REQUEST FOR PREPROPOSALS
For the operation of the Integrated Atmospheric Deposition Network (IADN)

OVERVIEW

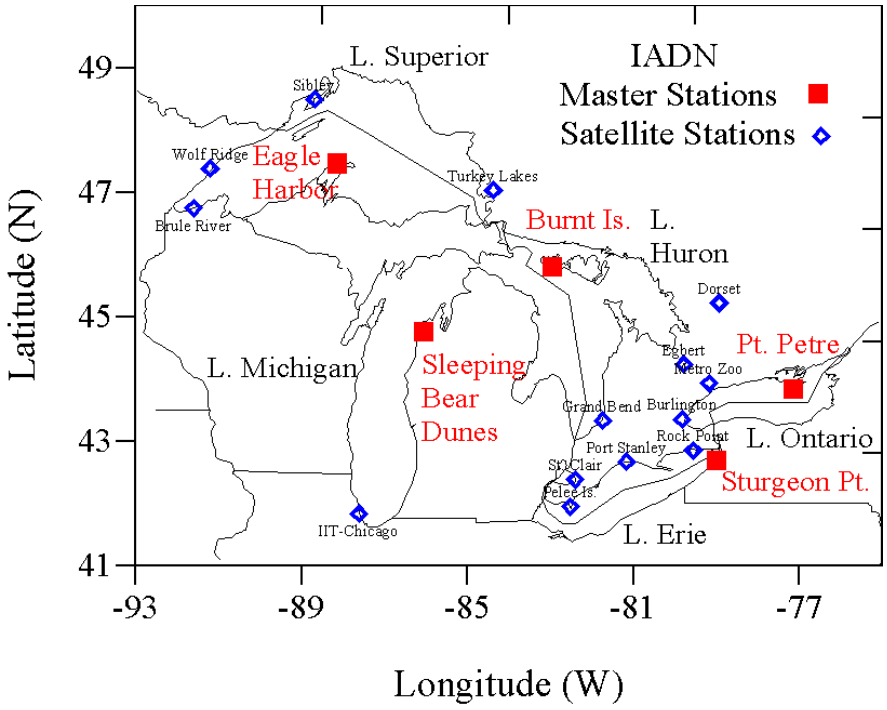
The Great Lakes National Program Office (GLNPO) of the U.S. Environmental Protection Agency is seeking cooperators for the management, operation, and possible expansion of the Integrated Atmospheric Deposition Network (IADN). IADN is primarily intended to be used as a platform for conducting research and monitoring activities to assess the atmospheric deposition of toxic pollutants to the Great Lakes. The goals of IADN are to:

1. Determine, with a specified degree of confidence, the atmospheric loadings and trends (both spatial and temporal) of priority toxic chemicals to the Great Lakes and its basin on, at least, a biennial basis;

2. Acquire quality-assured air and precipitation concentrations measurements, with attention to continuity and consistency of those measurements, so that trend data are not biased by changes in network operations or personnel;

3. Help determine the sources of the continuing input of those chemicals (Second Implementation Plan for the IADN, 1998).

IADN currently collects data on the deposition of toxic pollutants to the Great Lakes at 16 sites (5 in the U.S.) through wet and dry deposition and gas exchange. Source attribution questions are addressed where possible.



Map of the IADN network.

The IADN presently consists of one master station per lake, along with several satellite stations. The three US master stations are located at Eagle Harbor, MI, Sleeping Bear Dunes, MI and Sturgeon Point, NY. Two satellite stations are located at Chicago, IL and Brule River, WI. This request for preproposals (RFP) addresses network management and operation including sample analysis corresponding to a sample collection period of two years from November 1, 2001 to October 31, 2003 for the five currently operating US sites and possible network expansion. This RFP also includes indefinite operation at the network co-location site at Point Petre, ON. (A site operator is already employed through Environment Canada at the Point Petre site.) Sampling equipment presently located at the sites is listed in Table 1. Target analytes are listed in Table 2. This list may be revised and/or expanded in the future depending on network resources and method availability. A summary of current sampling and analysis methods is given in Table 3.

EXPECTATIONS OF THE AWARD RECIPIENT(S)

In order to optimize the performance of the components of IADN, this RFP separates the network into five programs: trace organics (base program), trace metals, emerging contaminants, dioxins/furans, and mercury. Responders to this solicitation may submit preproposals for one or a combination of the programs. However, separate budgets for each program must be submitted. Grantees selected for any of the programs are expected to fulfill the main P.I. responsibilities listed below.

Management/operation of the IADN involves the following tasks:

Overall Program Management: All Principal Investigators (PIs) are responsible for ensuring efficient operation of the network. This includes coordination of the sample collection schedule with the GLNPO project officer and other PIs; review and optimization of field methods and maintenance and calibration of sampling equipment beyond that required of the site operators; development, implementation, and revision of the Quality Assurance Project Plan (QAPP) and field and analytical Standard Operating Procedures (SOPs); sample analysis; data management, reporting, and interpretation; IADN workgroup participation; analytical methods development and optimization; and field and analytical intercomparison studies. The training and direction of the site operators is mainly the responsibility of the base program PI, with other PIs contributing to training and direction of operators for equipment and techniques relevant to their specific program(s). Frequent and effective communication is required between the PIs and the GLNPO project officer to resolve problems, discuss status of sampling and results, etc.

Steering Committee Participation: PIs will be required to actively participate in the binational US-Canadian steering committee. The Steering Committee is responsible for determining the future direction of IADN and assessing and improving the quality of the present network through QA compliance, methods comparability studies, etc. As a participant on the Steering Committee, the PI will be involved in evaluation of data quality indicators, revision of the target analyte list, assessing the adequacy of the measurement process, network-wide results reporting and outreach, development of loading estimates and

models, and assessing the degree of accuracy of loading estimates. The Steering Committee also develops a report for SOLEC (State of the Lakes Ecosystem Conference) Indicator #117, Atmospheric Deposition of Toxic Chemicals.

The Steering Committee consists of representatives from participating IADN agencies. Participation by the PIs is required on monthly conference calls and at 1-3 network workshops, most often requiring travel, annually.

Data Reporting and Interpretation: Electronic data submissions, annual data summary and interpretive reports, annual Quality Assurance reports, and a Biennial US-Canadian Data Interpretation and Loadings report are the minimum requirement for data reporting. Field and analytical data must be available to the GLNPO project officer and the IADN data manager within 12 months of receipt of samples in the laboratory. Data is quality controlled by the IADN data manager and must be submitted in the proper format. There is also a possibility that IADN data may be added to the Great Lakes Environmental Monitoring Database (GLENDA) in the future.

Methods Development/Optimization/Intercomparison: Methods development may be necessary as the parameter list is modified in response to workgroup recommendations. Specific details of required methods development are not presently available for inclusion in this preproposal; however, the preproposals will be evaluated as to experience and success in methods development. Any additional funding for methods development will be negotiated with the grantee as the need arises. Intercomparison of field and analytical methods between IADN investigators to ensure sample comparability is also a part of the IADN program. All IADN partners have sampling operations at the Point Petre station on Lake Ontario as part of an intercomparison program.

Information on IADN, including background documents and current SOPs, is on the internet at:
http://www.epa.gov/glnpo/iadn/resources.html
or
http://www.msc.ec.gc.ca/iadn/resources/resources_e.html

Applicants may also wish to explore the rest of the IADN website as well.

The future expansion of IADN may involve the addition of satellite sites, particularly in urban areas. At present, there are plans for wet deposition mercury to be measured at the Sleeping Bear Dunes site through a separate cooperator. Mercury monitoring is now being conducted at some of the Canadian IADN stations through the Canadian Atmospheric Mercury Network (CAMNet).

Cooperation and communication with EPA employees and participants from other monitoring programs may also be necessary and beneficial in order to provide a full picture of toxic contaminants in the Great Lakes basin, as well as to properly inform policy and regulatory decisions regarding toxics reduction.

All of the above responsibilities and tasks should be discussed in preproposals for any of the following programs.

PROGRAM AREAS

A. Trace Organics (IADN Base Program)

This program area addresses program management, field collection of samples through the use of site operators, sample analysis, Steering Committee participation, data reporting and interpretation, and methods development and intercomparison pertaining to trace organics. Trace organics are currently collected as precipitation (XAD-2 resin columns), vapor-phase (XAD-2 cartridges) and particulate-phase air samples (Quartz Fiber Filters). The annual number of trace organic samples (sum of precipitation, vapor-phase, and particulate-phase) is approximately 485 plus any necessary additional quality assurance samples from the five land-based U.S. stations. There is a possibility that some samples may be collected aboard the R/V Lake Guardian. PIs are requested to use sampling and analytical methods that are comparable to the SOPs that have been developed for IADN to ensure comparability and continuity in data sets. However, development and optimization of methods is encouraged.

Maintenance and calibration of the sampling equipment used in the collection of the organic parameters, as well as supervision of site operators, is included in the trace organics base program. Maintenance and calibration of meteorological equipment and archiving of meteorological data (Campbell dataloggers) is also required as part of this program. An annual data summary/interpretive report utilizing organic data collected during that year and previously in IADN is required, as well as an approved Quality Assurance Plan, yearly Quality Assurance reports, and work involved in producing a network-wide biennial loadings/data summary report.

B. Trace Metals Program

This program area involves the program management, field collection of samples through the use of site operators, sample analysis, Steering Committee participation, data reporting and interpretation, and methods development and intercomparison necessary for the collection and analysis of trace metals in precipitation and particulates. U.S. EPA stopped analyzing for trace metals in March 1995. However, sampling for trace metals using dichot samplers continued through the end of 2000 and the samples from November 1997 through 2000 have been archived for future use. This program includes analysis of viable archived samples as well as the re-initiation of metals sampling. Applicants should separate out the analysis costs for the archived samples from those for new ongoing sampling and analysis.

In the past in the U.S., weekly precipitation samples and monthly aerosol samples for target trace metals were collected. The method used for trace metal analysis by the U.S. in the past was X-ray Fluorescence (XRF). Currently, Environment Canada collects monthly precipitation composite samples and particulate samples every 12 days. Canadian samples are currently being analyzed using Inductively Coupled Plasma-Mass Spectrometry (ICP-MS). While EPA encourages harmonization of trace metal sampling and analysis with the techniques used for Canadian sites, applicants should inform EPA of their chosen method and sample frequency, discuss pros and cons, and construct a corresponding budget in their preproposal.

An annual data summary/interpretive report utilizing trace metals data collected during that year and previously in IADN is required, as well as an approved Quality Assurance Plan, yearly Quality Assurance reports, and work involved in producing a network-wide biennial loadings/data summary report (metals data only).

C. Emerging Contaminants Screening

GLNPO's mission is to protect, maintain, and restore the chemical, biological, and physical integrity of the Great Lakes. This goal requires that EPA be responsive to emerging threats or concerns regarding the Great Lakes basin. This third program area includes a systematic, regular screening of IADN samples for emerging contaminants of concern or contaminants not yet monitored by IADN that are suspected to be persistent, bioaccumulative, and/or toxic. Examples of such contaminants, which may not necessarily be measured under this program if it is implemented, are polychlorinated naphthalenes, polybrominated diphenyl ethers, and alkylphenol ethoxylates. Applicants should designate the design of the monitoring system (in terms of contaminants, frequency, etc.) in their preproposals; the final study design and contaminant list will be negotiated with GLNPO when and if an award is offered. It may be necessary to coordinate emerging chemical studies with those of other monitoring programs, including GLNPO's Fish Contaminant Program. Preproposals should also include ideas and concepts for future implementation of other non-routine, periodic scans or analyses to identify chemicals that may be emerging issues or problems.

An annual data summary/interpretive report utilizing emerging contaminants data collected is required, as well as an approved Quality Assurance Plan, yearly Quality Assurance reports, and work involved in producing a network-wide biennial loadings/data summary report.

D. Dioxins/Furans Monitoring

EPA is also interested in soliciting preproposals for monitoring of polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans (PCDD/F) at IADN sites. PCDD/F monitoring efforts should be designed to estimate atmospheric loadings to the Great Lakes and identify contributing sources and/or source regions. Monitoring efforts should also be evaluated against other PCDD/F monitoring efforts nationwide. Frequency of sampling and number of stations monitored will depend on resource availability; the final study design and contaminant list will be negotiated with GLNPO when and if an award is offered. As with the emerging contaminants program, applicants should specify the design of the monitoring system (in terms of methods, frequency, etc.) in their preproposals and supply a corresponding budget.

An annual data summary/interpretive report utilizing emerging contaminants data collected is required, as well as an approved Quality Assurance Plan, yearly Quality Assurance reports, and work involved in producing a network-wide biennial loadings/data summary report.

E. Mercury Monitoring

EPA is also interested in soliciting preproposals for monitoring of mercury at IADN sites. As described earlier in this RFP, EPA is planning to monitor for mercury in wet deposition at the

Sleeping Bear Dunes site through a separate cooperator. Mercury monitoring is also now being conducted at some of the Canadian IADN stations through CAMNet. Proposed mercury monitoring efforts should incorporate and expand on these existing efforts. EPA is particularly interested in mercury monitoring projects that help identify and characterize sources of mercury loadings to the Great Lakes. Examples include event-based sampling, concurrent trace metals analyses (which could possibly be provided through the Trace Metals Program of this RFP), and particulate and reactive gaseous mercury measurements. Frequency of sampling and number of stations monitored will depend on resource availability; the final study design will be negotiated with GLNPO when and if an award is offered. As with the emerging contaminants program, applicants should specify the design of the monitoring system (in terms of methods, frequency, etc.) in their preproposals and supply a corresponding budget.

An annual data summary/interpretive report utilizing emerging contaminants data collected is required, as well as an approved Quality Assurance Plan, yearly Quality Assurance reports, and work involved in producing a network-wide biennial loadings/data summary report.

PREPROPOSAL SPECIFICS

The following information should be used in the development of the preproposal submissions to allow comparison between preproposals and budget estimates.

1. **Multiple Program Areas**: A preproposal may be submitted for one or any combination of the program areas. However, if preproposals are submitted by the same applicant for multiple programs, please submit separate budgets for each program area.

   A grant for the IADN Base Program will be awarded at the conclusion of the current RFP review. The level of funding for the Base Program will be that deemed appropriate by GLNPO. However, the funding of remaining advertised program components in this RFP will be subject to current and future resource availability and may be funded at the conclusion of the review or at a later date. USEPA reserves the right to decrease this amount or to eliminate funding entirely. The term of the agreement may be extended in the future depending on agency needs and resources. If such an extension is offered by USEPA, extensions of the Project and Budget Periods, as well as additional funding would be negotiated.

1. **Analyses:** The preproposal shall include collection of samples for the period November 1, 2001-October 31, 2003 and subsequent sample analysis. The project and budget periods of the preproposals and final proposals should be appropriate for completion of all analyses and development of a final report. For the purpose of cost estimates, the number of samples (including field blanks and duplicates) to be analyzed are as follows:

   Trace Organics

   U.S. stations (five sites)

Organic	- precipitation:	80/year
	- particle-phase:	180/year
	- vapor-phase:	180/year
		440/year

Intercomparison station (Point Petre)		
Organic	- precipitation	13/year
	- particle-phase	16/year
	- vapor-phase	16/year
		45/year

Total: 485 samples

Lab QC measures (duplicates, surrogate and matrix spikes, and blanks, etc.) are also required.

Trace Metals

Backlog of archived dichot samples: Approximately 420 samples (210 dichot pairs)

Five U.S. stations, assuming harmonization with Canadian sample frequency (please revise numbers appropriately if proposing an alternative frequency):

Precipitation samples (assuming monthly composites):	80/year
Dichot sample pairs (assuming every 12 days):	180

Sample numbers for the Emerging Contaminants, Dioxins/Furans, and Mercury Programs will depend on the monitoring design indicated by the applicant.

3. **XAD-2 Resin**: The Base Program/Organics PI is responsible for obtaining and cleaning XAD-2 resin.

4. **Site Costs**: Costs for site operators should be included in the base program/organics preproposals. Calibration and maintenance (three times per year or as required by the IADN program) of the appropriate organics sampling equipment (hi-vols, MICs, meteorological tower) is also required in the base program preproposal. Costs for purchase, installation, and maintenance of relevant sampling equipment (including equipment not yet present at IADN sites), as well as costs for shipping sampling media and samples to and from the sites shall be included in preproposals for all programs.

5. **Travel**: For the purpose of cost comparisons, the preproposal shall include travel costs to attend two meetings in Toronto (two days each) and two in Chicago (two days each) each year for Steering Committee and progress reporting meetings. Travel costs for attending two professional meetings (including IAGLR) each year should also be included. For network operation, estimates for three trips per year to each of the sites for calibration and maintenance of equipment necessary for operation of the specific program (base, trace metals, etc.) should be included as a separate line item.

Additional conditions for the preproposal are:

1. No portion of the work is to be subcontracted without explicit notification and written approval of the GLNPO Project Officer.

2. In developing a Preproposal, applicants should consider that they must provide a non-Federal match of at least 5% of the total project cost, which may be provided in cash or in-kind.

3. All projects that collect environmental data must have an approved Quality System. A Quality Management Plan (QMP) that adequately describes the Quality System must be approved by the GLNPO Quality Assurance Manager and IADN Project Officer 30 days prior to commencement of data collection. Costs associated with data collection are not allowable costs until the Quality System is approved. **In the interest of time, applicants should format their proposals to include the quality assurance topics outlined in the attached QA guidance.** Contact GLNPO's Quality Assurance Manager, Louis Blume (312-353-2317) with questions.

4. The PIs will be required to participate in laboratory performance evaluations. These evaluations will be coordinated by the GLNPO Project Officer and/or Steering Committee members.

5. Quality assured analytical results must be available within 12 months from the day that the samples are received at the laboratory. Quality assured data will be submitted to the GLNPO project officer and IADN data manager annually (or, if possible, every six months) for release and exchange with Canadian IADN participants. Note that under Public Law No. 105-277, data produced under an award is subject to the Freedom of Information Act.

6. The PIs will be required to submit all data in the electronic format required by the data verification application Research Data Management and Quality Control System (RDMQ). Details will be supplied by the IADN data manager.

7. The PIs must submit draft Annual Data Summary and Interpretive Reports and Quality Assurance Reports. A peer reviewed Interpretive Data Report (i.e. deposition estimates and corresponding uncertainty estimates) will be developed during the grant period in coordination with other US and Canadian IADN participants and will be published under the IADN program. Traditionally, the IADN Base Program U.S. PI is responsible for developing the loadings estimates every two years (i.e., every other biennial loadings cycle).

8. Preproposals will be reviewed in-house by EPA scientists and by an external review panel. We expect that applications will only submit non-confidential information, since external reviewers assist in evaluations. 40 C.F.R. Part 2 discusses "public information," including procedures for claiming confidentiality (40 C.F.R. Section 2.203 and 2.204).

ELIGIBILITY

Assistance (through grants, cooperative agreements, and interagency agreements) is available pursuant to the Clean Water Act Section 104(b)(3) for activities in the Great Lakes Basin and in

support of the Great Lakes Water Quality Agreement. State pollution control agencies, federal agencies, interstate agencies, and other public or nonprofit private agencies, institutions, and organizations are eligible; "for-profit" organizations are not.

CRITERIA

Preproposals will be evaluated according to these criteria:

A. (50%) Qualifications of the principal investigators (PIs) and staff. This will stress demonstrated expertise of the PIs in the proposed program area including ability to perform trace level contaminants analyses and experience in management and interpretation of environmental data. For RFP program components not clearly defined here (in terms of methods, frequency, etc.), soundness of scientific approach and methods.

B. (20%) Demonstrated access to laboratory space, instrumentation, and personnel sufficient to complete the work described in this RFP within the prescribed time frame.

C. (20%) Reasonable budgetary justification of the project, including cost of analysis, meeting administrative principle requirements of 40CFR Part 30/circular A-21 or A-122, and applicable administrative requirements for audit and administration.

D. (10%) Management structure sufficient for successful project completion and overall vision in terms of the future direction of IADN.

Please submit electronically, via e-mail to **hulting.melissa@epa.gov,** the following.

(1) *Curriculum vitae*, including publication records, of all PIs/staff.

(2) your preproposal(s).

The deadline for receipt of preproposal packages is **Monday, August 6, 2001**. All applicants will be notified of receipt of preproposals via e-mail. Preproposals shall be reviewed and applicants notified of funding decisions by September 3, 2001. Applicants may be contacted for clarification and for the purpose of negotiating changes in project terms and amounts. Preproposals selected for funding will be required to submit a full proposal and U.S. EPA grant application by September 24, 2001. Direct questions and requests for further information to:

Melissa Hulting
U.S. EPA Great Lakes National Program Office
77 West Jackson Boulevard, Mail Code G-17J
Chicago, IL 60604
Phone: 312-886-2265
Fax: 312-353-2018
E-mail: hulting.melissa@epa.gov

Table 1. IADN Master Station Sampling Equipment

Parameter	Sampling Instrument	Number of Samplers	Current Frequency of Sampling
Semivolatile organic compounds - vapor/particulate	Mod Hi-Vol Anderson (Model UV-1)	2	24 hours every 12 days
Semivolatile organic compounds - precipitation	Mod MIC Sampler w/Belfort rain gauge	2	Integrated 28 days
Trace Metals - air	Dichot Andersen (Model 234)	1	Composite - 96 hours/28 days♦←
Trace Metals - precipitation	Mod Aerochem	1	Discontinued in March 1995; In past, integrated 7 days
Nutrients/major ions	Std Aerochem	1	Discontinued; In past, integrated 7 days
TSP/TOC	Std Hi-Vol Andersen (Model UV-1)	1	Discontinued; In past, 24 hours every 6 days
Wind Speed	Meteorological Tower	1	continuous
Wind Direction	Meteorological Tower	1	continuous
Solar Radiation	Meteorological Tower	1	continuous
Temperature	Meteorological Tower	1	continuous
Relative Humidity	Meteorological Tower	1	continuous

♦ Actual number of hours per month has varied in past depending on character of sites (more time for cleaner sites, less for Chicago, etc.)

← Environment Canada currently samples metals in precipitation monthly and metals as particulates every 12 days

Table 2. Integrated Atmospheric Deposition Network Parameters

The "IADN Chemical List" includes those parameters required by all participating agencies. A subset of PCB congeners must be measured by all agencies, and their total is reported as ΣPCB by IADN. The second section of this table names the substances for which data is currently available for one or more agencies. It would be desirable to harmonize U.S. and Canadian chemical lists (in other words, add substances not presently analyzed by the U.S. if possible). The last section of the table shows substances for which loadings estimates are available. Calculation of loadings estimates requires appropriate water concentration data and reliable physical-chemical parameter information.

Chemical List, Revised 5/2000

IADN Chemical List

Chemicals Measured at all Master Stations in Air and Precipitation

PCBs (56 congeners and ΣPCB suite)

Organochlorine pesticides:

Aldrin
trans-chlordane (γ)
cis-chlordane (α)
p,p'-DDT
p,p'-DDD
p,p'-DDE
o,p'-DDT
Dieldrin
α-endosulphan (I)
β-endosulphan (II)
Endrin
Heptachlor epoxide
Hexachlorobenzene (HCB)
α - HCH
β - HCH
γ - HCH (lindane)
Methoxychlor
Trans-nonachlor

Polycyclic aromatic compounds:

Anthracene
Benz(*a*)anthracene
Benzo(*b*)fluoranthene
Benzo(*k*)fluoranthene
Benzo(*ghi*)perylene
Benzo(*a*)pyrene
Chrysene + Triphenylene
Dibenz(*a,h*)anthracene
Fluoranthene
Indeno(*1,2,3,cd*)pyrene
Phenanthrene
Pyrene

Additional chemicals for which data is available
Monitoring currently done by at least 1 agency☎

o,p'-DDD (MSC, EPA)
o,p'-DDE (MSC)
Endosulphan sulphate (MSC, EPA)
Heptachlor (MSC, EHD)
δ - HCH (MSC)
Benzo(*e*)pyrene (MSC, EPA)
2-chloronaphthalene (EHD)
Coronene (MSC, EPA)
Dibenz(a,c)anthracene (MSC)
Fluorene (MSC, EPA)

☎ Cooperating agencies are U.S EPA/its grantee; the Meteorological Service of Canada (MSC), part of Environment Canada and formerly Atmospheric Environment Service (AES); and Ecosystem Health Division of Environment Canada (EHD).

Mirex (MSC, EHD)	Indene (EHD)
Octachlorostyrene (EPA)	1-methylnaphthalene (EHD)
Oxychlordane (MSC, EPA)	2-methylnaphthalene (EHD)
di-/tri-/tetra-/pentachlorobenzenes (EHD)	Retene (MSC, EPA)
Photomirex (MSC)	1,2,3,4-tetrahydronaphthalene (EHD)
Acenaphthene (MSC, EHD)	***Trace elements♦:***
Acenaphthylene (MSC, EHD)	As (MSC)
Anthanthrene (MSC)	Cd (MSC, EHD)
Benzo(ghi)fluoranthene (MSC)	Pb (MSC, EHD)
	Se (MSC)

Chemicals for which loadings estimates are available
(Based on loadings report published 5/2000)

trans-chlordane	Sum PCBs
cis-chlordane	Individual PCB congeners 18, 44, 52, 101
p,p'-DDD	
p,p'-DDE	Benzo(b)fluoranthene
p,p'-DDT	Benzo(k)fluoranthene
Dieldrin	Benzo(a)pyrene
α-endosulphan	Indeno(1,2,3,cd)pyrene
β-endosulphan	Phenanthrene
Endosulphan sulphate	Pyrene
Hexachlorobenzene (HCB)	
a-HCH	As
g-HCH	Cd
trans-nonachlor	Pb
	Se

Meteorological parameters: Wind speed, wind direction, air temperature, solar radiation, relative humidity, barometric pressure, precipitation amount/rate

♦ Samples at U.S. stations have not been analyzed for metals since 1995.

Table 3. Summary of sampling and analysis methods

Media/Parameter	Agency	Sampling Method[a]	Sampling Frequency[b]	Analytical Method	Reporting Units
Air Organics (PCBs, Pesticides, PAHs)	AES	HiVol PUF Sampler: GFF + PUF	24 hr/12 days	Soxhlet/GC-ECD (PCBs, Pesticides); HPLC-fluorescence (PAHs)	pg/m^3
	Current EPA grantee	HiVol: GFF + XAD2	24 hr/12 days	Soxhlet/GC-ECD (PCBs, Pesticides); GC/MS (PAHs)	pg/m^3
Air Metals	AES	PM10/15 HiVol	24 hr/12 days	ICP-MS or INAA	ng/m^3
	Current EPA grantee	PM10 Dichot	96 hr/28 days	XRF	ng/m^3
Precipitation Organics (PCBs, Pesticides, PAHs)	Current EPA grantee	MIC-B/XAD2	28 days	GC-ECD	ng/L
	EHD	MIC-B/DCM	14 days	GC-ECD or GC-ECD-MS	ng/L
Precipitation Metals	EHD	MIC-A	monthly	ICP	ug/L
Related Air Measurements					
Total Suspended Particulate	AES, Current EPA grantee	HiVol/GFF	24 hr/6 days	Gravimetric	ug/m^3
PM10	Current EPA grantee	Dichot/TF	96 hr/mo.	Gravimetric	ug/m^3
Meteorology[c]					
Temperature	AES, Current EPA grantee	Thermistor	hrly. avg.	Direct Reading	°C
Relative Humidity	AES, Current EPA grantee	Hygristor	hrly. avg.	Direct Reading	Percent
Barometric Pressure	Current EPA grantee		hrly. avg.	Direct Reading	kPa
Wind Speed	AES, Current EPA grantee	Anemometer	hrly. avg.	Direct Reading	m/s
Wind Direction	AES, Current EPA grantee	Vane	hrly. avg.	Direct Reading	Degrees
Precipitation Amount	AES	Type B Rain Gauge	24 hrs	Direct Reading	mm
	Current EPA grantee, AES	Belfort gauge	continuous	Direct Reading	mm
Solar Irradiation	AES	Pyranometer	hrly. avg.	Direct Reading	w/m^2
	Current EPA grantee	Pyranometer	hrly. avg.	Direct Reading	Langleys

NOTES:

[a] Sampling and analysis methods used by different groups may appear similar, but differ significantly in operational and other details.

[b] Sampling frequency is sometimes given as sample duration/sampling interval.

KEY TO ABBREVIATIONS

AAS	atomic absorption spectroscopy
DCM	dichloromethane solvent
Dichot	dichotomous sampler
ECD	electron capture detector
GC	gas chromatography
GFF	glass fibre filter
HiVol	high volume sampler
ICP	inductively coupled plasma spectrometry
INAA	instrumental neutron activation analysis
LoVol	low volume sampler
MIC-A	MIC type A precipitation sampler
MIC-AU	MIC type AU precipitation sampler
MIC-B	MIC type B precipitation sampler
MS	mass spectrometry
PM10	particulate matter less than 10μm in diameter
PUF	polyurethane foam plug
XAD	XAD resin
XRF	x-ray fluorescence