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OFFICE OF SCIENCE & TECHNOLOGY
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NOTE:

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JUL -9 '99

[The following letter was individually addressed and mailed to the Fisheries, Health and Environmental Agency Directors/Commissioners of all 50 States. The letter was also provided to Tribes with delegated authority to administer water quality standards programs.]

Dear Colleague:

We have made great progress in reducing the discharge of contaminants to our nation's waters, but persistent bioaccumulative toxic substances from current and past industrial and agricultural uses continue to pose health risks to people who eat locally caught fish. For this reason, we want to reaffirm the importance of local fish consumption advisories and the appropriate approach for developing and communicating these advisories. Over the past 10 years, the United States Environmental Protection Agency (EPA) has been working with the States and Tribes to develop a risk-based nationally consistent approach to developing and communicating local fish consumption advisories. This approach is detailed in the four-volume set of peer reviewed guidance documents titled *Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories* (National Guidance). EPA believes that the approach is scientifically sound, cost effective and protective of public health.

Advisories for locally caught fish are important, especially for sports/recreational anglers and subsistence populations, such as certain Native American Tribes, who consume locally caught fish and shellfish, which may contain high levels of contaminants. Consideration of the benefits of fish consumption is also important because, for many indigenous populations, fish provide the most readily available and affordable source of high quality, lean protein. Therefore, extra care should be taken to ensure that high fishing use areas are identified and monitored, and local consumption rates considered. Properly communicated fish advice should identify less polluted areas and/or species of fish.

The President's 1994 Executive Order on Environmental Justice requires the Federal Government to identify, characterize, and communicate disproportionate adverse health effects to minority populations and low income populations which may result from differential patterns of consumption of natural resources, including subsistence consumption of fish and shellfish. People in such communities can unknowingly be at risk unless the State, Tribal, and Federal governments work together to provide them with information they need to avoid adverse health effects. In February 1998, the President released the *Clean Water Action Plan: Restoring and Protecting America's Waters* (the Action Plan). The Action Plan charts a course toward fulfilling the original goal of the Clean Water Act - "fishable and swimmable" waters for all Americans. The Action Plan includes several "Key Action Items," one of which is to ensure the use of nationally consistent guidelines on the development and communication of fish consumption

advisories by December 1999. This Key Action Item requires EPA to work with State, Federal and Tribal agencies to ensure adoption of consistent methods for developing and communicating fish consumption advisories. The action item also requires EPA to issue advisories in cases where States and Tribes fail to do so. In order to meet this Key Action Item, EPA is increasing its work to characterize current State and Tribal programs.

Each year, EPA distributes a questionnaire to all 50 States and Tribes issuing advisories which enable EPA to both update the *National Listing of Fish and Wildlife Consumption Advisories* and to characterize methods and level of effort for developing advisories. Based on that questionnaire, we have determined that 48 States and at least two Tribes currently support fish consumption advisory "programs." However, these programs may range from one with millions of dollars per year supporting an integrated multi-agency program with several dedicated personnel, to one with a few hundred dollars per year and a part time employee. Efforts to monitor fish for contaminants may range from sampling several hundred waterbodies per year to no sampling of fish tissue at all. A majority of the States and Tribes with advisory programs have adopted a risk-based approach to developing advisories that is similar to the approach recommended in EPA's National Guidance. However, due to variability in application of the National Guidance, some States may not be adequately warning the public of health risks. A small number of States continue to use fish consumption advisory approaches that are considered by EPA to be inadequate for protecting public health. The use of these approaches may lead to significant increased health risks for people consuming fish harvested from contaminated local waters. Such approaches include the inappropriate use of Action Levels and Tolerances developed by EPA and the Food and Drug Administration. These are designed to ensure a safe food supply for consumers of commercial fish. The Action Levels and Tolerances, while appropriate for use in the commercial marketplace, are inappropriate for establishing local advisory needs and should not be used for that purpose.

We are requesting that you review your existing fish advisory program's approaches and methodologies and compare them with recommendations in EPA's National Guidance. Areas of particular interest include monitoring strategies, risk assessment methods, communication strategies, and overall level of effort. To assist you, we have enclosed a summary description of the most important elements of a recommended advisory program. All of these elements are described in greater detail in the National Guidance documents. Review in your State or Tribe may require coordination among agencies responsible for environmental protection, fish tissue monitoring, fisheries management, public health and risk communication. We are sending a copy of this letter to all relevant State or Tribal agencies.

In the Spring of 1999, EPA will be sponsoring a national meeting to provide each State and Tribe an opportunity to present their respective advisory program, identify any inconsistencies with the National Guidance, and discuss how inconsistencies can be rectified. We are prepared to provide technical assistance in order to help you meet the goal of ensuring your program is consistent with the National Guidance. If you require additional copies of the National Guidance, or have technical questions regarding this letter, please call the EPA Fish Contamination Program at (202) 260-1305.

Enclosed please also find camera ready and electronic copies of a brochure titled ***Should I Eat the Fish I Catch? A guide to healthy eating of the fish I catch***. This brochure was developed by EPA and the Agency for Toxic Substances and Disease Registry, United States Public Health Service. We believe that, in the absence of other materials, this brochure could provide useful information for fish consumers. This Fall, we will provide you with additional copies in Spanish and Vietnamese. Please feel free to copy and distribute this brochure as you feel appropriate.

We look forward to working with you to ensure that we attain the Clean Water Action Plan public health goal of national consistency in State and Tribal fish advisory programs. Please contact us if you have any questions about this letter.

Sincerely, Lynn R. Goldman

Bob Perciasepe

Robert Perciasepe
Assistant Administrator
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Enclosure

Summary of Program Elements

The following is a summary of the major elements of a fish consumption advisory program:

Monitoring and Sampling Strategy - States and Tribes should monitor for contaminants at frequently fished sites where fish are commonly consumed by sport and/or subsistence users. In areas where elevated contaminants[1] are detected, further testing should be conducted to determine extent and magnitude. Table 2.1 (attached) provides a summary of the recommended monitoring and sampling strategy elements which are described in detail in Volume I of the National Guidance:

Target Species Selection - The EPA believes the most important criterion for selecting target fish, shellfish, and turtle species for State and Tribal contaminant monitoring programs is that the species are commonly consumed in the study area and are of recreational, or subsistence fishing value. Two other criteria of major importance are that the species have the potential to bioaccumulate high concentrations of chemical contaminants and have a wide geographic distribution. EPA recommends that States and Tribes use the same criteria to select species for both screening and intensive site-specific studies. Volume 1, Chapter 3 provides a description of target species used by various Federal, State and Tribal programs.

Target Analytes - Recommended target analytes for screening studies in fish and shellfish contaminant monitoring programs are listed in Table 4-1. This list was developed by the EPA from a review of the following information:

- Pollutants analyzed in several national or regional fish contaminant monitoring studies;
- Pesticides with active registrations;
- Contaminants that have triggered States to issue fish and shellfish consumption advisories or bans;
- Published literature on the chemistry and health effects of potential contaminants.

States and Tribes should include other analytes which are suspected to occur within the area being sampled. Chemical profiles are provided in detail in Volume 1, Chapter 4 of the National Guidance.

Screening Values for Target Analytes - For the purpose of applying the National Guidance, screening values (SVs) are defined as concentrations of target analytes in fish or shellfish tissue that are of potential public health concern and that are used as standards against which levels of contamination in similar tissue collected from the ambient environment can be compared. Exceedance of these SVs should be taken as an indication that more intensive site-specific monitoring and/or evaluation of human health risk should be conducted.

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[1]As determined based on screening approach identified under risk assessment methodology

The EPA-recommended risk-based method for developing SVs is described in detail in Volume 1, Chapter 5 of the National Guidance. This method is considered to be appropriate for protecting the health of fish and shellfish consumers for the following reasons:

- It gives full priority to protection of public health.
- It provides a direct link between fish consumption rate and health risk (i.e., between dose and response).
- It is designed for protection of consumers of locally caught fish and shellfish, including susceptible subpopulations such as sport and subsistence fishermen who are at potentially greater risk than the general adult population because they tend to consume greater quantities of fish and because they fish the same sites repeatedly.

Methods for calculating SVs are provided in Chapter 4 as well as screening values for the recommended target analytes based on consuming approximately one meal per month (6.5 grams fish consumption per day). The calculation requires the input of values for several parameters including fish consumption rates, toxicity values, risk levels (for carcinogens), and body weights.

The following equation should be used to calculate SVs for noncarcinogens:

$$SV_n = (RfD \bullet BW)/CR$$

where

SV = Screening value for a noncarcinogen (mg/kg; ppm)
RfD = Oral reference dose (mg/kg/d)
BW = Mean body weight of the general population or subpopulation of concern (kg).
CR = Mean daily consumption rate of the species of interest by the general population or subpopulation of concern averaged over a 70-yr lifetime (kg/d)

The following equation should be used to calculate SVs for carcinogens:

$$SV_c = [(RL / SF) \bullet BW] / CR$$

where

SV_c = Screening value for a carcinogen (mg/kg; ppm)
RL = Maximum acceptable risk level (unitless)
SF = Oral slope factor $(mg/kg/d)^{-1}$
BW and CR are defined as in noncancer Equation above.

The default parameter values used for determining the recommended screening values included in Table 5-2 (attached) were recommended by EPA at the time Volume 1 was published in 1995.

These defaults are current with the exception of toxicity values for mercury and PCBs which have been updated in July 1997 and provided in Volume 2, Chapter 4. EPA is currently reevaluating default values for fish consumption rates, body weights, and slope factors as part of the Federal Register Notice of Draft Revisions to the Methodology for Deriving Ambient Water Quality Criteria For the Protection of Human Health, which is expected to be announced early this summer. The default values used for calculating screening values may change depending on the results of this Notice. In any case, the parameter values used in the calculation of advisory screening values by States and Tribes should be reflective of local conditions and should be consistent with those values used in establishing the water quality standards for the same waterbody.

Field and Laboratory Procedures - Volume 1, Chapters 6, 7 and 8 provide detailed field and laboratory procedures, methods, and protocols for conducting analysis on the listed target analytes.

Calculating Safe Consumption Limits - Methods for deriving consumption limits, expressed in number of meals over time (one month) for chemical contaminants with carcinogenic and/or noncarcinogenic effects are described in Volume 2, Chapters 3 and 4 of the National Guidance. When available data indicate that a target analyte is associated with both carcinogenic and noncarcinogenic health effects, consumption limits based on both types of effects are calculated. In these cases, it is recommended that the toxicological effect resulting in the more conservative consumption limits be used to issue an advisory since resulting limits would be protective of both types of health effects. Methods for calculating consumption limits for a single contaminant in a multiple species diet or for multiple contaminants causing the same chronic health effect endpoints are also discussed. Species-specific consumption limits are calculated in kilograms per day and converted to allowable fish meals in ounces that may be consumed per month. This approach is taken because consumers tend to think of fish consumption in terms of meals rather than in terms of grams or ounces.

Two equations are required to derive meal consumption limits for either carcinogenic or noncarcinogenic health effects. The following illustrates the calculations for determining safe meal consumption limits for carcinogens. The first equation is used to calculate daily consumption limits in units of milligrams of edible fish per kilogram of consumer body weight per day (mg/kg/d):

for carcinogens:

$$CR_{lim} = \frac{ARL \cdot BW}{q_1^* \cdot C_m}$$

where:

CR_{lim} = maximum allowable fish consumption rate (kg/d)
ARL = maximum acceptable individual lifetime risk level (unitless)
BW = consumer body weight (kg)
q_1^* = cancer slope factor, usually the upper 95 percent confidence limit on the linear term in the multistage model used by EPA [$(mg/kg\text{-}d)^{-1}$], (see Section 2 for a discussion of this value)
C_m = measured concentration of chemical contaminant *m* in a given species of fish (mg/kg).

The calculated daily consumption limit (CR_{lim}) represents the amount of fish (in kilograms) expected to generate a risk no greater than the maximum ARL used, based on a lifetime of daily consumption at that consumption rate.

The second equation is used to convert daily consumption limits to meal consumption limits over a specified period of time (e.g., 1 month):

$$CR_{mm} = \frac{CR_{lim} \cdot T_{ap}}{MS}$$

where:

Cr_{mm} = maximum allowable fish consumption rate (meals/mo)
Cr_{lim} = maximum allowable fish consumption rate (kg/d)
MS = meal size (kg fish/meal)
T_{ap} = time averaging period (365.25 d/12 mo = 30.44 d/mo).

This equation was used to convert daily consumption limits, in kilograms, to meal consumption limits over a given time period (month), as a function of meal size. Monthly consumption limits were derived for all of the 25 target analytes and are provided in Volume 2, Chapter 4. Toxicity profiles for the 25 target analytes are provided in detail in Volume 2, Chapter 5.

Table 2.1 - Recommended Strategy for State Fish and Shellfish Contaminant Monitoring Programs

Program element	Tier 1 Screening study	Tier 2 Intensive study (Phase I)	Tier 2 Intensive study (Phase II)
Objective (see Section 2)	Identify frequently fished sites where commonly consumed fish and shellfish target species are contaminated and may pose potential human health risk.	Assess and verify magnitude of tissue contamination at screening site for commonly consumed target species.	Assess geographic extent of contamination in selected size classes of commonly consumed target species.
Target species and size classes (see Sections 3 and 6)	Select target species from commonly consumed species using the following additional criteria: known to bioaccumulate high concentrations of contaminants and distributed over a wide geographic area. Recommended types of target species: Inland fresh waters: 1 bottom-feeder, 1 predator Great Lakes: 1 bottom-feeder, 1 predator Estuarine/ marine: 1 shellfish and 1 fish species, or 2 fish species (one species should be bottom-feeder).	Resample target species at sites where they were found to be contaminated in screening study.	Resample at additional sites in the waterbody three size classes of the target species found to be contaminated in Phase I study.

See notes at end of table.

(continued)

Table 2-1 (continued)

Program element	Tier 1 Screening study	Tier 2 Intensive study (Phase I)	Tier 2 Intensive study (Phase II)
Target species and size classes (continued)	OPTIONAL: If resources are limited and a State cannot conduct Tier 2 intensive studies, the State may find it more cost-effective to collect additional samples during the Tier 1 screening study. States may collect (1) one composite sample of each of three size classes for each target species, (2) replicate composite samples for each target species, or (3) replicate composite samples of each of three size classes for each target species.	OPTIONAL: If resources are limited and a State cannot conduct Tier 2, Phase II, intensive studies, the State may find it more cost-effective to collect additional samples during the Tier 2, Phase I, intensive study. States may collect replicate composite samples of three size classes of the target species found to be contaminated to assess size-specific contaminant concentrations. Other commonly consumed target species may also be sampled if resources allow.	OPTIONAL: If resources allow, select additional commonly consumed target species using same criteria as in Phase I study.
Target analytes (see Section 4)	Consider all target analytes listed in Table 4-1 for analysis as resources allow. Include additional site-specific target analytes as appropriate based on historic data.	Analyze only for those target analytes from Tier 1 screening study that exceeded SVs.	Analyze only for those target analytes from Tier 2, Phase I, study that exceeded SVs.

See notes at end of table.

(continued)

Table 2-1 (continued)

Program element	Tier 1 Screening study	Tier 2 Intensive study (Phase I)	Tier 2 Intensive study (Phase II)
Screening values (see Section 5)	Calculate SVs using oral RfDs for noncarcinogens and using oral slope factors and an appropriate risk level (10^{-4} to 10^{-7}) for carcinogens, for adults consuming 6.5 g/d to 140 g/d or more of fish and shellfish (based on site-specific dietary data). Note: In this guidance document, EPA's Office of Water used a 6.5-g/d consumption rate, 70-kg adult body weight, and, for carcinogens, used a 10^{-6} risk level, 70-year exposure, and assumed no loss of contaminants during preparation or cooking. States may use other SVs for site-specific exposure scenarios by adjusting values for consumption rate, body weight, risk level, exposure period, and contaminant loss during preparation or cooking.	Use same SVs as in screening study.	Use same SVs as in screening study.
Sampling sites (see Section 6)	Sample target species at sites in each harvest area that have a high probability of contamination and at presumed clean sites as resources allow.	Sample target species at each site identified in the screening study where fish/shellfish tissue concentrations exceed SVs to assess the magnitude of contamination.	Sample at additional sites in the harvest area three size classes of the target species found to be contaminated in Phase I study to assess the geographic extent of the contamination in the waterbody.

See notes at end of table.

(continued)

Table 2-1 (continued)

Program element	Tier 1 Screening study	Tier 2 Intensive study (Phase I)	Tier 2 Intensive study (Phase II)
Sampling times (see Section 6)	Sample during legal harvest season when target species are most available to consumers. Ideally, sampling time should not include the spawning period for target species unless the target species can be legally harvested during this period.	Same as screening study.	Same as screening study.
Sample type (see Sections 6 and 7)	Collect composite fillet samples (skin on, belly flap included) for each target fish species and composite samples of edible portions of target shellfish species. The exceptions to the "skin on, belly flap included" recommendation is to use skin-off fillets for catfish and other scaleless species.	Same as screening study.	Same as screening study but collect composite samples for three size classes of each target species.
	OPTIONAL: States may use individual fish samples, whole fish, or other sample types, if necessary, to improve exposure estimates of local fish-, shellfish-, or turtle-consuming populations.	Same as screening stu...	Same as screening study.
Sample replicates (see Section 6)	Collect one composite sample for each target species. Collection of replicate composite samples is encouraged but is optional. If resources allow, collect a minimum of one replicate composite sample for each target species at 10% of the screening sites for QC.	Collect replicate composites for each target species at each Phase I site.	Collect replicate composites of three size classes for each target species at each Phase II site.

See notes at end of table.

(continued)

Table 2-1 (continued)

Program element	Tier 1 Screening study	Tier 2 Intensive study (Phase I)	Tier 2 Intensive study (Phase II)
Sample analysis (see Section 8)	Use standardized and quantitative analytical methods with limits of detection adequate to allow reliable quantitation of selected target analytes at or below SVs.	Use same analytical methods as in screening study.	Use same analytical methods as in screening study.
Data analysis and reporting (see Sections 6, 7, 8, and 9)	For each target species, compare target analyte concentrations of composite sample with SVs to determine which sites require Tier 2, Phase I, intensive study.	For each target species, compare target analyte arithmetic mean concentrations of replicate composite samples with SVs to determine which sites require Phase II intensive study. If resources are insufficient to conduct Phase II intensive study, conduct a risk assessment and assess the need for issuing a preliminary fish or shellfish consumption advisory.	For each of three size classes within each target species, compare target analyte arithmetic mean concentrations of replicate composite samples at each Phase II site with SVs to determine geographic extent of fish or shellfish contamination. Assess the need for issuing a final fish or shellfish consumption advisory.
	The following information should be reported for each target species at each site:	The following information should be reported for each target species at each site:	The following information should be reported for each of three size classes within each target species at each site:
	• Site location (e.g., sample site name, waterbody name, type of waterbody, and latitude/longitude)	• Same as screening study.	• Same as screening study.
	• Scientific and common name of target species	• Same as screening study	• Same as screening study

See notes at end of table.

(continued)

Table 2-1 (continued)

Program element	Tier 1 Screening study	Tier 2 Intensive study (Phase I)	Tier 2 Intensive study (Phase II)
Data analysis and reporting (continued)	• Sampling date and time	• Same as screening study	• Same as screening study
	• Sampling gear type used	• Same as screening study	• Same as screening study
	• Sampling depth	• Sampling depth	• Sampling depth
	• Number of QC replicates (optional)	• Number of replicates	• Same as Phase I study
	• Number of individual organisms used in the composite sample and in the QC replicate composite sample if applicable	• Number of individual organisms used in each replicate composite sample	• Same as Phase I study
	• Predominant characteristics of specimens used in the composite sample and in the QC replicate if applicable (e.g., life stage, age, sex, total length or body size) and description of fish fillet or edible parts of shellfish (tissue type) used	• Predominant characteristics of specimens used in each replicate composite sample (e.g., life stage, age, sex, total length or body size) and description of fish fillet or edible parts of shellfish (tissue type) used	• Same as Phase I study
	• Analytical methods used (including a method for lipid analysis) and method detection and quantitation limits for each target analyte.	• Same as screening study	• Same as screening study
	• Sample cleanup procedures	• Same as screening study.	• Same as screening study.
	• Data qualifiers	• Same as screening study.	• Same as screening study.
	• Percent lipid in each composite sample.	• Same as screening study.	• Same as screening study.

See notes at end of table.

(continued)

Table 2-1 (continued)

Program element	Tier 1 Screening study	Tier 2 Intensive study (Phase I)	Tier 2 Intensive study (Phase II)
Data analysis and reporting (continued)	• For each target analyte:	• For each target analyte:	• For each target analyte:
	- Total wet weight of composite sample (g) used in analysis	- Total wet weight of each replicate composite sample (g) used in analysis	- Same as Phase I study
	- Measured concentration (wet weight) in composite sample including units of measurement for target analyte	- Measured concentration (wet weight) in each replicate composite sample and units of measurement for target analyte	- Same as Phase I study
	- Measured concentration (wet weight) in the QC replicate, if applicable.	- Range of concentrations (wet weight) for each set of replicate composite samples	- Same as Phase I study
		- Mean (arithmetic) concentration (wet weight) for each set of replicate composite samples	- Same as Phase I study
		- Standard deviation of mean concentration (wet weight)	- Same as Phase I study
	- Evaluation of laboratory performance (i.e., description of all QA and QC samples associated with the sample(s) and results of all QA and QC analyses)	- Same as screening study	- Same as screening study
	- Comparison of measured concentration of composite sample with SV and clear indication of whether SV was exceeded	- Comparison of target analyte arithmetic mean concentration of replicate composite samples with SV using hypothesis testing and clear indication of whether the SV was exceeded	- Same as Phase I study

QA = Quality assurance.
QC = Quality control.
RfDs = Reference doses.
SVs = Screening values.

Table 4-1. Recommended Target Analytes[a]

Metals
- Arsenic (inorganic)
- Cadmium
- Mercury
- Selenium
- Tributyltin

Organochlorine Pesticides
- Chlordane, total (cis- and trans-chlordane, cis- and trans-nonachlor, oxychlordane)
- DDT, total (2,4'-DDD, 4,4'-DDD, 2,4'-DDE, 4,4'-DDE, 2,4'-DDT, 4,4'-DDT)
- Dicofol
- Dieldrin
- Endosulfan (I and II)
- Endrin
- Heptachlor epoxide[b]
- Hexachlorobenzene
- Lindane (γ-hexachlorocyclohexane; γ-HCH)[c]
- Mirex[d]
- Toxaphene

Organophosphate Pesticides[e]
- Chlorpyrifos
- Diazinon
- Disulfoton
- Ethion
- Terbufos

Chlorophenoxy Herbicides
- Oxyfluorfen

PAHs[f]

PCBs
- Total Aroclors[g]

Dioxins/furans[h,i]

PAHs = Polycyclic aromatic hydrocarbons.
PCBs = Polychlorinated biphenyls.

[a] States should include all recommended target analytes in screening studies, if resources allow, unless historic tissue or sediment data indicate that an analyte is not present at a level of concern for human health. Additional target analytes should be included in screening studies if States have site-specific information (e.g., historic tissue or sediment data, discharge monitoring reports from municipal and industrial sources, pesticide use application information) that these chemicals may be present at levels of concern for human health.

[b] Heptachlor epoxide is not a pesticide but is a metabolite of the pesticide heptachlor.

[c] Also known as γ-benzene hexachloride (γ-BHC).

[d] Mirex should be regarded primarily as a regional target analyte in the southeast and Great Lakes States, unless historic tissue, sediment, or discharge data indicate the likelihood of its presence in other areas.

[e] The reader should note that carbophenothion was included on the original list of target analytes. Because the registrant did not support reregistration of this chemical, it will no longer be used. For this reason and because of its use profile, carbophenothion was removed from the recommended list of target analytes.

[f] It is recommended that, in both screening and intensive studies, tissue samples be analyzed for benzo[*a*]pyrene, benz[*a*]anthracene, benzo[*b*]fluoranthene, benzo[*k*]fluoranthene, chrysene, dibenz[*a,h*]anthracene, and indeno[*1,2,3-cd*]pyrene, and that the order-of-magnitude relative potencies given for these PAHs in the EPA provisional guidance for quantitative risk assessment of PAHs (U.S. EPA, 1993c) be used to calculate a potency equivalency concentration (PEC) for each sample for comparison with the recommended SV for benzo[*a*]pyrene (see Section 5.3.2.3). At this time, EPA's recommendation for risk assessment of PAHs (U.S. EPA, 1993c) is considered provisional because quantitative risk assessment data are not available for all PAHs. This approach is under Agency review and over the next year will be evaluated as new health effects benchmark values are developed. Therefore, the method provided in this guidance document is subject to change pending results of the Agency's reevaluation.

[g] Analysis of total PCBs, as the sum of Aroclor equivalents, is recommended in both screening and intensive studies because of the lack of adequate toxicologic data to develop screening values (SVs) for individual PCB congeners (see Section 4.3.5). However, because of the wide range of toxicities among different PCB congeners and the effects of metabolism and degradation on Aroclor composition in the environment, congener analysis is deemed to be a more scientifically sound and accurate method for determining total PCB concentrations. Consequently, States that currently do congener-specific PCB analyses should continue to do so. Other States are encouraged to develop the capability to conduct PCB congener analysis.

[h] Note: The EPA Office of Research and Development is currently reassessing the human health effects of dioxins/furans.

[i] Dioxins/furans should be considered for analysis primarily at sites of pulp and paper mills using a chlorine bleaching process and at industrial sites where the following organic compounds are formulated: herbicides (containing 2,4,5-trichlorophenoxy acids and 2,4,5-trichlorophenol), hexachlorophene, pentachlorophenol, and PCBs (U.S. EPA, 1987d). It is recommended that the 2,3,7,8-substituted tetra- through octa-chlorinated dibenzo-*p*-dioxins (PCDDs) and dibenzofurans (PCDFs) be determined and a toxicity-weighted total concentration calculated for each sample (Barnes and Bellin, 1989; U.S. EPA, 1987d) (see Section 5.3.2.4). If resources are limited, 2,3,7,8-TCDD and 2,3,7,8-TCDF should be determined at a minimum.