/l, .033 μg/l, 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 μg/l, 1.85 μg/l, and .185 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.

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 2,4-dichlorophenol indicate that acute and chronic toxicity to freshwater aquatic life occurs at concentrations as low as 2,020 and 365 μg/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 μg/l.

Saltwater Aquatic Life

Only one test has been conducted with saltwater organisms on 2,4-dichlorophenol 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.

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 μg/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.

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 μg/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 and chronic toxicity to freshwater aquatic life occurs at concentrations as low as 6,060 and 244 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 dichloropropanes indicate that acute and chronic toxicity to saltwater aquatic life occurs at concentrations as low as 10,300 and 3,040 μg/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 2,4-dimethylphenol indicate that acute toxicity to freshwater aquatic life occurs at concentrations as low as 2,120 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 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 μg/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 2,4-dinitrotoluene 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 2,4-dinitrotoluenes indicate that acute 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 2,4-dinitrotoluenes 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 2,4-dinitrotoluene through ingestion of 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 nc· be attainable at the present time. Therefore, the levels which may resul. .. incremental increase of cancer risk over the lifetime are estimated at 10^{-5}, 10^{-6} and 10^{-7}. 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 μg/l, 9.1 μg, and 0.91 μg/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-Diphenylhydrazine

Freshwater Aquatic Life

The available data for 1,2-diphenylhydrazine indicate that acute toxicity to freshwater aquatic life occurs at concentrations as low as 270 μg/l a would occur at lower concentrations among species that are more sensitive than those tested. No data are available concerning the chronic toxicity of 1,2-diphenylhydrazine 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 1,2-diphenylhydrazine through ingestion of 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 o· the lifetime are estimated at 10^{-5}, 10^{-6}, and 10^{-7}. The corresponding criteria a·· 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 μg/l, 0.56 μg/l, and 0.056 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.

Endosulfan

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 µg/l as a 24-hour 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 criterion is determined to be 159 µg/l.

Endrin

Freshwater Aquatic Life

For endrin the criterion to protect freshwater aquatic life as derived using the Guidelines is 0.0023 µg/l as a 24-hour average and the concentration should not exceed 0.18 µg/l at any time.

Saltwater Aquatic Life

For endrin the criterion to protect saltwater aquatic life as derived using the Guidelines is 0.0023 µg/l as a 24-hour average and the concentration should not exceed 0.037 µg/l at any time.

Human Health

The ambient water quality criterion for endrin 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 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.

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 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 ethylbenzene to sensitive freshwater aquatic life.

Saltwater Aquatic Life

The available data for ethylbenzene indicate that acute 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 acute and chronic toxicity to saltwater aquatic life occur at concentrations as low as 40 and 18 µg/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 fluoranthene ingested through water and contaminated aquatic organisms, the ambient water criterion is determined to be 42 µg/l.

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/l.

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 µg/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 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 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/l.

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 c the non-threshold assumption for this chemical. However, zero level may n be attainable at the present time. Therefore, the levels which may resu incremental increase of cancer risk c the lifetimes are estimated at 10^{-5}, 10 and 10^{-7}. The corresponding criteria

1.9 μg/l, 0.19 μg/l, and 0.019 μg/l, respectively. If the above estimates are made for consumption of aquatic organisms only, excluding consumption of water, the levels are 157 μg/l, 15.7 μg/l, and 1.57 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.

Heptachlor

Freshwater Aquatic Life

For heptachlor the criterion to protect freshwater aquatic life as derived using the Guidelines is 0.0038 μg/l as a 24-hour average and the concentration should not exceed 0.52 μg/l at any time.

Saltwater Aquatic Life

For heptachlor the criterion to protect saltwater aquatic life as derived using the Guidelines is 0.0036 μg/l as a 24-hour average and the concentration should not exceed 0.053 μg/l at any time.

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^{-5}, 10^{-6}, and 10^{-7}. 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 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 hexachlorobutadiene indicate that acute toxicity to saltwater aquatic life occurs at concentrations as low as 32 μg/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^{-5}, 10^{-6}, and 10^{-7}. The corresponding criteria are 4.47 μg/l, 0.45 μg/l, and 0.045 μg/l, respectively. If the above estimates are made for consumption of aquatic organisms only, excluding consumption of water, the levels are 500 μg/l, 50 μg/l, and 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.

Hexachlorocyclohexane

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 μg/l at any time.

Saltwater Aquatic Life

For saltwater aquatic life the concentration of lindane should not exceed 0.16 μg/l at any time. No data are available concerning the chronic toxicity of lindane to sensitive saltwater aquatic life.

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 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 freshwater aquatic life.

Saltwater Aquatic Life

The available date for a mixture of isomers of BHC indicate that acute toxicity to saltwater aquatic life occurs 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 carcinogenic effects due to exposure of alpha-HCH 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^{-5}, 10^{-6}, and 10^{-7}. The corresponding criteria are 92 ng/l, 9.2 ng/l, and .92 ng/l, respectively. If the above estimates are made for consumption of aquatic organisms only, excluding consumption of water, the levels are 310 ng/l, 31.0 ng/l, and 3.1 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 beta-HCH 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^{-5}, 10^{-6}, and 10^{-7}. The corresponding criteria are 163 ng/l, 16.3 ng/l, and 1.63 ng/l, respectively. If the above estimates are made for consumption of aquatic organisms only, 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 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 tech-HCH 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^{-5}, 10^{-6}, and 10^{-7}. 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 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^{-5}, 10^{-6}, and 10^{-7}. The corresponding criteria are 186 ng/l, 18.6 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, 6.25 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.

Using the present guidelines, a satisfactory criterion cannot be derived at this time due to the insufficiency in the 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.

Hexachlorocyclopentadiene

Freshwater Aquatic Life

The available data for hexachlorocyclopentadiene indicate that acute and chronic toxicity to freshwater aquatic life occurs at concentrations as low as 7.0 and 5.2 µg/l, respectively, and would occur at lower concentrations among species that are more sensitive than those tested.

Saltwater Aquatic Life

The available data to hexachlorocyclopentadiene indicate that acute toxicity to saltwater aquatic life occurs at concentrations as low as 7.0 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 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 µg/l. Using available organoleptic data, for controlling undesirable taste and odor quality of ambient water, the estimated level is 1.0 µg/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.

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 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 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 as low as 12,900 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 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.

For the protection of human health from the toxic properties of isophorone 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 µg/l) to protect freshwater aquatic life as derived using the Guidelines is the numerical value given by e(2.35[ln(hardness)]−9.48) as a 24-hour average and the concentration (in µg/l) should not exceed the numerical value given by e(1.22[ln(hardness)]−0.47) at any time. For example, at hardnesses of 50, 100, and 200 mg/l as $CaCO_3$ the criteria are 0.75, 3.8, and 20 µg/l, respectively, as 24-hour averages, and the concentrations should 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 µg/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 µg/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 µg/l as a 24-hour average and the concentration should not exceed 0.0017 µg/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 µg/l as a 24-hour average and the concentration should not exceed 3.7 µg/l at any time.

Human Health

For the protection of human health from the toxic properties of mercury ingested through water and contaminated aquatic organisms, the ambient water criterion is determined to be 144 ng/l.

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.

Naphthalene

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 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 naphthalene indicate that acute toxicity to saltwater aquatic life occurs at concentrations as low as 2,350 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 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.

Nickel

Freshwater Aquatic Life

For total recoverable nickel the criterion (in μg/l) to protect freshwater aquatic life as derived using the Guidelines is the numerical value given by e(0.76 [ln (hardness)] + 1.06) as a 24-hour average and the concentration (in μg/l) should not exceed the numerical value given by e(0.76[ln (hardness)] + 4.02) at any time. For example, at hardnesses of 50, 100, and 200 mg/l as $CaCO_3$, the criteria are 56, 96, and 160 μg/l, respectively, as 24-hour averages, and the concentrations should not exceed 1,100, 1,800, and 3,100 μg/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 μg/l as a 24-hour average and the concentration should not exceed 140 μg/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 μg/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 saltwater aquatic life occurs at concentrations as low as 6,680 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 nitrobenzene to sensitive saltwater aquatic life.

Human Health

For comparison purposes, two approaches were used to derive criterion levels for nitrobenzene. Based 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 μg/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 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 nitrophenols to sensitive freshwater aquatic life but toxicity to one species of algae occurs at concentrations as low as 150 μg/l.

Saltwater Aquatic Life

The available data for nitrophenols indicate that acute toxicity to saltwater aquatic life occurs at concentrations as low as 4,850 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 nitrophenols to sensitive saltwater aquatic life.

Human Health

For the protection of human health from the toxic properties of 2,4-dinitro-o-cresol ingested through water and contaminated aquatic organisms, the ambient water criterion is determined be 13.4 μg/l.

For the protection of human health from the toxic properties of 2,4-dinitro-o-cresol ingested through contaminated aquatic organisms alone, the ambient water criterion is determined to be 765 μg/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 aquatic organisms alone, the ambient water criterion is determined to be 14.3 mg/l.

Using the present guidelines, a satisfactory criterion cannot be derived at this time due to the insufficiency in the available data for mononitrophenol.

Using the present guidelines, a satisfactory criterion cannot be derived at 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 freshwater aquatic life occurs at concentrations as low as 5,850 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 nitrosamines to sensitive freshwater aquatic life.

Saltwater Aquatic Life

The available data for nitrosamines indicate that acute toxicity to saltwater aquatic life occurs at concentrations as low as 3,300,000 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 nitrosamines to sensitive saltwater aquatic life

Human Health

For the maximum protection of human health from the potential carcinogenic effects due to exposure of n-nitrosodimethylamine 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^{-5}, 10^{-6}, and 10^{-7}. 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.

For the maximum protection of human health from the potential carcinogenic effects due to exposure of n-nitrosodiethylamine 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^{-5}, 10^{-6}, and 10^{-7}. 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 consumption 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-n-butylamine 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^{-5}, 10^{-6}, and 10^{-7}. The corresponding criteria are 64 ng/l, 6.4 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 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-nitrosodiphenylamine 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^{-5}, 10^{-6}, and 10^{-7}. 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 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-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^{-5}, 10^{-6}, and 10^{-7}. 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.

Pentachlorophenol

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 μg/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 μg/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.

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 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 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 taste 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 phthalate 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.

Human Health

For the protection of human health from the toxic properties of dimethyl-phthalate ingested through water and contaminated aquatic organisms, the ambient water criterion is determined to be 313 mg/l.

For the protection of human health from the toxic properties of dimethyl-phthalate ingested through contaminated aquatic organisms alone, the ambient water criterion is determined to be 2.9 g/l.

For the protection of human health from the toxic properties of diethyl-phthalate 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 diethyl-phthalate 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 dibutyl-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 dibutyl-phthalate 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-2-ethylhexyl-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-2-ethylhexyl-phthalate ingested through contaminated aquatic organisms alone, the ambient water criterion is determined to be 50 mg/l.

Polychlorinated Biphenyls

Freshwater Aquatic Life

For polychlorinated biphenyls 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 biphenyls 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 aquatic life probably will only occur at concentrations above 10 µg/l and that the 24-hour average should provide adequate protection against acute toxicity.

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^{-5}, 10^{-6}, and 10^{-7}. The corresponding criteria are .79 ng/l, 0.79 ng/l, and .0079 ng/l, respectively. If the above estimates are made for consumption of aquatic 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 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-term 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 300 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. 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^{-5}, 10^{-6}, and 10^{-7}. 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 only, 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 derved usi the Guidelines is 35 µg/l as a 24-hour average and the concentration should not exceed 260 µg/l at any time.

The available data for inorganic 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 aquatic life as derived using the Guidelines is 54 μg/l as a 24-hour average and the concentration should not exceed 410 μg/l at any time.

No data are available concerning the toxicity 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 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.

Silver

Freshwater Aquatic Life

For freshwater aquatic life the concentration (in μg/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 $CaCO_3$ the concentration of total recoverable silver should not exceed 1.2, 4.1, and 13 μg/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 μg/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 available data for tetrachloroethylene indicate that acute and chronic toxicity to freshwater aquatic life occur at concentrations as low as 5,280 and 840 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 tetrachloroethylene indicate that acute and chronic toxicity to saltwater aquatic life occur at concentrations low as 10,200 and 450 μg/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^{-5}, 10^{-6}, and 10^{-7}. The corresponding criteria are 8 μg/l, .8 μg/l, and .08 μg/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 μg/l, respectively, and would occur at lower concentrations among species that are more sensitive than those tested. Toxicity to one species of fish occurs at concentrations as low as 20 μg/l after 2,600 hours of exposure.

Saltwater Aquatic Life

The available data for thallium indicate that acute toxicity to saltwater aquatic life occurs at concentrations as low as 2,130 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 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 μg/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 μg/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 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 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 μg/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 μg/l as a 24-hour average and the concentration should not exceed 1.6 μg/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 health 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^{-5}, 10^{-6}, and 10^{-7}. 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

The available data for trichloroethylene indicate that acute toxicity to freshwater aquatic life occurs at concentrations as low as 45,000 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 trichloroethylene to sensitive freshwater aquatic life but adverse behavioral effects occurs to one species at concentrations as low as 21,900 μg/l.

Saltwater Aquatic Life

The available data for trichloroethylene indicate that acute toxicity to saltwater aquatic life occurs at concentrations as low as 2,000 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 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 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^{-5}, 10^{-6}, and 10^{-7}. 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 μg/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^{-5}, 10^{-6}, and 10^{-7}. The corresponding criteria are 20 μg/l, 2.0 μg/l, and .2 μg/l, respectively. If the above estimates are made for consumption of aquatic organisms only, excluding consumption of water, the levels are 5,246 μg/l, 525 μg/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

For total recoverable zinc the criterion to protect freshwater aquatic life as derived using the Guidelines is 47 μg/l as a 24-hour average and the concentration (in μg/l) should not exceed the numerical value given by $e^{(0.83 [\ln(\text{hardness})] + 1.95)}$ at any time. For example, at hardnesses of 50, 100, an 200 mg/l as $CaCO_3$ the concentration of total recoverable zinc should not exceed 180, 320, and 570 μg/l at any time.

Saltwater Aquatic Life

For total recoverable zinc the criterion to protect saltwater aquatic life as derived using the Guidelines is 58 μg/l as a 24-hour average and the concentration should not exceed 170 μg/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 potenti adverse human health effects.

Appendix B—Guidelines for Deriving Water Quality Criteria for the Protec of Aquatic Life and Its Uses

Introduction

This version of the Guidelines provides clarifications, additional details, and technical and editorial changes in the last version published the Federal Register [44 FR 15970 (M 15, 1979)]. This version incorporates changes resulting from comments on previous versions and from experien gained during U.S. EPA's use of the previous versions. Future versions of Guidelines will incorporate new ideas and data as their usefulness is demonstrated.

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 highe concentration of a substance in water which does not present a significant risk to the aquatic organisms in the water and their uses. Thus the Guidelines a 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

DRINKING WATER STANDARDS AND HEALTH ADVISORIES

CHEMICAL	EPA MCL	EPA RMCL	CA DOHS Action Level	HEALTH ADVISORIES (SNARLs) acute 1 day	subchronic (no. of days)	chronic non-cancer	chronic cancer	EPA NAWQC non-cancer	EPA NAWQC cancer
INORGANICS									
Aluminum		§		35000*	5000(7)*				
Antimony		§						146	
Arsenic	50								2.2 ppt
Asbestos		§							30,000 fibers/1
Barium	1000			6000*		4700*			
Beryllium		§							6.8 ppt
Bromide				1400ppm*	224ppm(7)*	2.3ppm*			
Cadmium	10			150*	21(7)*	5*		10	
Chloramine				1200*	125 (7)*				
Chlorate				125*	125 (7)*				
Chloride	250ppm††		100ppm (CA MCL)						
Chlorine Dioxide				1200*	125 (7)*				
Chlorite				125*	125 (7)*				
Chromium	50							170000(Cr^{+3}) 50(Cr^{+6})	
Copper	1000††	§						1000	
Cyanide		§						200	
Fluoride	1400-2400								
Iodide				115500	16500(7)*	1190*			

DRINKING WATER STANDARDS AND HEALTH ADVISORIES

CHEMICAL	EPA MCL	EPA RMCL	CA DOHS Action Level	HEALTH ADVISORIES (SNARLS) acute 1 day	subchronic (no. of days)	chronic non-cancer	chronic cancer	EPA NAWQC non-cancer	EPA NAWQC cancer
Iron	300††								
Lead	50							50	
Manganese	50††								
Mercury	2							144 ppt	
Molybdenum		$							
Nickel		$						13.4	
Nitrate (as N)	10.0ppm								
Selenium	10							10	
Silver	50							50	
Sodium		$							
Strontium					8400(7)*				
Sulfate	250ppm††	$							
Thallium		$						13	
Uranium						35*			
Vanadium		$							
Zinc	5000††	$						5000(taste&odor)	

DRINKING WATER STANDARDS AND HEALTH ADVISORIES

CHEMICAL	EPA MCL	EPA RMCL	CA DOHS Action Level	HEALTH ADVISORIES (SNARLS) acute 1 day	subchronic (no. of days)	chronic non-cancer	chronic cancer	EPA NAWQC non-cancer	EPA NAWQC cancer
ORGANICS									
Acenaphthene								20(taste&odor)	
Acrolein								320	
Acrylamide		§							
Acrylonitrile					35(10) 3(30)		0.77 *		0.058
Adipates		§							
Alachlor		§							
Aldicarb		§	10			10			
Aldrin			0.05						0.074ppt
Atrazine		§							
Baygon			90						
Benzene		0	0.70		350(7)		0.67		0.66
Benzene hexachloride (BHC,Lindane)			0.70 (α) 0.30 (β)	3500*	30(7)*	0.35	0.54*		9.2ppt (α) 16.3ppt (β) 12.3ppt (γ) 18.6ppt (δ)
Benzidine									0.12ppt
Benzo(a)pyrene					25(7)				
Bolero(thiobencarb)			10 (1 taste&odor)						
Bromodichloromethane	100**								0.19
Bromomethane (Methyl bromide)									0.19

**Total Trihalomethanes

DRINKING WATER STANDARDS AND HEALTH ADVISORIES

CHEMICAL	EPA MCL	EPA RMCL	CA DOHS Action Level	HEALTH ADVISORIES (SNARLS) acute 1 day	subchronic (no. of days)	chronic non-cancer	chronic cancer	EPA NAWQC non-cancer	EPA NAWQC cancer
Captan			350						
Carbofuran		S							
Carbon tetrachloride		0	5.0	200†	20(10)†		0.4†		0.40
Catechol				2200*					
Chlordane		S	55	63	8(10)		0.023		0.46ppt
Chlorobenzene						72	4.7*	488 (20 taste&odor)	
bis-(2-chloroethyl) ether									0.03
Chloroform (trichloromethane)	100**			22000*	3200(7)*				0.19
bis-(2-chloroisopropyl) ether								34.7	
Chloromethane (Methyl chloride)									0.19
bis-(chloromethyl) ether									0.0038 ppt
2-Chlorophenol								0.1(taste&odor)	
3-Chlorophenol								0.1(taste&odor)	
4-Chlorophenol								0.1(taste&odor)	
CIPC			350						
Dalapon		S							
DDT				1					0.024ppt
Diazinon			14						
Dibromochloromethane	100**			18000*					0.19

DRINKING WATER STANDARDS AND HEALTH ADVISORIES

CHEMICAL	EPA MCL	EPA RMCL	CA DOHS Action Level	HEALTH ADVISORIES (SNARLS) acute 1 day	subchronic (no. of days)	chronic non-cancer	chronic cancer	EPA NAWQC non-cancer	EPA NAWQC cancer
1,2-Dibromo-3-chloro-propane (DBCP)		S	1.0			0.050	0.01		
1,2-Dibromoethane (Ethylene Dibromide)		S	LOQ(0.05)				0.67ppt		
Di-n-butyl phthalate								34000	
1,2-Dichlorobenzene			130** (10 taste&odor)			300		400	
1,3-Dichlorobenzene			130** (20 taste&odor)					400	
1,4-Dichlorobenzene		750	130** (0.3 taste&odor)			130		400	
Dichlorobenzidine									0.0103
Dichlorodifluoromethane									0.19
1,2-Dichloroethane		0	1.0				0.6†		0.94
1,1-Dichloroethylene		0	LOQ(.1-.4)	1000†		70†	0.24		0.033
cis-1,2-Dichloro-ethylene				4000†	400(10)†				
trans-1,2-Dichloro-ethylene				2700†	270(10)†				
Dichlorofluoromethane (Freon 21)				100ppm	43ppm(7)	1.6ppm			
Dichloromethane									0.19
2,3-Dichlorophenol								0.04(taste&odor)	
2,4-Dichlorophenol						700*			
2,5-Dichlorophenol								0.5(taste&odor)	
2,6-Dichlorophenol								0.2(taste&odor)	
3,4-Dichlorophenol								0.3(taste&odor)	

**Action level is for a single isomer or sum of the three

DRINKING WATER STANDARDS AND HEALTH ADVISORIES

CHEMICAL	EPA MCL	EPA RMCL	CA DOHS Action Level	HEALTH ADVISORIES (SNARLS) acute 1 day	subchronic (no. of days)	chronic non-cancer	chronic cancer	EPA NAWQC non-cancer	EPA NAWQC cancer
2,4-Dichlorophenoxy-acetic acid (2,4-D)	100								
1,2-Dichloropropane		§	10						
Dichloropropene								87	
Dieldrin			LOQ(.05)						0.071ppt
Di-(2-ethylhexyl) phthalate or DEHP						210		15000	
Diethyl phthalate								350000	
Dimethoate			140						
2,4-dimethylphenol			400 (taste&odor)						
Dimethylphthalate								313000	
2,4-Dinitro-o-cresol								13.4	
2,4-Dinitrophenol						110*			
2,4-Dinitrotoluene									0.11
Dinoseb (2-sec-Butyl-4,6-dinitrophenol)		§				39*			
1,4-Dioxane					20(10)				
Diphenamide			40						
1,2-Diphenylhydrazine									0.042
Diquat		§		'					
Endosulfan								74	
Endothall		§							

DRINKING WATER STANDARDS AND HEALTH ADVISORIES

CHEMICAL	EPA MCL	EPA RMCL	CA DOHS Action Level	HEALTH ADVISORIES (SHARLS) acute 1 day	subchronic (no. of days)	chronic non-cancer	chronic cancer	EPA HAWQC non-cancer	EPA HAWQC cancer
Endrin	0.2								
Epichlorohydrin		§		840*	530(7)*				
Ethion			35						
Ethylbenzene								1400	
Ethylene dibromide (EDB)		§	LOQ(.05)				0.67ppt		
Ethylene glycol				19000†		5500†			
Fluoranthene								42	
Formaldehyde			30	30**					
Glyphosate		§	500						
Heptachlor			0.02						0.28
Heptachlor epoxide			0.10						
Hexachlorobenzene					30(7)*	0.35	0.54*		0.72
Hexachlorobutadiene									0.45
Hexachlorocyclo-pentadiene		§						206 1.0(taste&odor)	
Hexachlorophene						0.35			
n-Hexane				12900†	4000(10)†				
Isophorone				1				5200	
Isopropyl alcohol (Isopropanol)				1000	1000(10)				
Lindane(gamma-BHC)	4								12.3ppt

DRINKING WATER STANDARDS AND HEALTH ADVISORIES

CHEMICAL	EPA MCL	EPA RMCL	CA DOHS Action Level	HEALTH ADVISORIES (SNARLS) acute 1 day	subchronic (no. of days)	chronic non-cancer	chronic cancer	EPA NAWQC non-cancer	EPA NAWQC cancer
Pentachlorobenzene								74	
Pentachlorophenol		S	30						
Picloram		S				1050*			
Phenol			1.0					3500 300(taste&odor)	
Phthalates		S							
Polychlorinated Biphenyls (PCB)		S		125	12.5(10) 1(30)		0.3		0.79ppt
Polynuclear Aromatic Hydrocarbons		S							2.8ppt
Resorcinol				11700*	500*				
Rotenone						14*			
Simazine		S							
Styrene						1300			
Terrachlor (pentachloronitrobenzene)			0.9						
1,2,4,5-Tetrachloro-benzene								38	
2,3,7,8-Tetrachloro-dibenzo-p-dioxin		S							$1.3x10^{-8}$
1,1,2,2-Tetrachloro-ethane									0.17
Tetrachloroethylene		0	4.0	2300	175(10)		0.9		0.8
2,3,4,6-Tetrachloro-phenol								1(taste&odor)	
Toluene		S	100	1000	1000(10)	100		14300	
Toxaphene	5								0.71ppt

DRINKING WATER STANDARDS AND HEALTH ADVISORIES

CHEMICAL	EPA MCL	EPA RMCL	CA DOHS Action Level	HEALTH ADVISORIES (SNARLS) acute 1 day	subchronic (no. of days)	chronic non-cancer	chronic cancer	EPA NAS non-cancer	EPA NAS cancer
Malathion			160						
Methomyl (Lannate)						175*			
Methoxychlor	100								
2-methyl-4-chloro-phenol								1800(taste&odor)	
3-methyl-4-chloro-phenol								3000(taste&odor)	
3-methyl-6-chloro-phenol								20(taste&odor)	
Methylene chloride			40	13000†	1300-1500(10)†	150†			
Methyl ethyl ketone				7500†	750(10)†				
Methyl methacrylate						35			
Methyl Parathion			30						
Mononitrophenol					290(7)*				
Nitrobenzene				35*	5(7)*			19800 30(taste&odor)	
n-Nitrosodi-n-butyl-amine									6.4ppt
n-Nitrosodiethlyamine									0.8ppt
n-Nitrosodimethylamine									1.4ppt
n-Nitrosodiphenylamine									4.9
n-Nitrosopyrrolidine									16.0ppt
Ordram (Molinate)			20						
Parathion			30						

DRINKING WATER STANDARDS AND HEALTH ADVISORIES

CHEMICAL	EPA MCL	EPA RMCL	CA DOHS Action Level	HEALTH ADVISORIES (SNARLS) acute 1 day	subchronic (no. of days)	chronic non-cancer	chronic cancer	EPA NAWQC non-cancer	EPA NAWQC cancer
Tribromomethane (Bromoform)	100**								0.19
1,1,1-Trichloroethane		200	200	140000	20000(10)	1000		18400	
1,1,2-Trichloroethane		S							0.6
Trichloroethylene		0	5.0	2000	200(10)	75	2.8		2.7
Trichlorofluoromethane (Freon 11)′				25000	2200(10)				0.19
2,4,5-Trichlorophenol								2600 1(taste&odor)	
2,4,6-Trichlorophenol				17500*	2500(7)*			2(taste& odor)	1.2
2,4,5-Trichloro-phenoxypropionic acid (2,4,5-TP Silvex)	10								
2,4,6-Trinitrophenol				4900*	200(7)*				
Trithion			7.0						
Vinyl chloride		0	2.0				2.0		2.0
Vydate		S							
Xylenes***		S	620	12000†	1400(10)†	620†			
m-Xylene			620	6100	3200(10)				
o-Xylene			620						
p-Xylene			620						

APPENDIX M

RESULTS OF VOLATILE ORGANIC SAMPLING OF PRIVATE WELLS NEAR MATHER AFB, PROVIDED BY CRWQCB-CVR, AUGUST 1984

VOLATILE ORGANIC SAMPLING RESULTS OF PRIVATE WELLS NEAR MATHER AFB

Conducted by: - California Regional Water Quality Control Board
- Sacramento County Health Department

SITE No.	OWNER/ADDRESS	SAMPLE DATE	VOLATILE ORGANIC COMPOUND DETECTED	LEVEL DETECTED (ppb)	STATE ACTION LEVEL (ppb)
1	Camellia Mather Mobile Home Park (32 Units) 3005 Camellia Mather Drive	5 Feb 80	1,1,1 Trichloroethane	1.6	300.0
			Perchloroethylene	1.0	4.0
			Trichloroethylene	2.4	5.0
		29 Apr 80	None		
		2 Jun 81	Chloroform	0.3	100.0
			Carbon Tetrachloride	1.5	5.0
			Tetrachloroethylene	1.4	4.0
			Trichloroethylene	**(5.1)**	5.0
			Trans-1,2-Dichloroethylene	1.5	None
		16 Sep 81	Chloroform	0.8	100.0
			Carbon Tetrachloride	1.8	5.0
			Tetrachloroethylene	1.7	4.0
			Trichloroethylene	**(5.6)**	5.0
		22 Aug 83	Carbon Tetrachloride	1.1	5.0

LEGEND: ( ) State Action Level Exceeded

22 Aug 83	Tetrachloroethylene	2.3	4.0
	Trichloroethylene	4.0	5.0
	1,1,1, Trichloroethane	1.1	300.0
2 May 84	Carbon Tetrachloride	1.3	5.0
	Tetrachloroethylene	4.2	4.0
	Trichloroethylene (Sample taken at air valve leak)	6.3	5.0
	Carbon Tetrachloride	1.5	5.0
	Tetrachloroethylene	4.3	4.0
	Trichloroethylene (Sample taken after pressure tank)	6.6	5.0
	Carbon Tetrachloride	1.3	5.0
	Tetrachloroethylene	4.2	4.0
	Trichloroethylene (Sample taken in residents home)	7.0	5.0
Jun 84	Trichloroethylene	7.2	5.0

ID NO.	OWNER/ADDRESS	SAMPLE DATE	VOLATILE ORGANIC COMPOUND DETECTED	LEVEL DETECTED (ppb)	STATE ACTION LEVEL (ppb)
[illegible]	Hernandez 382[illegible] Happy Lane	5 Feb 80	None		
4	Matsumoto 3851 Happy Lane	22 Mar 82	None (Home) None (Irrigation water)		
		27 Apr 84	Carbon Tetrachloride	1.0	5.0
			Trichloroethylene (Sample #1)	0.9	5.0
			Carbon Tetrachloride	1.0	5.0
			Trichloroethylene (Sample #2)	1.1	5.0
5	Rand 3900 Happy Lane	29 Jan 82	1,1 Dichloroethane	1.0	None
			Trans-1,2-Dichloroethylene	1.5	None
			Trichloroethylene	9.3	5.0
		26 Apr 84	Trichloroethylene	3.6	5.0
[illegible]	Kiko Landscaping 3950 Happy Lane	28 Oct 83	Trichloroethylene	1.3	5.0
		26 Apr 84	Trichloroethylene	3.3	5.0

SITE NO.	OWNER/ADDRESS	SAMPLE DATE	VOLATILE ORGANIC COMPOUND DETECTED	CONCENTRATION DETECTED (ppb)	STATE ACTION LEVEL (ppb)
6	Sterling 3960 Happy Lane	26 Apr 84	None		
7	Gregory 3990 Happy Lane	22 Mar 82	Tetrachloroethylene	2.5	4.0
			Trichloroethylene	2.2	5.0
			Trans-1,2,-Dichloroethylene	4.9	None
			1,1,1, Trichloroethane	1.2	300.0
8	Furuike 4001 Happy Lane	5 Feb 80	Trichloroethylene	2.0	5.0
		29 Apr 80	None		
		18 Dec 81	Trichloroethylene	8.0	5.0
			Trans-1,2,-Dichloroethylene	22.0	None
			1,1-Dichloroethylene	4.2	0.1
			Tetrachloroethylene	1.0	4.0
			1,1-Dichloroethane	2.7	None
		29 Jan 82	Trichloroethylene	8.0	5.0
			Trans-1,2,-Dichloroethylene	22.0	None
			1,1,-Dichloroethylene	1.9	0.1

SITE NO.	OWNER/ADDRESS	SAMPLE DATE	VOLATILE ORGANIC COMPOUND DETECTED	CONCENTRATION DETECTED (ppb)	STATE ACTION LEVEL (ppb)
		29 Jan 82	Tetrachloroethylene	0.9	4.0
			1,1-Dichloroethane	1.9	None
			1,1,1,-Trichoroethane	0.2	300.0
		22 Aug 83	1,1-Dichloroethylene	3.1	0.1
			1,1-Dichloroethane	2.6	None
			Trans-1,2-Dichloroethylene	28.0	None
			Trichloroethylene	8.4	5.0
			Tetrachloroethylene	1.5	4.0
		Jun 84	1,1-Dichloroethylene	9.0	0.1
			1,2-Dichloroethane	3.6	None
			Trichloroethylene	15.0	5.0
9	Church of Gedatsu 3016 Happy Lane	22 Mar 82	Trichloroethylene	1.8	5.0
			Trans-1,2-Dichloroethylene	9.6	None
			1,1-Dichloroethylene	0.7	0.1
			1,1-Dichloroethane	1.5	None
10	Tanaka	22 Mar 82	None		

SITE NO.	OWNER/ADDRESS	SAMPLE DATE	VOLATILE ORGANIC COMPOUND DETECTED	CONCENTRATION DETECTED (ppb)	STATE ACTION LEVEL (ppb)
11	Cordova Truck Dismantlers 4075 Happy Lane	29 Jun 82	Trichloroethylene	0.2	5.0
			Trans-1,2-Dichloroethylene	0.4	None
		22 Aug 83	None		
12	Rancho Truck Dismantlers 4079 Happy Lane	29 Jan 84	Trichloroethylene	0.2	5.0
			Trans-1,2-Dichloroethylene	0.4	None
		22 Aug 83	None		
13	Mather Auto Dismantlers	6 Feb 80	Trichloroethylene	1.0	5.0
			1,1,1, Trichloroethane	1.6	300.0
		29 Jan 82	None		
14	Kobata 4108 Happy Lane	14 Dec 81	None		
15	Brugger 9745 Old Placer-Ville Road	28 Oct 83	None		

SITE NO.	OWNER/ADDRESS	SAMPLE DATE	VOLATILE ORGANIC COMPOUND DETECTED	CONCENTRATION DETECTED (ppb)	STATE ACTION LEVEL (ppb)
15		26 Apr 84	Carbon Tetrachloride	1.3	5.0
16	Fatyrynuik 9835 Old Placer-Ville Road	27 Apr 84	None		
17	Nobel 9874 Old Placer-Ville Road	22 Mar 82	Carbon Tetrachloride	1.5	5.0
18	Corwin 9910 Old Placer-Ville Road	2 May 84	Carbon Tetrachloride	6.4	5.0
19	SMF Properties 9938 Old Placer-Ville Road	14 Dec 81	None		
20	Yokoi 9970 Old Placer-Ville Road	22 Mar 82	Trichloroethylene (West Well)	1.4	5.0
			Carbon Tetrachloride (East Well)	2.6	5.0

SITE NO.	OWNER/ADDRESS	SAMPLE DATE	VOLATILE ORGANIC COMPOUND DETECTED	CONCENTRATION DETECTED (ppb)	STATE ACTION LEVEL (ppb)
		22 Aug 83	Trans-1,2-Dichloroethylene (West Well)	1.8	None
			1,2-Dichloroethane	0.5	0.1
		28 Oct 83	Carbon Tetrachloride	3.0	5.0
			Tetrachloroethylene (No Well Location Given)	3.1	4.0
		2 May 84	Carbon Tetrachloride (West Well)	7.8	5.0
20			Tetrachloroethylene	9.2	4.0
			Carbon Tetrachloride	4.4	5.0
			Tetrachloroethylene (East Well)	3.4	4.0
21	Sutter 3590 Bradshaw Road	26 Apr 84	None		
22	Ogawa 9721 Farm Lane	6 Feb 80	None		
23	Kanamura 9841 Farm Lane	5 Feb 80	None		

SITE NO.	OWNER/ADDRESS	SAMPLE DATE	VOLATILE ORGANIC COMPOUND DETECTED	CONCENTRATION DETECTED (ppb)	STATE ACTION LEVEL (ppb)
24	Sacramento County Office of Education 3308 Excelsior Rd	28 Oct 83	None		
25	Kiefer (Sacramento County) Dump East of Sunrise-Kiefer intersection	6 Feb 80	None		
26	Granite Construction Kiefer/Bradshaw Rd	26 Apr 84	None		
27	Site not yet evaluated				
28	Sacramento County Branch Center (Two Wells) 3701 Branch Center Road	28 Oct 83	None		
		26 Apr 84	None		
29	Shady Oaks Mobile Home Park [illegible]	6 Feb 80	None		

ID No.	OWNER/ADDRESS	SAMPLE DATE	VOLATILE ORGANIC COMPOUND DETECTED	CONCENTRATION DETECTED (ppb)	STATE ACTION LEVEL (ppb)
30	Satow 10122 Ellenwood	22 Aug 83	None		
31	Hayashi 3951 Happy Lane	Jun 84	1,2 Dichloroethylene	0.9	0.1
			Trichloroethylene	15.0	5.0

APPENDIX N

LABORATORY RESULTS - 1984 SAMPLE

NOTE: All data marked by * are invalid due to missed holding times or incorrect protocol.

WESTON

inter-office memorandum

TO: Fred Bopp

DATE: May 22, 1984

FROM: Don Baker

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 Kornc1nsk1 at Mather per Pete Marks instructions.

DHB:mr

xc: Dennis Korncinski

RFW 2-74-39

MATHER AFB

VOLATILE ORGANIC ANALYSIS

METHOD EPA 601/602

SAMPLE SITE	ANALYTE	RESULTS (ug/l)
K9	No peaks found	
ACW	Trichloroethylene	3.6
	Unidentified peaks	3
JTC	1,2 Dichloroethane	3.6
FH3	No peaks found	
FH4	No peaks found	
FH5	No peaks found	
FH6	No peaks found	
GC1	No peaks found	
FH1	No peaks found	
MB4	No peaks found	
MB1	No peaks found	
MB2	No peaks found	
FH2	No peaks found	
DS	1,1 Dichloroethane	0.1
Soil Sample	1,2 Dichloroethane	0.4
	Trichloroethylene	0.1
	1,3 Dichlorobenzene	0.9

MATHER AFB

VOLATILE ORGANIC ANALYSIS

METHOD EPA 601/602

SAMPLE SITE	ANALYTE	RESULTS (ug/l)
Soil Sample	1,4 Dichlorobenzene	0.8
	Unidentified peaks	1
~~Soil Sample~~ 15	1,3 Dichlorobenzene	1.4
	1,4 Dichlorobenzene	1.2
	Ethylbenzene	16
	Unidentified peaks	0
Unknown solvent mixture detected in sample		
DS-1	1,1 Dichloroethane	0.9
Soil Sample	1,2 Dichloroethane	0.3
	1,1,1 Trichloroethane	0.3
	1,3 Dichlorobenzene	2.5
	1,4 Dichlorobenzene	0.9
	Unidentified peaks	1
MB3	No peaks found	
Field Blank	No peaks found	
Field Blank	No peaks found	
TW-8	Methylene chloride	4.2
	1,1-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

MATHER AFB

VOLATILE ORGANIC ANALYSIS

METHOD EPA 601/602

SAMPLE SITE	ANALYTE	RESULTS (ug/l)
	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
	1,1,1-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
	1,2-Dichloroethane	0.3
	1,1,1-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

MATHER AFB

VOLATILE ORGANIC ANALYSIS

METHOD EPA 601/602

SAMPLE SITE	ANALYTE	RESULTS (ug/l)
TW-3	Chloroform	0.2
	1,1,1-Trichloroethane	0.2
	Carbon tetrachloride	0.3
	Trichloroethylene	130
	Unidentified Peaks	2
TW-4	Unidentified Peaks	7
TW-5	Tetrachlorethylene	0.3
	Unidentified Peaks	1
TW-6	Unidentified Peaks	1
TW-7	Methylene chloride	2.2
	Trans-1,2-Dichlorethylene	0.3
	Trichloroethylene	0.8
	Unidentified Peaks	8

WESTON

EPA METHOD 601 HALL DETECTOR

EPA METHOD 602 FID DETECTOR

COMPOUND	DETECTION LIMIT ug/l
Chloromethane	0.08
Bromomethane	1.18
Dichlorodifluromethane	1.81
Vinyl chloride	0.18
Chloroethane	0.52
Methylene chloride	0.25
Trichlorofluoromethane	1.0
1,1 Dichloroethene	0.13
1,1 Dichloroethane	[illegible]
Trans 1,2 Dichloroethene	0.10
Chloroform	0.05
1,2 Dichloroethane	0.03
1,1,1-Trichloroethane	0.03
Carbon tetrachloride	0.12
Bromodichloromethane	0.10
1,2 Dichloropropane	0.04
Trans 1,3-Dichloropropene	0.34
Trichloroethene	0.12
Dibromochloromethane	0.09
1,1,2 Trichloroethane	0.02
Cis 1,3-Dichloropropene	0.20
2-Chloroethylvinylether	0.13
Bromoform	0.20
1,1,2,2-Tetrachloroethane	0.03
Tetrachloroethene	0.03
Chlorobenzene	0.25
1,3 Dichlorobenzene	0.32
1,2 Dichlorobenzene	0.15
1,4 Dichlorobenzene	0.24
Benzene	10
Toluene	10
Ethylbenzene	10

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

WESTON

inter-office memorandum

TO: FRED BOPP

DATE: JULY 30, 1984

FROM: DON BAKER DHB

SUBJECT: ANALYSIS OF MATHER AFB SAMPLES TAKEN MAY 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 VOA's and oil and grease.

Phenols were run on the following samples:

JTC, JTC-1, DS, DS-1US, TW6, TW7, TW8, TW9, TW10, TW11 *

All were non-detectable at the following limits:

	(µg/L)
2-Chloro	2.0
2-Nitro	2.5
Phenol	1.4
2,4-Dimethyl	1.7
2,4-Dichloro	2.1
2,4,6-Trichloro	5.0
4-Chloro-3-methyl	8.3
2,4-Dinitro	7.0
2-methyl-4,6-dinitro	10
Pentachloro	10
4-Nitro	10

PCB's were run on FB1, TW3, TW2, TW1 and ACW. All were non-detectable at the following limits:

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PARAMETER	DETECTION LIMIT (µg/l)
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

Field blanks and duplicates are identified as:

FIELD #	SITE I.D. ASSIGNED	ACTUAL SITE I.D.
0019W	T.W. 12	T.W.4
0028W	MBW 5	MBW 3
0040W	LTC-1	J.T.C.
0043W	DS-1	D.S.
0015W	FB1	Field Blank
0017W	FB2	" "

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/l)
DBCP	0.1
EDB	1.0
ABHC	0.05
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
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

WESTON DATE OF FINAL REPORT: 3 January 1985

MATHER A.F.B. -1st ROUND TOTAL METALS*

b.)

R.F.W. NO.	SAMPLE DESCRIPTION	Ag ug/L	Cd ug/L	Cr ug/L	Pb ug/L	Ni ug/L
8405-273-0410	TW7	<2.5	12.6	<10	33	<100
-0420	TW4	<2.5	<2.5	<10	12	<100
-0430	MB2	<2.5	<2.5	<10	<10	<100
-0440	MB1	<2.5	<2.5	<10	<10	<100
-0450	TW5	<2.5	<2.5	<10	<10	<100
-0460	JTC	<2.5	<2.5	<10	<10	<100
-0470	TW11	<2.5	12.8	13	<10	<100
-0480	TW6	<2.5	<2.5	12	<10	<100
-0490	MB5	<2.5	<2.5	<10	15	<100
8405-273-0530	TW12	<2.5	<2.5	<10	21	<100
-0540	TW9	<2.5	<2.5	<10	36	<100
-0550	FB2	<2.5	10.0	<10	<10	<100
-0560	TW10	<2.5	9.9	<10	15	<100
-0570	TW8	<2.5	7.9	<10	47	<100
-0580	MB3	<2.5	<2.5	<10	<10	<100
-0590	FB1	<2.5	<2.5	<10	<10	<100

R.F.W. NO.	SAMPLE DESCRIPTION	TOTAL CN, ug/g
8405-273-0500	US (SOIL)	<0.1
-0510	DS (SOIL)	0.26
-0520	DS-1 (SOIL)	0.10

MATHER AFB - Sampling of May 1984 and August 1984

Sample ID	Date Sampled	Date Extracted		Date Analyzed		DDT	Chlordane	2,4-D
		Pesticides	Herbicides	Pesticides	Herbicides	ug/L	ug/L	ug/L
Detection Limit for May sampling*						0.05	0.5	2.0
MB1	5/7/84	5/7/84	5/8/84	5/8/84	5/9/84	ND	ND	ND
MB2	5/7/84	5/8/84	5/8/84	5/8/84	5/9/84	ND	ND	ND
MB3	5/4/84	5/7/84	5/8/84	5/8/84	5/9/84	ND	ND	ND
MB5	5/7/84	5/8/84	5/8/84	5/8/84	5/9/84	ND	ND	ND
TW4	5/3/84	5/7/84	5/8/84	5/8/84	5/9/84	ND	ND	ND
TW5	5/3/84	5/7/84	5/8/84	5/8/84	5/9/84	ND	ND	ND
TW6	5/3/84	5/7/84	5/8/84	5/8/84	5/9/84	ND	ND	ND
Detection limit for August sampling						0.02	0.02	0.06
MAFB4	8/16/84	8/21/84	8/20/84	8/21/84	8/22/84	ND	ND	ND
MAFB5	8/16/84	8/21/84	8/20/84	8/22/84	8/22/84	ND	ND	ND
MAFB6	8/16/84	8/21/84	8/20/84	8/22/84	8/22/84	ND	ND	ND

MATHER AFB - Extraction and analysis dates

Sample ID	Date Sampled	Pesticides		Herbicides		PCB	
		Extracted	Analyzed	Extracted	Analyzed	Extracted	Analyzed
FB-1	8/14/84	–	–	–	–	8/17/84	8/20/84
MAFB-1	8/15/84	–	–	–	–	8/21/84	8/22/84
MAFB-2	"	–	–	–	–	"	"
MAFB-3	"	–	–	–	–	"	"
Mather 2	9/27/84	–	–	–	–	10/1/84	10/3/84
Mather 3	"	–	–	–	–	"	"
Mather 4	"	10/4/84	10/11/84	10/5/84	10/18/84	–	–
Mather 5	"	"	"	"	"	–	–
FB-1	10/2/84	10/5/84	10/11/84	10/5/84	10/18/84	10/5/84	10/11/84
MAFB-1	"	–	–	–	–	"	"
MAFB-6	"	10/5/84	10/11/84	10/5/84	10/18/84	–	–

ROUND 2

WESTON

inter-office memorandum

TO: Katherine Sheedy

cc: Alison Dunn

DATE: October 16, 1985

FROM: David Ben-Hur DB

SUBJECT: Determination of vinyl chloride in a Mather AFB sample.

W. O. No.:

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.

REW 7-4-79

WESTON

inter-office memorandum

TO: Katherine Sheedy

cc: Alison Dunn

DATE. October 15, 1985

FROM: David Ben-Hur DB

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

Sample	Benzene	Toluene	Ethylbenzene
MAFB-1	-	-	-
MAFB-2	-	-	-
MAFB-3	-	-	-
MAFB-4	-	-	-
MAFB-5	-	-	-
MAFB-6	-	-	-
MAFB-7	-	-	-
MAFB-8	-	ND	-
MAFB-9	-	-	-
MAFB-10	-	-	-
MAFB-11	-	-	-
MAFB-20	-	-	-
MAFB-30	-	-	-
MAFB-80	-	ND	-
MAFB-110	-	-	-
FB-1	ND	-	-
FB-2	-	-	-
B-1	-	-	-
B-2	-	-	-
B-3	-	-	-
B-4	-	-	-
B-40	-	-	-
FH-1	-	-	-
FH-2	-	-	-
FH-3	-	-	-
FH-6	-	-	-
FH-10	-	-	-

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	-	-	-
MAFB-6	-	-	-
MAFB-7	-	-	-
MAFB-8	-	-	-
MAFB-9	0.4[illegible]	-	-
MAFB-10	-	-	-
MAFB-11	-	-	-
MAFB-30	-	-	-
MAFB-60	-	-	-
MAFB-90	0.32	-	-
MAFB-1[illegible]	0.25	-	-
FB-1	0.29	-	-
FB-[illegible]	-	-	-
[illegible]	-	-	-
[illegible]-1	0.4[illegible]	-	-

WESTON

inter-office memorandum

TO: FRED BOPP **DATE:** 8-27-84

FROM: 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

MATHER AFB
VOLATILE ORGANIC ANALYSIS FOR WATERS
EPA METHOD 601/602

LAB ID	FIELD NO.	UNIDENTIFIED PEAK(S)	PARAMETER	RESULTS (UG/L)
S 0981-80	MAFB-1	1	METHYLENE CHLORIDE	0.85
			CHLOROFORM	1.5
			1,2-DICHLOROETHANE	0.49
			CARBON TETRACHLORIDE	0.39
			TRICHLOROETHENE	1100
			TETRACHLOROETHENE	0.16
			CHLOROBENZENE	2.2
S 0980-88	MAFB-2	1	METHYLENE CHLORIDE	0.92
			CHLOROFORM	0.12
			1,2-DICHLOROETHANE	0.14
			TRICHLOROETHENE	17
S 0991-87	MAFB-3	1	METHYLENE CHLORIDE	0.97
			CHLOROFORM	0.16
			1,2-DICHLOROETHANE	0.07
			CARBON TETRACHLORIDE	0.12
			TRICHLOROETHENE	81
S [illegible]	MAFB-4	1	METHYLENE CHLORIDE	[illegible]
			TRICHLOROETHENE	0.21
S [illegible]	MAFB-5	1	METHYLENE CHLORIDE	0.97
			TETRACHLOROETHENE	0.42
S [illegible]	MAFB-6	1	METHYLENE CHLORIDE	0.97
			TRICHLOROETHENE	0.15
S [illegible]	MAFB-7	1	METHYLENE CHLORIDE	2.7
			1,1-DICHLOROETHENE	0.29
			CHLOROFORM	0.08
			1,2-DICHLOROPROPANE	0.05
			CHLOROBENZENE	0.22
S [illegible]	MAFB-8	1	VINYL CHLORIDE	17
			METHYLENE CHLORIDE	[illegible]
			1,1-DICHLOROETHENE	3.5
			1,1-DICHLOROETHANE	4.5
			TRANS-1,2-DICHLOROETHENE	6.5
			CHLOROFORM	0.16
			1,2-DICHLOROETHANE	1.4
			1,1,1-TRICHLOROETHANE	.39
			1,2-DICHLOROPROPANE	[illegible]
			TRICHLOROETHENE	[illegible]
			TETRACHLOROETHENE	[illegible]
			CHLOROBENZENE	[illegible]
			1,4-DICHLOROBENZENE	[illegible]
[illegible]	MAFB-[illegible]	1	BROMOMETHANE	4[illegible]
			METHYLENE CHLORIDE	[illegible]
			1,1-DICHLOROETHENE	[illegible]
			1,1-DICHLOROETHANE	[illegible]

[illegible]

MATHER AFB
VOLATILE ORGANIC ANALYSIS FOR WATERS
EPA METHOD 601/602

LAB ID	FIELD NO.	UNIDENTIFIED PEAKS	PARAMETER	RESULTS (UG/L)
[illegible]	MAFB-9	[illegible]	TRANS-1,2-DICHLOROETHENE	0.25
			1,1,1-TRICHLOROETHANE	1.6
			TRICHLOROETHENE	9.4
			TETRACHLOROETHENE	2.4
			CHLOROBENZENE	1.[illegible]
[illegible]	MAFB-1[illegible]	1	METHYLENE CHLORIDE	1.4
			1,1-DICHLOROETHANE	0.19
			1,2-DICHLOROETHANE	0.05
			TRICHLOROETHENE	0.94
			TETRACHLOROETHENE	0.03
[illegible]	MAFB-[illegible]	[illegible]	METHYLENE CHLORIDE	1.1
			1,1-DICHLOROETHANE	0.07
			TRICHLOROETHENE	1.1
			BROMOFORM	1
[illegible]	MAFB-1[illegible]	[illegible]	METHYLENE CHLORIDE	1.7
			1,2-DICHLOROETHANE	0.07
[illegible]	MAFB-1[illegible]	[illegible]	METHYLENE CHLORIDE	1.[illegible]
			CHLOROFORM	0.14
			TRICHLOROETHENE	0.13
[illegible]	MAFB-1[illegible]	[illegible]	METHYLENE CHLORIDE	1.[illegible]
[illegible]	FB-[illegible]	[illegible]	METHYLENE CHLORIDE	[illegible]
			1,1-DICHLOROETHANE	[illegible]
			CHLOROFORM	[illegible]
	BLANK [illegible]	[illegible]	METHYLENE CHLORIDE	[illegible]
			CHLOROFORM	[illegible]

WESTON
DESIGNERS CONSULTANTS

inter-office memorandum

TO: Fred Bopp

DATE: September 21, 1984

FROM: Maggie Neckels

SUBJECT: Analysis of Mather AFB Samples taken August, 1984 (ROUND 2)

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 duplicates has been sent to Alison Dunn per her request.

W . 2 '4 39

September 21, 1984

PCB's were run on MAFB-1, -2, -3 and FB-1. All were not detectable at the following limits.

PARAMETER	DETECTION LIMIT (ug/l)
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/l)
DBCP	0.1
EDB	1.0
ABHC	0.05
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
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

WESTON

Date of Final Report: January 2, 1985

MATHER A.F.B
2nd ROUND SAMPLING RESULTS
SAMPLES COLLECTED: AUGUST 14 TO AUGUST 20, 1984

I. TOC ANALYSIS

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:

R.F.W.NO.	SAMPLE NO.	SITE ID	TOC, mg/L
8408-588-0010	0129	MAFB-1	<1.0
8408-588-0020	0130	MAFB-2	<1.0
8408-588-0030	0131	MAFB-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-4	<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-6	<1.0
8408-588-0250	0157	GC-1	<1.0
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

WESTON

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 1st round, the 1 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	0140	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

Site Identification	Oil & Grease * mg/L	Extraction Date	Weston Lab No.
MAFB-1	0.76	8/29/84	S-0984
MAFB-1 D	< 0.33	8/30	S-1128
MAFB-2	0.86	8/29	S-0989
MAFB-2 D	0.68	8/30	S-1129
MAFB-3	0.52	8/30	S-1130
MAFB-3 D	< 0.33	8/29	S-0994
MAFB-4	< 0.33	8/30	S-1024
MAFB-4 D	0.48	8/30	S-1131
MAFB-5	0.55	8/29	S-1014
MAFB-6	0.39	8/29	S-1018
MAFB-7	< 0.33	8/29	S-0977
MAFB-8	< 0.33	8/29	S-0999
MAFB-9	< 0.33	8/29	S-1004
MAFB-10	0.35	8/29	S-0979
MAFB-11	< 0.33	8/29	S-0975
MAFB-12	< 0.33	8/29	S-1020
MAFB-13	< 0.33	8/29	S-1019
	mg/kg *		
0141 Ditch upstream	600	8/29	S-0954
0142 Downstream	700	8/29	S-0956
0143 Downstream	550	8/29	S-0955

ROUND 3

WESTON

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.

RFW [illegible]-39

Wells 4, 5, 6, and FBl were run for 4-4 DDT, 2,4-D and chlordane. All were not detected at the following limits.*

4-4 DDT	0.02 µg/l
2,4-D	0.02 "
Chlordane	0.06 "

Wells 1, 2, 3, and FBl 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

WESTON

DATE OF INTERIM REPORT: 18 January, 1985

MATHER A.F.B
3rd ROUND SAMPLING RESULTS - SOIL SAMPLES
DATE SAMPLES COLLECTED: 27 SEPTEMBER, 1984

II. 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	TOC (mg/kg)
8410-708-0010	0206 West Ditch - Upstream	6740
8410-708-0020	0207 West Ditch - Downstream	4270
8410-708-0030	0208 West Ditch - Downstream	821

DATE OF INTERIM REPORT:
3 January 1985

WESTON

MATHER 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. Requested 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.

b.

R.F.W. NO.	SAMPLE DESCRIPTION	SITE ID	Cr µg/L	Pb µg/L	Cd µg/L	Ni µg/L	Ag µg/L
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	<2.5
-0140	0222	FB-1	<50	<10	<2.5	<100	<2.5

No results for DMN reported as of the date of this report.

DATE OF INTERIM REPORT:
3 January 1985

WESTON

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.

b.

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 µg/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.

Date of Final Report: 24 January 1985

MATHER A.F.B.
3RD ROUND SAMPLING RESULTS-SOIL SAMPLES
DATE SAMPLES COLLECTED: 27 SEPTEMBER, 1984

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.

b)

		TOTAL METALS				
R.F.W. NO.	SAMPLE DESCRIPTION	Ag µg/g	Cd µg/g	Cr µg/g	Pb µg/g	Ni µg/g
8410-708-0010	0206 West Ditch Upstream	4.3	5.2	70.4	184.8	10.[illegible]
-0020	0207 West Ditch Downstream	<0.07	1.9	28.0	35.0	26.8
-0030	0208 West Ditch Downstream	<0.07	3.4	43.0	60.1	32.4

ROUND 4

DATE OF INTERIM REPORT:
3 January 1985

WESTON

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.

b.

		TOTAL METALS				
R.F.W. NO.	SAMPLE DESCRIPTION	Cr µg/L	Pb µg/L	Cd µg/L	Ni µg/L	Ag µg/L
8411-882-0010	MAFB-1	<50	<10	<2.5	<100	<2.5
-0020	MAFB-2	<50	<10	<2.5	<100	<2.5
-0030	MAFB-3	<50	<10	<2.5	<100	<2.5
-0040	MAFB-4	<50	<10	<2.5	<100	<2.5
-0050	MAFB-5	<50	<10	<2.5	<100	<2.5
-0060	MAFB-6	<50	<10	<2.5	<100	<2.5
-0070	MAFB-7	<50	<10	<2.5	<100	<2.5
-0080	MAFB-8	<50	<10	<2.5	<100	<2.5
-0090	MAFB-9	<50	<10	4	<100	<2.5
-0100	MAFB-10	<50	<10	<2.5	<100	<2.5
-0110	MAFB-11	<50	16	<2.5	<100	<2.5
-0120	MAFB-12 (MAFB-7 dup.)	<50	<10	<2.5	<100	<2.5
-0130	FB-1	<50	<10	<2.5	<100	<2.5

As of this date no results have been reported for TOC or total phenolics

Date of Report: 14 January 1985

WESTON

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)

R.F.W. NO.	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	<1
-0110	MAFB-11	<1
-0120	MAFB-12	[illegible]
-0130	FB-1	[illegible]

As of this date no total phenolics results h[illegible] reported.

III. DIMETHYLNITROSAMINE (DMN) ANALYSIS

a) These samples were received by the la[illegible] 1984 and extracted on 29 November [illegible] Analysis was completed on 1[illegible] limit of 1 mg/L using EPA METH[illegible] mended holding times for extr[illegible] exceeded and the requeste[illegible] concentrations follow:

AD-A184 581 INSTALLATION RESTORATION PROGRAM PHASE 2 5/5
CONFIRMATION/QUANTIFICATION STAGE 1 VOLUME 2 APPENDICES
(U) WESTON (ROY F) INC WEST CHESTER PA JUN 86
UNCLASSIFIED F33615-80-D-4006 F/G 24/4 NL

END
DATE
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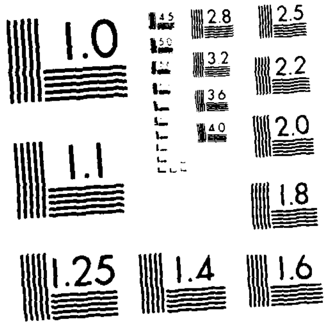
11 87



MICROCOPY RESOLUTION TEST CHART
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Date of Report: 14 January 1985

WESTON

MATHER A.F.B. (4TH ROUND-cont.)

b.

R.F.W. NO.	SAMPLE DESCRIPTION	DMN, 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	<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

DAT

FILM