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

February 29, 1984

MEMORANDUM

SUBJECT: National Dioxin Study - Tier 4 Literature Review, Source Prioritization and Testing

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

TO: Regional Dioxin Contacts

As you may know, the National Dioxin Study was officially initiated by Mr. Ruckelshaus late last year. The study is divided into seven tiers. The Air Management Technology Branch (AMTB) in the Office of Air Quality Planning and Standards (OAQPS) has been given the responsibility to manage Tier 4 which deals with combustion sources. We have initiated a literature review to collect and evaluate all available emissions data for 2,3,7,8-tetrachlorodibenzo-p-dioxin (2378-TCDD) and other dioxin isomers from ongoing and planned work for combustion sources. A preliminary listing of these references/tests is attached.

This information will help us identify and prioritize (for testing) the combustion source categories that may potentially emit 2378-TCDD. We expect that only 10 to 20 actual sources can be tested with the level of funding available; therefore, we are attempting to maximize the impact of these funds. The final literature review, along with a general source category prioritization and proposed testing plan, will be available later this spring. At that time, we expect to work with the Regions in locating, selecting and arranging sites for possible source testing. We plan to work with the Regions and other appropriate groups or individuals to gain necessary access and approvals for testing. We would also plan to seek the support of the Regional Offices with requests to provide assistance in actual on-site monitoring during the testing program.

We would appreciate your assistance in locating test data, commenting on our program, identifying potentially sensitive sources, etc. If you have any questions in the meanwhile please call me at (FTS) 629-5586 or Jim Southerland or Bill Lamason of my staff. Their telephone number is (FTS) 629-5585.

Andrew Miles and/or John Williams from Radian and/or Bill Lamason will soon be contacting you to determine if we have all available pertinent test data for combustion sources to obtain any useful references they do not already have and to acquire information on current and future test programs. Any preliminary data that may not yet be approved for release would be appreciated and would, of course, not be released by us without approval. Your cooperation and assistance will expedite both this and subsequent tasks.

cc: Chief, Air Branch, Regions I-X
J. Cummings, (PM-222)
J. McGinnity, SASD
D. Rhoads, MDAD
G. Smith, RO II
J. Southerland, AMTB
B. Thayil, RO V
Regional Air Toxics Contacts, Regions I-X

National Dioxin Strategy

Tier 4 - Combustion Sources

Work Plan

Draft

November 1983

Objective of Tier 4 - National Dioxin Study

The objective of the Tier 4 effort of the National Dioxin Strategy is to gain a better understanding of the likelihood and magnitude of 2,3,7,8-TCDD* emissions from combustion related facilities. This two-year study will address the following questions:

(a) What combustion related source categories are known to, or likely to, emit 2,3,7,8-TCDD into the atmosphere and at what concentrations?

(b) What is the source of 2,3,7,8-TCDD emitted from such facilities (i.e., is 2,3,7,8-TCDD emitted only as a result of being a constituent of the fuel that is combusted, and/or is it being formed as a by-product of the combustion process)?

An outline of a work plan that addresses these questions is provided below:

What Combustion Related Source Categories Are Known To (Or Likely To) Emit 2,3,7,8-TCDD Into The Atmosphere, And At What Concentration?

1. Prepare a comprehensive list of combustion related source categories and the number of individual sources within each category. Develop criteria and rank each source category with respect to their likelihood/potential of emitting dioxin. A preliminary list of source categories is provided in Table 1.
2. Review the available literature and compile, summarize and evaluate all previously reported dioxin related source studies for combustion related facilities to determine:

(a) if 2,3,7,8-TCDD was specifically sampled and/or measured in either the gas phase and/or as particulate matter;

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* At this time, the National Dioxin Study is focusing on 2,3,7,8-TCDD. However, OSWER is currently investigating other dioxin isomers that should also be evaluated.

Table 1: Combustion Related Source Categories With Potential To Emit Dioxins*

Incineration

- o Hazardous Waste Incinerators
- o Municipal Waste Incinerators
- o Hospital (Pathological) Waste Incinerators
- o Sewage Sludge Incinerators
- o Wire Reclamation Incinerators

Combustion

- o Utility Boilers
  - --- coal-fired
  - --- residual oil-fired
- o Industrial Boilers
  - --- wood-fired
  - --- coal-fired
  - --- residual oil-fired
  - --- distillate oil-fired
  - --- waste oil fired
  - --- refused derived fuel-fired
- o Residential Boilers
  - --- coal-fired
  - --- residual oil-fired
  - --- distillate oil-fired
  - --- other
- o Rotary Kilns (using contaminated oil as fuel)
- o Regeneration of Spent Activated Carbon at Waste Treatment Facility
- o Stationary Internal Combustion Engines
- o Highway Vehicles
  - --- gasoline-fired
  - --- diesel-fired

Process Related

- o Coking
- o Steel Making

Miscellaneous

- o Open Burning
- o Forest Fires
- o PCB Transformer Fires
- o Structural Fires
- o Agricultural Burning
- o Charcoal Grills
- o Wood Stoves
- o Fireplaces

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* not listed in any priority order

(b) the concentration of 2,3,7,8-TCDD measured in:

(i) the gas phase

(ii) as particles

(iii) in control equipment dust

(iv) in ash from combustion pit

(v) in fuel or process feed

(vi) other (e.g., soil in the vicinity of the facility);

(c) the source testing methodology and the laboratory analysis methodologies used;

(d) the detection limit of the analytical methodologies used;

(e) other dioxin sources that were measured and reported;

(f) source and process description of the tested facility

(g) pertinent operating conditions that existed at the facility during the sampling period, including fuel and process rate; and

(h) any other pertinent information.

3. Using information from items 1 and 2 above, determine those source categories for which additional source sampling may be needed to provide a more complete understanding of the magnitude of 2,3,7,8-TCDD emissions discharged from the source category.

4. Recognizing that funds will not be adequate to fully test each source category, determine the most reasonable way to distribute the available project funds so that the objectives of the study can best be achieved. Criteria to be used in selecting source categories for testing include:

(a) source categories with the greatest potential for 2,3,7,8-TCDD emissions will be given the highest priority for testing;

(b) source categories for which data are already available will need to be examined to determine if additional source testing is needed and/or desirable; and

(c) other factors.

5. Once the source categories have been selected, candidate sources for testing within each of the source categories will be identified. Initial efforts at locating candidate sources will be based on contacts with EPA's Regional Offices.

6. Criteria to be used in selecting specific sources for testing from the list of candidate sources will include:

(a) the representativeness of the candidate source, with respect to other sources within the source category;

(b) the potential of supplemental funding and/or other support from a State/local agency in performing the source test at the candidate facility;

(c) the potential of piggy-backing on other related EPA and other Federal agency (e.g., DOE) projects (e.g., piggy-backing onto planned compliance testing for NSPS for pertinent source categories, and/or piggy-backing on currently planned and/or funded FY-84 or FY-85 EPA projects related to testing combustion related facilities); and

(d) other considerations.*

7. Once actual facilities for testing have been selected, efforts will be made through the Regional Offices and the State and local agencies to secure permission to test the facility.

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* It has already been decided that the Hempstead incinerator will be tested under the Tier 4 program.

8. Source testing at each facility will follow a prescribed sampling protocol that will be prepared in conjunction with ORD. The purpose of the detailed sampling protocol is to assure that each of the various groups that may be funded to perform the actual source tests under the Tier 4 program use the same sampling methodology and collect the same pertinent operating data. The protocol shall indicate:

(a) the procedures to be followed and the equipment to be used in collecting samples;

(b) the number of individual source tests to be performed at each facility;

(c) the types of tests (e.g., before or after controls, feedstock, collector dust, ash, soil);

(d) information on the various operating parameters that shall be recorded during source testing;

(e) procedures to be followed concerning the storage and shipping the samples to ORD for laboratory analysis;* and

(f) a QA/QC program for the source testing program.

Note: The completion of the sampling protocol will be contingent upon the results of an anticipated ASME Workshop to be held on source sampling methodologies for dioxin. This workshop is currently scheduled for January 1984.

9. A source test report, describing each source test conducted under the Tier 4 program, will be prepared to document the test conditions and sampling results. A detailed outline, identifying the specific information to be included in the report, will be prepared and provided to all groups involved in the source test effort.

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* This assumes that Tier 4 samples will be analyzed by ORD. However, there is some question at this time if ORD will do these analyses.

What Is The Source Of The 2,3,7,8-TCDD Emitted From Combustion Facilities? (i.e., Is It In The Fuel Or Is It A By-Product Of Combustion)?

A two phased study is anticipated to address the question of where the 2,3,7,8-TCDD emissions in combustion emissions come from and what factors (e.g., operating conditions, feedstock) are important in the formation of 2,3,7,8-TCDD during the combustion process). Phase 1 will include a summary and analysis of the various theories and hypotheses that exist concerning the likely reasons for the formation of dioxin in exhaust emissions from combustion facilities. Phase 1 will also examine the apparent impact of various operating conditions on the formation of dioxin emissions. Based on this analysis, Phase I will result in a recommended list of projects that could possibly be undertaken during the Tier 4 Study to resolve some (or all) of the current uncertainties. If specific tasks and studies can be identified that could be performed within the budget and timetable of the Tier 4 effort, a Phase II effort would be initiated.

Tier 4 Final Report

After the two year study, a final report will be prepared. The report will focus on answering the two key questions previously identified. In addition to summarizing all of the available 2,3,7,8-TCDD data for combustion related facilities, the report will also describe the representativeness of the available source test data with respect to expected emissions from other sources in the source category. Known limitations in the data base will also be described. The report will likely recommend a followup program that could be pursued to gain a more complete understanding of the potential discharge of 2,3,7,8-TCDD from these combustion related sources that were inadequately

characterized in the current study because of limited resources. The report will be circulated for peer review, both within and outside the Agency.

Management of Tier 4

The responsibility for the management of the Tier 4 Study of the National Dioxin Study has been delegated to OANR from OSWER through OW. Within OANR, the task has been delgated to OAQPS/MDAD/AMTB. Mr. Edward J. Lillis, Chief of the Air Management Technology Branch, will be Program Manager of the Tier 4 Study. Mr. Lillis will be assisted by Mr. James H. Southerland, Chief of the Source Analysis Section/AMTB, and by Mr. William H. Lamason, Staff Engineer, Source Analysis Section.

A Tier 4 Work Group, comprised of representatives of the various EPA program offices, will be organized, and Mr. Lillis will chair the Work Group. The purposes of the Work Group will be:

(a) to keep the program offices advised of the goals and status of the project;

(b) to seek technical expertise and guidance on various issues that may arise during the project;

(c) to seek and obtain suggestions concerning the most appropriate manner in which to accomplish the objectives of the study; and

(d) to review and comment on protocols, reports and other materials that may be prepared for the project.

As such, the Work Group is advisory in nature. Issues identified at the Work Group level will be resolved either by OANR or will be elevated for resolution within the management structure of the National Dioxin Study. A list of the program office representatives anticipated to participate in this Tier 4 Work Group is provided in Table 2.

Table 2: Tier 4 Work Group

Name	Organization	Mail Code or Room Number	Telephone Number (FTS)
Edward J. Lillis	OAQPS - RTP, NC	MD-14	629-5586
James H. Southerland	OAQPS - RTP, NC	MD-14	629-5585
Lisa Barrera	OANR - Washington, DC		382-7426
Jim Cummings	Dioxin Management Coordination Staff - Washington, DC	W-439	382-5363
Mike Slimak	OWRS/OW - Washington, DC	E-829	382-7051
Don Barnes	Chlorinated Dioxin Work Group - Washington, DC	E-635	382-2897
Bob Olexsey	IERL - Cincinnati, OH		684-7696
Dave Sussman	OSW/OSWER - Washington, DC	WSM-S2811	382-7927
Paul des Rosiers	ORD - Washington, DC	W-621	382-2722
Boniface Thayil	Air Programs - Region V		886-6054
Garrett Smith	Air Programs - Region II		264-3407
Mike Dellarco	ORD - Washington, DC	M-3100	382-5763

An informal work group, comprised of various OAQPS representatives, will also be formed, and Mr. Lillis will serve as chairman. The purposes of this work group will be essentially the same as for the Tier 4 Work Group.

Contractual Support

Several contractors will be used to perform varisous aspects of the Tier 4 Study. The following two contracts are currently anticipated.

1. Management Related

A contractor will be selected, primarily to assist in the overall management of the task. Initially, the contractor will prepare a detailed, technical work plan for the Tier 4 effort, identifying the key subtasks, analyses, investigations, etc., that are to be performed during the Tier 4 Study. The contractor will also be responsible for monitoring the progress of the study and will prepare draft and final reports for the Tier 4 effort. The contractor will identify and bring to the project manager's attention, on a continuous basis, various questions/issues that may have an impact on the study. The contractor will also develop a detailed project schedule, which includes the completion of a draft final report (by the contractor), by September 30, 1985.

2. Literature Review and Detailed Evaluation of Existing Data

A separate contract with Radian is anticipated for the purpose of performing a literature search and detailed evaluation of existing source test information. The contractor will compile all available combustion related source test information for dioxins and TCDDs, and specifically for 2,3,7,8-TCDD. Based upon criteria established by the project manager, in conjunction with the Tier 4 Work Group, the contractor will review and assess the validity of each of the available data sets to determine its usefulness

in achieving the objectives of the project. Based upon this review, the contractor will recommend a prioritized list of source categories for which additional source testing for 2,3,7,8-TCDD is needed to fill data gaps. The prioritized list will be reviewed by the project manager and the Tier 4 Work Group, who will select a final list of combustion related source categories for testing. Efforts will then be made to locate individual sources within each of the source categories for source testing.

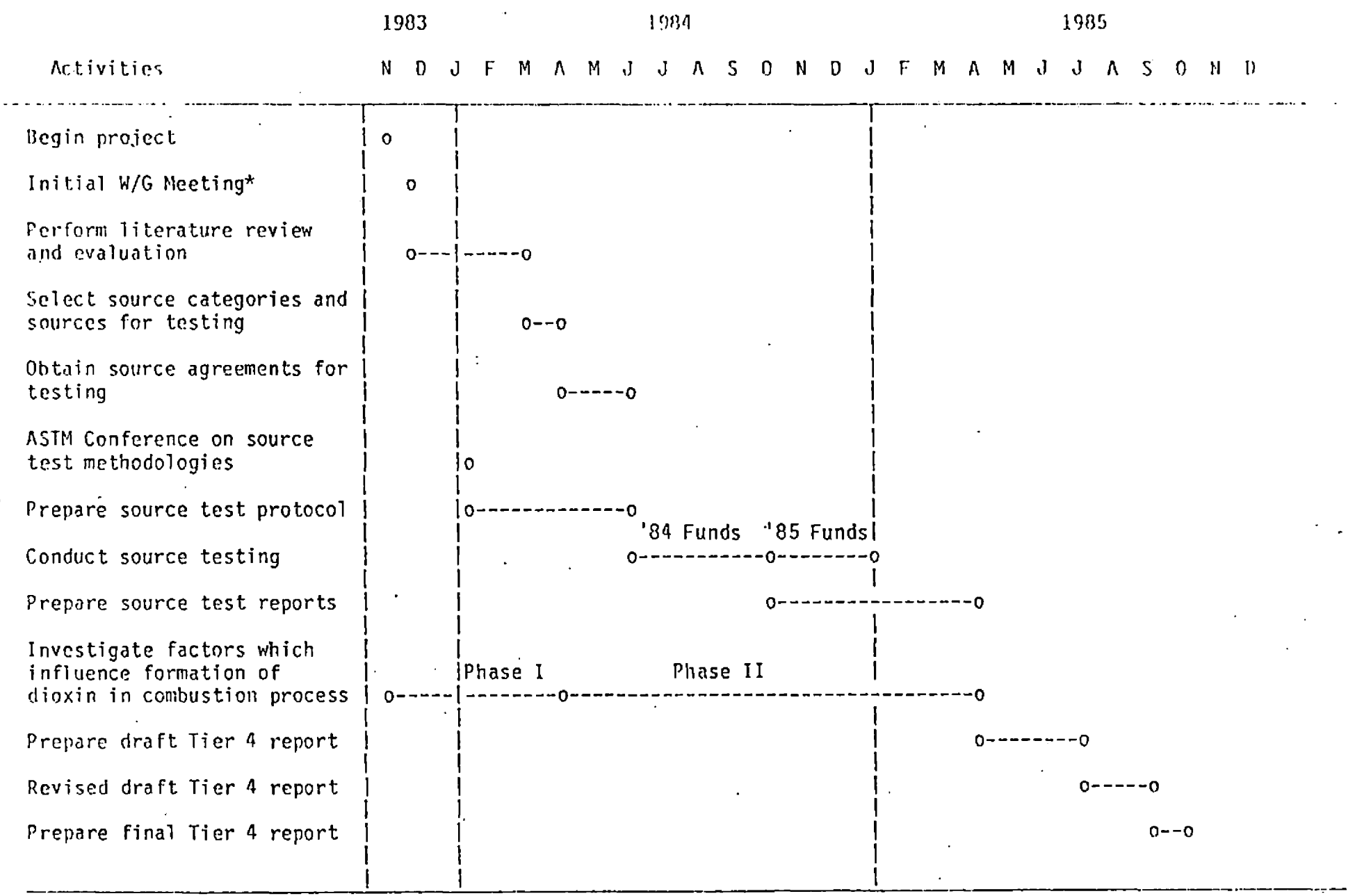
Schedule

It is expected that the detailed evaluation of available data and the selection of sources for testing and the test protocol will be completed by March 31, 1984. Source testing will begin by the summer of 1984. It is expected that all Tier 4 activities will be completed, and a final report prepared, by September 30, 1985. A more detailed schedule is provided in Figure 1.

Budget

The total budget for the Tier 4 Study is $1,500,000 ($715,000 in FY-84 and $785,000 in FY-85). To the extent possible, an effort will be made to coordinate with other ongoing or anticipated dioxin related efforts within EPA and other Federal agencies. External funding sources will also be pursued, particularly with respect to joint testing efforts of specific facilities that State/local agencies may wish to perform in conjunction with EPA.

Figure 1: Anticipated Schedule: Tier 4 - Combustion Related Sources



* Tier 4 Work Group will meet periodically (bi-monthly) throughout the study period.