

DRAFT

CHARACTERIZATION OF SAMPLES
FROM HAZARDOUS WASTE SITE INVESTIGATIONS

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In general, samples are taken as part of the investigation of hazardous waste sites for various reasons including the following:

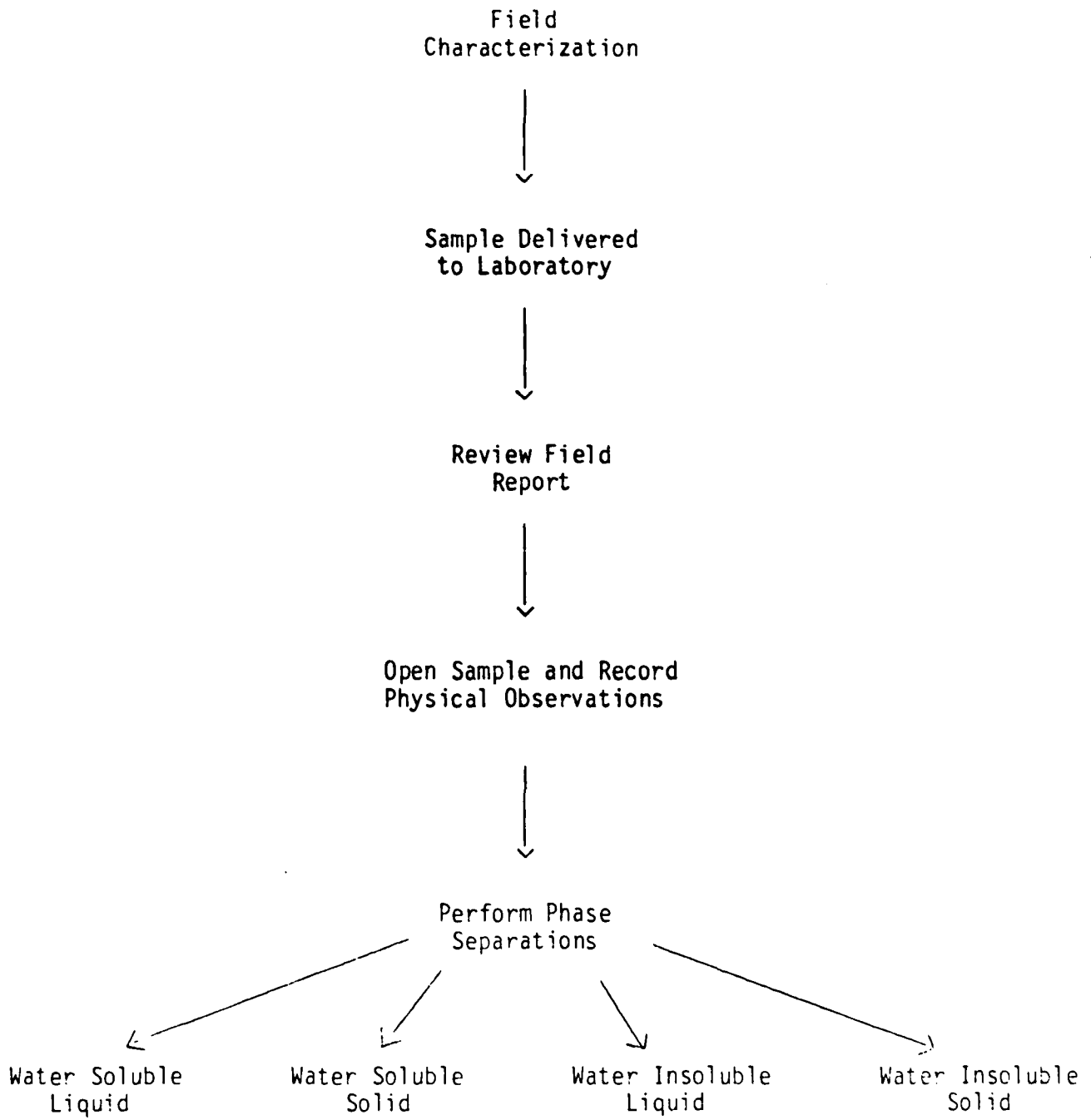
1. To determine if the wastes are hazardous as defined by Section 3001 of the Resource Conservation and Recovery Act (RCRA). A waste is defined as hazardous if it has the characteristics of ignitability, corrosivity, reactivity, or toxicity; or if it contains certain specific chemicals; or if it is from specific sources.
2. To determine whether the presence of a waste at a particular location represents an "imminent" hazard requiring immediate corrective action.
3. To determine whether the waste represents a potential hazard requiring eventual removal.
4. To characterize the material to determine an appropriate disposal solution.
5. To determine the levels of specific components such as PCB's or dioxin.

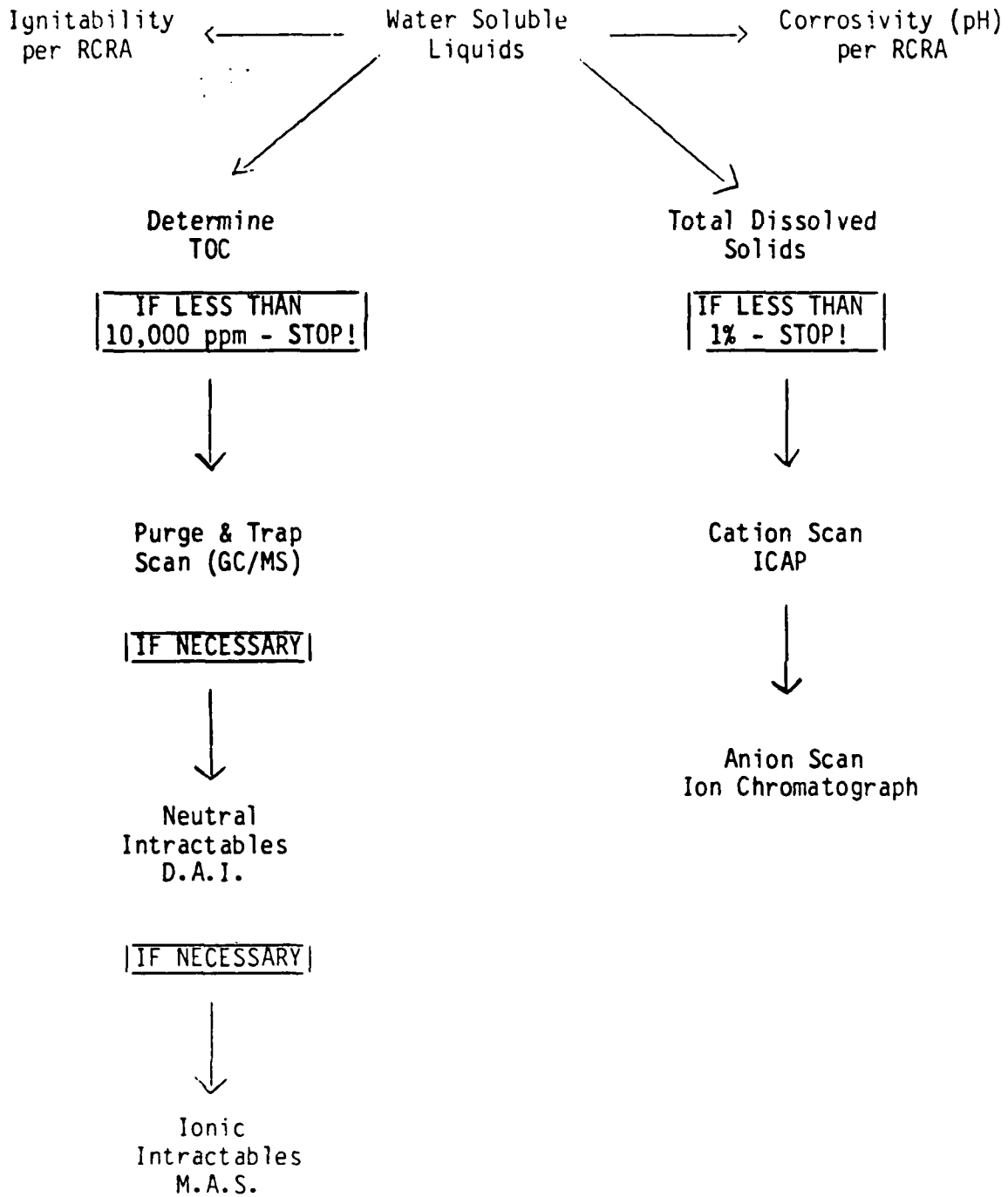
Very specific and detailed tests have been provided to determine the RCRA characteristics of ignitability, corrosivity, reactivity, and toxicity. Further characterization procedures are not well documented.

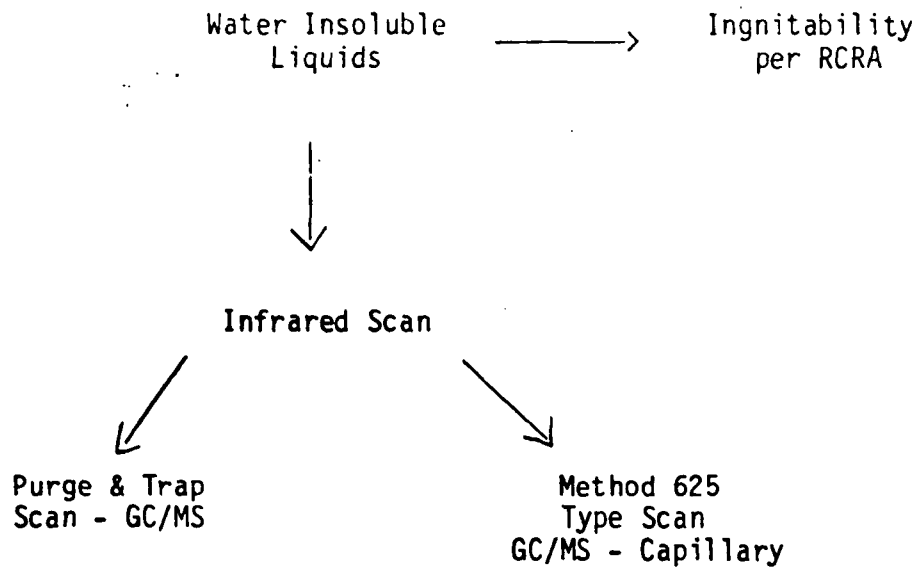
The purpose of this report is to describe methodology and procedures which characterize to the fullest extent practical samples taken from or near hazardous waste sites. The general objective is to identify and quantify all components down to the 1% by weight concentration level for samples taken directly from the site such as the contents of abandoned steel drums. The desired concentration level for off-site samples such as leachate or contaminated soil is generally 10 ppm. However, there may be occasions where lower detection levels will be required for specific compounds.

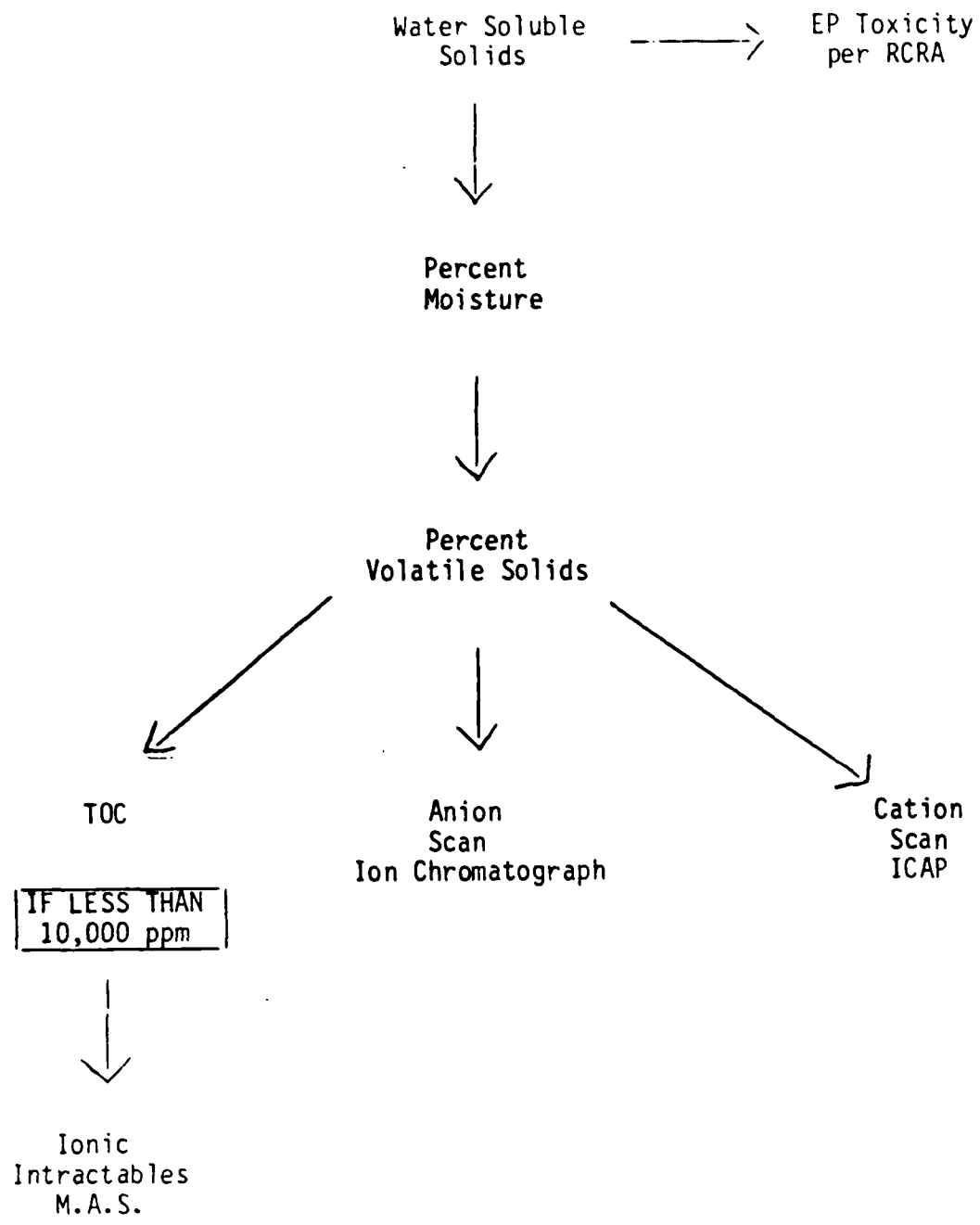
It should be noted that these objectives may not always be achievable in practice, especially for complex mixtures of wastes. Presently, there are more than 5 million known chemicals. A comprehensive analytical approach to identify and measure these chemicals does not exist. Such a task would be incredibly complex and time consuming. The approach taken here is to utilize established analytical methodology to measure components of current environmental concern while attempting to achieve a reasonable mass balance. Gross measurements such as total organic carbon will, therefore, often be utilized.

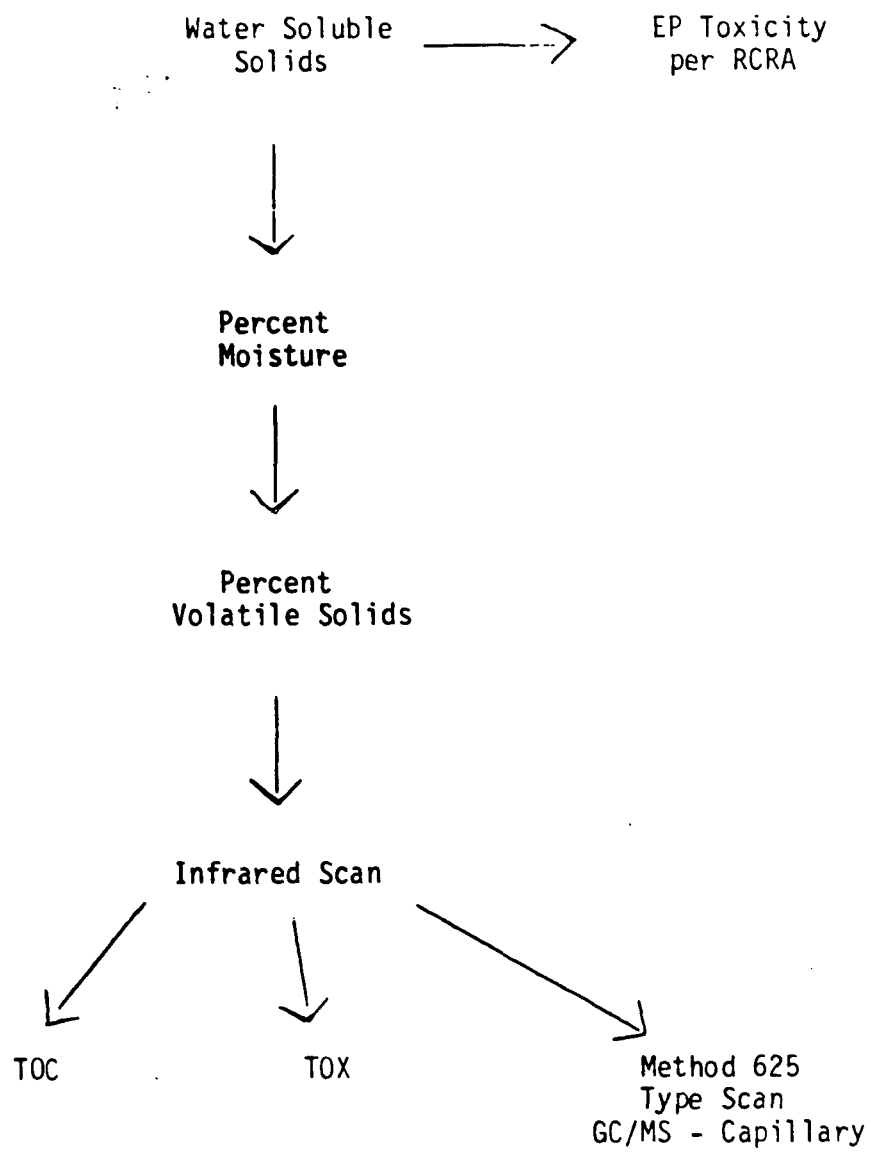
CHARACTERIZATION SCHEMATIC











REVIEW FIELD OBSERVATIONS

The first and perhaps most critical step prior to in-laboratory characterization is to review the field observations pertaining to a particular sample. The analyst should then make a judgment as to what analyses to perform, keeping in mind that the following step approach is merely a guideline. For example, if the sample was taken from a drum clearly labeled as ortho-chlorophenol (OCP), it would probably not be of value to perform any tests except one for OCP. If a reasonable mass balance is achieved (greater than 99% of the sample contents accounted for), then additional work would not be useful.

In reviewing the field observations keep in mind that many of the tests are merely screening methods which were not intended to be as detailed or comprehensive as in-laboratory methods. Carefully note any indications of unusual hazards (e.g., cyanides, sulfide, caustics, acids, explosives) and plan the laboratory procedures accordingly. Also plan for any low-level analyses which may be needed. For example, the presence of 1 ppm of TCDD may be more significant than the 99.999% by weight OCP in the previously mentioned sample.

DOCUMENTATION OF PHYSICAL APPEARANCE

The next step is to unpack the sample using standard laboratory safety procedures (see Appendix A) and to document the physical appearance of the sample. Specifically, note the number and types of phases, color, viscosity, weight, and opacity. Although it is recommended that odor observations not be deliberately made, any observed should be fully described along with any other organoleptic responses (e.g., caused headache, watery eyes, aftertaste).

PERFORM PHASE SEPARATIONS

This step can be omitted if the sample is obviously a single-phase homogenous system. Otherwise, it will be necessary to perform a phase separation by centrifugation or filtration as described in method 2. All phases accounting for 1% or more of the total sample must be retained and characterized separately.

DETERMINE WATER SOLUBILITY OF EACH PHASE

The water solubility of each phase should be determined as described in method 3. For the purpose of this characterization scheme, any phase which is soluble to the extent of 1 g per liter of water is categorized as water soluble. At this stage of characterization, the possible categories are water soluble liquids, water soluble solids, water insoluble liquids, and water insoluble solids.

CHARACTERIZATION OF WATER SOLUBLE LIQUIDS

A water soluble liquid will very often contain large amounts of water. However, occasionally significant amounts (>1% by weight) of dissolved materials may be present. This is determined by performing total organic carbon and total dissolved solids according to methods 4a and 5b, respectively. Further characterization will not be required if the TOC is less than 10,000 ppm and the TDS is less than 1% by weight.

CHARACTERIZATION OF WATER SOLUBLE LIQUIDS (TOC >10,000 ppm)

Dilute the sample and perform a purge and trap analysis per method 6a. If the TOC can be accounted for, then further characterization is unnecessary. Otherwise, perform analyses for neutral intractables (e.g., methanol, acetone) by method 7a and ionic intractables (e.g., formates, acetates) by method 8a.

CHARACTERIZATION OF WATER SOLUBLE LIQUIDS (>1% by weight TDS)

Perform cation characterization by method 9a. Perform anion characterization by method 10a.

CHARACTERIZATION OF WATER INSOLUBLE LIQUIDS

This category would include many petroleum derived products such as fuel oil, benzene, gasoline, crude oil, and crankcase oil. An infrared scan should be done according to method 11a to determine the types of functional groups which are present. Further characterization should be performed on dilutions following methods 6b (purge and trap) and 12a (GC/MS scan of methylene chloride solution).

CHARACTERIZATION OF WATER SOLUBLE SOLIDS

This category would include many inorganic and low molecular weight organic salts. The first step is to determine the water or moisture content of the solid using method 13a. The percent of volatile solids should be determined using method 14a. Other tests to be performed include a cation scan (method 9b), an anion scan (method ___), and TOC (method 4b). If the TOC result is greater than 10,000 ppm, further characterization of ionic intractables (method 8b) should be performed.

CHARACTERIZATION OF WATER INSOLUBLE SOLIDS

This category would include high molecular weight organics, polymers, plastics, many man-made objects and debris, and insoluble salts. The first step is to determine the water content or percent moisture (method 13b) and percent volatile solids (method 14b). An infrared scan (method 11b) should be performed on a KBr pellet. Further characterization includes TOC, TOX, and GC/MS scan on methylene chloride extracts by methods 4c, 5a, and 6b, respectively.