



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

JAN 9 1984

MEMORANDUM

SUBJECT: Preliminary Estimates of Analytical Requirements for Tier 4 of National Dioxin Study

FROM: Edward J. Lillis, Chief
Air Management Technology Branch, MDAD (MD-14)

TO: Alexander McBride, Chief
Water Quality Analysis Branch (WH-553)

Per recent conversations with the Office of Water (OW), the Office of Solid Waste (OSW), the Office of Research and Development (ORD) and other National Dioxin study participants, our preliminary estimate is that approximately 1200 analyses for dioxin isomers will be required for the Tier 4 (combustion sources) of the National Dioxin Study. This preliminary estimate assumes that 15 to 20 sources will be tested and that an average of 25-30 samples will be analyzed. Two separate analyses will be required for each sample to determine 2378-TCDD and the tetra, hexa, octa and hepta homologues (at high resolution parts per trillion concentrations). The 1200 analyses include an allowance of approximately 20 percent for quality assurance purposes. Analysis of other organic and inorganic substances, such as total chlorine, will also be required but will be done by other contractor laboratories.

These estimates are soft at this time but will be firmed up following the results of the American Society of Mechanical Engineers (ASME) workshop that is focusing on dioxin sampling and analysis protocols. The type of samples to be analyzed at most external combustion point sources are expected to generally agree with the "model" in the attached table. The typical number and type of samples will probably vary considerably for internal combustion engines, wood stoves and other special sources if such sources are tested under the program.

At this time, we do not expect sampling to begin until the Summer of 1984. As a result, samples would be sent to the labs for analysis over a time period of about a year. Sample lot size will be coordinated with ORD. A decision pathway will be developed and followed which would allow for "in lab" determinations of when some of the analyses may not be warranted. Sufficient storage and possible future analyses for other dioxin isomers and furans not addressed under the current funding levels will need be considered.

Please review these estimates and give me your reaction. If your office authorizes it we understand such an effort would be in agreement with ORD's support and capacity to handle the work. We would like to establish reasonably firm commitments and get the necessary concurrences so that we can adequately plan the Tier 4 sampling program.

Thank you for your continued assistance on this matter. We look forward to working with you in the future on this project.

cc: Jim Cummings, OSW (PM-222)
Michael Cook, OSW (WH-562)
Michael Dellarco, QAMS (RD-675)
Paul desRosiers, ORD (RD-681)
Bill Lamason, AMTB
Gary McAlister, ESED
Joe Padgett, SASD
Robert Olexsey, IERL/Cinn.
Steve Schatzow, OWRS (WH-551)
Mike Slimak, OW (WH-553)
Garrett Smith, RO II
James Southerland, AMTB
David Sussman, OSW (WH-656A)
~~Beniface~~ Thayil, RO V

**TABLE 1. PRILIMINARY SAMPLE ANALYSES ESTIMATES FOR SOURCE TESTING
UNDER TIER 4, NATIONAL DIOXIN STUDY**

SOURCE	PROBABLE NUMBER OF SAMPLES			POSSIBLE COLLECTION MEDIA	OTHER ANALYSES (TIER 4 CONTRACTORS)
	LOW	HIGH	AVERAGE		
Stack/Vent					
Before Control ²	3	9	6	MM5 filter, wash sorbents	Total chlorine
After Control ^{2,3}	0	9	6		Total organic chlorine
Fuel/Waste Feed ⁴	3	6	3	Grab samples	Total chlorine Total organic chlorine Waste compounds (i.e. PCB, TCP) Indicator organics (i.e. substituted benzenes)
Ash or Slurry From Control Device ^{3,5}	0	3	2	Grab samples	Total chlorine Waste Compounds
Bottom Ash ⁶	0	2	2	Grab samples	Waste compounds Total chlorine
Ash Quench Water ⁷	0	2	1	Grab samples	
Ash Pit Water ⁷	0	2	1	Grab samples	
Service Water ⁷	0	2	1	Grab samples	
Precombustion Air ⁷	0	2	1	Filter	
Soil ⁷	0	6	3	Grab samples	
Local Ground/Surface Waters ⁷	0	2	1	Grab samples	
TOTAL	6	45	27		

¹Number of samples per source test will vary according to source characteristics. "Average" number of samples would be more representative of tests on an external combustion, point source (e.g. boiler or incinerator) but less representative of other tests on area sources (e.g. internal combustion engines, fireplaces, and open burning). The estimated number of analyses per sample in Table does not include quality assurance samples. All analyses are for ppt concentration using high resolution techniques, but these may not be required for all samples.

²Three test runs before and after control. Low estimate assumes combined analysis of impinger and sorbent catches, while high estimate assumes separate analyses of two sorbents and impinger extracts.

³Low estimate assumes no control device on a tested source.

⁴High estimate assumes separate analyses of two fuels for co-fired sources.

⁵High estimate assumes as many as three control devices used in exhaust cleaning.

⁶Low estimate assumes no bottom ash from process (e.g. internal combustion engines).

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

August 19, 1983

REGION II

SUBJECT: Dioxin Strategy - Tier 4

FROM: Dick Dewling
Deputy Regional AdministratorTO: Steve Schatzow, Director
Office of Water Standards & Regulations, WH-551

In November 1981 EPA issued a document entitled "Interim Evaluation of Health Risks Associated with Emissions of Tetrachlorinated Dioxins from Municipal Waste Resource Recovery Facilities". The "Draft" strategy makes little reference to this Agency report, which essentially indicates that if municipal combustion facilities operate within an "emission window" of ND - 3.5 ng/dscm for 2,3,7,8 TCDD, and N.D. - 8.5 ng/dscm for total TCDDs, there should be no reason for public health concern.

Steve, since a finalization of additional studies or results to support Tier 4 activities/decisions are at least 12 - 18 months away, what is our position which regard to the November '81 report. I don't know about other areas of the U.S.; however, in the Northeast, the push is on for the construction of resource recovery facilities. Therefore, we need to know now, pending the receipt of additional information under the strategy, whether or not we still follow the November '81 document.

cc: Al Alm, Deputy Administrator A-101
Lee Thomas, AA for Solid Waste & Emergency Response, WH-562A
Val Adamkus, Regional Administrator, Region V ✓
Chuck Elkins, Acting AA for Air, Noise and Radiation, ANR-445

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U.S. EPA
Eastern District Office

TIER 4 STATUS REPORT

July 17. 1984

OUTLINE

Accomplishments Since Last Meeting

Brief Summary Of Tier 4 Work Plan

Alternatives Considered/Rejected In Designing Plan

Outstanding Issues

Accomplishments Since Last Meeting

- o OAQPS reorganization to establish 4-person group to focus solely on Tier 4.
- o Draft Tier 4 Work Plan Sent For Internal/External Review and Comment (June):
 - Regional Offices
 - SAB
 - CDWG
 - Tier 4 Work Group
 - Others
- o All Tier 4 Project Funds Committed.
- o Arrangements Nearing Completion For IERL-ORD Support For Source Testing.

Summary Of Tier 4 Work Plan

Note: Study Design, By Necessity, Based Upon Resource Constraints.

Objective: Problem Definition

To The Extent Possible, Address The Following Two Questions:

1. What Source Categories Emit 2378-TCDD?
2. At What Concentration Is 2378-TCDD Emitted?

Key Elements:

Stack Testing Program

- o 12 Source Tests Possible (@ \$90k per test).
- o Source Categories With Greatest Likelihood Of Emitting 2378-TCDD Identified.
- o Source Categories Ranked By Groups (See Page 4).
- o Plan To Test Three Sources In Each High Priority Source Category.
- o Samples To Be Collected And Analyzed (See Page 5).

Ash Sampling Program

- o Ash Data Of Limited Usefulness.
- o Only A Qualitative Tool.
- o Ash Data Will Be Collected To Help Refine Priority List.
- o Source Categories To Be Tested Via Ash (See Page 6).

Ambient Air Study

- o Collect Ambient Air Samples Downwind From One Site Where 2378-TCDD Was Found In Stack Emissions.
- o Four-Six Monitors For One-Two Months.
- o Study Planned For Summer 1985.

Ranked Source Category List

Rank A Source Categories:

Sewage Sludge Incinerators
Black Liquor Boilers
Commercial Boilers Firing Fuels Contaminated with Chlorinated
Organic Wastes

Rank B Source Categories:

PCP Sludge Incinerators
Carbon Regeneration (industrial)
Charcoal Manufacturing
Wire Reclamation

Rank C Source Categories:

Wood Stoves
Boilers (Firing PCP treated Wood)
Mobile Sources
Small Spreader-Stoker Coal Boiler
Hazardous Waste Incinerators
Lime/Cement Kilns Co-fired with Chlorinated Organic
Wastes

Rank D Source Categories:

Municipal Solid Waste (MSW) Incineration
Industrial Boilers Co-firing Wastes

Rank A: Large source categories (greater than 1 million tons of fuel and/or waste burned annually) with elevated dioxin precursor contamination of feed/fuel. These categories are judged to have the highest potential to emit TCDD.

Rank B: Small source categories (less than 1 million tons of fuel and/or waste burned annually) or source categories with limited dioxin precursor contamination of feed/fuel. These categories have a high potential to emit TCDD.

Rank C: Source categories less likely to emit TCDD.

Rank D: Source categories which have already been tested three or more times.

Sampling And Analyses Model

Sample	Method	Samples	Analyses	Total Samples ^a for Analysis
<u>Inputs</u>				
Precombustion Air	XAD-2 (PUPF) ^b	0-1 ^c	2378-TCDD, PCDD ^d , TOCL ^e , Cl-phenols, Cl-benzenes	1 ^c
Feed/Fuel	Grabs	Daily Composite	PCDD Scan, Cl-phenols Cl-benzenes, PCB, TOCL	3 ^f
<u>Outputs</u>				
Stack (before control)	MMST ^g	2 trains -Back Half Daily Composite -condenser Rinse -adsorbent Resin -Front Half Daily Composite -cyclone Catch -filter -probe Rinse	2378-TCDD, Homologues ^h (tetra - octa), PCDD	6
Stack (after control)	MMST	2 trains -Back Half Daily Composite -condenser Rinse -adsorbent Resin -Front Half Daily Composite -filter Catch -probe Rinse	2378-TCDD, Homologues (tetra - octa), PCDD	6
Bottom Ash	Grabs	Daily Composite	2378-TCDD, Homologues (tetra - octa), PCDD	3
Ash From Control Device	Grabs	Daily Composite	2378-TCDD, Homologues (tetra - octa), PCDD	3
Quench Water Effluent	Grabs	Daily Composite	2378-TCDD, Homologues (tetra - octa), PCDD	3
<u>Other</u>				
Soils (in vicinity)	Borings	1 Composite	2378-TCDD, Homologues (tetra - octa), PCDD	1
				Total 26ⁱ

^aBased on 3 sampling days.

^bXAD-2 (PUPF) denotes a modified high volume air sampler with a special sampling head for ambient organic compounds.

^cSample to be collected if there is a significant source of suspected precursors in vicinity of sampling site.

^dPCDD - Polychlorinated dibenzo dioxin.

^eTOCL - Total organic chlorine.

^fAnalyses by contractor.

^gMMST is a modified EPA "Method 5" train as defined in the ASME protocol.

^hHomologues - Analyses done on higher (tetra through octa) PCDD's as a total for each group only.

ⁱMultiple analyses for each sample will have a multiplier effect on the analytical costs also. Total does not include quality assurance samples (approx. 20%).

Combustion Source Categories Where Ash Samples
Will Likely Be Collected

Source Categories:*

Chemical Sludge Incinerators
Carbon Regeneration Unit (at industrial source)
Charcoal Manufacturing
Wire Reclamation
Wood Stoves
Wood Boilers Burning PCP Treated Wood
Spreader-Stoker Coal Boiler
Hazardous Waste Incineration
Lime/Cement Kiln Burning Hazardous Wastes
Forest Fires
Apartment House Flue Fed Incinerators
Agricultural Burning

*To be supplemented by other categories identified by State and Regional Officials with reasonable likelihood of emitting 2378-TCDD.

Primary Alternatives Considered And Rejected

1. Focus Tier 4 Primarily On Municipal Waste Incinerators.

Rejected: (a) On A Relative Basis, This Source Category Has Been Fairly Well Tested.

(b) Other Agencies Are Planning Tests Of Municipal Incinerators (New York State).

(c) Uncertain If Other Source Categories Are More Important; Will Not Know Unless Tested.

2. Investigate Conditions That Increase/Decrease 2378-TCDD Emissions.

Rejected: This Alternative Was Rejected, Primarily Since Other Agencies (e.g., Canada, ASME) Have Related Work Planned.

3. Analyze Samples For Furans.

Rejected: (a) Limited Laboratory Resource Allocation.

(b) ORD Indicates Technical Limitations With Furan Analysis.

(c) Duplicate Samples Will Be Collected For Future Analysis.

Other Issues

1. Schedule

It is probable that Tier 4 may not be fully completed by December 1985. Key factors which may greatly influence the time needed to complete the study are (1) the time required to gain access to sites for testing and (2) the turnaround time needed by the TROIKA until samples are analyzed and results released.

2. Level Of TROIKA Support For Tier 4

For planning purposes, Tier 4 was allocated 700 of the approximate 3600 analyses to be performed by the TROIKA. This "planning" estimate was to be revised based upon the laboratory needs set forth in the Work Plan. A revised allocation should be determined shortly.

3. Availability Of Sampling And Analytical Protocols

Sampling and analyses under Tier 4 are to follow procedures specified by ORD. A sampling protocol (EPA/ASME) has been under development, and a preliminary draft is available. However, a final document is not yet available. Similarly, laboratory procedures for Tier 4 samples have not been documented. While the lack of these documents has not delayed Tier 4 to date, they will be needed soon.

4. Testing "Worst" Case Or "Typical" Sources

An issue not fully resolved is whether we should focus our test program on sources which represent either the "worst" case or more "typical" situation. Since three sources are to be tested in each category, an alternative would be to test some worst case and some typical sources. We have asked for feedback on this issue from reviewers of the Tier 4 Work Plan.