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COMPREHENSIVE REVIEW OF COMMON LABORATORY ARTIFACTS DETECTED IN ENVIRONMENTAL SAMPLES CNC CHARLESTON SC

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To: Project Team Members

From: Charles Vernoy CV

Subject: A Comprehensive Review of Common Laboratory Artifacts Detected in Environmental Samples from the Charleston Naval Base

Date: February 12, 1998

A COMPREHENSIVE REVIEW OF COMMON LABORATORY ARTIFACTS DETECTED IN ENVIRONMENTAL SAMPLES FROM THE CHARLESTON NAVAL BASE

This memo serves as a technical review of possible industrial, laboratory and field sampling uses of common laboratory chemicals that have also been detected in varying media and concentrations at the Charleston Naval Base. The purpose of this memo is to show possible paths of introduction of these chemicals into the environmental samples through various pathways. Heartland Environmental Services, Inc. did an independent literature search to supplement this memo. Heartland's text and references are featured as Attachment A. Since much of the blame for common artifacts in environmental samples is usually placed on the laboratory, a brief discussion on the role of the laboratory is needed.

Under the Resource Conservation Recovery Act (RCRA) and the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) investigations, environmental samples are routinely collected by field personnel and sent to analytical laboratories for analysis to determine if contaminants of concern are present and at significant concentrations to pose a risk to either human or ecological assessments. Laboratories selected to analyze environmental samples often go through intensive laboratory auditing processes either by the client's representatives or by individual government agencies or its appointee to assess a laboratory's capabilities. After successful completion of the audit and successful analysis of performance evaluation (PE) samples, the laboratory will become certified or given a stamp of approval. The laboratory then performs laboratory analysis of samples using regulated methods promulgated throughout the United States.

The RCRA methods commonly called SW-846 and the CERCLA methods called CLP, give step by step instructions on how a laboratory must follow the laboratory procedures. Built into these methods are quality controls and standards a laboratory must adhere to in order for data to be acceptable. A laboratory must make every effort to meet these quality control requirements or face the possibility of the data not being acceptable or non compliant by a data validator. When the laboratory has shown through data validation that the data is compliant but unexplainable results show up for chemicals like acetone, methylene chloride, and bis(2-Ethylhexyl)phthalate (BEHP), a more thorough review of the data is needed.

It is the objective of the data user to try to understand the usage of these chemicals. The where and why of common contaminants being detected also needs to be explained before a judgement can be made of the data. In that respect historical data plays a very important role in determining the usefulness of the data and understanding how the laboratory operates supplements that role. But normal standard operating procedures of laboratory and field personnel can lead to contamination of samples with acetone, methylene chloride and BEHP.

Acetone and methylene chloride are parameters listed in USEPA SW-846 method 8260 and USEPA CLP volatile organic analysis method. Both chemicals are used throughout the laboratory in extraction and cleanup solvents (VOA methods do not use extraction and cleanup procedures)

for soils and water samples. Acetone, derived from the oxidation of isopropyl alcohol, is used primarily in industry in paints, varnish, and lacquer solvent. A laboratory will use acetone to dissolve semivolatile compounds for stock standard solutions for method SW-846 8270 and in a solvent solution (300ml 1:1) with either methylene chloride or hexane used in sample quantitative extraction methods for soils. The EPA approved extraction methods that a laboratory uses for soils/solids samples are solid phase, soxhlet, pressurized fluid, and ultrasonic. Analytical clean up procedures, used to help eliminate sample interference and false positives and negatives, such as alumina, florisil, silica, acid-base partition, and sulfur also use acetone as an extraction solvent (100 ml). Specifically to the Charleston Naval Base, acetone is used in extractions of solids for methods 8080A, 8081A, 8082 (pesticides and PCBs) 8141A (organophosphorus pesticides), 8150B (herbicides) and 8270C (semivolatiles).

Methylene chloride, derived from the chlorination of methyl chloride, is used primarily in industry in paint removers and solvent degreasing. A laboratory uses methylene chloride to prepare the Gas Chromatography/ Mass Spectrometry (GC/MS) tuning standard for method 8270, as a solvent solution with acetone (300 ml total solvent at 1:1 for each sample) used in sample quantitative extraction methods for soils and as a stand alone solvent (500 ml) for water samples. The EPA approved extraction methods that a laboratory uses for water samples are liquid-liquid, continuous liquid-liquid, and solid phase. Methylene chloride is used in sample analytical clean up procedures such as alumina, florisil, silica gel, gel permeation, and acid-base partition (100 ml) which help to eliminate interferences.

Methylene chloride is used as a precleaning agent for sodium sulfate which is used after every extraction and cleanup procedure as a drying agent to remove moisture from extracts. Methylene chloride is also used as a rinse for the polytetrafluoroethylene (PTFE) boiling chips needed to help concentrate down the volumes of extraction and cleanup solvents produced for every sample to the correct volume. Both the sodium sulfate and the boiling chips are to be dried in an oven for several hours before usage and stored in glass containers and not plastic to prevent cross contamination from BHEP. Specifically to the Charleston Naval Base, methylene chloride is used in extractions of liquids for methods 8080A, 8081A, 8082 (pesticides and PCBs) 8141A (organophosphorus pesticides), 8150B (herbicides), 8270C (semivolatiles), and 8290 (dioxin). Another possible pathway of methylene chloride contamination according to method 8260A is **"Laboratory clothing worn by the analyst should be clean, since clothing previously exposed to methylene chloride fumes during liquid/liquid extraction procedures can contribute to sample contamination."** As an additional precaution it is extremely important that air ventilation systems do not lead between the extraction labs and volatile analysis labs as acetone and methylene chloride will contaminate samples.

BEHP is derived from the reaction of 2-ethylhexanol and phthalic anhydride and is used in industry as a plasticizer for many resins and elastomers and as a liquid in vacuum pumps. Laboratories do not use BEHP for any extractions or as a cleanup agent but BEHP can come in

contact with environmental samples in other ways. If sample containers have plastic lids instead of screw caps lined with Teflon septas, possible contamination from phthalates (BEHP) can be seen in the samples. As noted in method 8080A of the USEPA SW-846 Test Methods, other phthalate interferences are discussed as follows " **Interferences by phthalate esters can pose a major problem in pesticide determinations when using the electron capture detector. These compounds generally appear in the chromatogram as large late-eluting peaks, especially in the 15% and 50% fractions from Florisil clean-up. Common flexible plastics contain varying amounts of phthalates. These phthalates are easily extracted or leached from such materials during laboratory operations. Cross contamination of clean glassware routinely occurs when plastics are handled during extraction steps, especially when solvent-wetted surfaces are handled. Interferences from phthalates can best be minimized by avoiding contact with any plastic materials. Exhaustive cleanup of reagents and glassware may be required to eliminate background phthalate contamination."** Method 8061A (Phthalate Esters by Gas Chromatography) goes into further detail discussing Soxhlet extractors and possible cross contamination in using them. **"If Soxhlet extractors are baked in the muffle furnace, care must be taken to ensure that they are dry. Thorough rinsing with hot tap water, followed by deionized water and acetone, is not an adequate decontamination procedure. Even after a Soxhlet extractor was refluxed with acetone for three days, with daily solvent changes, the concentration of bis(2-Ethylhexyl)phthalate was as high as 500 ng per washing. Storage of glassware in the laboratory introduces contamination, even if the glassware is wrapped in aluminum foil. Therefore, any glassware used in Method 8061 should be cleaned immediately prior to use".** The method goes on to state that **"Florisil and alumina may be contaminated with phthalate esters and, therefore, use of these materials in sample cleanup should be employed cautiously. Washing of these materials prior to use with the solvent(s) used for elution during extract cleanup was helpful, however, heating at 320°C for Florisil and 210°C for alumina is recommended. Phthalate esters were detected in Florisil cartridge method blanks at concentrations ranging from 10 to 460 ng, with 5 phthalate esters in the 105 to 460 ng range. Complete removal of the phthalate esters from Florisil cartridges does not seem possible, and it is therefore desirable to keep the steps involved in sample preparation to a minimum."** As with acetone and methylene chloride, BEHP may have pathways of contamination inadvertently leading to environmental samples if extreme caution and care are not taken in the laboratory to prevent them. Pathways of possible contamination do not solely belong to the laboratory. Field sampling procedures need to be scrutinized in depth as well to help eliminate cross contamination.

Field sampling procedures may lead to possible contamination of samples. Plastic sheeting and gloves are routinely used to keep both the sampling area and field personnel contaminate free but caution needs to be taken to prevent cross contamination to samples. Sampling tools such as stainless steel trowels, teflon trowels and teflon tubing should remain covered with aluminum foil until the point of sampling so as not to come in contact with the plastic sheeting. When wearing plastic gloves the sampler needs to use extra caution so that none of the sample comes in contact

with the glove as the sample bottle is being filled and possibly causing a cross contamination with phthalates.

It is also necessary to follow proper sampling decontamination procedures to help prevent cross contamination. Though there are no solvents used for decontamination on the Charleston Naval Base that are listed on the VOA method list, isopropyl alcohol is used as a solvent rinse on sampling equipment as described in the CSAP. Extreme caution needs to be taken when using isopropyl alcohol for decontamination. When using isopropyl alcohol as a rinse after Alconox detergent and DI water wash, the alcohol must be throughly rinsed with DI water and allowed to completely dry before additional samples are taken. If too much alcohol is used, or too little DI water for a final rinse, samples can show increased levels of acetone when analyzed.

A base wide review of the data showed acetone was randomly showing up in samples throughout the Naval Base. To help narrow down the possible routes of exposure of acetone to the samples, a decontamination experiment was conducted in the Fall of 1996 and blind samples were collected and sent to Southwest Laboratories to be analyzed.

Three blind soil samples and one water sample spiked with isopropyl alcohol were sent to the lab to be analyzed using method 8260. The equipment used to collect the sample was a hand auger. One sample was taken following the decontamination procedures listed in the CSAP and after the auger was let to dry. One soil sample was taken following the new EPA decontamination procedures set forward in their August 1996 audit. The audit stated that a smaller amount of DI water (using a squirt bottle filled with DI water to rinse off the alcohol instead of the larger amounts previously used) was to be used. One sample was also taken using a hand auger that was wrapped in tin foil and stored in the field trailer. As an added bonus, one water vial was spiked with a few drops of isopropyl alcohol. A trip blank was also submitted for analysis in case of any carryover contaminants.

The hand auger that was wrapped in foil had acetone detected at 10 ppb with no TICs reported. Using the August 1996 EPA audit decontamination procedures, acetone was detected at 200 ppb with TICs of isopropyl alcohol at 190 ppb. The concentration of isopropyl alcohol is estimated due to the fact that the laboratory is not required to establish instrument calibration criteria on TICs. Using the CSAP decontamination procedures, acetone was detected at 31 ppb with no tentatively identified compounds (TICs). The water spike showed acetone at 2900 and a TIC of isopropyl alcohol at 180000 ppb. The results of the water spike are estimated due to the sample having to be diluted in order for the instrument to properly quantify the results. The concentration of isopropyl alcohol is estimated due to the fact that the laboratory is not required to establish instrument calibration criteria on TICs.

It is apparent that sampling equipment needs to be rinsed heavily with DI water when required to use isopropyl alcohol as a decontamination step, and let it air dry as long as possible to help eliminate the possibility of cross contamination of unwanted acetone. It is not acceptable to have a bucket of DI water at the end of the decontamination line that is used all day without changing the water frequently. This happens far too many times. Isopropyl alcohol builds up and contributes to the cross contamination of samples with acetone.

For the data reviewer the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review state that acetone, methylene chloride and BEHP are common contaminants and certain rules such as the 10X rule need to be followed when evaluating blanks (lab or field) along with the samples. A caveat to this rule is when equipment and rinsate blanks are taken at the beginning of the day in ideal conditions and not after a full day of sampling, say when isopropyl alcohol has saturated the DI water bucket. This causes the reviewer to scrutinize data between blanks and samples that have not been collected by the same procedures.

As stated earlier, a base wide review of the data was performed on acetone, methylene chloride, and BEHP results to determine if there were treads developing that might shed some light on whether the results were site related or due to cross contamination. The quarterly groundwater monitoring program for all of the individual zones was evaluated in depth due to the concerns posed by the project team. All of the well data collected to date was printed out to see if analytical results showed repeated detections of acetone, methylene chloride, and BEHP. A comparison of soil data (soil borings and Direct Push Technology (DPT) in close proximity to monitoring wells was also made to see if possible leaching to groundwater could have occurred. When reviewing possible soil leaching of contaminants, the soil screening levels (SSL) along with history of the site, need to be considered before a final assessment of the data is made. The SSL for acetone is 8000 ppb (μg/kg), methylene chloride is 10 ppb, and BEHP is 11,000 ppb.

The well ID 638001 from Zone G had acetone results that appeared in two of the groundwater monitoring rounds (3rd and 4th) at concentrations of 3 and 7 ppb. Three wells in Zone H show results that appear in multiple rounds. Well ID 009005 had results of acetone of 11.7 and 19 ppb in the 1st and 3rd respectively. Well ID 009009 had results of acetone of 22 and 4 ppb in the 2nd and 4th rounds and well ID 017005 had acetone results of 17.9 and 360 ppb in the 1st and 3rd rounds.

A review of the soil borings near the above mentioned wells showed that boring ID 638004, taken approximately 75 feet from the well, had a second interval acetone result of 120 ppb. Boring IDs GDHSB056 and GDHSB057 which were located approximately 175 ft. from well 009009 had detections of 27 and 17 ppb respectively. Boring ID 009SB005, taken where a well was constructed, did not have a detection for acetone.

A review of the acetone results for DPT samples in Zone A showed no correlation to the nearest well pair 03915 and 15D and the DPT samples taken in Zone F at AOC 607 did not have acetone detections. Four second round groundwater DPT samples were taken in Zone L because of first round detections of acetone in either soil and/or water DPT samples. Samples 037GP001, 037SP002, 037GP002, and 037GP003 in subzone F had detections of 65.8 ppb, 12.9 ppb, 5.63 ppb, and 7.03 ppb respectively. The second round samples for 037GP001 and 037GP003 did not have detections for acetone and sample 037GP002 had a result of 2 ppb.

Sample 037GP032 in subzone C had a first round detection of 683 ppb for acetone. The second round sample had a result of 15 ppb.

A review of the methylene chloride results showed well ID 009007 showing results of 130, 68, and 330 ppb in the 2nd , 3rd and 4th rounds and well ID 017002 showing methylene chloride showing results of 520 and 240 ppb in the 2nd and 3rd rounds. The review of the soil borings collected around the vicinity of those wells showed no detections of methylene chloride. There was also no correlation between the DPT samples collected in Zones A and F and the wells that are in the vicinity of the DPT samples.

A review of the BEHP data shows that in Zone E well ID GDE009 had detections of 2 and 10 ppb for the 1st and 2nd rounds of data and well ID GDE09D had detections of 1 and 5 ppb for the 1st and 2nd rounds. The review of the soil borings for those wells showed non detects. Well ID 663002 in Zone H had detections of 180 and 59 ppb for the 3rd and 4th rounds and one soil boring, 663SB002 had a detection of 131 ppb of BEHP. Well ID 014003 had detections of 5 and 2 ppb for the 1st and 4th rounds. The site 684 soil borings taken around the well showed no detections for BEHP. Well ID 178001 had detections of 530 and 290 ppb in the 2nd and 3rd rounds. The site 178
borings taken around the well showed no detections for BEHP. Well ID GDH06D had BEHP detections of 3.9 and 230 ppb for the 1st and 2nd rounds. Soil boring GDHSB006 did not have detections of BEHP. Well ID GDH09D had detections of 6.9 and 2 ppb in the 2nd and 3rd rounds. The soil borings GDH076, GDH084 and GDH085 did not have detections of BEHP.

Heartland Environmental's task was to investigate the possible uses of methylene chloride at industrial and Department of Defense facilities and the possibility of acetone being a contaminant in isopropyl alcohol. Of particular interest is the information from Fisher Scientific Company that specifies isopropyl alcohol contains .002% (20ppm) of acetone. The type of isopropyl alcohol used at NAVBASE Charleston is the type Fisher's analytical reports discusses. Attachment B includes documentation from various USEPA resources as a supplement to this memo.

ATTACHMENT A

POSSIBLE ACETONE INTERFERENCES

5.3.1 Prepare stock standard solutions by accurately weighing about 0.0100 g of pure material. Dissolve the material in pesticide quality acetone or other suitable solvent and dilute to volume in a 10-mL volumetric flask. Larger volumes can be used at the convenience of the analyst. When compound purity is assayed to be 96% or greater, the weight may be used without correction to calculate the concentration of the stock standard. Commercially-prepared stock standards may be used at any concentration if they are certified by the manufacturer or by an independent source.

5.3.2 Transfer the stock standard solutions into bottles with PTFE-lined screw-caps. Store, protected from light, at -10°C or less or as recommended by the standard manufacturer. Stock standard solutions should be checked frequently for signs of degradation or evaporation, especially just prior to preparing calibration standards from them.

5.3.3 Stock standard solutions must be replaced after 1 year or sooner if comparison with quality control check samples indicates a problem.

5.3.4 It is recommended that nitrosamine compounds be placed together in a separate calibration mix and not combined with other calibration mixes. When using a premixed certified standard, consult the manufacturer's instructions for additional guidance.

5.3.5 Mixes with hydrochloride salts may contain hydrochloric acid, which can cause analytical difficulties. When using a premixed certified standard, consult the manufacturer's instructions for additional guidance.

5.4 Internal standard solutions - The internal standards recommended are 1,4-dichlorobenzene-d_4, naphthalene-d_8, acenaphthene-d_{10}, phenanthrene-d_{10}, chrysene-d_{12}, and perylene-d_{12} (see Table 5). Other compounds may be used as internal standards as long as the requirements given in Sec. 7.3.2 are met.

5.4.1 Dissolve 0.200 g of each compound with a small volume of carbon disulfide. Transfer to a 50 mL volumetric flask and dilute to volume with methylene chloride so that the final solvent is approximately 20% carbon disulfide. Most of the compounds are also soluble in small volumes of methanol, acetone, or toluene, except for perylene-d_{12}. The resulting solution will contain each standard at a concentration of 4,000 ng/µL. Each 1 mL sample extract undergoing analysis should be spiked with 10 µL of the internal standard solution, resulting in a concentration of 40 ng/µL of each internal standard. Store at -10°C or less when not in use. When using premixed certified solutions, store according to the manufacturer's documented holding time and storage temperature recommendations.

5.4.2 If a more sensitive mass spectrometer is employed to achieve lower detection levels, a more dilute internal standard solution may be required. Area counts of the internal standard peaks should be between 50-200% of the area of the target analytes in the mid-point calibration analysis.

5.5 GC/MS tuning standard - A methylene chloride solution containing 50 ng/µL of decafluorotriphenylphosphine (DFTPP) should be prepared. The standard should also contain 50 ng/µL each of 4,4'-DDT, pentachlorophenol, and benzidine to verify injection port inertness and GC column performance. Store at -10°C or less when not in use. If a more sensitive mass spectrometer is employed to achieve lower detection levels, a more dilute tuning solution may be necessary. When using premixed certified solutions, store according to the manufacturer's documented holding time and storage temperature recommendations.

5.2 Organic-free reagent water - All references to water in this method refer to organic-free reagent water, as defined in Chapter One.

5.3 Solvents

5.3.1 Hexane, C_6H_{14} - Pesticide quality or equivalent.

5.3.2 Acetone, CH_3COCH_3 - Pesticide quality or equivalent.

5.3.3 Toluene, $C_6H_5CH_3$ - Pesticide quality or equivalent.

5.3.4 Isooctane, $(CH_3)_3CCH_2CH(CH_3)_2$ - Pesticide quality or equivalent.

5.4 Stock standard solutions:

5.4.1 Prepare stock standard solutions at a concentration of 1000 mg/L by dissolving 0.0100 g of assayed reference material in isooctane and diluting to volume in a 10 mL volumetric flask. A small volume of toluene may be necessary to put some pesticides in solution. Larger volumes can be used at the convenience of the analyst. When compound purity is assayed to be 96% or greater, the weight can be used without correction to calculate the concentration of the stock standard. Commercially prepared stock standards can be used at any concentration if they are certified by the manufacturer or by an independent source.

5.4.2 Transfer the stock standard solutions into vials with Teflon-lined screw caps or crimp tops. Store at 4°C and protect from light. Stock standards should be checked frequently for signs of degradation or evaporation, especially just prior to preparing calibration standards from them.

5.4.3 Stock standard solutions must be replaced after one year, or sooner if comparison with check standards indicates a problem.

5.5 Calibration standards: Calibration standards at a minimum of five concentrations for each parameter of interest are prepared through dilution of the stock standards with isooctane. One of the concentrations should be at a concentration near, but above, the method detection limit. The remaining concentrations should correspond to the expected range of concentrations found in real samples or should define the working range of the GC. Calibration solutions must be replaced after six months, or sooner, if comparison with check standards indicates a problem.

5.6 Internal standards (if internal standard calibration is used): To use this approach, the analyst must select one or more internal standards that are similar in analytical behavior to the compounds of interest. The analyst must further demonstrate that the measurement of the internal standard is not affected by method or matrix interferences. Because of these limitations, no internal standard can be suggested that is applicable to all samples.

5.6.1 Prepare calibration standards at a minimum of five concentrations for each analyte of interest as described in Sec. 5.5.

Compound	CAS Registry No.
Chloropropylate	99516-95-7
Chlorothalonil	1897-45-6
DCPA	1861-32-1
Dichlone	117-80-6
Dicofol	115-32-2
Etridiazole	2593-15-9
Halowax-1000	58718-66-4
Halowax-1001	58718-67-5
Halowax-1013	12616-35-2
Halowax-1014	12616-36-3
Halowax-1051	2234-13-1
Halowax-1099	39450-05-0
Mirex	2385-85-5
Nitrofen	1836-75-5
PCNB	82-68-8
Permethrin	51877-74-8
Perthane	72-56-0
Propachlor	1918-16-7
Strobane	8001-50-1
trans-Nonachlor	39765-80-5
Trifluralin	1582-09-8

1.11 Kepone extracted from samples or standards exposed to water or methanol may produce peaks with broad tails that elute later than the standard by up to 1 minute. This shift is presumably the result of the formation of a hemi-acetal from the ketone functionality. As a result, Method 8081 is not recommended for determining Kepone. Method 8270 may be more appropriate for the analysis of Kepone.

2.0 SUMMARY OF METHOD

2.1 A measured volume or weight of sample (approximately 1 L for liquids, 2 g to 30 g for solids) is extracted using the appropriate matrix-specific sample extraction technique.

2.2 Liquid samples are extracted at neutral pH with methylene chloride using either Method 3510 (separatory funnel), Method 3520 (continuous liquid-liquid extractor), or other appropriate technique.

2.3 Solid samples are extracted with hexane-acetone (1:1) or methylene chloride-acetone (1:1) using Method 3540 (Soxhlet), Method 3541 (automated Soxhlet), Method 3545 (pressurized fluid extraction), Method 3550 (ultrasonic extraction), or other appropriate technique.

2.4 A variety of cleanup steps may be applied to the extract, depending on the nature of the matrix interferences and the target analytes. Suggested cleanups include alumina (Method 3610), Florisil (Method 3620), silica gel (Method 3630), gel permeation chromatography (Method 3640), and sulfur (Method 3660).

30 m x 0.53 mm ID fused silica capillary column chemically bonded with 50 percent phenyl methylpolysiloxane (DB-1701, or equivalent), 1.0 µm film thickness.

Column pair 1 is mounted in a press-fit Y-shaped glass 3-way union splitter (J&W Scientific, Catalog No. 705-0733) or a Y-shaped fused-silica connector (Restek, Catalog No. 20405), or equivalent.

4.2.3.2 Column pair 2

30 m x 0.53 mm ID fused silica capillary column chemically bonded with SE-54 (DB-5, SPB-5, RTx-5, or equivalent), 0.83 µm film thickness.

30 m x 0.53 mm ID fused silica capillary column chemically bonded with 50 percent phenyl methylpolysiloxane (DB-1701, or equivalent), 1.0 µm film thickness.

Column pair 2 is mounted in an 8 in. deactivated glass injection tee (Supelco, Catalog No. 2-3665M), or equivalent.

4.3 Column rinsing kit: Bonded-phase column rinse kit (J&W Scientific, Catalog No. 430-3000), or equivalent.

4.4 Volumetric flasks, 10-mL and 25-mL, for preparation of standards.

5.0 REAGENTS

5.1 Reagent grade or pesticide grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available. Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

NOTE: Store the standard solutions (stock, composite, calibration, internal, and surrogate) at 4°C in polytetrafluoroethylene (PTFE)-sealed containers in the dark. When a lot of standards is prepared, it is recommended that aliquots of that lot be stored in individual small vials. All stock standard solutions must be replaced after one year or sooner if routine QC tests (Sec. 8.0) indicate a problem. All other standard solutions must be replaced after six months or sooner if routine QC (Sec. 8.0) indicates a problem.

5.2 Solvents used in the extraction and cleanup procedures (appropriate 3500 and 3600 series methods) include n-hexane, diethyl ether, methylene chloride, acetone, ethyl acetate, and isooctane (2,2,4-trimethylpentane) and must be exchanged to n-hexane or isooctane prior to analysis.

Therefore, n-hexane and isooctane will be required in this procedure. Acetone or toluene may be required for the preparation of some standard solutions (see Sec. 5.4.2). All solvents should be pesticide quality or equivalent, and each lot of solvent should be determined to be phthalate free.

5.3 Organic-free reagent water - All references to water in this method refer to organic-free reagent water as defined in Chapter One.

5.7.2 1-bromo-2-nitrobenzene is suggested as an internal standard for the dual-column analysis. Prepare a solution of 5000 mg/L (5000 ng/µL) of 1-bromo-2-nitrobenzene. Spike 10 µL of this solution into each 1 mL of sample extract.

5.8 Surrogate standards

The performance of the method should be monitored using surrogate compounds. Surrogate standards are added to all samples, method blanks, matrix spikes, and calibration standards. The following compounds are recommended as possible surrogates.

5.8.1 Decachlorobiphenyl and tetrachloro-m-xylene have been found to be a useful pair of surrogates for both the single-column and dual-column configurations. Method 3500, Sec. 5.0, describes the procedures for preparing these surrogates.

5.8.2 4-Chloro-3-nitrobenzotrifluoride may also be useful as a surrogate if the chromatographic conditions of the dual-column configuration cannot be adjusted to preclude co-elution of a target analyte with either of the surrogates in Sec. 5.8.1. However, this compound elutes early in the chromatographic run and may be subject to other interference problems. A recommended concentration for this surrogate is 500 ng/µL. Use a spiking volume of 100 µL for a 1-L aqueous sample.

5.8.3 Store surrogate spiking solutions at 4°C in PTFE-sealed containers in the dark.

6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

6.1 See Chapter Four, Organic Analytes, Sec. 4.0, for sample collection and preservation instructions.

6.2 Extracts must be stored under refrigeration in the dark and analyzed within 40 days of extraction.

7.0 PROCEDURE

7.1 Sample extraction

Refer to Chapter Two and Method 3500 for guidance in choosing the appropriate extraction procedure. In general, water samples are extracted at a neutral pH with methylene chloride using a separatory funnel (Method 3510) or a continuous liquid-liquid extractor (Method 3520), or other appropriate technique. Solid samples are extracted with hexane-acetone (1:1) or methylene chloride-acetone (1:1) using one of the Soxhlet extraction (Method 3540 or 3541), pressurized fluid extraction (Method 3545), ultrasonic extraction (Method 3550), or other appropriate technique.

NOTE: Hexane-acetone (1:1) may be more effective as an extraction solvent for organochlorine pesticides in some environmental and waste matrices than is methylene chloride-acetone (1:1). Relative to the methylene chloride-acetone mixture, use of hexane-acetone generally reduces the amount of interferences that are extracted and improves signal-to-noise.

in the dark. When a lot of standards is prepared, it is recommended that aliquots of that lot be stored in individual small vials. All stock standard solutions must be replaced after one year or sooner if routine QC (Sec. 8.0) indicates a problem. All other standard solutions must be replaced after six months or sooner if routine QC (Sec. 8.0) indicates a problem.

5.2 Sample extracts prepared by Methods 3510, 3520, 3540, 3541, 3545, or 3550 need to undergo a solvent exchange step prior to analysis. The following solvents are necessary for dilution of sample extracts. All solvent lots should be pesticide quality or equivalent and should be determined to be phthalate-free.

5.2.1 n-Hexane, C_6H_{14}

5.2.2 Isooctane, $(CH_3)_3CCH_2CH(CH_3)_2$

5.3 The following solvents may be necessary for the preparation of standards. All solvent lots must be pesticide quality or equivalent and should be determined to be phthalate-free.

5.3.1 Acetone, $(CH_3)_2CO$

5.3.2 Toluene, $C_6H_5CH_3$

5.4 Organic-free reagent water - All references to water in this method refer to organic-free reagent water as defined in Chapter One.

5.5 Stock standard solutions (1000 mg/L) - May be prepared from pure standard materials or can be purchased as certified solutions.

5.5.1 Prepare stock standard solutions by accurately weighing about 0.0100 g of pure compound. Dissolve the compound in isooctane or hexane and dilute to volume in a 10-mL volumetric flask. If compound purity is 96 percent or greater, the weight may be used without correction to calculate the concentration of the stock standard solution.

5.5.2 Commercially-prepared stock standard solutions may be used at any concentration if they are certified by the manufacturer or by an independent source.

5.6 Calibration standards for Aroclors

5.6.1 A standard containing a mixture of Aroclor 1016 and Aroclor 1260 will include many of the peaks represented in the other five Aroclor mixtures. As a result, a multi-point initial calibration employing a mixture of Aroclors 1016 and 1260 at five concentrations should be sufficient to demonstrate the linearity of the detector response without the necessity of performing initial calibrations for each of the seven Aroclors. In addition, such a mixture can be used as a standard to demonstrate that a sample does not contain peaks that represent any one of the Aroclors. This standard can also be used to determine the concentrations of either Aroclor 1016 or Aroclor 1260, should they be present in a sample. Prepare a minimum of five calibration standards containing equal concentrations of both Aroclor 1016 and Aroclor 1260 by dilution of the stock standard with isooctane or hexane. The concentrations should correspond to the expected range of concentrations found in real samples and should bracket the linear range of the detector.

7.0 PROCEDURE

7.1 Sample extraction

7.1.1 Refer to Chapter Two and Method 3500 for guidance in choosing the appropriate extraction procedure. In general, water samples are extracted at a neutral pH with methylene chloride using a separatory funnel (Method 3510) or a continuous liquid-liquid extractor (Method 3520) or other appropriate procedure. Solid samples are extracted with hexane-acetone (1:1) or methylene chloride-acetone (1:1) using one of the Soxhlet extraction (Method 3540 or 3541) procedures, ultrasonic extraction (Method 3550), or other appropriate procedure.

NOTE: Use of hexane-acetone generally reduces the amount of interferences that are extracted and improves signal-to-noise.

7.1.2 Reference materials, field-contaminated samples, or spiked samples should be used to verify the applicability of the selected extraction technique to each new sample type. Such samples should contain or be spiked with the compounds of interest in order to determine the percent recovery and the limit of detection for that sample type (see Chapter One). When other materials are not available and spiked samples are used, they should be spiked with the analytes of interest, either specific Aroclors or PCB congeners. When the presence of specific Aroclors is not anticipated, the Aroclor 1016/1260 mixture may be an appropriate choice for spiking. See Methods 3500 and 8000 for guidance on demonstration of initial method proficiency as well as guidance on matrix spikes for routine sample analysis.

7.2 Extract cleanup

Refer to Methods 3660 and 3665 for information on extract cleanup.

7.3 GC conditions

This method allows the analyst to choose between a single-column or a dual-column configuration in the injector port. Either wide- or narrow-bore columns may be used. See Sec. 7.7 for information on techniques for making positive identifications of multi-component analytes.

7.3.1 Single-column analysis

This capillary GC/ECD method allows the analyst the option of using 0.25-0.32 mm ID capillary columns (narrow-bore) or 0.53 mm ID capillary columns (wide-bore). The use of narrow-bore (0.25-0.32 mm ID) columns is recommended when the analyst requires greater chromatographic resolution. Use of narrow-bore columns is suitable for relatively clean samples or for extracts that have been prepared with one or more of the clean-up options referenced in the method. Wide-bore columns (0.53 mm ID) are suitable for more complex environmental and waste matrices.

7.3.2 Dual-column analysis

The dual-column/dual-detector approach involves the use of two 30 m x 0.53 mm ID fused-silica open-tubular columns of different polarities, thus different selectivities towards the target compounds. The columns are connected to an injection tee and ECD detectors.

4.1.4.3 Halogen-Specific Detectors (electrolytic conductivity or microcoulometry) may be used only for a limited number of halogenated or sulfur-containing analytes (Sec. 3.0).

4.1.4.4 Electron-capture detectors may be used for a limited number of analytes (Sec. 3.0).

4.1.5 Data system:

4.1.5.1 Data system capable of presenting chromatograms, retention time, and peak integration data is strongly recommended.

4.1.5.2 Use of a data system that allows storage of raw chromatographic data is strongly recommended.

5.0 REAGENTS

5.1 Solvents

5.1.1 Isooctane, $(CH_3)_3CCH_2CH(CH_3)_2$ - Pesticide quality or equivalent.

5.1.2 Hexane, C_6H_{14} - Pesticide quality or equivalent.

5.1.3 Acetone, CH_3COCH_3 - Pesticide quality or equivalent.

5.1.4 Tetrahydrofuran (THF), C_4H_8O - Pesticide quality or equivalent (for triazine standards only).

5.1.5 Methyl *tert*-butyl-ether (MTBE), CH_3O*t*-C_4H_9 - Pesticide quality or equivalent (for triazine standards only).

5.2 Stock standard solutions (1000 mg/L): Can be prepared from pure standard materials or can be purchased as certified solutions.

5.2.1 Prepare stock standard solutions by accurately weighing about 0.0100 g of pure compounds. Dissolve the compounds in suitable mixtures of acetone and hexane and dilute to volume in a 10-mL volumetric flask. If compound purity is 96 percent or greater, the weight can be used without correction to calculate the concentration of the stock standard solution. Commercially prepared stock standard solutions can be used at any concentration if they are certified by the manufacturer or by an independent source.

5.2.2 Both Simazine and Atrazine have low solubilities in hexane. If Simazine and Atrazine standards are required, Atrazine should be dissolved in MTBE, and Simazine should be dissolved in acetone/MTBE/THF (1:3:1).

5.2.3 Composite stock standard: This standard can be prepared from individual stock solutions. The analyst must demonstrate that the individual analytes and common oxidation products are resolved by the chromatographic system. For composite stock standards containing less

when many samples are analyzed over a short time, or when extracts of contaminated samples are analyzed.

1.3 Two detectors can be used for the listed OP chemicals. The FPD works by measuring the emission of phosphorus- or sulfur-containing species. Detector performance is optimized by selecting the proper optical filter and adjusting the hydrogen and air flows to the flame. The NPD is a flame ionization detector with a rubidium ceramic flame tip which enhances the response of phosphorus- and nitrogen-containing analytes. The FPD is more sensitive and more selective, but is a less common detector in environmental laboratories.

1.4 Table 1 lists method detection limits (MDLs) for the target analytes, using 15-m columns and FPD, for water and soil matrices. Table 2 lists the estimated quantitation limits (EQLs) for other matrices. MDLs and EQLs using 30-m columns will be very similar to those obtained from 15-m columns.

1.5 The use of a 15-m column system has not been fully validated for the determination of the following compounds. The analyst must demonstrate chromatographic resolution of all analytes, recoveries of greater than 70 percent, with precision of no more than 15 percent RSD, before data generated on the 15-m column system can be reported for these, or any additional, analytes:

Azinphos-ethyl	Ethion	Phosmet
Carbophenothion	Famphur	Phosphamidon
Chlorfenvinphos	HMPA	Terbufos
Dioxathion	Leptophos	TOCP

1.6 When Method 8141 is used to analyze unfamiliar samples, compound identifications should be supported by confirmatory analysis. Sec. 8.0 provides gas chromatograph/mass spectrometer (GC/MS) criteria appropriate for the qualitative confirmation of compound identifications.

1.7 This method is restricted to use by, or under the supervision of, analysts experienced in the use of capillary gas chromatography and in the interpretation of chromatograms.

2.0 SUMMARY OF METHOD

2.1 Method 8141 provides gas chromatographic conditions for the detection of ppb concentrations of organophosphorus compounds. Prior to the use of this method, appropriate sample preparation techniques must be used. Water samples are extracted at a neutral pH with methylene chloride by using a separatory funnel (Method 3510) or a continuous liquid-liquid extractor (Method 3520). Soxhlet extraction (Method 3540) or automated Soxhlet extraction (Method 3541) using methylene chloride/acetone (1:1) are used for solid samples. Both neat and diluted organic liquids (Method 3580, Waste Dilution) may be analyzed by direct injection. Spiked samples are used to verify the applicability of the chosen extraction technique to each new sample type. A gas chromatograph with a flame photometric or nitrogen-phosphorus detector is used for this multiresidue procedure.

7.0 PROCEDURE

7.1 Extraction and cleanup:

7.1.1 Refer to Chapter Two and Method 8140 for guidance on choosing the appropriate extraction procedure. In general, water samples are extracted at a neutral pH with methylene chloride, using either Method 3510 or 3520. Solid samples are extracted using either Method 3540 or 3541 with methylene chloride/acetone (1:1 v/v) or hexane/acetone (1:1 v/v) as the extraction solvent. Method 3550 is an inappropriate extraction technique for the target analytes of this method (See Sec. 2.3).

7.1.2 Extraction and cleanup procedures that use solutions below pH 4 or above pH 8 are not appropriate for this method.

7.1.3 If required, the samples may be cleaned up using the Methods presented in Chapter Four, Sec. 2. Florisil Column Cleanup (Method 3620) and Sulfur Cleanup (Method 3660, TBA-sulfite option) may have particular application for OPs. Gel Permeation Cleanup (Method 3640) should not generally be used for OP pesticides.

7.1.3.1 If sulfur cleanup by Method 3660 is required, do not use mercury or copper.

7.1.3.2 GPC may only be employed if all target OP pesticides are listed as analytes of Method 3640, or if the laboratory has demonstrated a recovery of greater than 85 percent for target OPs at a concentration not greater than 5 times the regulatory action level. Laboratories must retain data demonstrating acceptable recovery.

7.1.4 Prior to gas chromatographic analysis, the extraction solvent may be exchanged to hexane. The analyst must ensure quantitative transfer of the extract concentrate. Single-laboratory data indicate that samples should not be transferred with 100-percent hexane during sample workup, as the more polar organophosphorus compounds may be lost. Transfer of organophosphorus esters is best accomplished using methylene chloride or a hexane/acetone solvent mixture.

7.1.5 Methylene chloride may be used as an injection solvent with both the FPD and the NPD.

<u>NOTE</u>: Follow manufacturer's instructions as to suitability of using methylene chloride with any specific detector.

7.2 Gas chromatographic conditions:

7.2.1 Four 0.53-mm ID capillary columns are suggested for the determination of organophosphates by this method. Column 1 (DB-210 or equivalent) and Column 2 (SPB-608 or equivalent) of 30-m length are recommended if a large number of organophosphorus analytes are to be determined. If superior chromatographic resolution is not required, 15-m lengths columns may be appropriate. Operating conditions for 15-m columns

5.2 Organic-free reagent water. All references to water in this method refer to organic-free reagent water, as defined in Chapter One.

5.3 Sulfuric acid solution

5.3.1 ((1:1) (v/v)) - Slowly add 50 mL H_2SO_4 (sp. gr. 1.84) to 50 mL of organic-free reagent water.

5.3.2 ((1:3) (v/v)) - Slowly add 25 mL H_2SO_4 (sp. gr. 1.84) to 75 mL of organic-free reagent water.

5.4 Hydrochloric acid ((1:9) (v/v)), HCl. Add one volume of concentrated HCl to 9 volumes of organic-free reagent water.

5.5 Potassium hydroxide solution (KOH) - 37% aqueous solution (w/v). Dissolve 37 g potassium hydroxide pellets in organic-free reagent water, and dilute to 100 mL.

5.6 Carbitol (Diethylene glycol monoethyl ether), $C_2H_5OCH_2CH_2OCH_2CH_2OH$. Available from Aldrich Chemical Co.

5.7 Solvents

5.7.1 Acetone, CH_3COCH_3 - Pesticide quality or equivalent.

5.7.2 Methanol, CH_3OH - Pesticide quality or equivalent.

5.7.3 Isooctane, $(CH_3)_3CCH_2CH(CH_3)_2$ - Pesticide quality or equivalent.

5.7.4 Hexane, C_6H_{14} - Pesticide quality or equivalent.

5.7.5 Diethyl Ether, $C_2H_5OC_2H_5$. Pesticide quality or equivalent. Must be free of peroxides as indicated by test strips (EM Quant, or equivalent). Procedures for removal of peroxides are provided with the test strips. After cleanup, 20 mL of ethyl alcohol preservative must be added to each liter of ether.

5.8 Sodium sulfate (granular, acidified, anhydrous), Na_2SO_4. Purify by heating at 400°C for 4 hours in a shallow tray, or by precleaning the sodium sulfate with methylene chloride. If the sodium sulfate is precleaned with methylene chloride, a method blank must be analyzed, demonstrating that there is no interference from the sodium sulfate. Acidify by slurrying 100 g sodium sulfate with enough diethyl ether to just cover the solid; then add 0.1 mL of concentrated sulfuric acid and mix thoroughly. Remove the ether under a vacuum. Mix 1 g of the resulting solid with 5 mL of organic-free reagent water and measure the pH of the mixture. It must be below a pH of 4. Store at 130°C.

5.9 N-Methyl-N-nitroso-p-toluenesulfonamide (Diazald), $CH_3C_6H_4SO_2N(CH_3)NO$. Available from Aldrich Chemical Co.

5.10 Silicic acid. Chromatographic grade, nominal 100 mesh. Store at 130°C.

hydroxide, and extraneous organic material is removed by a solvent wash. After acidification, the acids are extracted with solvent and converted to their methyl esters using diazomethane as the derivatizing agent. After excess reagent is removed, the esters are determined by gas chromatography employing an electron capture detector, microcoulometric detector, or electrolytic conductivity detector (Goerlitz and Lamar, 1967). The results are reported as the acid equivalents.

2.2 The sensitivity of Method 8150 usually depends on the level of interferences rather than on instrumental limitations.

3.0 INTERFERENCES

3.1 Refer to Method 8000.

3.2 Method interferences may be caused by contaminants in solvents, reagents, glassware, and other sample processing hardware that lead to discrete artifacts or elevated baselines in gas chromatograms. All these materials must be routinely demonstrated to be free from interferences under the conditions of the analysis, by analyzing reagent blanks.

3.2.1 Glassware must be scrupulously cleaned. Clean each piece of glassware as soon as possible after use by rinsing it with the last solvent used in it. This should be followed by detergent washing with hot water and rinses with tap water, then with organic-free reagent water. Glassware should be solvent-rinsed with acetone and pesticide-quality hexane. After rinsing and drying, glassware should be sealed and stored in a clean environment to prevent any accumulation of dust or other contaminants. Store glassware inverted or capped with aluminum foil. Immediately prior to use, glassware should be rinsed with the next solvent to be used.

3.2.2 The use of high purity reagents and solvents helps to minimize interference problems. Purification of solvents by distillation in all-glass systems may be required.

3.3 Matrix interferences may be caused by contaminants that are coextracted from the sample. The extent of matrix interferences will vary considerably from waste to waste, depending upon the nature and diversity of the waste being sampled.

3.4 Organic acids, especially chlorinated acids, cause the most direct interference with the determination. Phenols, including chlorophenols, may also interfere with this procedure.

3.5 Alkaline hydrolysis and subsequent extraction of the basic solution remove many chlorinated hydrocarbons and phthalate esters that might otherwise interfere with the electron capture analysis.

3.6 The herbicides, being strong organic acids, react readily with alkaline substances and may be lost during analysis. Therefore, glassware and glass wool must be acid rinsed, and sodium sulfate must be acidified with sulfuric acid prior to use to avoid this possibility.

METHOD 3535

SOLID-PHASE EXTRACTION (SPE)

1.0 SCOPE AND APPLICATION

1.1 This method describes a procedure for isolating target organic analytes from aqueous samples using solid-phase extraction media. The method describes conditions for extracting organochlorine pesticides and phthalate esters from aqueous matrices including groundwater, wastewater, and TCLP leachates using disk extraction media. Performance data for these extractions are provided in Method 8081 (organochlorine pesticides) and Method 8061 (phthalate esters). The technique may also be applicable to semivolatiles and other extractable compounds. Other solid-phase extraction media configurations, e.g., SPE cartridges, may be employed provided that the laboratory demonstrates adequate performance for the analytes of interest.

1.2 This method also provides procedures for concentrating extracts and for solvent exchange.

1.3 The method may be used for the extraction of additional target analytes or other solid-phase media if the analyst demonstrates adequate performance (e.g., recovery of 70 - 130%) using spiked sample matrices and an appropriate determinative method from Chapter Four (Sec. 4.3). Organic-free reagent water is not considered appropriate for conducting such performance studies. Specifically, many non-polar organic contaminants present in an aqueous sample are likely to be bound to particulate matter and extraction efficiencies are expected to be less than those determined from simply spiking organic-free reagent water.

1.4 Solid-phase extraction is called liquid-solid extraction (LSE) in EPA Drinking Water methods.

1.5 This method is restricted to use by or under the supervision of trained analysts. Each analyst must demonstrate the ability to generate acceptable results with this method.

2.0 SUMMARY OF METHOD

2.1 A measured volume of sample is adjusted to a specified pH (see Table 1) and then extracted using a Solid-phase Extraction (SPE) device.

2.2 Target analytes are eluted from the solid-phase media using methylene chloride or other appropriate solvent. The resulting solvent extract is dried using sodium sulfate and concentrated.

2.3 The concentrated extract may be exchanged into a solvent compatible with subsequent cleanup procedures (Chapter Four, Sec. 4.2) or determinative procedures (Chapter Four, Sec. 4.3) employed for the measurement of the target analytes.

3.0 INTERFERENCES

3.1 Refer to Method 3500.

5.5.6 Acetone, $(CH_3)_2CO$.

6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

See the introductory material to this chapter, Organic Analytes, Sec. 4.1.

7.0 PROCEDURE

7.1 Using a graduated cylinder, measure a 1-liter sample. Take care to minimize any loss of sample particulates during this step. This method may not be appropriate for aqueous samples with greater than 1% suspended solids, as such samples can be difficult to filter and the extraction efficiency may be reduced as a result of the small volumes of solvents employed and the short contact time. If the particulate load significantly slows or prevents filtration, it may be more appropriate to employ an alternative extraction procedure.

7.1.1 Add 5.0 mL of methanol and any surrogate standards listed in the determinative method to all samples and blanks.

7.1.2 Prepare matrix spikes by adding appropriate matrix spike standards to representative sample replicates. The frequency with which matrix spikes are prepared and analyzed is described in Chapter One or as part of the determinative method.

7.1.3 If cleanup procedures are to be employed that result in the loss of extract, adjust the amount of surrogate and spiking cocktail(s) accordingly. In the case of Method 3640, Gel Permeation Cleanup, double the amount of standards to compensate for the loss of one half of the extract concentrate when loading the GPC column.

7.1.4 If high concentrations of target analytes are anticipated to be present in samples, a smaller volume may be extracted.

7.2 Check the pH of the sample with wide-range pH paper and, if necessary, adjust the pH range listed in Table 1.

CAUTION: The adjustment of the sample pH may lead to precipitation or flocculation reactions that may remove analytes from the aqueous portion of the sample. The analyst should note the formation of precipitates or floc and take care to transfer any such material to the extraction device, rinsing the graduated cylinder with organic-free reagent water, and adding the rinse to the extraction device.

7.3 Assemble a manifold for multiple extractions (Figure 1) using 47-mm or 90-mm Empore™ disks. Use a filter flask with the standard filter apparatus for single extractions. If samples contain significant quantities of particulates, the use of a filter aid or prefilter is advisable. Empore™ Filter Aid 400 or Whatman GMF 150 prefilters are recommended.

7.3.1 Pour about 40 g of Filter Aid 400 onto the surface of the disk after assembling the standard filter apparatus.

7.3.2 Place the Whatman GMF 150 on top of the Empore™ disk prior to clamping the glass reservoir into the standard filter apparatus.

METHOD 3540C

SOXHLET EXTRACTION

1.0 SCOPE AND APPLICATION

1.1 Method 3540 is a procedure for extracting nonvolatile and semivolatile organic compounds from solids such as soils, sludges, and wastes. The Soxhlet extraction process ensures intimate contact of the sample matrix with the extraction solvent.

1.2 This method is applicable to the isolation and concentration of water-insoluble and slightly water soluble organics in preparation for a variety of chromatographic procedures.

1.3 This method is restricted to use by or under the supervision of trained analysts. Each analyst must demonstrate the ability to generate acceptable results with this method.

2.0 SUMMARY OF METHOD

2.1 The solid sample is mixed with anhydrous sodium sulfate, placed in an extraction thimble or between two plugs of glass wool, and extracted using an appropriate solvent in a Soxhlet extractor.

2.2 The extract is then dried, concentrated (if necessary), and, as necessary, exchanged into a solvent compatible with the cleanup or determinative step being employed.

3.0 INTERFERENCES

Refer to Method 3500.

4.0 APPARATUS AND MATERIALS

4.1 Soxhlet extractor - 40 mm ID, with 500-mL round bottom flask.

4.2 Drying column - 20 mm ID Pyrex® chromatographic column with Pyrex® glass wool at bottom.

NOTE: Fritted glass discs are difficult to decontaminate after highly contaminated extracts have been passed through. Columns without frits may be purchased. Use a small pad of Pyrex® glass wool to retain the adsorbent. Prewash the glass wool pad with 50 mL of acetone followed by 50 mL of elution solvent prior to packing the column with adsorbent.

4.3 Kuderna-Danish (K-D) apparatus

4.3.1 Concentrator tube - 10-mL, graduated (Kontes K-570050-1025 or equivalent). A ground-glass stopper is used to prevent evaporation of extracts.

5.0 REAGENTS

5.1 Reagent grade inorganic chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available. Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

5.2 Organic-free reagent water. All references to water in this method refer to organic-free reagent water, as defined in Chapter One.

5.3 Sodium sulfate (granular, anhydrous), Na_2SO_4. Purify by heating at 400°C for 4 hours in a shallow tray, or by precleaning the sodium sulfate with methylene chloride. If the sodium sulfate is precleaned with methylene chloride, a method blank must be analyzed, demonstrating that there is no interference from the sodium sulfate.

5.4 Extraction solvents - All solvents must be pesticide quality or equivalent.

5.4.1 Soil/sediment and aqueous sludge samples shall be extracted using either of the following solvent systems:

5.4.1.1 Acetone/Hexane (1:1) (v/v), CH_3COCH_3/C_6H_{14}.

NOTE: This solvent system has lower disposal cost and lower toxicity.

5.4.1.2 Methylene chloride/Acetone (1:1 v/v), CH_2Cl_2/CH_3COCH_3.

5.4.2 Other samples shall be extracted using the following:

5.4.2.1 Methylene chloride, CH_2Cl_2.

5.4.2.2 Toluene/Methanol (10:1) (v/v), $C_6H_5CH_3/CH_3OH$.

5.5 Exchange solvents - All solvents must be pesticide quality or equivalent.

5.5.1 Hexane, C_6H_{14}.

5.5.2 2-Propanol, $(CH_3)_2CHOH$.

5.5.3 Cyclohexane, C_6H_{12}.

5.5.4 Acetonitrile, CH_3CN.

6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

See the introductory material to this chapter, Organic Analytes, Section 4.1.

METHOD 3545

PRESSURIZED FLUID EXTRACTION (PFE)

1.0 SCOPE AND APPLICATION

1.1 Method 3545 is a procedure for extracting water insoluble or slightly water soluble semivolatile organic compounds from soils, clays, sediments, sludges, and waste solids. The method uses elevated temperature (100°C) and pressure (1500 - 2000 psi) to achieve analyte recoveries equivalent to those from Soxhlet extraction, using less solvent and taking significantly less time than the Soxhlet procedure. This procedure was developed and validated on a commercially-available, automated extraction system.

1.2 This method is applicable to the extraction of semivolatile organic compounds, organophosphorus pesticides, organochlorine pesticides, chlorinated herbicides, and PCBs, which may then be analyzed by a variety of chromatographic procedures.

1.3 This method has been validated for solid matrices containing 250 to 12,500 µg/kg of semivolatile organic compounds, 250 to 2500 µg/kg of organophosphorus pesticides, 5 to 250 µg/kg of organochlorine pesticides, 50 to 5000 µg/kg of chlorinated herbicides, and 1 to 1400 µg/kg of PCBs. The method may be applicable to samples containing these analytes at higher concentrations and may be employed after adequate performance has been demonstrated for the concentrations of interest (see Method 3500, Sec. 8.0).

1.4 This method is applicable to solid samples only, and is most effective on dry materials with small particle sizes. Therefore, waste samples must undergo phase separation, as described in Chapter Two, and only the solid phase material is to be extracted by this procedure. If possible, soil/sediment samples may be air-dried and ground to a fine powder prior to extraction. Alternatively, if the loss of analytes during drying is a concern, soil/sediment samples may be mixed with anhydrous sodium sulfate or pelletized diatomaceous earth. The total mass of material to be prepared depends on the specifications of the determinative method and the sensitivity required for the analysis, but 10 - 30 g of material are usually necessary and can be accommodated by this extraction procedure.

1.5 This method is restricted to use by or under the supervision of trained analysts. Each analyst must demonstrate the ability to generate acceptable results with this method.

2.0 SUMMARY OF METHOD

2.1 Samples are prepared for extraction either by air drying the sample, or by mixing the sample with anhydrous sodium sulfate or pelletized diatomaceous earth. The sample is then ground to a 100 - 200 mesh powder (150 µm to 75 µm) and loaded into the extraction cell.

2.2 The extraction cell containing the sample is heated to the extraction temperature (see Sec. 7.8), pressurized with the appropriate solvent system, and extracted for 5 minutes (or as recommended by the instrument manufacturer). The solvent systems used for this procedure vary with the analytes of interest and are described in Sec. 5.5.

2.3 The solvent is collected from the heated extraction vessel and allowed to cool.

5.2 Organic-free reagent water. All references to water in this method refer to organic-free reagent water, as defined in Chapter One.

5.3 Drying agents

5.3.1 Sodium sulfate (granular anhydrous), Na_2SO_4.

5.3.2 Pelletized diatomaceous earth.

5.3.3 The drying agents should be purified by heating at 400°C for 4 hours in a shallow tray, or by extraction with methylene chloride. If extraction with methylene chloride is employed, then a reagent blank should be prepared to demonstrate that the drying agent is free of interferences.

5.4 Phosphoric acid solution (see Sec. 5.5.5). Prepare a 1:1 (v/v) solution of 85% phosphoric acid (H_3PO_4) in organic-free reagent water.

5.5 Extraction solvents

The extraction solvent to be employed depends on the analytes to be extracted, as described below. All solvents should be pesticide quality or equivalent. Solvents may be degassed prior to use.

5.5.1 Organochlorine pesticides may be extracted with acetone/hexane (1:1, v/v), CH_3COCH_3/C_6H_{14} or acetone/methylene chloride (1:1,v/v), CH_3COCH_3/CH_2Cl_2.

5.5.2 Semivolatile organics may be extracted with acetone/methylene chloride (1:1, v/v), CH_3COCH_3/CH_2Cl_2 or acetone/hexane (1:1, v/v), CH_3COCH_3/C_6H_{14}.

5.5.3 PCBs may be extracted with acetone/hexane (1:1, v/v), CH_3COCH_3/C_6H_{14} or acetone/methylene chloride (1:1, v/v), CH_3COCH_3/CH_2Cl_2 or hexane, C_6H_{14}.

5.5.4 Organophosphorus pesticides may be extracted with methylene chloride, CH_2Cl_2 or acetone/methylene chloride (11:1, v/v), CH_3COCH_3/CH_2Cl_2.

5.5.5 Chlorinated herbicides may be extracted with an acetone/methylene chloride/phosphoric acid solution (250:125:15, v/v/v), $CH_3COCH_3/CH_2Cl_2/H_3PO_4$, or an acetone/methylene chloride/trifluoroacetic acid solution (250:125:1, v/v/v), $CH_3COCH_3/CH_2Cl_2/CF_3COOH$. (If the second option is used, the trifluoroacetic acid solution should be prepared by mixing 1% trifluoroacetic acid in acetonitrile.) Make fresh solutions before each batch of extractions.

5.5.6 Other solvent systems may be employed, provided that the analyst can demonstrate adequate performance for the analytes of interest in the sample matrix (see Method 3500, Sec. 8.0).

CAUTION: For best results with very wet samples (e.g., ≥30% moisture), reduce or eliminate the quantity of hydrophilic solvent used.

5.6 High-purity gases such as nitrogen, carbon dioxide, or helium are used to purge and/or pressurize the extraction cell. Follow the instrument manufacturer's recommendation for the choice of gases.

METHOD 3550B

ULTRASONIC EXTRACTION

See Disclaimer. See manufacturer's specifications for operational settings.

1.0 SCOPE AND APPLICATION

1.1 Method 3550 is a procedure for extracting nonvolatile and semivolatile organic compounds from solids such as soils, sludges, and wastes. The ultrasonic process ensures intimate contact of the sample matrix with the extraction solvent.

1.2 The method is divided into two sections, based on the expected concentration of organics in the sample. The low concentration method (individual organic components of less than or equal to 20 mg/kg) uses a larger sample size and a more rigorous extraction procedure (lower concentrations are more difficult to extract). The medium/high concentration method (individual organic components of greater than 20 mg/kg) is much simpler and therefore faster.

1.3 It is highly recommended that the extracts be cleaned up prior to analysis. See Chapter Four (Cleanup), Sec. 4.2.2, for applicable methods.

1.4 Ultrasonic extraction is not as rigorous as other extraction methods for soils/solids. Therefore, it is critical that the method (including the manufacturer's instructions) be followed explicitly in order to achieve the maximum extraction efficiency. See Sec. 7.0 for the critical aspects of the extraction procedure.

1.5 EPA has not validated Method 3550 for the extraction of organophosphorous compounds from solid matrices. In addition, there are concerns that the ultrasonic energy may lead to breakdown of some organophosphorous compounds (see Reference 3). As a result, this extraction technique should not be used for organophosphorous compounds without extensive validation on real-world samples. Such studies should assess the precision, accuracy, ruggedness, and sensitivity of the technique relative to the appropriate regulatory limits or project-specific concentrations of interest.

1.6 This method is restricted to use by or under the supervision of trained analysts. Each analyst must demonstrate the ability to generate acceptable results with this method.

1.7 This method is not appropriate for applications where high extraction efficiencies of analytes at very low concentrations is necessary (e.g., demonstration of effectiveness of corrective action).

2.0 SUMMARY OF METHOD

2.1 Low concentration method - A 30-g sample is mixed with anhydrous sodium sulfate to form a free-flowing powder. This is solvent extracted three times using ultrasonic extraction. The extract is separated from the sample by vacuum filtration or centrifugation. The extract is ready for cleanup and/or analysis following concentration.

Analytical Reagents of the American Chemical Society, where such specifications are available. Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

5.2 Organic-free reagent water. All references to water in this method refer to organic-free reagent water, as defined in Chapter One.

5.3 Sodium sulfate (granular, anhydrous), Na_2SO_4. Purify by heating at 400°C for 4 hours in a shallow tray, or by precleaning the sodium sulfate with methylene chloride. If the sodium sulfate is precleaned with methylene chloride, a method blank must be analyzed, demonstrating that there is no interference from the sodium sulfate.

5.4 Extraction solvents

Samples should be extracted using a solvent system that gives optimum, reproducible recovery of the analytes of interest from the sample matrix. Table 1 provides recovery data for selected semivolatile organic compounds extracted from an NIST SRM. The following sections provide guidance on the choice of solvents for various classes of analytes. All solvents must be pesticide quality or equivalent.

5.4.1 Semivolatile organics may be extracted with acetone/methylene chloride (1:1, v/v), CH_3COCH_3/CH_2Cl_2 or acetone/hexane (1:1, v/v), CH_3COCH_3/C_6H_{14}.

5.4.2 Organochlorine pesticides may be extracted with acetone/hexane (1:1, v/v), CH_3COCH_3/C_6H_{14} or acetone/methylene chloride (1:1,v/v), CH_3COCH_3/CH_2Cl_2.

5.4.3 PCBs may be extracted with acetone/hexane (1:1, v/v), CH_3COCH_3/C_6H_{14}, acetone/methylene chloride (1:1, v/v), CH_3COCH_3/CH_2Cl_2 or hexane, C_6H_{14}.

5.4.4 Other solvent systems may be employed, provided that the analyst can demonstrate adequate performance for the analytes of interest in the sample matrix (see Method 3500, Sec. 8.0).

5.5 Exchange solvents - All solvents must be pesticide quality or equivalent.

5.5.1 Hexane, C_6H_{14}.

5.5.2 2-Propanol, $(CH_3)_2CHOH$.

5.5.3 Cyclohexane, C_6H_{12}.

5.5.4 Acetonitrile, CH_3CN.

5.5.5 Methanol, CH_3OH.

6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

See the introductory material to this chapter, Organic Analytes, Sec. 4.1.

METHOD 3660B

SULFUR CLEANUP

1.0 SCOPE AND APPLICATION

1.1 Elemental sulfur is encountered in many sediment samples (generally specific to different areas in the country), marine algae, and some industrial wastes. The solubility of sulfur in various solvents is very similar to the organochlorine and organophosphorus pesticides. Therefore, the sulfur interference follows along with the pesticides through the normal extraction and cleanup techniques. In general, sulfur will usually elute entirely in Fraction 1 of the Florisil cleanup (Method 3620).

1.2 Sulfur will be quite evident in gas chromatograms obtained from electron capture detectors, flame photometric detectors operated in the sulfur or phosphorous mode, and Coulson electrolytic conductivity detectors in the sulfur mode. If the gas chromatograph is operated at the normal conditions for pesticide analysis, the sulfur interference can completely mask the region from the solvent peak through Aldrin.

1.3 Two techniques for the elimination of sulfur are detailed within this method: (1) the use of copper powder; and (2) the use of tetrabutylammonium sulfite. Tetrabutylammonium sulfite causes the least amount of degradation of a broad range of pesticides and organic compounds, while copper may degrade organophosphorus and some organochlorine pesticides.

1.4 This method is restricted to use by or under the supervision of trained analysts. Each analyst must demonstrate the ability to generate acceptable results with this method.

2.0 SUMMARY OF METHOD

2.1 The sample to undergo cleanup is mixed with either copper or tetrabutylammonium (TBA) sulfite. The mixture is shaken and the extract is removed from the sulfur cleanup reagent.

3.0 INTERFERENCES

The copper technique requires that the copper powder be very reactive, as evidenced by a bright shiny appearance (see Sec. 5.5 for the preparation of this reagent). However, care must be taken to remove all traces of the acid used to prepare the copper, in order to avoid degradation of some analytes.

4.0 APPARATUS AND MATERIALS

4.1 Mechanical shaker or mixer - Vortex Genie or equivalent.

4.2 Pipets, disposable - Pasteur type.

4.3 Centrifuge tubes, calibrated - 12 mL.

4.4 Glass bottles or vials - 10 mL and 50 mL, with polytetrafluoroethylene (PTFE)-lined screw caps or crimp tops.

5.0 REAGENTS

5.1 Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available. Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

5.2 Organic-free reagent water - All references to water in this method refer to organic-free reagent water, as defined in Chapter One.

5.3 Nitric acid, HNO_3, dilute.

5.4 Solvents

5.4.1 Acetone, CH_3COCH_3 - Pesticide quality or equivalent.

5.4.2 Hexane, C_6H_{14} - Pesticide quality or equivalent.

5.4.3 2-Propanol, $CH_3CH(OH)CH_3$ - Pesticide quality or equivalent.

5.5 Copper powder - Remove oxides by treating with dilute nitric acid, rinse with organic-free reagent water to remove all traces of acid, rinse with acetone and dry under a stream of nitrogen. (Copper, fine granular Mallinckrodt 4649 or equivalent).

5.6 Tetrabutylammonium (TBA) sulfite reagent

5.6.1 Tetrabutylammonium hydrogen sulfate, $[CH_3(CH_2)_3]_4NHSO_4$.

5.6.2 Sodium sulfite, Na_2SO_3.

5.6.3 Prepare reagent by dissolving 3.39 g tetrabutylammonium hydrogen sulfate in 100 mL organic-free reagent water. To remove impurities, extract this solution three times with 20 mL portions of hexane. Discard the hexane extracts, and add 25 g sodium sulfite to the water solution. Store the resulting solution, which is saturated with sodium sulfite, in an amber bottle with a PTFE-lined screw cap. This solution can be stored at room temperature for at least one month.

6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

6.1 See the introductory material to this chapter, Organic Analytes, Sec. 4.1.

7.0 PROCEDURE

7.1 Removal of sulfur using copper.

7.1.1 Concentrate the sample to exactly 1.0 mL or other known volume. Perform concentration using the techniques described in the appropriate 3500 series method.

METHOD 3610B

ALUMINA CLEANUP

1.0 SCOPE AND APPLICATION

1.1 Alumina is a highly porous and granular form of aluminum oxide. It is available in three pH ranges (basic, neutral, and acidic) for use in chromatographic cleanup procedures. It is used to separate analytes from interfering compounds of a different chemical polarity.

1.2 Each of the three pH ranges of alumina has different uses and disadvantages as a cleanup procedure.

1.2.1 Basic alumina has a pH of 9-10. It is used to separate basic and neutral compounds that are stable to alkali, alcohols, hydrocarbons, steroids, alkaloids, natural pigments. Its disadvantages are that it can cause polymerization, condensation, and dehydration reactions, and one cannot use acetone or ethyl acetate as eluants.

1.2.2 Neutral alumina has a pH of 6-8. It is used to separate aldehydes, ketones, quinones, esters, lactones, glycoside. Its disadvantage is that is it considerably less active than the basic form.

1.2.3 Acidic alumina has a pH of 4-5. It is used to separate acidic pigments (natural and synthetic), and strong acids (that otherwise chemisorb to neutral and basic alumina). This method does not address the use of acid alumina.

1.3 Basic, neutral, and acidic alumina can be prepared in various activity grades (I to V), based on the Brockmann scale reproduced below. Grade I is prepared by heating alumina until no more water is lost (typically overnight at 400-450°C, but other time-temperature relationships may be employed). The other grades (II-V) are prepared by adding water to Grade I to deactivate it.

Activity grade	I	II	III	IV	V
Water added (wt. %)	0	3	6	10	15
RF (p-aminoazobenzene)	0.0	0.13	0.25	0.45	0.55

where RF is the retention factor for p-aminoazobenzene.

1.4 Alumina cleanup may be accomplished using a glass chromatographic column packed with alumina or using solid-phase extraction cartridges containing alumina.

1.5 This method includes procedures for cleanup of sample extracts containing phthalate esters and nitrosamines. See Method 3611, Alumina Column Cleanup of Petroleum Wastes, for alumina cleanup of petroleum wastes.

1.6 This method is restricted to use by or under the supervision of trained analysts. Each analyst must demonstrate the ability to generate acceptable results with this method.

4.6 Vacuum manifold - VacElute Manifold SPS-24 (Analytichem International), Visiprep (Supelco, Inc.) or equivalent, consisting of glass vacuum basin, collection rack and funnel, collection vials, replaceable stainless steel delivery tips, built-in vacuum bleed valve and gauge. The system is connected to a vacuum pump or water aspirator through a vacuum trap made from a 500-mL sidearm flask fitted with a one-hole stopper and glass tubing. The manifold is needed for use of the cartridge cleanup protocol.

4.7 Top-loading balance - capable of weighing 0.01 g.

5.0 REAGENTS

5.1 Organic-free reagent water - All references to water in this method refer to organic-free reagent water, as defined in Chapter One.

5.2 Sodium sulfate - Sodium sulfate (granular, anhydrous), Na_2SO_4. Purify by heating at 400°C for 4 hours in a shallow tray, or by precleaning the sodium sulfate with methylene chloride. A method blank must be analyzed in order to demonstrate that there is no interference from the sodium sulfate.

5.3 Eluting solvents - all solvents must be pesticide quality or equivalent.

5.3.1 Diethyl Ether, $C_2H_5OC_2H_5$. Must be free of peroxides as indicated by test strips (EM Quant, or equivalent). Procedures for removal of peroxides are provided with the test strips. After cleanup, 20 mL of ethyl alcohol preservative must be added to each liter of ether.

5.3.2 Methanol, CH_3OH

5.3.3 Pentane, $CH_3(CH_2)_3CH_3$

5.3.4 Hexane, C_6H_{14}

5.3.5 Methylene chloride, CH_2Cl_2

5.3.6 Acetone, CH_3COCH_3

5.4 Granular alumina, for column cleanup procedure

5.4.1 Neutral alumina, for cleanup of phthalates, activity Super I, W200 series (ICN Life Sciences Group, No. 404583 or equivalent). To activate, place 100 g of alumina into a 500-mL beaker and heat for approximately 16 hr at 400°C. After heating, transfer to a 500-mL reagent bottle. Tightly seal the bottle and cool to room temperature. When cool, add 3 mL of organic-free reagent water. Mix thoroughly by shaking or rolling for 10 min and let it stand for at least 2 hr. The preparation should be homogeneous before use. Keep the bottle sealed tightly to ensure proper activity. Super I alumina cited above is a Grade I reagent with a very high binding capacity. The neutral alumina employed in this method may be prepared from reagents other than Super I, provided that adequate performance can be demonstrated.

5.4.2 Basic alumina, for cleanup of nitrosamines, activity Super I, W200 series (ICN Life Sciences Group, No. 404571, or equivalent). To activate, place 100 g of alumina into a 500-mL reagent bottle and add 2 mL of organic-free reagent water. Mix thoroughly by shaking or rolling for 10 min and let it stand for at least 2 hr. The preparation should be homogeneous

METHOD 3620B

FLORISIL CLEANUP

1.0 SCOPE AND APPLICATION

1.1 Florisil, a registered trade name of U. S. Silica Co., is a magnesium silicate with basic properties. It is used to separate analytes from interfering compounds prior to sample analysis by a chromatographic method.

1.2 Florisil has been used for the cleanup of pesticide residues and other chlorinated hydrocarbons; the separation of nitrogen compounds from hydrocarbons; the separation of aromatic compounds from aliphatic-aromatic mixtures; and similar applications for use with fats, oils, and waxes. Additionally, Florisil is considered good for separations with steroids, esters, ketones, glycerides, alkaloids, and some carbohydrates.

1.3 Florisil cleanup may be accomplished using a glass chromatographic column packed with Florisil or using solid-phase extraction cartridges containing Florisil.

1.4 This method includes procedures for cleanup of sample extracts containing the following analyte groups:

Phthalate esters	Chlorinated hydrocarbons
Nitrosamines	Organochlorine pesticides
Nitroaromatics	Organophosphates
Haloethers	Organophosphorus pesticides
Aniline and aniline derivatives	PCBs

1.5 This method is restricted to use by or under the supervision of trained analysts. Each analyst must demonstrate the ability to generate acceptable results with this method.

2.0 SUMMARY OF METHOD

2.1 This method describes procedures for Florisil cleanup of solvent extracts of environmental samples. It provides the option of using either traditional column chromatography techniques to solid-phase extraction cartridges. Generally, the traditional column chromatography technique uses larger amounts of adsorbent and, therefore, has a greater cleanup capacity.

2.2 In the column cleanup protocol, the column is packed with the required amount of adsorbent, topped with a water adsorbent, and then loaded with the sample extract. Elution of the analytes is effected with a suitable solvent(s), leaving the interfering compounds on the column. The eluate may be further concentrated prior to gas chromatographic analysis.

2.3 The cartridge cleanup protocol uses solid-phase extraction cartridges containing 40 µm particles of Florisil (60 Å pores). Each cartridge is washed with solvent immediately prior to use. The sample extract is loaded onto the cartridge which is then eluted with suitable solvent(s). A vacuum manifold is required to obtain reproducible results. The eluate may be further concentrated prior to gas chromatographic analysis.

5.6.3.3 Let the Florisil settle and using a volumetric pipet, transfer 10.0 mL of supernatant liquid into a 125-mL Erlenmeyer flask. Avoid inclusion of any Florisil.

5.6.3.4 Add 60 mL of ethanol and 3 drops of the phenolphthalein indicator solution to the flask.

5.6.3.5 Titrate the solution in the flask with the 0.05N NaOH solution until a permanent end point is reached (i.e., the indicator color does not disappear when the solution is allowed to stand for 1 min).

5.6.3.6 The lauric acid value is calculated as follows:

Lauric acid value = 200 - (titration volume in mL of NaOH) (strength of NaOH)

where the strength of the NaOH is measured in Sec. 7.5.3 as the mg of lauric acid neutralized per mL of NaOH solution.

5.6.3.7 Use the following equation to obtain an equivalent quantity of any batch of Florisil.

$$\frac{\text{lauric acid value}}{110} \times 20\text{ g} = \text{Required weight of Florisil}$$

5.7 Sodium sulfate (granular, anhydrous), Na_2SO_4 - Purify by heating at 400°C for 4 hours in a shallow tray, or by precleaning the sodium sulfate with methylene chloride. A method blank must be analyzed in order to demonstrate that there is no interference from the sodium sulfate.

5.8 Florisil cartridges - 40 µm particles, 60 Å pores. The cartridges from which this method were developed consist of 6-mL serological- grade polypropylene tubes, with the 1 g of Florisil held between two polyethylene or stainless steel frits with 20 µm pores. Cartridges containing 0.5 g and 2.0 g of Florisil are available, however, the compound elution patterns must be verified when cartridges containing other than 1 g of Florisil are used.

5.9 Eluting solvents - all solvents must be pesticide quality or equivalent.

5.9.1 Diethyl Ether, $C_2H_5OC_2H_5$. Must be free of peroxides as indicated by test strips (EM Quant, or equivalent). Procedures for removal of peroxides are provided with the test strips. After cleanup, 20 mL of ethyl alcohol preservative must be added to each liter of ether.

5.9.2 Pentane, $CH_3(CH_2)_3CH_3$

5.9.3 Hexane, C_6H_{14}

5.9.4 Methylene chloride, CH_2Cl_2

5.9.5 Acetone, CH_3COCH_3

5.9.6 Petroleum ether (boiling range 30-60°C)

5.9.7 Toluene, $C_6H_5CH_3$

METHOD 3630C

SILICA GEL CLEANUP

1.0 SCOPE AND APPLICATION

1.1 Silica gel (silicic acid) is a regenerative adsorbent of silica with weakly acidic properties. It is produced from sodium silicate and sulfuric acid. Silica gel can be used in column chromatography for the separation of analytes from interfering compounds of a different chemical polarity. It may be used activated, after heating to 150 - 160°C, or deactivated with up to 10% water.

1.2 This method includes guidance for standard column cleanup of sample extracts containing polynuclear aromatic hydrocarbons, derivatized phenolic compounds, organochlorine pesticides, and PCBs as Aroclors.

1.3 This method also provides cleanup procedures using solid-phase extraction cartridges for pentafluorobenzyl bromide-derivatized phenols, organochlorine pesticides, and PCBs. This technique also provides the best separation of PCBs from most single component organochlorine pesticides. When only PCBs are to be measured, this method can be used in conjunction with sulfuric acid/permanganate cleanup (Method 3665).

1.4 Other analytes may be cleaned up using this method if the analyte recovery meets the criteria specified in Sec. 8.0.

1.5 This method is restricted to use by or under the supervision of trained analysts. Each analyst must demonstrate the ability to generate acceptable results with this method.

2.0 SUMMARY OF METHOD

2.1 This method provides the option of using either standard column chromatography techniques or solid-phase extraction cartridges. Generally, the standard column chromatography techniques use larger amounts of adsorbent and, therefore, have a greater cleanup capacity.

2.2 In the standard column cleanup protocol, the column is packed with the required amount of adsorbent, topped with a water adsorbent, and then loaded with the sample to be analyzed. Elution of the analytes is accomplished with a suitable solvent(s) that leaves the interfering compounds on the column. The eluate is then concentrated (if necessary).

2.3 The cartridge cleanup protocol uses solid-phase extraction cartridges packed with 1 g or 2 g of silica gel (silicic acid) adsorbent. Each cartridge is solvent washed immediately prior to use. Aliquots of sample extracts are loaded onto the cartridges, which are then eluted with suitable solvent(s). A vacuum manifold is required to obtain reproducible results. The collected fractions may be further concentrated prior to gas chromatographic analysis.

2.4 The appropriate gas chromatographic method is listed at the end of each technique. Analysis may also be performed by gas chromatography/mass spectrometry (Method 8270).

5.2 Organic-free reagent water. All references to water in this method refer to organic-free reagent water, as defined in Chapter One.

5.3 Silica gel for chromatography columns.

5.3.1 Silica Gel for Phenols and Polynuclear Aromatic Hydrocarbons: 100/200 mesh (Davison Chemical grade 923 or equivalent). Before use, activate for at least 16 hr. at 130°C in a shallow glass tray, loosely covered with foil.

5.3.2 Silica Gel for Organochlorine pesticides/PCBs: 100/200 mesh (Davison Chemical grade 923 or equivalent). Before use, activate for at least 16 hr. at 130°C in a shallow glass tray, loosely covered with foil. Deactivate it to 3.3% with reagent water in a 500 mL glass jar. Mix the contents thoroughly and allow to equilibrate for 6 hours. Store the deactivated silica gel in a sealed glass jar inside a desiccator.

5.4 Silica cartridges: 40 µm particles, 60 A pores. The cartridges with which this method was developed consist of 6 mL serological-grade polypropylene tubes, with the 1 g of silica held between two polyethylene or stainless steel frits with 20 µm pores. 2 g silica cartridges are also used in this method, and 0.5 g cartridges are available. The compound elution patterns must be verified when cartridges other than the specified size are used.

5.5 Sodium sulfate (granular, anhydrous), Na_2SO_4. Purify by heating at 400°C for 4 hours in a shallow tray, or by precleaning the sodium sulfate with methylene chloride. A method blank must be analyzed in order to demonstrate that there is no interference from the sodium sulfate.

5.6 Eluting solvents

5.6.1 Cyclohexane, C_6H_{12} - Pesticide quality or equivalent.

5.6.2 Hexane, C_6H_{14} - Pesticide quality or equivalent.

5.6.3 2-Propanol, $(CH_3)_2CHOH$ - Pesticide quality or equivalent.

5.6.4 Toluene, $C_6H_5CH_3$ - Pesticide quality or equivalent.

5.6.5 Methylene chloride, CH_2Cl_2 - Pesticide quality or equivalent.

5.6.6 Pentane, C_5H_{12} - Pesticide quality or equivalent.

5.6.7 Acetone, CH_3COCH_3 - Pesticide quality or equivalent.

5.6.8 Diethyl Ether, $C_2H_5OC_2H_5$. Pesticide quality or equivalent. Must be free of peroxides as indicated by test strips (EM Quant, or equivalent). Procedures for removal of peroxides are provided with the test strips. After cleanup, 20 mL of ethanol preservative must be added to each liter of ether.

6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

6.1 See the introductory material to this chapter, Organic Analytes, Sec. 4.1.

METHOD 3650B

ACID-BASE PARTITION CLEANUP

1.0 SCOPE AND APPLICATION

1.1 Method 3650 is a liquid-liquid partitioning cleanup method to separate acid analytes, e.g., organic acids and phenols, from base/neutral analytes, e.g. amines, aromatic hydrocarbons, and halogenated organic compounds, using pH adjustment. It may be used for cleanup of petroleum waste prior to analysis or further cleanup (e.g., alumina cleanup). The following compounds can be separated by this method:

Compound Name	CAS No.[a]	Fraction
Benz(a)anthracene	56-55-3	Base-neutral
Benzo(a)pyrene	50-32-8	Base-neutral
Benzo(b)fluoranthene	205-99-2	Base-neutral
Chlordane	57-74-9	Base-neutral
Chlorinated dibenzodioxins		Base-neutral
2-Chlorophenol	95-57-8	Acid
Chrysene	218-01-9	Base-neutral
Creosote	8001-58-9	Base-neutral and Acid
Cresol(s)		Acid
Dichlorobenzene(s)		Base-neutral
Dichlorophenoxyacetic acid	94-75-7	Acid
2,4-Dimethylphenol	105-67-9	Acid
Dinitrobenzene	25154-54-5	Base-neutral
4,6-Dinitro-o-cresol	534-52-1	Acid
2,4-Dinitrotoluene	121-14-2	Base-neutral
Heptachlor	76-44-8	Base-neutral
Hexachlorobenzene	118-74-1	Base-neutral
Hexachlorobutadiene	87-68-3	Base-neutral
Hexachloroethane	67-72-1	Base-neutral
Hexachlorocyclopentadiene	77-47-4	Base-neutral
Naphthalene	91-20-3	Base-neutral
Nitrobenzene	98-95-3	Base-neutral
4-Nitrophenol	100-02-7	Acid
Pentachlorophenol	87-86-5	Acid
Phenol	108-95-2	Acid
Phorate	298-02-2	Base-neutral
2-Picoline	109-06-8	Base-neutral
Pyridine	110-86-1	Base-neutral
Tetrachlorobenzene(s)		Base-neutral
Tetrachlorophenol(s)		Acid
Toxaphene	8001-35-2	Base-neutral
Trichlorophenol(s)		Acid
2,4,5-TP (Silvex)	93-72-1	Acid

[a] Chemical Abstract Service Registry Number.

5.0 REAGENTS

5.1 Reagent grade inorganic chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all inorganic reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available. Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

5.2 Organic-free reagent water - All references to water in this method refer to organic-free reagent water, as defined in Chapter One.

5.3 Sodium hydroxide, NaOH, (10N) - Dissolve 40 g of sodium hydroxide in 100 mL of organic-free reagent water.

5.4 Sulfuric acid, H_2SO_4, (1:1 v/v in water) - Slowly add 50 mL H_2SO_4 to 50 mL of organic-free reagent water.

5.5 Sodium sulfate (granular, anhydrous), Na_2SO_4 - Purify by heating at 400°C for 4 hours in a shallow tray, or by precleaning the sodium sulfate with methylene chloride. If the sodium sulfate is precleaned with methylene chloride, a method blank must be analyzed, demonstrating that there is no interference from the sodium sulfate.

5.6 Solvents:

5.6.1 Methylene chloride, CH_2Cl_2 - Pesticide quality or equivalent.

5.6.2 Acetone, CH_3COCH_3 - Pesticide quality or equivalent.

5.6.3 Methanol, CH_3OH - Pesticide quality or equivalent.

5.6.4 Diethyl Ether, $C_2H_5OC_2H_5$ - Pesticide quality or equivalent. Must be free of peroxides as indicated by test strips (EM Quant, or equivalent). Procedures for removal of peroxides are provided with the test strips. After cleanup, 20 mL of ethyl alcohol preservative must be added to each liter of ether.

6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

6.1 See the introductory material to this chapter, Organic Analytes, Sec. 4.1.

7.0 PROCEDURE

7.1 Place 10 mL of the solvent extract from a prior extraction procedure into a 125 mL separatory funnel.

7.2 Add 20 mL of methylene chloride to the separatory funnel.

7.3 Slowly add 20 mL of prechilled organic-free reagent water which has been previously adjusted to a pH of 12-13 with 10N sodium hydroxide.

POSSIBLE METHYLENE CHLORIDE INTERFERENCES

3.4 Many analytes exhibit low purging efficiencies from a 25-mL sample. This often results in significant amounts of these analytes remaining in the sample purge vessel after analysis. After removal of the sample aliquot that was purged, and rinsing the purge vessel three times with organic-free water, the empty vessel should be subjected to a heated purge cycle prior to the analysis of another sample in the same purge vessel. This will reduce sample-to-sample carryover.

3.5 Special precautions must be taken to analyze for methylene chloride. The analytical and sample storage area should be isolated from all atmospheric sources of methylene chloride. Otherwise, random background levels will result. Since methylene chloride will permeate through PTFE tubing, all gas chromatography carrier gas lines and purge gas plumbing should be constructed from stainless steel or copper tubing. Laboratory clothing worn by the analyst should be clean, since clothing previously exposed to methylene chloride fumes during liquid/liquid extraction procedures can contribute to sample contamination.

3.6 Samples can be contaminated by diffusion of volatile organics (particularly methylene chloride and fluorocarbons) through the septum seal of the sample container into the sample during shipment and storage. A trip blank prepared from organic-free reagent water and carried through the sampling, handling, and storage protocols can serve as a check on such contamination.

3.7 Use of sensitive mass spectrometers to achieve lower detection level will increase the potential to detect laboratory contaminants as interferences.

3.8 Direct injection - Some contamination may be eliminated by baking out the column between analyses. Changing the injector liner will reduce the potential for cross-contamination. A portion of the analytical column may need to be removed in the case of extreme contamination. The use of direct injection will result in the need for more frequent instrument maintenance.

3.9 If hexadecane is added to waste samples or petroleum samples that are analyzed, some chromatographic peaks will elute after the target analytes. The oven temperature program must include a post-analysis bake out period to ensure that semivolatile hydrocarbons are volatilized.

4.0 APPARATUS AND MATERIALS

4.1 Purge-and-trap device for aqueous samples - Described in Method 5030.

4.2 Purge-and-trap device for solid samples - Described in Method 5035.

4.3 Automated static headspace device for solid samples - Described in Method 5021.

4.4 Azeotropic distillation apparatus for aqueous and solid samples - Described in Method 5031.

4.5 Vacuum distillation apparatus for aqueous, solid and tissue samples - Described in Method 5032.

4.6 Desorption device for air trapping media for air samples - Described in Method 5041.

4.7 Air sampling loop for sampling from Tedlar® bags for air samples - Described in Method 0040.

Compounds	CAS No[a]	Appropriate Preparation Techniques[b] 3510	3520	3540/ 3541	3550	3580
2,4,5-Trimethylaniline	137-17-7	X	ND	ND	ND	X
Trimethyl phosphate	512-56-1	HE(60)	ND	ND	ND	X
1,3,5-Trinitrobenzene	99-35-4	X	ND	ND	ND	X
Tris(2,3-dibromopropyl) phosphate	126-72-7	X	ND	ND	ND	LR
Tri-p-tolyl phosphate	78-32-0	X	ND	ND	ND	X
O,O,O-Triethyl phosphorothioate	126-68-1	X	ND	ND	ND	X

[a] Chemical Abstract Service Registry Number
[b] See Sec. 1.2 for other acceptable preparation methods.

KEY TO ANALYTE LIST

IS = This compound may be used as an internal standard.
surr = This compound may be used as a surrogate.
AW = Adsorption to walls of glassware during extraction and storage.
CP = Nonreproducible chromatographic performance.
DC = Unfavorable distribution coefficient (number in parenthesis is percent recovery).
HE = Hydrolysis during extraction accelerated by acidic or basic conditions (number in parenthesis is percent recovery).
HS = Hydrolysis during storage (number in parenthesis is percent stability).
LR = Low response.
ND = Not determined.
OE = Oxidation during extraction accelerated by basic conditions (number in parenthesis is percent recovery).
OS = Oxidation during storage (number in parenthesis is percent stability).
X = Greater than 70 percent recovery by this technique.

1.2 In addition to the sample preparation methods listed in the above analyte list, Method 3542 describes sample preparation for semivolatile organic compounds in air sampled by Method 0010 (Table 11 contains surrogate performance data), Method 3545 describes an automated solvent extraction device for semivolatiles in solids (Table 12 contains performance data), and Method 3561 describes a supercritical fluid extraction of solids for PAHs (see Tables 13, 14, and 15 for performance data).

1.3 Method 8270 can be used to quantitate most neutral, acidic, and basic organic compounds that are soluble in methylene chloride and capable of being eluted, without derivatization, as sharp peaks from a gas chromatographic fused-silica capillary column coated with a slightly polar silicone. Such compounds include polynuclear aromatic hydrocarbons, chlorinated hydrocarbons and pesticides, phthalate esters, organophosphate esters, nitrosamines, haloethers, aldehydes, ethers, ketones, anilines, pyridines, quinolines, aromatic nitro compounds, and phenols, including nitrophenols. See Table 1 for a list of compounds and their characteristic ions that have been evaluated.

5.3.1 Prepare stock standard solutions by accurately weighing about 0.0100 g of pure material. Dissolve the material in pesticide quality acetone or other suitable solvent and dilute to volume in a 10-mL volumetric flask. Larger volumes can be used at the convenience of the analyst. When compound purity is assayed to be 96% or greater, the weight may be used without correction to calculate the concentration of the stock standard. Commercially-prepared stock standards may be used at any concentration if they are certified by the manufacturer or by an independent source.

5.3.2 Transfer the stock standard solutions into bottles with PTFE-lined screw-caps. Store, protected from light, at -10°C or less or as recommended by the standard manufacturer. Stock standard solutions should be checked frequently for signs of degradation or evaporation, especially just prior to preparing calibration standards from them.

5.3.3 Stock standard solutions must be replaced after 1 year or sooner if comparison with quality control check samples indicates a problem.

5.3.4 *It is recommended that nitrosamine compounds be placed together in a separate* calibration mix and not combined with other calibration mixes. When using a premixed certified standard, consult the manufacturer's instructions for additional guidance.

5.3.5 Mixes with hydrochloride salts may contain hydrochloric acid, which can cause analytical difficulties. When using a premixed certified standard, consult the manufacturer's instructions for additional guidance.

5.4 Internal standard solutions - The internal standards recommended are 1,4-dichlorobenzene-d_4, naphthalene-d_8, acenaphthene-d_{10}, phenanthrene-d_{10}, chrysene-d_{12}, and perylene-d_{12} (see Table 5). Other compounds may be used as internal standards as long as the requirements given in Sec. 7.3.2 are met.

5.4.1 Dissolve 0.200 g of each compound with a small volume of carbon disulfide. Transfer to a 50 mL volumetric flask and dilute to volume with methylene chloride so that the final solvent is approximately 20% carbon disulfide. Most of the compounds are also soluble in small volumes of methanol, acetone, or toluene, except for perylene-d_{12}. The resulting solution will contain each standard at a concentration of 4,000 ng/µL. Each 1 mL sample extract undergoing analysis should be spiked with 10 µL of the internal standard solution, resulting in a concentration of 40 ng/µL of each internal standard. Store at -10°C or less when not in use. When using premixed certified solutions, store according to the manufacturer's documented holding time and storage temperature recommendations.

5.4.2 If a more sensitive mass spectrometer is employed to achieve lower detection levels, a more dilute internal standard solution may be required. Area counts of the internal standard peaks should be between 50-200% of the area of the target analytes in the mid-point calibration analysis.

5.5 GC/MS tuning standard - A methylene chloride solution containing 50 ng/µL of decafluorotriphenylphosphine (DFTPP) should be prepared. The standard should also contain 50 ng/µL each of 4,4'-DDT, pentachlorophenol, and benzidine to verify injection port inertness and GC column performance. Store at -10°C or less when not in use. If a more sensitive mass spectrometer is employed to achieve lower detection levels, a more dilute tuning solution may be necessary. When using premixed certified solutions, store according to the manufacturer's documented holding time and storage temperature recommendations.

5.6.2 To each calibration standard, add a known constant amount of one or more internal standards, and dilute to volume with isooctane.

5.6.3 Analyze each calibration standard according to Sec. 7.0.

5.7 Surrogate standards: The analyst should monitor the performance of the extraction, cleanup (when used), and analytical system and the effectiveness of the method in dealing with each sample matrix by spiking each sample, standard, and organic-free reagent water blank with pesticide surrogates. Because GC/ECD data are much more subject to interference than GC/MS, a secondary surrogate is to be used when sample interference is apparent. Two surrogate standards (tetrachloro-m-xylene (TCMX) and decachlorobiphenyl) are added to each sample; however, only one need be calculated for recovery. Proceed with corrective action when both surrogates are out of limits for a sample (Sec. 8.3). Method 3500 indicates the proper procedure for preparing these surrogates.

6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

6.1 See the introductory material to this chapter, Organic Analytes, Sec. 4.1. Extracts must be stored under refrigeration and analyzed within 40 days of extraction.

7.0 PROCEDURE

7.1 Extraction:

7.1.1 Refer to Chapter Two for guidance on choosing the appropriate extraction procedure. In general, water samples are extracted at a neutral, or as is, pH with methylene chloride, using either Method 3510 or 3520. Solid samples are extracted using Method 3540, 3541, or 3550.

7.1.2 Prior to gas chromatographic analysis, the extraction solvent must be exchanged to hexane. The exchange is performed during the K-D procedures listed in all of the extraction methods. The exchange is performed as follows.

7.1.2.1 Following K-D of the methylene chloride extract to 1 mL using the macro-Snyder column, allow the apparatus to cool and drain for at least 10 min.

7.1.2.2 Increase the temperature of the hot water bath to about 90°C. Momentarily remove the Snyder column, add 50 mL of hexane, a new boiling chip, and reattach the macro-Snyder column. Concentrate the extract using 1 mL of hexane to prewet the Snyder column. Place the K-D apparatus on the water bath so that the concentrator tube is partially immersed in the hot water. Adjust the vertical position of the apparatus and the water temperature, as required, to complete concentration in 5-10 min. At the proper rate of distillation the balls of the column will actively chatter, but the chambers will not flood. When the apparent volume of liquid

Compound	CAS Registry No.
Chloropropylate	99516-95-7
Chlorothalonil	1897-45-6
DCPA	1861-32-1
Dichlone	117-80-6
Dicofol	115-32-2
Etridiazole	2593-15-9
Halowax-1000	58718-66-4
Halowax-1001	58718-67-5
Halowax-1013	12616-35-2
Halowax-1014	12616-36-3
Halowax-1051	2234-13-1
Halowax-1099	39450-05-0
Mirex	2385-85-5
Nitrofen	1836-75-5
PCNB	82-68-8
Permethrin	51877-74-8
Perthane	72-56-0
Propachlor	1918-16-7
Strobane	8001-50-1
trans-Nonachlor	39765-80-5
Trifluralin	1582-09-8

1.11 Kepone extracted from samples or standards exposed to water or methanol may produce peaks with broad tails that elute later than the standard by up to 1 minute. This shift is presumably the result of the formation of a hemi-acetal from the ketone functionality. As a result, Method 8081 is not recommended for determining Kepone. Method 8270 may be more appropriate for the analysis of Kepone.

2.0 SUMMARY OF METHOD

2.1 A measured volume or weight of sample (approximately 1 L for liquids, 2 g to 30 g for solids) is extracted using the appropriate matrix-specific sample extraction technique.

2.2 Liquid samples are extracted at neutral pH with methylene chloride using either Method 3510 (separatory funnel), Method 3520 (continuous liquid-liquid extractor), or other appropriate technique.

2.3 Solid samples are extracted with hexane-acetone (1:1) or methylene chloride-acetone (1:1) using Method 3540 (Soxhlet), Method 3541 (automated Soxhlet), Method 3545 (pressurized fluid extraction), Method 3550 (ultrasonic extraction), or other appropriate technique.

2.4 A variety of cleanup steps may be applied to the extract, depending on the nature of the matrix interferences and the target analytes. Suggested cleanups include alumina (Method 3610), Florisil (Method 3620), silica gel (Method 3630), gel permeation chromatography (Method 3640), and sulfur (Method 3660).

30 m x 0.53 mm ID fused silica capillary column chemically bonded with 50 percent phenyl methylpolysiloxane (DB-1701, or equivalent), 1.0 µm film thickness.

Column pair 1 is mounted in a press-fit Y-shaped glass 3-way union splitter (J&W Scientific, Catalog No. 705-0733) or a Y-shaped fused-silica connector (Restek, Catalog No. 20405), or equivalent.

4.2.3.2 Column pair 2

30 m x 0.53 mm ID fused silica capillary column chemically bonded with SE-54 (DB-5, SPB-5, RTx-5, or equivalent), 0.83 µm film thickness.

30 m x 0.53 mm ID fused silica capillary column chemically bonded with 50 percent phenyl methylpolysiloxane (DB-1701, or equivalent), 1.0 µm film thickness.

Column pair 2 is mounted in an 8 in. deactivated glass injection tee (Supelco, Catalog No. 2-3665M), or equivalent.

4.3 Column rinsing kit: Bonded-phase column rinse kit (J&W Scientific, Catalog No. 430-3000), or equivalent.

4.4 Volumetric flasks, 10-mL and 25-mL, for preparation of standards.

5.0 REAGENTS

5.1 Reagent grade or pesticide grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available. Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

NOTE: Store the standard solutions (stock, composite, calibration, internal, and surrogate) at 4°C in polytetrafluoroethylene (PTFE)-sealed containers in the dark. When a lot of standards is prepared, it is recommended that aliquots of that lot be stored in individual small vials. All stock standard solutions must be replaced after one year or sooner if routine QC tests (Sec. 8.0) indicate a problem. All other standard solutions must be replaced after six months or sooner if routine QC (Sec. 8.0) indicates a problem.

5.2 Solvents used in the extraction and cleanup procedures (appropriate 3500 and 3600 series methods) include n-hexane, diethyl ether, methylene chloride, acetone, ethyl acetate, and isooctane (2,2,4-trimethylpentane) and must be exchanged to n-hexane or isooctane prior to analysis.

Therefore, n-hexane and isooctane will be required in this procedure. Acetone or toluene may be required for the preparation of some standard solutions (see Sec. 5.4.2). All solvents should be pesticide quality or equivalent, and each lot of solvent should be determined to be phthalate free.

5.3 Organic-free reagent water - All references to water in this method refer to organic-free reagent water as defined in Chapter One.

5.7.2 1-bromo-2-nitrobenzene is suggested as an internal standard for the dual-column analysis. Prepare a solution of 5000 mg/L (5000 ng/µL) of 1-bromo-2-nitrobenzene. Spike 10 µL of this solution into each 1 mL of sample extract.

5.8 Surrogate standards

The performance of the method should be monitored using surrogate compounds. Surrogate standards are added to all samples, method blanks, matrix spikes, and calibration standards. The following compounds are recommended as possible surrogates.

5.8.1 Decachlorobiphenyl and tetrachloro-m-xylene have been found to be a useful pair of surrogates for both the single-column and dual-column configurations. Method 3500, Sec. 5.0, describes the procedures for preparing these surrogates.

5.8.2 4-Chloro-3-nitrobenzotrifluoride may also be useful as a surrogate if the chromatographic conditions of the dual-column configuration cannot be adjusted to preclude co-elution of a target analyte with either of the surrogates in Sec. 5.8.1. However, this compound elutes early in the chromatographic run and may be subject to other interference problems. A recommended concentration for this surrogate is 500 ng/µL. Use a spiking volume of 100 µL for a 1-L aqueous sample.

5.8.3 Store surrogate spiking solutions at 4°C in PTFE-sealed containers in the dark.

6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

6.1 See Chapter Four, Organic Analytes, Sec. 4.0, for sample collection and preservation instructions.

6.2 Extracts must be stored under refrigeration in the dark and analyzed within 40 days of extraction.

7.0 PROCEDURE

7.1 Sample extraction

Refer to Chapter Two and Method 3500 for guidance in choosing the appropriate extraction procedure. In general, water samples are extracted at a neutral pH with methylene chloride using a separatory funnel (Method 3510) or a continuous liquid-liquid extractor (Method 3520), or other appropriate technique. Solid samples are extracted with hexane-acetone (1:1) or methylene chloride-acetone (1:1) using one of the Soxhlet extraction (Method 3540 or 3541), pressurized fluid extraction (Method 3545), ultrasonic extraction (Method 3550), or other appropriate technique.

NOTE: Hexane-acetone (1:1) may be more effective as an extraction solvent for organochlorine pesticides in some environmental and waste matrices than is methylene chloride-acetone (1:1). Relative to the methylene chloride-acetone mixture, use of hexane-acetone generally reduces the amount of interferences that are extracted and improves signal-to-noise.

7.0 PROCEDURE

7.1 Sample extraction

7.1.1 Refer to Chapter Two and Method 3500 for guidance in choosing the appropriate extraction procedure. In general, water samples are extracted at a neutral pH with methylene chloride using a separatory funnel (Method 3510) or a continuous liquid-liquid extractor (Method 3520) or other appropriate procedure. Solid samples are extracted with hexane-acetone (1:1) or methylene chloride-acetone (1:1) using one of the Soxhlet extraction (Method 3540 or 3541) procedures, ultrasonic extraction (Method 3550), or other appropriate procedure.

NOTE: Use of hexane-acetone generally reduces the amount of interferences that are extracted and improves signal-to-noise.

7.1.2 Reference materials, field-contaminated samples, or spiked samples should be used to verify the applicability of the selected extraction technique to each new sample type. Such samples should contain or be spiked with the compounds of interest in order to determine the percent recovery and the limit of detection for that sample type (see Chapter One). When other materials are not available and spiked samples are used, they should be spiked with the analytes of interest, either specific Aroclors or PCB congeners. When the presence of specific Aroclors is not anticipated, the Aroclor 1016/1260 mixture may be an appropriate choice for spiking. See Methods 3500 and 8000 for guidance on demonstration of initial method proficiency as well as guidance on matrix spikes for routine sample analysis.

7.2 Extract cleanup

Refer to Methods 3660 and 3665 for information on extract cleanup.

7.3 GC conditions

This method allows the analyst to choose between a single-column or a dual-column configuration in the injector port. Either wide- or narrow-bore columns may be used. See Sec. 7.7 for information on techniques for making positive identifications of multi-component analytes.

7.3.1 Single-column analysis

This capillary GC/ECD method allows the analyst the option of using 0.25-0.32 mm ID capillary columns (narrow-bore) or 0.53 mm ID capillary columns (wide-bore). The use of narrow-bore (0.25-0.32 mm ID) columns is recommended when the analyst requires greater chromatographic resolution. Use of narrow-bore columns is suitable for relatively clean samples or for extracts that have been prepared with one or more of the clean-up options referenced in the method. Wide-bore columns (0.53 mm ID) are suitable for more complex environmental and waste matrices.

7.3.2 Dual-column analysis

The dual-column/dual-detector approach involves the use of two 30 m x 0.53 mm ID fused-silica open-tubular columns of different polarities, thus different selectivities towards the target compounds. The columns are connected to an injection tee and ECD detectors.

when many samples are analyzed over a short time, or when extracts of contaminated samples are analyzed.

1.3 Two detectors can be used for the listed OP chemicals. The FPD works by measuring the emission of phosphorus- or sulfur-containing species. Detector performance is optimized by selecting the proper optical filter and adjusting the hydrogen and air flows to the flame. The NPD is a flame ionization detector with a rubidium ceramic flame tip which enhances the response of phosphorus- and nitrogen-containing analytes. The FPD is more sensitive and more selective, but is a less common detector in environmental laboratories.

1.4 Table 1 lists method detection limits (MDLs) for the target analytes, using 15-m columns and FPD, for water and soil matrices. Table 2 lists the estimated quantitation limits (EQLs) for other matrices. MDLs and EQLs using 30-m columns will be very similar to those obtained from 15-m columns.

1.5 The use of a 15-m column system has not been fully validated for the determination of the following compounds. The analyst must demonstrate chromatographic resolution of all analytes, recoveries of greater than 70 percent, with precision of no more than 15 percent RSD, before data generated on the 15-m column system can be reported for these, or any additional, analytes:

Azinphos-ethyl	Ethion	Phosmet
Carbophenothion	Famphur	Phosphamidon
Chlorfenvinphos	HMPA	Terbufos
Dioxathion	Leptophos	TOCP

1.6 When Method 8141 is used to analyze unfamiliar samples, compound identifications should be supported by confirmatory analysis. Sec. 8.0 provides gas chromatograph/mass spectrometer (GC/MS) criteria appropriate for the qualitative confirmation of compound identifications.

1.7 This method is restricted to use by, or under the supervision of, analysts experienced in the use of capillary gas chromatography and in the interpretation of chromatograms.

2.0 SUMMARY OF METHOD

2.1 Method 8141 provides gas chromatographic conditions for the detection of ppb concentrations of organophosphorus compounds. Prior to the use of this method, appropriate sample preparation techniques must be used. Water samples are extracted at a neutral pH with methylene chloride by using a separatory funnel (Method 3510) or a continuous liquid-liquid extractor (Method 3520). Soxhlet extraction (Method 3540) or automated Soxhlet extraction (Method 3541) using methylene chloride/acetone (1:1) are used for solid samples. Both neat and diluted organic liquids (Method 3580, Waste Dilution) may be analyzed by direct injection. Spiked samples are used to verify the applicability of the chosen extraction technique to each new sample type. A gas chromatograph with a flame photometric or nitrogen-phosphorus detector is used for this multiresidue procedure.

7.0 PROCEDURE

7.1 Extraction and cleanup:

7.1.1 Refer to Chapter Two and Method 8140 for guidance on choosing the appropriate extraction procedure. In general, water samples are extracted at a neutral pH with methylene chloride, using either Method 3510 or 3520. Solid samples are extracted using either Method 3540 or 3541 with methylene chloride/acetone (1:1 v/v) or hexane/acetone (1:1 v/v) as the extraction solvent. Method 3550 is an inappropriate extraction technique for the target analytes of this method (See Sec. 2.3).

7.1.2 Extraction and cleanup procedures that use solutions below pH 4 or above pH 8 are not appropriate for this method.

7.1.3 If required, the samples may be cleaned up using the Methods presented in Chapter Four, Sec. 2. Florisil Column Cleanup (Method 3620) and Sulfur Cleanup (Method 3660, TBA-sulfite option) may have particular application for OPs. Gel Permeation Cleanup (Method 3640) should not generally be used for OP pesticides.

7.1.3.1 If sulfur cleanup by Method 3660 is required, do not use mercury or copper.

7.1.3.2 GPC may only be employed if all target OP pesticides are listed as analytes of Method 3640, or if the laboratory has demonstrated a recovery of greater than 85 percent for target OPs at a concentration not greater than 5 times the regulatory action level. Laboratories must retain data demonstrating acceptable recovery.

7.1.4 Prior to gas chromatographic analysis, the extraction solvent may be exchanged to hexane. The analyst must ensure quantitative transfer of the extract concentrate. Single-laboratory data indicate that samples should not be transferred with 100-percent hexane during sample workup, as the more polar organophosphorus compounds may be lost. Transfer of organophosphorus esters is best accomplished using methylene chloride or a hexane/acetone solvent mixture.

7.1.5 Methylene chloride may be used as an injection solvent with both the FPD and the NPD.

<u>NOTE</u>: Follow manufacturer's instructions as to suitability of using methylene chloride with any specific detector.

7.2 Gas chromatographic conditions:

7.2.1 Four 0.53-mm ID capillary columns are suggested for the determination of organophosphates by this method. Column 1 (DB-210 or equivalent) and Column 2 (SPB-608 or equivalent) of 30-m length are recommended if a large number of organophosphorus analytes are to be determined. If superior chromatographic resolution is not required, 15-m lengths columns may be appropriate. Operating conditions for 15-m columns

1.3 The sensitivity of this method is dependent upon the level of interferences within a given matrix. The calibration range of the method for a 1 L water sample is 10 to 2000 ppq for TCDD/TCDF and PeCDD/PeCDF, and 1.0 to 200 ppt for a 10 g soil, sediment, fly ash, or tissue sample for the same analytes (Table 1). Analysis of a one-tenth aliquot of the sample permits measurement of concentrations up to 10 times the upper MCL. The actual limits of detection and quantitation will differ from the lower MCL, depending on the complexity of the matrix.

1.4 This method is designed for use by analysts who are experienced with residue analysis and skilled in HRGC/HRMS.

1.5 Because of the extreme toxicity of many of these compounds, the analyst must take the necessary precautions to prevent exposure to materials known or believed to contain PCDDs or PCDFs. It is the responsibility of the laboratory personnel to ensure that safe handling procedures are employed. Sec. 11 of this method discusses safety procedures.

2.0 SUMMARY OF METHOD

2.1 This procedure uses matrix specific extraction, analyte specific cleanup, and HRGC/HRMS analysis techniques.

2.2 If interferences are encountered, the method provides selected cleanup procedures to aid the analyst in their elimination. A simplified analysis flow chart is presented at the end of this method.

2.3 A specified amount (see Table 1) of soil, sediment, fly ash, water, sludge (including paper pulp), still bottom, fuel oil, chemical reactor residue, fish tissue, or human adipose tissue is spiked with a solution containing specified amounts of each of the nine isotopically ($^{13}C_{12}$) labeled PCDDs/PCDFs listed in Column 1 of Table 2. The sample is then extracted according to a matrix specific extraction procedure. Aqueous samples that are judged to contain 1 percent or more solids, and solid samples that show an aqueous phase, are filtered, the solid phase (including the filter) and the aqueous phase extracted separately, and the extracts combined before extract cleanup. The extraction procedures are:

a) Toluene: Soxhlet extraction for soil, sediment, fly ash, and paper pulp samples;

b) Methylene chloride: liquid-liquid extraction for water samples;

c) Toluene: Dean-Stark extraction for fuel oil, and aqueous sludge samples;

d) Toluene extraction for still bottom samples;

e) Hexane/methylene chloride: Soxhlet extraction or methylene chloride: Soxhlet extraction for fish tissue samples; and

f) Methylene chloride extraction for human adipose tissue samples.

METHOD 3510C

SEPARATORY FUNNEL LIQUID-LIQUID EXTRACTION

1.0 SCOPE AND APPLICATION

1.1 This method describes a procedure for isolating organic compounds from aqueous samples. The method also describes concentration techniques suitable for preparing the extract for the appropriate determinative methods described in Section 4.3 of Chapter Four.

1.2 This method is applicable to the isolation and concentration of water-insoluble and slightly water-soluble organics in preparation for a variety of chromatographic procedures.

1.3 This method is restricted to use by or under the supervision of trained analysts. Each analyst must demonstrate the ability to generate acceptable results with this method.

2.0 SUMMARY OF METHOD

2.1 A measured volume of sample, usually 1 liter, at a specified pH (see Table 1), is serially extracted with methylene chloride using a separatory funnel.

2.2 The extract is dried, concentrated (if necessary), and, as necessary, exchanged into a solvent compatible with the cleanup or determinative method to be used (see Table 1 for appropriate exchange solvents).

3.0 INTERFERENCES

3.1 Refer to Method 3500.

3.2 The decomposition of some analytes has been demonstrated under basic extraction conditions. Organochlorine pesticides may dechlorinate, phthalate esters may exchange, and phenols may react to form tannates. These reactions increase with increasing pH, and are decreased by the shorter reaction times available in Method 3510. Method 3510 is preferred over Method 3520 for the analysis of these classes of compounds. However, the recovery of phenols may be optimized by using Method 3520, and performing the initial extraction at the acid pH.

4.0 APPARATUS AND MATERIALS

4.1 Separatory funnel - 2-liter, with polytetrafluoroethylene (PTFE) stopcock.

4.2 Drying column - 20 mm ID Pyrex® chromatographic column with Pyrex® glass wool at bottom and a PTFE stopcock.

NOTE: Fritted glass discs are difficult to decontaminate after highly contaminated extracts have been passed through. Columns without frits may be purchased. Use a small pad of Pyrex® glass wool to retain the adsorbent. Prewash the glass wool pad with 50 mL of acetone followed by 50 mL of elution solvent prior to packing the column with adsorbent.

5.2 Organic-free reagent water - All references to water in this method refer to organic-free reagent water, as defined in Chapter One.

5.3 Sodium hydroxide solution (10 N), NaOH. Dissolve 40 g NaOH in organic-free reagent water and dilute to 100 mL. Other concentrations of hydroxide solutions may be used to adjust sample pH, provided that the volume added does not appreciably change (e.g., <1%) the total sample volume.

5.4 Sodium sulfate (granular, anhydrous), Na_2SO_4. Purify by heating to 400°C for 4 hours in a shallow tray, or by precleaning the sodium sulfate with methylene chloride. If the sodium sulfate is precleaned with methylene chloride, a method blank must be analyzed, demonstrating that there is no interference from the sodium sulfate. Other concentrations of acid solutions may be used to adjust sample pH, provided that the volume added does not appreciably change (e.g., <1%) the total sample volume.

5.5 Sulfuric acid solution (1:1 v/v), H_2SO_4. Slowly add 50 mL of H_2SO_4 (sp. gr. 1.84) to 50 mL of organic-free reagent water.

5.6 Extraction/exchange solvents - All solvents must be pesticide quality or equivalent.

5.6.1 Methylene chloride, CH_2Cl_2, boiling point 39°C.

5.6.2 Hexane, C_6H_{14}, boiling point 68.7°C.

5.6.3 2-Propanol, $CH_3CH(OH)CH_3$, boiling point 82.3°C.

5.6.4 Cyclohexane, C_6H_{12}, boiling point 80.7°C.

5.6.5 Acetonitrile, CH_3CN, boiling point 81.6°C.

6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

See the introductory material to this chapter, Organic Analytes, Sect. 4.1.

7.0 PROCEDURE

7.1 Using a 1-liter graduated cylinder, measure 1 liter (nominal) of sample. Alternatively, if the entire contents of the sample bottle are to be extracted, mark the level of sample on the outside of the bottle. If high analyte concentrations are anticipated, a smaller sample volume may be taken and diluted to 1-L with organic-free reagent water, or samples may be collected in smaller sample bottles and the whole sample used.

7.2 Pipet 1.0 mL of the surrogate spiking solution into each sample in the graduated cylinder (or sample bottle) and mix well. (See Method 3500 and the determinative method to be used for details on the surrogate standard solution and matrix spiking solution).

7.2.1 For the sample in each batch (see Chapter One) selected for use as a matrix spike sample, add 1.0 mL of the matrix spiking standard.

METHOD 3520C

CONTINUOUS LIQUID-LIQUID EXTRACTION

1.0 SCOPE AND APPLICATION

1.1 This method describes a procedure for isolating organic compounds from aqueous samples. The method also describes concentration techniques suitable for preparing the extract for the appropriate determinative steps described in Sec. 4.3 of Chapter Four.

1.2 This method is applicable to the isolation and concentration of water-insoluble and slightly soluble organics in preparation for a variety of chromatographic procedures.

1.3 Method 3520 is designed for extraction solvents with greater density than the sample. Continuous extraction devices are available for extraction solvents that are less dense than the sample. The analyst must demonstrate the effectiveness of any such automatic extraction device before employing it in sample extraction.

1.4 This method is restricted to use by or under the supervision of trained analysts. Each analyst must demonstrate the ability to generate acceptable results with this method.

2.0 SUMMARY OF METHOD

2.1 A measured volume of sample, usually 1 liter, is placed into a continuous liquid-liquid extractor, adjusted, if necessary, to a specific pH (see Table 1), and extracted with organic solvent for 18 - 24 hours.

2.2 The extract is dried, concentrated (if necessary), and, as necessary, exchanged into a solvent compatible with the cleanup or determinative method being employed (see Table 1 for appropriate exchange solvents).

3.0 INTERFERENCES

3.1 Refer to Method 3500.

3.2 The decomposition of some analytes has been demonstrated under basic extraction conditions required to separate analytes. Organochlorine pesticides may dechlorinate, phthalate esters may exchange, and phenols may react to form tannates. These reactions increase with increasing pH, and are decreased by the shorter reaction times available in Method 3510. Method 3510 is preferred over Method 3520 for the analysis of these classes of compounds. However, the recovery of phenols may be optimized by using Method 3520 and performing the initial extraction at the acid pH.

4.0 APPARATUS AND MATERIALS

4.1 Continuous liquid-liquid extractor - Equipped with polytetrafluoroethylene (PTFE) or glass connecting joints and stopcocks requiring no lubrication (Kontes 584200-0000, 584500-0000, 583250-0000, or equivalent).

5.0 REAGENTS

5.1 Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available. Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination. Reagents should be stored in glass to prevent the leaching of contaminants from plastic containers.

5.2 Organic-free reagent water - All references to water in this method refer to organic-free reagent water, as defined in Chapter One.

5.3 Sodium hydroxide solution (10N), NaOH. Dissolve 40 g NaOH in organic-free reagent water and dilute to 100 mL. Other concentrations of hydroxide solutions may be used to adjust sample pH, provided that the volume added does not appreciably change (e.g., <1%) the total sample volume.

5.4 Sodium sulfate (granular, anhydrous), Na_2SO_4. Purify by heating at 400°C for 4 hours in a shallow tray, or by precleaning the sodium sulfate with methylene chloride. If the sodium sulfate is precleaned with methylene chloride, a method blank must be analyzed, demonstrating that there is no interference from the sodium sulfate.

5.5 Sulfuric acid solution (1:1 v/v), H_2SO_4. Slowly add 50 mL of H_2SO_4 (sp. gr. 1.84) to 50 mL of organic-free reagent water. Other concentrations of acid solutions may be used to adjust sample pH, provided that the volume added does not appreciably change (e.g., <1%) the total sample volume.

5.6 Extraction/exchange solvents - All solvents must be pesticide quality or equivalent.

5.6.1 Methylene chloride, CH_2Cl_2, boiling point 39°C.

5.6.2 Hexane, C_6H_{14}, boiling point 68.7°C.

5.6.3 2-Propanol, $CH_3CH(OH)CH_3$, boiling point 82.3°C.

5.6.4 Cyclohexane, C_6H_{12}, boiling point 80.7°C.

5.6.5 Acetonitrile, CH_3CN, boiling point 81.6°C.

6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

See the introductory material to this chapter, Organic Analytes, Sec. 4.1.

7.0 PROCEDURE

7.1 Using a 1-liter graduated cylinder, measure 1 liter (nominal) of sample. Alternatively, if the entire contents of sample bottle are to be extracted, mark the level of sample on the outside of the bottle. If high concentrations are anticipated, a smaller sample volume may be taken and diluted to 1-L with organic-free reagent water. It is recommended that if high analyte concentrations are anticipated, samples should be collected in smaller sample bottles and the whole sample used.

METHOD 3535

SOLID-PHASE EXTRACTION (SPE)

1.0 SCOPE AND APPLICATION

1.1 This method describes a procedure for isolating target organic analytes from aqueous samples using solid-phase extraction media. The method describes conditions for extracting organochlorine pesticides and phthalate esters from aqueous matrices including groundwater, wastewater, and TCLP leachates using disk extraction media. Performance data for these extractions are provided in Method 8081 (organochlorine pesticides) and Method 8061 (phthalate esters). The technique may also be applicable to semivolatiles and other extractable compounds. Other solid-phase extraction media configurations, e.g., SPE cartridges, may be employed provided that the laboratory demonstrates adequate performance for the analytes of interest.

1.2 This method also provides procedures for concentrating extracts and for solvent exchange.

1.3 The method may be used for the extraction of additional target analytes or other solid-phase media if the analyst demonstrates adequate performance (e.g., recovery of 70 - 130%) using spiked sample matrices and an appropriate determinative method from Chapter Four (Sec. 4.3). Organic-free reagent water is not considered appropriate for conducting such performance studies. Specifically, many non-polar organic contaminants present in an aqueous sample are likely to be bound to particulate matter and extraction efficiencies are expected to be less than those determined from simply spiking organic-free reagent water.

1.4 Solid-phase extraction is called liquid-solid extraction (LSE) in EPA Drinking Water methods.

1.5 This method is restricted to use by or under the supervision of trained analysts. Each analyst must demonstrate the ability to generate acceptable results with this method.

2.0 SUMMARY OF METHOD

2.1 A measured volume of sample is adjusted to a specified pH (see Table 1) and then extracted using a Solid-phase Extraction (SPE) device.

2.2 Target analytes are eluted from the solid-phase media using methylene chloride or other appropriate solvent. The resulting solvent extract is dried using sodium sulfate and concentrated.

2.3 The concentrated extract may be exchanged into a solvent compatible with subsequent cleanup procedures (Chapter Four, Sec. 4.2) or determinative procedures (Chapter Four, Sec. 4.3) employed for the measurement of the target analytes.

3.0 INTERFERENCES

3.1 Refer to Method 3500.

4.9 N-Evap - Nitrogen blowdown apparatus, 12- or 24-position (Organomation Model 112, or equivalent) (optional).

4.10 Vials, glass - Sizes as appropriate, e.g., 2-mL or 10-mL with PTFE-fluorocarbon-lined screw caps or crimp tops for storage of extracts.

4.11 pH indicator paper - Wide pH range (Fisher Scientific 14-850-13B, or equivalent).

4.12 Vacuum system - Capable of maintaining a vacuum of approximately 66 cm (26 inches) of mercury.

4.13 Graduated cylinder - Sizes as appropriate.

4.14 Pipets, disposable (Fisher Scientific 13-678-20C, or equivalent).

5.0 REAGENTS

5.1 Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available. Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without decreasing the accuracy of the determination. Reagents should be stored in glass to prevent the leaching of contaminants from plastic containers.

5.2 Organic-free reagent water - All references to water in this method refer to organic-free reagent water, as defined in Chapter One.

5.3 Sodium sulfate (granular, anhydrous), Na_2SO_4 - Purify by heating at 400°C for 4 hours in a shallow tray, or by precleaning the sodium sulfate with methylene chloride.

5.4 Solutions for adjusting the pH of samples before extraction.

5.4.1 Sulfuric acid solution (1:1 v/v), H_2SO_4 - Slowly add 50 mL of H_2SO_4 (sp. gr. 1.84) to 50 mL of organic-free reagent water.

5.4.2 Sodium hydroxide solution (10N), NaOH - Dissolve 40 g NaOH in organic-free reagent water and dilute to 100 mL.

5.5 Extraction, washing, and exchange solvents - All solvents must be pesticide quality or equivalent.

5.5.1 Methylene chloride, CH_2Cl_2.

5.5.2 Hexane, C_6H_{14}.

5.5.3 Ethyl acetate, $CH_3COOC_2H_5$.

5.5.4 Acetonitrile, CH_3CN.

5.5.5 Methanol, CH_3OH.

METHOD 3540C

SOXHLET EXTRACTION

1.0 SCOPE AND APPLICATION

1.1 Method 3540 is a procedure for extracting nonvolatile and semivolatile organic compounds from solids such as soils, sludges, and wastes. The Soxhlet extraction process ensures intimate contact of the sample matrix with the extraction solvent.

1.2 This method is applicable to the isolation and concentration of water-insoluble and slightly water soluble organics in preparation for a variety of chromatographic procedures.

1.3 This method is restricted to use by or under the supervision of trained analysts. Each analyst must demonstrate the ability to generate acceptable results with this method.

2.0 SUMMARY OF METHOD

2.1 The solid sample is mixed with anhydrous sodium sulfate, placed in an extraction thimble or between two plugs of glass wool, and extracted using an appropriate solvent in a Soxhlet extractor.

2.2 The extract is then dried, concentrated (if necessary), and, as necessary, exchanged into a solvent compatible with the cleanup or determinative step being employed.

3.0 INTERFERENCES

Refer to Method 3500.

4.0 APPARATUS AND MATERIALS

4.1 Soxhlet extractor - 40 mm ID, with 500-mL round bottom flask.

4.2 Drying column - 20 mm ID Pyrex® chromatographic column with Pyrex® glass wool at bottom.

NOTE: Fritted glass discs are difficult to decontaminate after highly contaminated extracts have been passed through. Columns without frits may be purchased. Use a small pad of Pyrex® glass wool to retain the adsorbent. Prewash the glass wool pad with 50 mL of acetone followed by 50 mL of elution solvent prior to packing the column with adsorbent.

4.3 Kuderna-Danish (K-D) apparatus

4.3.1 Concentrator tube - 10-mL, graduated (Kontes K-570050-1025 or equivalent). A ground-glass stopper is used to prevent evaporation of extracts.

5.0 REAGENTS

5.1 Reagent grade inorganic chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available. Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

5.2 Organic-free reagent water. All references to water in this method refer to organic-free reagent water, as defined in Chapter One.

5.3 Sodium sulfate (granular, anhydrous), Na_2SO_4. Purify by heating at 400°C for 4 hours in a shallow tray, or by precleaning the sodium sulfate with methylene chloride. If the sodium sulfate is precleaned with methylene chloride, a method blank must be analyzed, demonstrating that there is no interference from the sodium sulfate.

5.4 Extraction solvents - All solvents must be pesticide quality or equivalent.

5.4.1 Soil/sediment and aqueous sludge samples shall be extracted using either of the following solvent systems:

5.4.1.1 Acetone/Hexane (1:1) (v/v), CH_3COCH_3/C_6H_{14}.

<u>NOTE</u>: This solvent system has lower disposal cost and lower toxicity.

5.4.1.2 Methylene chloride/Acetone (1:1 v/v), CH_2Cl_2/CH_3COCH_3.

5.4.2 Other samples shall be extracted using the following:

5.4.2.1 Methylene chloride, CH_2Cl_2.

5.4.2.2 Toluene/Methanol (10:1) (v/v), $C_6H_5CH_3/CH_3OH$.

5.5 Exchange solvents - All solvents must be pesticide quality or equivalent.

5.5.1 Hexane, C_6H_{14}.

5.5.2 2-Propanol, $(CH_3)_2CHOH$.

5.5.3 Cyclohexane, C_6H_{12}.

5.5.4 Acetonitrile, CH_3CN.

6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

See the introductory material to this chapter, Organic Analytes, Section 4.1.

METHOD 3545

PRESSURIZED FLUID EXTRACTION (PFE)

1.0 SCOPE AND APPLICATION

1.1 Method 3545 is a procedure for extracting water insoluble or slightly water soluble semivolatile organic compounds from soils, clays, sediments, sludges, and waste solids. The method uses elevated temperature (100°C) and pressure (1500 - 2000 psi) to achieve analyte recoveries equivalent to those from Soxhlet extraction, using less solvent and taking significantly less time than the Soxhlet procedure. This procedure was developed and validated on a commercially-available, automated extraction system.

1.2 This method is applicable to the extraction of semivolatile organic compounds, organophosphorus pesticides, organochlorine pesticides, chlorinated herbicides, and PCBs, which may then be analyzed by a variety of chromatographic procedures.

1.3 This method has been validated for solid matrices containing 250 to 12,500 µg/kg of semivolatile organic compounds, 250 to 2500 µg/kg of organophosphorus pesticides, 5 to 250 µg/kg of organochlorine pesticides, 50 to 5000 µg/kg of chlorinated herbicides, and 1 to 1400 µg/kg of PCBs. The method may be applicable to samples containing these analytes at higher concentrations and may be employed after adequate performance has been demonstrated for the concentrations of interest (see Method 3500, Sec. 8.0).

1.4 This method is applicable to solid samples only, and is most effective on dry materials with small particle sizes. Therefore, waste samples must undergo phase separation, as described in Chapter Two, and only the solid phase material is to be extracted by this procedure. If possible, soil/sediment samples may be air-dried and ground to a fine powder prior to extraction. Alternatively, if the loss of analytes during drying is a concern, soil/sediment samples may be mixed with anhydrous sodium sulfate or pelletized diatomaceous earth. The total mass of material to be prepared depends on the specifications of the determinative method and the sensitivity required for the analysis, but 10 - 30 g of material are usually necessary and can be accommodated by this extraction procedure.

1.5 This method is restricted to use by or under the supervision of trained analysts. Each analyst must demonstrate the ability to generate acceptable results with this method.

2.0 SUMMARY OF METHOD

2.1 Samples are prepared for extraction either by air drying the sample, or by mixing the sample with anhydrous sodium sulfate or pelletized diatomaceous earth. The sample is then ground to a 100 - 200 mesh powder (150 µm to 75 µm) and loaded into the extraction cell.

2.2 The extraction cell containing the sample is heated to the extraction temperature (see Sec. 7.8), pressurized with the appropriate solvent system, and extracted for 5 minutes (or as recommended by the instrument manufacturer). The solvent systems used for this procedure vary with the analytes of interest and are described in Sec. 5.5.

2.3 The solvent is collected from the heated extraction vessel and allowed to cool.

5.2 Organic-free reagent water. All references to water in this method refer to organic-free reagent water, as defined in Chapter One.

5.3 Drying agents

5.3.1 Sodium sulfate (granular anhydrous), Na_2SO_4.

5.3.2 Pelletized diatomaceous earth.

5.3.3 The drying agents should be purified by heating at 400°C for 4 hours in a shallow tray, or by extraction with methylene chloride. If extraction with methylene chloride is employed, then a reagent blank should be prepared to demonstrate that the drying agent is free of interferences.

5.4 Phosphoric acid solution (see Sec. 5.5.5). Prepare a 1:1 (v/v) solution of 85% phosphoric acid (H_3PO_4) in organic-free reagent water.

5.5 Extraction solvents

The extraction solvent to be employed depends on the analytes to be extracted, as described below. All solvents should be pesticide quality or equivalent. Solvents may be degassed prior to use.

5.5.1 Organochlorine pesticides may be extracted with acetone/hexane (1:1, v/v), CH_3COCH_3/C_6H_{14} or acetone/methylene chloride (1:1,v/v), CH_3COCH_3/CH_2Cl_2.

5.5.2 Semivolatile organics may be extracted with acetone/methylene chloride (1:1, v/v), CH_3COCH_3/CH_2Cl_2 or acetone/hexane (1:1, v/v), CH_3COCH_3/C_6H_{14}.

5.5.3 PCBs may be extracted with acetone/hexane (1:1, v/v), CH_3COCH_3/C_6H_{14} or acetone/methylene chloride (1:1, v/v), CH_3COCH_3/CH_2Cl_2 or hexane, C_6H_{14}.

5.5.4 Organophosphorus pesticides may be extracted with methylene chloride, CH_2Cl_2 or acetone/methylene chloride (11:1, v/v), CH_3COCH_3/CH_2Cl_2.

5.5.5 Chlorinated herbicides may be extracted with an acetone/methylene chloride/phosphoric acid solution (250:125:15, v/v/v), $CH_3COCH_3/CH_2Cl_2/H_3PO_4$, or an acetone/methylene chloride/trifluoroacetic acid solution (250:125:1, v/v/v), $CH_3COCH_3/CH_2Cl_2/CF_3COOH$. (If the second option is used, the trifluoroacetic acid solution should be prepared by mixing 1% trifluoroacetic acid in acetonitrile.) Make fresh solutions before each batch of extractions.

5.5.6 Other solvent systems may be employed, provided that the analyst can demonstrate adequate performance for the analytes of interest in the sample matrix (see Method 3500, Sec. 8.0).

CAUTION: For best results with very wet samples (e.g., ≥30% moisture), reduce or eliminate the quantity of hydrophilic solvent used.

5.6 High-purity gases such as nitrogen, carbon dioxide, or helium are used to purge and/or pressurize the extraction cell. Follow the instrument manufacturer's recommendation for the choice of gases.

METHOD 3550B

ULTRASONIC EXTRACTION

See Disclaimer. See manufacturer's specifications for operational settings.

1.0 SCOPE AND APPLICATION

1.1 Method 3550 is a procedure for extracting nonvolatile and semivolatile organic compounds from solids such as soils, sludges, and wastes. The ultrasonic process ensures intimate contact of the sample matrix with the extraction solvent.

1.2 The method is divided into two sections, based on the expected concentration of organics in the sample. The low concentration method (individual organic components of less than or equal to 20 mg/kg) uses a larger sample size and a more rigorous extraction procedure (lower concentrations are more difficult to extract). The medium/high concentration method (individual organic components of greater than 20 mg/kg) is much simpler and therefore faster.

1.3 It is highly recommended that the extracts be cleaned up prior to analysis. See Chapter Four (Cleanup), Sec. 4.2.2, for applicable methods.

1.4 Ultrasonic extraction is not as rigorous as other extraction methods for soils/solids. Therefore, it is critical that the method (including the manufacturer's instructions) be followed explicitly in order to achieve the maximum extraction efficiency. See Sec. 7.0 for the critical aspects of the extraction procedure.

1.5 EPA has not validated Method 3550 for the extraction of organophosphorous compounds from solid matrices. In addition, there are concerns that the ultrasonic energy may lead to breakdown of some organophosphorous compounds (see Reference 3). As a result, this extraction technique should not be used for organophosphorous compounds without extensive validation on real-world samples. Such studies should assess the precision, accuracy, ruggedness, and sensitivity of the technique relative to the appropriate regulatory limits or project-specific concentrations of interest.

1.6 This method is restricted to use by or under the supervision of trained analysts. Each analyst must demonstrate the ability to generate acceptable results with this method.

1.7 This method is not appropriate for applications where high extraction efficiencies of analytes at very low concentrations is necessary (e.g., demonstration of effectiveness of corrective action).

2.0 SUMMARY OF METHOD

2.1 Low concentration method - A 30-g sample is mixed with anhydrous sodium sulfate to form a free-flowing powder. This is solvent extracted three times using ultrasonic extraction. The extract is separated from the sample by vacuum filtration or centrifugation. The extract is ready for cleanup and/or analysis following concentration.

Analytical Reagents of the American Chemical Society, where such specifications are available. Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

5.2 Organic-free reagent water. All references to water in this method refer to organic-free reagent water, as defined in Chapter One.

5.3 Sodium sulfate (granular, anhydrous), Na_2SO_4. Purify by heating at 400°C for 4 hours in a shallow tray, or by precleaning the sodium sulfate with methylene chloride. If the sodium sulfate is precleaned with methylene chloride, a method blank must be analyzed, demonstrating that there is no interference from the sodium sulfate.

5.4 Extraction solvents

Samples should be extracted using a solvent system that gives optimum, reproducible recovery of the analytes of interest from the sample matrix. Table 1 provides recovery data for selected semivolatile organic compounds extracted from an NIST SRM. The following sections provide guidance on the choice of solvents for various classes of analytes. All solvents must be pesticide quality or equivalent.

5.4.1 Semivolatile organics may be extracted with acetone/methylene chloride (1:1, v/v), CH_3COCH_3/CH_2Cl_2 or acetone/hexane (1:1, v/v), CH_3COCH_3/C_6H_{14}.

5.4.2 Organochlorine pesticides may be extracted with acetone/hexane (1:1, v/v), CH_3COCH_3/C_6H_{14} or acetone/methylene chloride (1:1,v/v), CH_3COCH_3/CH_2Cl_2.

5.4.3 PCBs may be extracted with acetone/hexane (1:1, v/v), CH_3COCH_3/C_6H_{14}, acetone/methylene chloride (1:1, v/v), CH_3COCH_3/CH_2Cl_2 or hexane, C_6H_{14}.

5.4.4 Other solvent systems may be employed, provided that the analyst can demonstrate adequate performance for the analytes of interest in the sample matrix (see Method 3500, Sec. 8.0).

5.5 Exchange solvents - All solvents must be pesticide quality or equivalent.

5.5.1 Hexane, C_6H_{14}.

5.5.2 2-Propanol, $(CH_3)_2CHOH$.

5.5.3 Cyclohexane, C_6H_{12}.

5.5.4 Acetonitrile, CH_3CN.

5.5.5 Methanol, CH_3OH.

6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

See the introductory material to this chapter, Organic Analytes, Sec. 4.1.

METHOD 3640A

GEL-PERMEATION CLEANUP

1.0 SCOPE AND APPLICATION

1.1 Gel-permeation chromatography (GPC) is a size exclusion cleanup procedure using organic solvents and hydrophobic gels in the separation of synthetic macromolecules (1). The packing gel is porous and is characterized by the range or uniformity (exclusion range) of that pore size. In the choice of gels, the exclusion range must be larger than the molecular size of the molecules to be separated (2). A cross-linked divinylbenzene-styrene copolymer (SX-3 Bio Beads or equivalent) is specified for this method.

1.2 General cleanup application - GPC is recommended for the elimination from the sample of lipids, polymers, copolymers, proteins, natural resins and polymers, cellular components, viruses, steroids, and dispersed high-molecular-weight compounds (2). GPC is appropriate for both polar and non-polar analytes, therefore, it can be effectively used to cleanup extracts containing a broad range of analytes.

1.3 Specific application - This method includes guidance for cleanup of sample extracts containing the following analytes from the RCRA Appendix VIII and Appendix IX lists:

Compound Name	CAS No.[a]
Acenaphthene	83-32-9
Acenaphthylene	208-96-8
Acetophenone	98-86-2
2-Acetylaminofluorene	53-96-3
Aldrin	309-00-2
4-Aminobiphenyl	92-67-1
Aniline	62-53-3
Anthracene	120-12-7
Benomyl	17804-35-2
Benzenethiol	108-98-5
Benzidine	92-87-5
Benz(a)anthracene	56-55-3
Benzo(b)fluoranthene	205-99-2
Benzo(a)pyrene	50-32-8
Benzo(ghi)perylene	191-24-2
Benzo(k)fluoranthene	207-08-9
Benzoic acid	65-85-0
Benzotrichloride	98-07-7
Benzyl alcohol	100-51-6
Benzyl chloride	100-44-7
alpha-BHC	319-84-6
beta-BHC	319-85-7

5.0 REAGENTS

5.1 Methylene chloride, CH_2Cl_2. Pesticide quality or equivalent.

5.1.1 Some brands of methylene chloride may contain unacceptably high levels of acid (HCl). Check the pH by shaking equal portions of methylene chloride and water, then check the pH of the water layer.

5.1.1.1 If the pH of the water layer is $\leq$ 5, filter the entire supply of solvent through a 2 in. x 15 in. glass column containing activated basic alumina. This column should be sufficient for processing approximately 20-30 liters of solvent. Alternatively, find a different supply of methylene chloride.

5.2 Cyclohexane, C_6H_{12}. Pesticide quality or equivalent.

5.3 n-Butyl chloride, $CH_3CH_2CH_2CH_2Cl$. Pesticide quality or equivalent.

5.4 GPC Calibration Solution. Prepare a calibration solution in methylene chloride containing the following analytes (in elution order):

Compound	mg/L
corn oil	25,000
bis(2-ethylhexyl) phthalate	1,000
methoxychlor	200
perylene	20
sulfur	80

NOTE: Sulfur is not very soluble in methylene chloride, however, it is soluble in warm corn oil. Therefore, one approach is to weigh out the corn oil, warm it and transfer the weighed amount of sulfur into the warm corn oil. Mix it and then transfer into a volumetric flask with methylene chloride, along with the other calibration compounds.

Store the calibration solution in an amber glass bottle with a Teflon lined screw-cap at 4°C, and protect from light. (Refrigeration may cause the corn oil to precipitate. Before use, allow the calibration solution to stand at room temperature until the corn oil dissolves.) Replace the calibration standard solution every 6 months, or more frequently if necessary.

5.5 Corn Oil Spike for Gravimetric Screen. Prepare a solution of corn oil in methylene chloride (5 g/100 mL).

6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

6.1 See the introductory material to this chapter, Organic Analytes, Sec. 4.1.

METHOD 3610B

ALUMINA CLEANUP

1.0 SCOPE AND APPLICATION

1.1 Alumina is a highly porous and granular form of aluminum oxide. It is available in three pH ranges (basic, neutral, and acidic) for use in chromatographic cleanup procedures. It is used to separate analytes from interfering compounds of a different chemical polarity.

1.2 Each of the three pH ranges of alumina has different uses and disadvantages as a cleanup procedure.

1.2.1 Basic alumina has a pH of 9-10. It is used to separate basic and neutral compounds that are stable to alkali, alcohols, hydrocarbons, steroids, alkaloids, natural pigments. Its disadvantages are that it can cause polymerization, condensation, and dehydration reactions, and one cannot use acetone or ethyl acetate as eluants.

1.2.2 Neutral alumina has a pH of 6-8. It is used to separate aldehydes, ketones, quinones, esters, lactones, glycoside. Its disadvantage is that is it considerably less active than the basic form.

1.2.3 Acidic alumina has a pH of 4-5. It is used to separate acidic pigments (natural and synthetic), and strong acids (that otherwise chemisorb to neutral and basic alumina). This method does not address the use of acid alumina.

1.3 Basic, neutral, and acidic alumina can be prepared in various activity grades (I to V), based on the Brockmann scale reproduced below. Grade I is prepared by heating alumina until no more water is lost (typically overnight at 400-450°C, but other time-temperature relationships may be employed). The other grades (II-V) are prepared by adding water to Grade I to deactivate it.

Activity grade	I	II	III	IV	V
Water added (wt. %)	0	3	6	10	15
RF (p-aminoazobenzene)	0.0	0.13	0.25	0.45	0.55

where RF is the retention factor for p-aminoazobenzene.

1.4 Alumina cleanup may be accomplished using a glass chromatographic column packed with alumina or using solid-phase extraction cartridges containing alumina.

1.5 This method includes procedures for cleanup of sample extracts containing phthalate esters and nitrosamines. See Method 3611, Alumina Column Cleanup of Petroleum Wastes, for alumina cleanup of petroleum wastes.

1.6 This method is restricted to use by or under the supervision of trained analysts. Each analyst must demonstrate the ability to generate acceptable results with this method.

4.6 Vacuum manifold - VacElute Manifold SPS-24 (Analytichem International), Visiprep (Supelco, Inc.) or equivalent, consisting of glass vacuum basin, collection rack and funnel, collection vials, replaceable stainless steel delivery tips, built-in vacuum bleed valve and gauge. The system is connected to a vacuum pump or water aspirator through a vacuum trap made from a 500-mL sidearm flask fitted with a one-hole stopper and glass tubing. The manifold is needed for use of the cartridge cleanup protocol.

4.7 Top-loading balance - capable of weighing 0.01 g.

5.0 REAGENTS

5.1 Organic-free reagent water - All references to water in this method refer to organic-free reagent water, as defined in Chapter One.

5.2 Sodium sulfate - Sodium sulfate (granular, anhydrous), Na_2SO_4. Purify by heating at 400°C for 4 hours in a shallow tray, or by precleaning the sodium sulfate with methylene chloride. A method blank must be analyzed in order to demonstrate that there is no interference from the sodium sulfate.

5.3 Eluting solvents - all solvents must be pesticide quality or equivalent.

5.3.1 Diethyl Ether, $C_2H_5OC_2H_5$. Must be free of peroxides as indicated by test strips (EM Quant, or equivalent). Procedures for removal of peroxides are provided with the test strips. After cleanup, 20 mL of ethyl alcohol preservative must be added to each liter of ether.

5.3.2 Methanol, CH_3OH

5.3.3 Pentane, $CH_3(CH_2)_3CH_3$

5.3.4 Hexane, C_6H_{14}

5.3.5 Methylene chloride, CH_2Cl_2

5.3.6 Acetone, CH_3COCH_3

5.4 Granular alumina, for column cleanup procedure

5.4.1 Neutral alumina, for cleanup of phthalates, activity Super I, W200 series (ICN Life Sciences Group, No. 404583 or equivalent). To activate, place 100 g of alumina into a 500-mL beaker and heat for approximately 16 hr at 400°C. After heating, transfer to a 500-mL reagent bottle. Tightly seal the bottle and cool to room temperature. When cool, add 3 mL of organic-free reagent water. Mix thoroughly by shaking or rolling for 10 min and let it stand for at least 2 hr. The preparation should be homogeneous before use. Keep the bottle sealed tightly to ensure proper activity. Super I alumina cited above is a Grade I reagent with a very high binding capacity. The neutral alumina employed in this method may be prepared from reagents other than Super I, provided that adequate performance can be demonstrated.

5.4.2 Basic alumina, for cleanup of nitrosamines, activity Super I, W200 series (ICN Life Sciences Group, No. 404571, or equivalent). To activate, place 100 g of alumina into a 500-mL reagent bottle and add 2 mL of organic-free reagent water. Mix thoroughly by shaking or rolling for 10 min and let it stand for at least 2 hr. The preparation should be homogeneous

METHOD 3620B

FLORISIL CLEANUP

1.0 SCOPE AND APPLICATION

1.1 Florisil, a registered trade name of U. S. Silica Co., is a magnesium silicate with basic properties. It is used to separate analytes from interfering compounds prior to sample analysis by a chromatographic method.

1.2 Florisil has been used for the cleanup of pesticide residues and other chlorinated hydrocarbons; the separation of nitrogen compounds from hydrocarbons; the separation of aromatic compounds from aliphatic-aromatic mixtures; and similar applications for use with fats, oils, and waxes. Additionally, Florisil is considered good for separations with steroids, esters, ketones, glycerides, alkaloids, and some carbohydrates.

1.3 Florisil cleanup may be accomplished using a glass chromatographic column packed with Florisil or using solid-phase extraction cartridges containing Florisil.

1.4 This method includes procedures for cleanup of sample extracts containing the following analyte groups:

Phthalate esters	Chlorinated hydrocarbons
Nitrosamines	Organochlorine pesticides
Nitroaromatics	Organophosphates
Haloethers	Organophosphorus pesticides
Aniline and aniline derivatives	PCBs

1.5 This method is restricted to use by or under the supervision of trained analysts. Each analyst must demonstrate the ability to generate acceptable results with this method.

2.0 SUMMARY OF METHOD

2.1 This method describes procedures for Florisil cleanup of solvent extracts of environmental samples. It provides the option of using either traditional column chromatography techniques to solid-phase extraction cartridges. Generally, the traditional column chromatography technique uses larger amounts of adsorbent and, therefore, has a greater cleanup capacity.

2.2 In the column cleanup protocol, the column is packed with the required amount of adsorbent, topped with a water adsorbent, and then loaded with the sample extract. Elution of the analytes is effected with a suitable solvent(s), leaving the interfering compounds on the column. The eluate may be further concentrated prior to gas chromatographic analysis.

2.3 The cartridge cleanup protocol uses solid-phase extraction cartridges containing 40 µm particles of Florisil (60 Å pores). Each cartridge is washed with solvent immediately prior to use. The sample extract is loaded onto the cartridge which is then eluted with suitable solvent(s). A vacuum manifold is required to obtain reproducible results. The eluate may be further concentrated prior to gas chromatographic analysis.

5.6.3.3 Let the Florisil settle and using a volumetric pipet, transfer 10.0 mL of supernatant liquid into a 125-mL Erlenmeyer flask. Avoid inclusion of any Florisil.

5.6.3.4 Add 60 mL of ethanol and 3 drops of the phenolphthalein indicator solution to the flask.

5.6.3.5 Titrate the solution in the flask with the 0.05N NaOH solution until a permanent end point is reached (i.e., the indicator color does not disappear when the solution is allowed to stand for 1 min).

5.6.3.6 The lauric acid value is calculated as follows:

Lauric acid value = 200 - (titration volume in mL of NaOH) (strength of NaOH)

where the strength of the NaOH is measured in Sec. 7.5.3 as the mg of lauric acid neutralized per mL of NaOH solution.

5.6.3.7 Use the following equation to obtain an equivalent quantity of any batch of Florisil.

$$\frac{\text{lauric acid value}}{110} \times 20\text{ g} = \text{Required weight of Florisil}$$

5.7 Sodium sulfate (granular, anhydrous), Na_2SO_4 - Purify by heating at 400°C for 4 hours in a shallow tray, or by precleaning the sodium sulfate with methylene chloride. A method blank must be analyzed in order to demonstrate that there is no interference from the sodium sulfate.

5.8 Florisil cartridges - 40 µm particles, 60 Å pores. The cartridges from which this method were developed consist of 6-mL serological- grade polypropylene tubes, with the 1 g of Florisil held between two polyethylene or stainless steel frits with 20 µm pores. Cartridges containing 0.5 g and 2.0 g of Florisil are available, however, the compound elution patterns must be verified when cartridges containing other than 1 g of Florisil are used.

5.9 Eluting solvents - all solvents must be pesticide quality or equivalent.

5.9.1 Diethyl Ether, $C_2H_5OC_2H_5$. Must be free of peroxides as indicated by test strips (EM Quant, or equivalent). Procedures for removal of peroxides are provided with the test strips. After cleanup, 20 mL of ethyl alcohol preservative must be added to each liter of ether.

5.9.2 Pentane, $CH_3(CH_2)_3CH_3$

5.9.3 Hexane, C_6H_{14}

5.9.4 Methylene chloride, CH_2Cl_2

5.9.5 Acetone, CH_3COCH_3

5.9.6 Petroleum ether (boiling range 30-60°C)

5.9.7 Toluene, $C_6H_5CH_3$

METHOD 3630C

SILICA GEL CLEANUP

1.0 SCOPE AND APPLICATION

1.1 Silica gel (silicic acid) is a regenerative adsorbent of silica with weakly acidic properties. It is produced from sodium silicate and sulfuric acid. Silica gel can be used in column chromatography for the separation of analytes from interfering compounds of a different chemical polarity. It may be used activated, after heating to 150 - 160°C, or deactivated with up to 10% water.

1.2 This method includes guidance for standard column cleanup of sample extracts containing polynuclear aromatic hydrocarbons, derivatized phenolic compounds, organochlorine pesticides, and PCBs as Aroclors.

1.3 This method also provides cleanup procedures using solid-phase extraction cartridges for pentafluorobenzyl bromide-derivatized phenols, organochlorine pesticides, and PCBs. This technique also provides the best separation of PCBs from most single component organochlorine pesticides. When only PCBs are to be measured, this method can be used in conjunction with sulfuric acid/permanganate cleanup (Method 3665).

1.4 Other analytes may be cleaned up using this method if the analyte recovery meets the criteria specified in Sec. 8.0.

1.5 This method is restricted to use by or under the supervision of trained analysts. Each analyst must demonstrate the ability to generate acceptable results with this method.

2.0 SUMMARY OF METHOD

2.1 This method provides the option of using either standard column chromatography techniques or solid-phase extraction cartridges. Generally, the standard column chromatography techniques use larger amounts of adsorbent and, therefore, have a greater cleanup capacity.

2.2 In the standard column cleanup protocol, the column is packed with the required amount of adsorbent, topped with a water adsorbent, and then loaded with the sample to be analyzed. Elution of the analytes is accomplished with a suitable solvent(s) that leaves the interfering compounds on the column. The eluate is then concentrated (if necessary).

2.3 The cartridge cleanup protocol uses solid-phase extraction cartridges packed with 1 g or 2 g of silica gel (silicic acid) adsorbent. Each cartridge is solvent washed immediately prior to use. Aliquots of sample extracts are loaded onto the cartridges, which are then eluted with suitable solvent(s). A vacuum manifold is required to obtain reproducible results. The collected fractions may be further concentrated prior to gas chromatographic analysis.

2.4 The appropriate gas chromatographic method is listed at the end of each technique. Analysis may also be performed by gas chromatography/mass spectrometry (Method 8270).

5.2 Organic-free reagent water. All references to water in this method refer to organic-free reagent water, as defined in Chapter One.

5.3 Silica gel for chromatography columns.

5.3.1 Silica Gel for Phenols and Polynuclear Aromatic Hydrocarbons: 100/200 mesh (Davison Chemical grade 923 or equivalent). Before use, activate for at least 16 hr. at 130°C in a shallow glass tray, loosely covered with foil.

5.3.2 Silica Gel for Organochlorine pesticides/PCBs: 100/200 mesh (Davison Chemical grade 923 or equivalent). Before use, activate for at least 16 hr. at 130°C in a shallow glass tray, loosely covered with foil. Deactivate it to 3.3% with reagent water in a 500 mL glass jar. Mix the contents thoroughly and allow to equilibrate for 6 hours. Store the deactivated silica gel in a sealed glass jar inside a desiccator.

5.4 Silica cartridges: 40 µm particles, 60 A pores. The cartridges with which this method was developed consist of 6 mL serological-grade polypropylene tubes, with the 1 g of silica held between two polyethylene or stainless steel frits with 20 µm pores. 2 g silica cartridges are also used in this method, and 0.5 g cartridges are available. The compound elution patterns must be verified when cartridges other than the specified size are used.

5.5 Sodium sulfate (granular, anhydrous), Na_2SO_4. Purify by heating at 400°C for 4 hours in a shallow tray, or by precleaning the sodium sulfate with methylene chloride. A method blank must be analyzed in order to demonstrate that there is no interference from the sodium sulfate.

5.6 Eluting solvents

5.6.1 Cyclohexane, C_6H_{12} - Pesticide quality or equivalent.

5.6.2 Hexane, C_6H_{14} - Pesticide quality or equivalent.

5.6.3 2-Propanol, $(CH_3)_2CHOH$ - Pesticide quality or equivalent.

5.6.4 Toluene, $C_6H_5CH_3$ - Pesticide quality or equivalent.

5.6.5 Methylene chloride, CH_2Cl_2 - Pesticide quality or equivalent.

5.6.6 Pentane, C_5H_{12} - Pesticide quality or equivalent.

5.6.7 Acetone, CH_3COCH_3 - Pesticide quality or equivalent.

5.6.8 Diethyl Ether, $C_2H_5OC_2H_5$. Pesticide quality or equivalent. Must be free of peroxides as indicated by test strips (EM Quant, or equivalent). Procedures for removal of peroxides are provided with the test strips. After cleanup, 20 mL of ethanol preservative must be added to each liter of ether.

6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

6.1 See the introductory material to this chapter, Organic Analytes, Sec. 4.1.

METHOD 3650B

ACID-BASE PARTITION CLEANUP

1.0 SCOPE AND APPLICATION

1.1 Method 3650 is a liquid-liquid partitioning cleanup method to separate acid analytes, e.g., organic acids and phenols, from base/neutral analytes, e.g. amines, aromatic hydrocarbons, and halogenated organic compounds, using pH adjustment. It may be used for cleanup of petroleum waste prior to analysis or further cleanup (e.g., alumina cleanup). The following compounds can be separated by this method:

Compound Name	CAS No.[a]	Fraction
Benz(a)anthracene	56-55-3	Base-neutral
Benzo(a)pyrene	50-32-8	Base-neutral
Benzo(b)fluoranthene	205-99-2	Base-neutral
Chlordane	57-74-9	Base-neutral
Chlorinated dibenzodioxins		Base-neutral
2-Chlorophenol	95-57-8	Acid
Chrysene	218-01-9	Base-neutral
Creosote	8001-58-9	Base-neutral and Acid
Cresol(s)		Acid
Dichlorobenzene(s)		Base-neutral
Dichlorophenoxyacetic acid	94-75-7	Acid
2,4-Dimethylphenol	105-67-9	Acid
Dinitrobenzene	25154-54-5	Base-neutral
4,6-Dinitro-o-cresol	534-52-1	Acid
2,4-Dinitrotoluene	121-14-2	Base-neutral
Heptachlor	76-44-8	Base-neutral
Hexachlorobenzene	118-74-1	Base-neutral
Hexachlorobutadiene	87-68-3	Base-neutral
Hexachloroethane	67-72-1	Base-neutral
Hexachlorocyclopentadiene	77-47-4	Base-neutral
Naphthalene	91-20-3	Base-neutral
Nitrobenzene	98-95-3	Base-neutral
4-Nitrophenol	100-02-7	Acid
Pentachlorophenol	87-86-5	Acid
Phenol	108-95-2	Acid
Phorate	298-02-2	Base-neutral
2-Picoline	109-06-8	Base-neutral
Pyridine	110-86-1	Base-neutral
Tetrachlorobenzene(s)		Base-neutral
Tetrachlorophenol(s)		Acid
Toxaphene	8001-35-2	Base-neutral
Trichlorophenol(s)		Acid
2,4,5-TP (Silvex)	93-72-1	Acid

[a] Chemical Abstract Service Registry Number.

5.0 REAGENTS

5.1 Reagent grade inorganic chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all inorganic reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available. Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

5.2 Organic-free reagent water - All references to water in this method refer to organic-free reagent water, as defined in Chapter One.

5.3 Sodium hydroxide, NaOH, (10N) - Dissolve 40 g of sodium hydroxide in 100 mL of organic-free reagent water.

5.4 Sulfuric acid, H_2SO_4, (1:1 v/v in water) - Slowly add 50 mL H_2SO_4 to 50 mL of organic-free reagent water.

5.5 Sodium sulfate (granular, anhydrous), Na_2SO_4 - Purify by heating at 400°C for 4 hours in a shallow tray, or by precleaning the sodium sulfate with methylene chloride. If the sodium sulfate is precleaned with methylene chloride, a method blank must be analyzed, demonstrating that there is no interference from the sodium sulfate.

5.6 Solvents:

5.6.1 Methylene chloride, CH_2Cl_2 - Pesticide quality or equivalent.

5.6.2 Acetone, CH_3COCH_3 - Pesticide quality or equivalent.

5.6.3 Methanol, CH_3OH - Pesticide quality or equivalent.

5.6.4 Diethyl Ether, $C_2H_5OC_2H_5$ - Pesticide quality or equivalent. Must be free of peroxides as indicated by test strips (EM Quant, or equivalent). Procedures for removal of peroxides are provided with the test strips. After cleanup, 20 mL of ethyl alcohol preservative must be added to each liter of ether.

6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

6.1 See the introductory material to this chapter, Organic Analytes, Sec. 4.1.

7.0 PROCEDURE

7.1 Place 10 mL of the solvent extract from a prior extraction procedure into a 125 mL separatory funnel.

7.2 Add 20 mL of methylene chloride to the separatory funnel.

7.3 Slowly add 20 mL of prechilled organic-free reagent water which has been previously adjusted to a pH of 12-13 with 10N sodium hydroxide.

POSSIBLE PHTHALATE INTERFERENCES

2.0 SUMMARY OF METHOD

2.1 Method 8080 provides gas chromatographic conditions for the detection of ppb concentrations of certain organochlorine pesticides and PCBs. Prior to the use of this method, appropriate sample extraction techniques must be used. Both neat and diluted organic liquids (Method 3580, Waste Dilution) may be analyzed by direct injection. A 2 to 5 µL sample is injected into a gas chromatograph (GC) using the solvent flush technique, and compounds in the GC effluent are detected by an electron capture detector (ECD) or an electrolytic conductivity detector (HECD).

2.2 The sensitivity of Method 8080 usually depends on the concentration of interferences rather than on instrumental limitations. If interferences prevent detection of the analytes, Method 8080 may also be performed on samples that have undergone cleanup. Method 3620, Florisil Column Cleanup, by itself or followed by Method 3660, Sulfur Cleanup, may be used to eliminate interferences in the analysis.

3.0 INTERFERENCES

3.1 Refer to Methods 3500, 3600, and 8000.

3.2 Interferences by phthalate esters can pose a major problem in pesticide determinations when using the electron capture detector. These compounds generally appear in the chromatogram as large late-eluting peaks, especially in the 15% and 50% fractions from the Florisil cleanup. Common flexible plastics contain varying amounts of phthalates. These phthalates are easily extracted or leached from such materials during laboratory operations. Cross contamination of clean glassware routinely occurs when plastics are handled during extraction steps, especially when solvent-wetted surfaces are handled. Interferences from phthalates can best be minimized by avoiding contact with any plastic materials. Exhaustive cleanup of reagents and glassware may be required to eliminate background phthalate contamination. The contamination from phthalate esters can be completely eliminated with a microcoulometric or electrolytic conductivity detector.

4.0 APPARATUS AND MATERIALS

4.1 Gas chromatograph

4.1.1 Gas Chromatograph: Analytical system complete with gas chromatograph suitable for on-column injections and all required accessories, including detectors, column supplies, recorder, gases, and syringes. A data system for measuring peak heights and/or peak areas is recommended.

4.1.2 Columns

4.1.2.1 Column 1: Supelcoport (100/120 mesh) coated with 1.5% SP-2250/1.95% SP-2401 packed in a 1.8 m x 4 mm ID glass column or equivalent.

1.4 Methods 3545, 3560, and 3561 are techniques that utilize pressurized solvent extraction to reduce the amount of solvent needed to extract target analytes and reduce the extraction time when compared to more traditional techniques such as Soxhlet extraction.

1.5 Prior to employing this method, analysts are advised to consult the disclaimer statement at the front of the manual and the information in Chapter Two for guidance on the allowed flexibility in the choice of apparatus, reagents, and supplies. In addition, unless specified in a regulation, the use of SW-846 methods is not mandatory in response to Federal testing requirements. The information contained in this procedure is provided by EPA as guidance to be used by the analyst and the regulated community in making judgments necessary to meet the data quality objectives or needs for the intended use of the data.

2.0 SUMMARY OF METHOD

2.1 A sample of a known volume or weight is extracted with solvent or diluted with solvent. Method choices for aqueous samples include liquid-liquid extraction by separatory funnel or by continuous extractor and solid-phase extraction (SPE). Method choices for soil/sediment and solid waste samples include standard solvent extraction methods utilizing either Soxhlet, automated Soxhlet, or ultrasonic extraction. Solids may also be extracted using pressurized extraction techniques such as supercritical fluid extraction or heated pressurized fluid extraction.

2.2 The resultant extract is dried and concentrated in a Kuderna-Danish (K-D) apparatus. Other concentration devices or techniques may be used in place of the Kuderna-Danish concentrator if the quality control requirements of the determinative methods are met (Method 8000, Sec. 8.0).

NOTE: Solvent recovery apparatus is recommended for use in methods that require the use of Kuderna-Danish evaporative concentrators. EPA recommends the incorporation of this type of reclamation system as a method to implement an emissions reduction program.

2.3 See Sec. 7.0 for additional guidance to assist in selection of the appropriate method.

3.0 INTERFERENCES

3.1 Solvents, reagents, glassware, and other sample processing hardware may yield artifacts and/or interferences to sample analysis. All these materials must be demonstrated to be free from interferences under the conditions of the analysis by analyzing method blanks. Specific selection of reagents and purification of solvents by distillation in all-glass systems may be necessary. Refer to each method for specific guidance on quality control procedures and to Chapter Four for guidance on the cleaning of glassware.

3.2 Interferences coextracted from the samples will vary considerably from source to source. If analysis of an extracted sample is prevented due to interferences, further cleanup of the sample extract may be necessary. Refer to Method 3600 for guidance on cleanup procedures.

3.3 Phthalate esters contaminate many types of products commonly found in the laboratory. Plastics, in particular, must be avoided because phthalates are commonly used as plasticizers and are easily extracted from plastic materials. Serious phthalate contamination may result at any time if consistent quality control is not practiced.

3.2 The decomposition of some analytes has been demonstrated under basic extraction conditions. Organochlorine pesticides may dechlorinate and phthalate esters may hydrolyze. The rates of these reactions increase with increasing pH and reaction times.

3.3 Bonded phase silicas (e.g., C_{18}) will hydrolyze on prolonged exposure to aqueous samples with pH less than 2 or greater than 9. Hydrolysis will increase at the extremes of this pH range and with longer contact times. Hydrolysis may reduce extraction efficiency or cause baseline irregularities. Styrene divinylbenzene (SDB) extraction disks should be considered when hydrolysis is a problem.

3.4 Phthalates are a ubiquitous laboratory contaminant. All glass extraction apparatus should be used for this method because phthalates are used as release agents when molding rigid plastic (e.g., PVC). A method blank as described in Chapter One should be analyzed, demonstrating that there is no phthalate contamination of the sodium sulfate or other reagents specified in this method.

3.5 Sample particulates may clog the solid-phase media and result in extremely slow sample extractions. Use of an appropriate filter aid will result in shorter extractions without loss of method performance if clogging is a problem. Even when a filter aid is employed, this method may not be appropriate for aqueous samples with high levels of suspended solids (>1%), as the extraction efficiency may not be sufficient, given the small volumes of solvents employed and the short contact time.

4.0 APPARATUS AND MATERIALS

The apparatus and materials described here are based on data provided to EPA for disk-type solid-phase extraction materials. Other solid-phase extraction media configurations, e.g., SPE cartridges, may be employed provided that the laboratory demonstrates adequate performance for the analytes of interest. The use of other SPE configurations will require modifications to the procedure described in Sec. 7.0. Consult the manufacturer's instructions regarding such modifications.

4.1 Solid-phase extraction system - Empore™ manifold with 3-90 mm or 6-47 mm standard filter apparatus, or equivalent. Automatic or robotic sample preparation systems designed for solid-phase media may be utilized for this method if adequate performance is achieved and all quality control requirements are satisfied.

4.1.1 Manifold station - (Fisher Scientific 14-378-1B [3-place], 14-378-1A [6-place], or equivalent).

4.1.2 Standard Filter Apparatus - (Fisher Scientific 14-378-2A [47-mm], 14-378-2B [90-mm], or equivalent), consisting of a sample reservoir, clamp, fritted disk and filtration head with drip tip.

4.1.3 Tube, collection - 60-mL (Kimble 609-58-A16, or equivalent). The collection tube should be of appropriate I.D. and length for the drip tip of the standard filter apparatus to be positioned well into the neck of the tube to prevent splattering.

4.1.4 Filter flask - 2-L with a ground glass receiver joint (Kontes K-953828-0000, or equivalent) (optional). May be used to carry out individual disk extractions with the standard filter apparatus and collection vial in an ALL GLASS SYSTEM.

to Chapter Four, Sec. 4.1.4, for further details regarding the cleaning of glassware. Volumetric glassware should not be heated in a muffle furnace.

NOTE: If Soxhlet extractors are baked in the muffle furnace, care must be taken to ensure that they are dry (breakage may result if any water is left in the side-arm). Thorough rinsing with hot tap water, followed by deionized water and acetone, is not an adequate decontamination procedure. Even after a Soxhlet extractor was refluxed with acetone for three days, with daily solvent changes, the concentration of bis(2-ethylhexyl) phthalate was as high as 500 ng per washing. Storage of glassware in the laboratory introduces contamination, even if the glassware is wrapped in aluminum foil. Therefore, any glassware used in Method 8061 should be cleaned immediately prior to use.

3.4 Florisil and alumina may be contaminated with phthalate esters and, therefore, use of these materials in sample cleanup should be employed cautiously. If these materials are used, they must be obtained packaged in glass (plastic packaging will contribute to contamination with phthalate esters). Washing of these materials prior to use with the solvent(s) used for elution during extract cleanup was found helpful, however, heating at 320°C for Florisil and 210°C for alumina is recommended. Phthalate esters were detected in Florisil cartridge method blanks at concentrations ranging from 10 to 460 ng, with 5 phthalate esters in the 105 to 460 ng range. Complete removal of the phthalate esters from Florisil cartridges does not seem possible, and it is therefore desirable to keep the steps involved in sample preparation to a minimum.

3.5 Paper thimbles and filter paper must be exhaustively washed with the solvent that will be used in the sample extraction. Soxhlet extraction of paper thimbles and filter paper for 12 hrs with fresh solvent should be repeated a minimum of three times. Method blanks should be obtained before any of the precleaned thimbles or filter papers are used. Storage of precleaned thimbles and filter paper in precleaned glass jars covered with aluminum foil is recommended.

3.6 Glass wool used in any step of sample preparation should be a specially treated Pyrex® wool, pesticide grade, and must be baked at 400°C for 4 hrs. immediately prior to use.

3.7 Sodium sulfate must be obtained packaged in glass (plastic packaging will contribute to contamination with phthalate esters), and must be purified by heating at 400°C for 4 hrs. in a shallow tray, or by precleaning with methylene chloride. To avoid recontamination, the precleaned material must be stored in glass-stoppered glass bottles, or glass bottles covered with precleaned aluminum foil. The storage period should not exceed two weeks. To minimize contamination, extracts should be dried directly in the glassware in which they are collected by adding small amounts of precleaned sodium sulfate until an excess of free-flowing material is noted.

3.8 The presence of elemental sulfur will result in large peaks which often mask the region of the compounds eluting before dicyclohexyl phthalate (Compound No. 14) in the gas chromatograms shown in Figure 1. Method 3660 is suggested for removal of sulfur.

3.9 Waxes and lipids can be removed by Gel Permeation Chromatography (Method 3640). Extracts containing high concentrations of lipids are viscous, and may even solidify at room temperature. Phthalates elute just after corn oil in the GPC program.

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shown to contain hydrocarbons, phthalate esters, and unesterified acids, among other compounds detected by GC. The most efficient way of eliminating these impurities was to treat the wool for a few minutes with hydrogen chloride vapors, followed by continuous Soxhlet extraction for 24 hours with methylene chloride (11). Losses of 2,4-D caused by a glass wool plug have been reported (12).

Distilled water can be troublesome, particularly in a procedure where a large volume is used. Such a procedure is the Mills, Onley, Gaither cleanup method for adipose tissue [EPA PAM, Section 5,A,(1),(a)] where 700 ml of water is partitioned with acetonitrile, the latter being finally concentrated to 5 ml (a potential contaminant concentration factor of 700/5 = 140). Since the source of contamination in laboratory water is organic in nature, distillation will not be sufficient cleanup if the organic material co-distills with the water. An activated charcoal filtration prior to the distillation procedure has been found to significantly improve water quality. If deionization through a column of ion exchange resin is carried out, an activated charcoal filter should be installed between the column and the distillation equipment to trap any organic impurities eluted from the resin before the water enters the still. For analyses at ppb and ppt levels, distilled and deionized water should be further purified by a double extraction with an appropriate immiscible solvent, e.g., benzene or isooctane, followed by boiling, if necessary, to remove the residual solvent. Aqueous salt solutions such as 2% NaCl or saturated NaCl used in some isolation procedures are prepared from properly purified salt and water and then solvent extracted as a further precaution. Contamination can result from Teflon or Tygon lines and/or plastic resin or charcoal cartridges. Water samples from systems containing these elements must be analyzed at the level of sensitivity necessary for the analysis prior to use of the water.

Materials in which the initial sample is stored must be given consideration. Polyethylene bags are totally unsuitable for samples to be examined by electron capture GC or TLC because of trace contaminants that may be present. As an example, it has been reported (2) that polyethylene contains a contaminant that reacts with $AgNO_3$ chromogenic reagent, giving a TLC spot close to that of p,p'-DDE and having similar GC retention times to o,p'-DDE and p,p'-DDE. Figure 3-D shows a gas chromatogram of a hexane extract of the cardboard liner from a common type [illegible] bottle. [illegible] were found by GC-MS to be [illegible] various phthalates, although these plasticizers would not interfere [illegible] with GC-[illegible]-selective detectors [illegible] used, they are a potential interference for electron capture GC and GC-MS analysis (13). Glass containers with solvent-rinsed aluminum foil or Teflon-lined caps are generally acceptable as sample containers and for storing purified reagents.

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2.5 After cleanup, the extract is analyzed by injecting a 1-µL sample into a gas chromatograph with a narrow- or wide-bore fused silica capillary column and electron capture detector (GC/ECD) or an electrolytic conductivity detector (GC/ELCD).

3.0 INTERFERENCES

3.1 Refer to Methods 3500 (Sec. 3.0, in particular), 3600, and 8000, for a discussion of interferences.

3.2 Sources of interference in this method can be grouped into three broad categories.

3.2.1 Contaminated solvents, reagents, or sample processing hardware.

3.2.2 Contaminated GC carrier gas, parts, column surfaces, or detector surfaces.

3.2.3 Compounds extracted from the sample matrix to which the detector will respond.

3.2.4 Interferences co-extracted from the samples will vary considerably from waste to waste. While general cleanup techniques are referenced or provided as part of this method, unique samples may require additional cleanup approaches to achieve desired degrees of discrimination and quantitation.

3.3 Interferences by phthalate esters introduced during sample preparation can pose a major problem in pesticide determinations.

3.3.1 These materials may be removed prior to analysis using Method 3640 (Gel Permeation Cleanup) or Method 3630 (Silica Gel Cleanup).

3.3.2 Common flexible plastics contain varying amounts of phthalate esters which are easily extracted or leached from such materials during laboratory operations.

3.3.3 Cross-contamination of clean glassware routinely occurs when plastics are handled during extraction steps, especially when solvent-wetted surfaces are handled.

3.3.4 Interferences from phthalate esters can best be minimized by avoiding contact with any plastic materials and checking all solvents and reagents for phthalate contamination. Exhaustive cleanup of solvents, reagents and glassware may be required to eliminate background phthalate ester contamination.

3.4 Glassware must be scrupulously cleaned. Clean all glassware as soon as possible after use by rinsing with the last solvent used. This should be followed by detergent washing with hot water, and rinses with tap water and organic-free reagent water. Drain the glassware and dry it in an oven at 130°C for several hours, or rinse with methanol and drain. Store dry glassware in a clean environment.

3.5 The presence of elemental sulfur will result in broad peaks that interfere with the detection of early-eluting organochlorine pesticides. Sulfur contamination should be expected with sediment samples. Method 3660 is suggested for removal of sulfur. Since the recovery of Endrin aldehyde (using the TBA procedure) is drastically reduced, this compound must be determined prior to sulfur cleanup.

3.2 The decomposition of some analytes has been demonstrated under basic extraction conditions. Organochlorine pesticides may dechlorinate and phthalate esters may hydrolyze. The rates of these reactions increase with increasing pH and reaction times.

3.3 Bonded phase silicas (e.g., C_{18}) will hydrolyze on prolonged exposure to aqueous samples with pH less than 2 or greater than 9. Hydrolysis will increase at the extremes of this pH range and with longer contact times. Hydrolysis may reduce extraction efficiency or cause baseline irregularities. Styrene divinylbenzene (SDB) extraction disks should be considered when hydrolysis is a problem.

3.4 Phthalates are a ubiquitous laboratory contaminant. All glass extraction apparatus should be used for this method because phthalates are used as release agents when molding rigid plastic (e.g., PVC). A method blank as described in Chapter One should be analyzed, demonstrating that there is no phthalate contamination of the sodium sulfate or other reagents specified in this method.

3.5 Sample particulates may clog the solid-phase media and result in extremely slow sample extractions. Use of an appropriate filter aid will result in shorter extractions without loss of method performance if clogging is a problem. Even when a filter aid is employed, this method may not be appropriate for aqueous samples with high levels of suspended solids (>1%), as the extraction efficiency may not be sufficient, given the small volumes of solvents employed and the short contact time.

4.0 APPARATUS AND MATERIALS

The apparatus and materials described here are based on data provided to EPA for disk-type solid-phase extraction materials. Other solid-phase extraction media configurations, e.g., SPE cartridges, may be employed provided that the laboratory demonstrates adequate performance for the analytes of interest. The use of other SPE configurations will require modifications to the procedure described in Sec. 7.0. Consult the manufacturer's instructions regarding such modifications.

4.1 Solid-phase extraction system - Empore™ manifold with 3-90 mm or 6-47 mm standard filter apparatus, or equivalent. Automatic or robotic sample preparation systems designed for solid-phase media may be utilized for this method if adequate performance is achieved and all quality control requirements are satisfied.

4.1.1 Manifold station - (Fisher Scientific 14-378-1B [3-place], 14-378-1A [6-place], or equivalent).

4.1.2 Standard Filter Apparatus - (Fisher Scientific 14-378-2A [47-mm], 14-378-2B [90-mm], or equivalent), consisting of a sample reservoir, clamp, fritted disk and filtration head with drip tip.

4.1.3 Tube, collection - 60-mL (Kimble 609-58-A16, or equivalent). The collection tube should be of appropriate I.D. and length for the drip tip of the standard filter apparatus to be positioned well into the neck of the tube to prevent splattering.

4.1.4 Filter flask - 2-L with a ground glass receiver joint (Kontes K-953828-0000, or equivalent) (optional). May be used to carry out individual disk extractions with the standard filter apparatus and collection vial in an ALL GLASS SYSTEM.

BLIND SAMPLES STUDY USING ISOPROPYL ALCOHOL IN DECONTAMINATION PROCEDURES

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

Hand Auger wrapped in Foil

EPA SAMPLE NO.

GDGSB99901

Lab Name: SWL-TULSA Contract: ZONE G-B

Lab Code: SWOK Case No.: ENSAFE SAS No.: SDG No.: 27934

Matrix: (soil/water) SOIL Lab Sample ID: 27956.01

Sample wt/vol: 5.0 (g/mL) G Lab File ID: I22686.D

Level: (low/med) LOW Date Received: 12/12/96

% Moisture: not dec. 10 Date Analyzed: 12/17/96

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Column: (pack/cap) CAP Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	11	U
74-83-9	Bromomethane	11	U
75-01-4	Vinyl Chloride	11	U
75-00-3	Chloroethane	11	U
75-09-2	Methylene Chloride	6	U
67-64-1	Acetone	10	J
75-15-0	Carbon Disulfide	6	U
75-35-4	1,1-Dichloroethene	6	U
75-34-3	1,1-Dichloroethane	6	U
540-59-0	1,2-Dichloroethene (total)	6	U
67-66-3	Chloroform	6	U
107-06-2	1,2-Dichloroethane	6	U
78-93-3	2-Butanone	11	U
71-55-6	1,1,1-Trichloroethane	6	U
56-23-5	Carbon Tetrachloride	6	U
108-05-4	Vinyl Acetate	11	U
75-27-4	Bromodichloromethane	6	U
78-87-5	1,2-Dichloropropane	6	U
10061-01-5	cis-1,3-Dichloropropene	6	U
79-01-6	Trichloroethene	6	U
124-48-1	Dibromochloromethane	6	U
79-00-5	1,1,2-Trichloroethane	6	U
71-43-2	Benzene	6	U
10061-02-6	trans-1,3-Dichloropropene	6	U
75-25-2	Bromoform	6	U
108-10-1	4-Methyl-2-Pentanone	11	U
591-78-6	2-Hexanone	11	U
127-18-4	Tetrachloroethene	6	U
108-88-3	Toluene	6	U
79-34-5	1,1,2,2-Tetrachloroethane	6	U
108-90-7	Chlorobenzene	6	U
100-41-4	Ethylbenzene	6	U
100-42-5	Styrene	6	U
1330-20-7	Xylene (Total)	6	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

GDGSB99901

Lab Name: SWL-TULSA Contract: ZONE G-B

Lab Code: SWOK Case No.: ENSAFE SAS No.: SDG No.: 27934

Matrix: (soil/water) SOIL Lab Sample ID: 27956.01

Sample wt/vol: 5.0 (g/mL) G Lab File ID: I22686.D

Level: (low/med) LOW Date Received: 12/12/96

% Moisture: not dec. 10 Date Analyzed: 12/17/96

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

Column: (pack/cap) CAP Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
110-75-8	2-Chloroethyl Vinyl Ether	11	U

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

GDGSB99901

Lab Name: SWL-TULSA Contract: ZONE G-B

Lab Code: SWOK Case No.: ENSAFE SAS No.: SDG No.: 27934

Matrix: (soil/water) SOIL Lab Sample ID: 27956.01

Sample wt/vol: 5.0 (g/mL) G Lab File ID: I22686.D

Level: (low/med) LOW Date Received: 12/12/96

% Moisture: not dec. 10 Date Analyzed: 12/17/96

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

Column: (pack/cap) CAP Dilution Factor: 1.0

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
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1A
VOLATILE ORGANICS ANALYSIS DATA SHEET
EPA August 1996 Audit Decon Procedures

EPA SAMPLE NO.

GDGSB99902

Lab Name: SWL-TULSA Contract: ZONE G-B

Lab Code: SWOK Case No.: ENSAFE SAS No.: SDG No.: 27934

Matrix: (soil/water) SOIL Lab Sample ID: 27956.02

Sample wt/vol: 5.0 (g/mL) G Lab File ID: I22687.D

Level: (low/med) LOW Date Received: 12/12/96

% Moisture: not dec. 11 Date Analyzed: 12/17/96

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

Column: (pack/cap) CAP Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	11	U
74-83-9	Bromomethane	11	U
75-01-4	Vinyl Chloride	11	U
75-00-3	Chloroethane	11	U
75-09-2	Methylene Chloride	6	U
67-64-1	Acetone	200	
75-15-0	Carbon Disulfide	6	U
75-35-4	1,1-Dichloroethene	6	U
75-34-3	1,1-Dichloroethane	6	U
540-59-0	1,2-Dichloroethene (total)	6	U
67-66-3	Chloroform	6	U
107-06-2	1,2-Dichloroethane	6	U
78-93-3	2-Butanone	11	U
71-55-6	1,1,1-Trichloroethane	6	U
56-23-5	Carbon Tetrachloride	6	U
108-05-4	Vinyl Acetate	11	U
75-27-4	Bromodichloromethane	6	U
78-87-5	1,2-Dichloropropane	6	U
10061-01-5	cis-1,3-Dichloropropene	6	U
79-01-6	Trichloroethene	6	U
124-48-1	Dibromochloromethane	6	U
79-00-5	1,1,2-Trichloroethane	6	U
71-43-2	Benzene	6	U
10061-02-6	trans-1,3-Dichloropropene	6	U
75-25-2	Bromoform	6	U
108-10-1	4-Methyl-2-Pentanone	11	U
591-78-6	2-Hexanone	11	U
127-18-4	Tetrachloroethene	6	U
108-88-3	Toluene	6	U
79-34-5	1,1,2,2-Tetrachloroethane	6	U
108-90-7	Chlorobenzene	6	U
100-41-4	Ethylbenzene	6	U
100-42-5	Styrene	6	U
1330-20-7	Xylene (Total)	6	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

GDGSB99902

Lab Name: SWL-TULSA Contract: ZONE G-B

Lab Code: SWOK Case No.: ENSAFE SAS No.: SDG No.: 27934

Matrix: (soil/water) SOIL Lab Sample ID: 27956.02

Sample wt/vol: 5.0 (g/mL) G Lab File ID: I22687.D

Level: (low/med) LOW Date Received: 12/12/96

% Moisture: not dec. 11 Date Analyzed: 12/17/96

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

Column: (pack/cap) CAP Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
110-75-8	2-Chloroethyl Vinyl Ether	11	U

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
GDGSB99902

Lab Name: SWL-TULSA Contract: ZONE G-B

Lab Code: SWOK Case No.: ENSAFE SAS No.: SDG No.: 27934

Matrix: (soil/water) SOIL Lab Sample ID: 27956.02

Sample wt/vol: 5.0 (g/mL) G Lab File ID: I22687.D

Level: (low/med) LOW Date Received: 12/12/96

% Moisture: not dec. 11 Date Analyzed: 12/17/96

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

Column: (pack/cap) CAP Dilution Factor: 1.0

Number TICs found: 1

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 67-63-0	Isopropyl Alcohol	2.961	190	NJ
2.				
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1A
VOLATILE ORGANICS ANALYSIS DATA SHEET
CSAP Decon Procedures

EPA SAMPLE NO.

GDGSB99903

Lab Name: SWL-TULSA Contract: ZONE G-B

Lab Code: SWOK Case No.: ENSAFE SAS No.: SDG No.: 27934

Matrix: (soil/water) SOIL Lab Sample ID: 27956.03

Sample wt/vol: 5.0 (g/mL) G Lab File ID: I22688.D

Level: (low/med) LOW Date Received: 12/12/96

% Moisture: not dec. 12 Date Analyzed: 12/17/96

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

Column: (pack/cap) CAP Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	11	U
74-83-9	Bromomethane	11	U
75-01-4	Vinyl Chloride	11	U
75-00-3	Chloroethane	11	U
75-09-2	Methylene Chloride	6	U
67-64-1	Acetone	31	
75-15-0	Carbon Disulfide	6	U
75-35-4	1,1-Dichloroethene	6	U
75-34-3	1,1-Dichloroethane	6	U
540-59-0	1,2-Dichloroethene (total)	6	U
67-66-3	Chloroform	6	U
107-06-2	1,2-Dichloroethane	6	U
78-93-3	2-Butanone	11	U
71-55-6	1,1,1-Trichloroethane	6	U
56-23-5	Carbon Tetrachloride	6	U
108-05-4	Vinyl Acetate	11	U
75-27-4	Bromodichloromethane	6	U
78-87-5	1,2-Dichloropropane	6	U
10061-01-5	cis-1,3-Dichloropropene	6	U
79-01-6	Trichloroethene	6	U
124-48-1	Dibromochloromethane	6	U
79-00-5	1,1,2-Trichloroethane	6	U
71-43-2	Benzene	6	U
10061-02-6	trans-1,3-Dichloropropene	6	U
75-25-2	Bromoform	6	U
108-10-1	4-Methyl-2-Pentanone	11	U
591-78-6	2-Hexanone	11	U
127-18-4	Tetrachloroethene	6	U
108-88-3	Toluene	6	U
79-34-5	1,1,2,2-Tetrachloroethane	6	U
108-90-7	Chlorobenzene	6	U
100-41-4	Ethylbenzene	6	U
100-42-5	Styrene	6	U
1330-20-7	Xylene (Total)	6	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

GDGSB99903

Lab Name: SWL-TULSA Contract: ZONE G-B

Lab Code: SWOK Case No.: ENSAFE SAS No.: SDG No.: 27934

Matrix: (soil/water) SOIL Lab Sample ID: 27956.03

Sample wt/vol: 5.0 (g/mL) G Lab File ID: I22688.D

Level: (low/med) LOW Date Received: 12/12/96

% Moisture: not dec. 12 Date Analyzed: 12/17/96

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

Column: (pack/cap) CAP Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
110-75-8	2-Chloroethyl Vinyl Ether	11	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

GDGSB99903

Lab Name: SWL-TULSA Contract: ZONE G-B

Lab Code: SWOK Case No.: ENSAFE SAS No.: SDG No.: 27934

Matrix: (soil/water) SOIL Lab Sample ID: 27956.03

Sample wt/vol: 5.0 (g/mL) G Lab File ID: I22688.D

Level: (low/med) LOW Date Received: 12/12/96

% Moisture: not dec. 12 Date Analyzed: 12/17/96

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

Column: (pack/cap) CAP Dilution Factor: 1.0

Number TICs found: 1

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		UNKNOWN	13.461	7	J
2.					
3.					
4.					
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1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

Isopropyl Alcohol drops in VOA vial w/ H_2O

EPA SAMPLE NO.

GDGGW99901

Lab Name: SWL-TULSA Contract: ZONE G-B

Lab Code: SWOK Case No.: ENSAFE SAS No.: SDG No.: 27934

Matrix: (soil/water) WATER Lab Sample ID: 27956.04

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: N24414.D

Level: (low/med) LOW Date Received: 12/12/96

% Moisture: not dec. _____ Date Analyzed: 12/18/96

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

Column: (pack/cap) CAP Dilution Factor: 500.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	5000	U
74-83-9	Bromomethane	5000	U
75-01-4	Vinyl Chloride	5000	U
75-00-3	Chloroethane	5000	U
75-09-2	Methylene Chloride	2500	U
67-64-1	Acetone	2900	J
75-15-0	Carbon Disulfide	2500	U
75-35-4	1,1-Dichloroethene	2500	U
75-34-3	1,1-Dichloroethane	2500	U
540-59-0	1,2-Dichloroethene (total)	2500	U
67-66-3	Chloroform	2500	U
107-06-2	1,2-Dichloroethane	2500	U
78-93-3	2-Butanone	5000	U
71-55-6	1,1,1-Trichloroethane	2500	U
56-23-5	Carbon Tetrachloride	2500	U
108-05-4	Vinyl Acetate	5000	U
75-27-4	Bromodichloromethane	2500	U
78-87-5	1,2-Dichloropropane	2500	U
10061-01-5	cis-1,3-Dichloropropene	2500	U
79-01-6	Trichloroethene	2500	U
124-48-1	Dibromochloromethane	2500	U
79-00-5	1,1,2-Trichloroethane	2500	U
71-43-2	Benzene	2500	U
10061-02-6	trans-1,3-Dichloropropene	2500	U
75-25-2	Bromoform	2500	U
108-10-1	4-Methyl-2-Pentanone	5000	U
591-78-6	2-Hexanone	5000	U
127-18-4	Tetrachloroethene	2500	U
108-88-3	Toluene	2500	U
79-34-5	1,1,2,2-Tetrachloroethane	2500	U
108-90-7	Chlorobenzene	2500	U
100-41-4	Ethylbenzene	2500	U
100-42-5	Styrene	2500	U
1330-20-7	Xylene (Total)	2500	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

GDGGW99901

Lab Name: SWL-TULSA Contract: ZONE G-B

Lab Code: SWOK Case No.: ENSAFE SAS No.: SDG No.: 27934

Matrix: (soil/water) WATER Lab Sample ID: 27956.04

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: N24414.D

Level: (low/med) LOW Date Received: 12/12/96

% Moisture: not dec. _____ Date Analyzed: 12/18/96

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

Column: (pack/cap) CAP Dilution Factor: 500.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
110-75-8	2-Chloroethyl Vinyl Ether	5000	U

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
GDGGW99901

Lab Name: SWL-TULSA Contract: ZONE G-B

Lab Code: SWOK Case No.: ENSAFE SAS No.: SDG No.: 27934

Matrix: (soil/water) WATER Lab Sample ID: 27956.04

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: N24414.D

Level: (low/med) LOW Date Received: 12/12/96

% Moisture: not dec. _____ Date Analyzed: 12/18/96

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

Column: (pack/cap) CAP Dilution Factor: 500.0

Number TICs found: 1

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	67-63-0	Isopropyl Alcohol	2.576	180000	NJ
2.					
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VOLATILE ORGANICS ANALYSIS DATA SHEET

Trip Blank

EPA SAMPLE NO.

GDGTW99903

Lab Name: SWL-TULSA Contract: ZONE G-B

Lab Code: SWOK Case No.: ENSAFE SAS No.: SDG No.: 27934

Matrix: (soil/water) WATER Lab Sample ID: 27956.05

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: N24396.D

Level: (low/med) LOW Date Received: 12/12/96

% Moisture: not dec. _____ Date Analyzed: 12/17/96

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

Column: (pack/cap) CAP Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	U
108-88-3	Toluene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Xylene (Total)	5	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

GDGTW99903

Lab Name: SWL-TULSA Contract: ZONE G-B

Lab Code: SWOK Case No.: ENSAFE SAS No.: SDG No.: 27934

Matrix: (soil/water) WATER Lab Sample ID: 27956.05

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: N24396.D

Level: (low/med) LOW Date Received: 12/12/96

% Moisture: not dec. _____ Date Analyzed: 12/17/96

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

Column: (pack/cap) CAP Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
110-75-8	2-Chloroethyl Vinyl Ether	10	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

GDGTW99903

Lab Name: SWL-TULSA Contract: ZONE G-B

Lab Code: SWOK Case No.: ENSAFE SAS No.: SDG No.: 27934

Matrix: (soil/water) WATER Lab Sample ID: 27956.05

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: N24396.D

Level: (low/med) LOW Date Received: 12/12/96

% Moisture: not dec. _____ Date Analyzed: 12/17/96

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

Column: (pack/cap) CAP Dilution Factor: 1.0

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
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SOIL AND WATER ANALYTICAL RESULTS FOR ACETONE, METHYLENE CHLORIDE, & BEHP

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2901-00001 - NAVAL BASE CHARLESTON ZONE A (NBCH)

Samples by Chemical Report

67-64-1 - Acetone

>= 1.0000 for All Concentration Units - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
001-S-B001-02	001SB00102	Soil	10/10/95	44.0000		UG/KG	L5571	VAL
002-M-0004-01	002M000401	Soil	03/29/96	29.0000	J	UG/KG	25106	VAL
038-S-B001-02	038SB00102	Soil	10/03/95	64.0000		UG/KG	L5510	VAL
038-S-B002-01	038SB00201	Soil	10/03/95	52.0000		UG/KG	L5510	VAL
038-C-B002-01	038CB00201	Soil	10/03/95	12.0000	J	UG/KG	L5509	VAL
038-S-B002-02	038SB00202	Soil	10/03/95	24.0000		UG/KG	L5510	VAL
038-S-B003-01	038SB00301	Soil	10/03/95	61.0000		UG/KG	L5510	VAL
038-S-B004-02	038SB00402	Soil	10/03/95	20.0000		UG/KG	L5510	VAL
038-S-B005-01	038SB00501	Soil	10/03/95	41.0000	J	UG/KG	L5510	VAL
038-S-B005-02	038SB00502	Soil	10/03/95	200.0000		UG/KG	L5510	VAL
038-S-B006-02	038SB00602	Soil	10/03/95	15.0000		UG/KG	L5510	VAL
039-S-B001-02	039SB00102	Soil	10/02/95	35.0000		UG/KG	L5506	VAL
039-S-B002-01	039SB00201	Soil	10/02/95	46.0000		UG/KG	L5506	VAL
039-S-B002-02	039SB00202	Soil	10/02/95	49.0000		UG/KG	L5506	VAL
039-S-B003-01	039SB00301	Soil	10/03/95	19.0000		UG/KG	L5510	VAL
039-C-B003-01	039CB00301	Soil	10/03/95	73.0000	J	UG/KG	L5509	VAL
039-S-B003-02	039SB00302	Soil	10/03/95	15.0000		UG/KG	L5510	VAL
039-S-B004-01	039SB00401	Soil	10/02/95	11.0000		UG/KG	L5506	VAL
039-S-B004-02	039SB00402	Soil	10/02/95	14.0000		UG/KG	L5506	VAL
039-S-B005-02	039SB00502	Soil	10/02/95	25.0000		UG/KG	L5506	VAL
39-S-B006-01	039SB00601	Soil	10/02/95	12.0000	J	UG/KG	L5506	VAL
039-S-B006-02	039SB00602	Soil	10/02/95	38.0000	J	UG/KG	L5506	VAL
039-S-B007-01	039SB00701	Soil	10/02/95	21.0000		UG/KG	L5506	VAL
039-S-B007-02	039SB00702	Soil	10/02/95	12.0000		UG/KG	L5506	VAL
039-S-B008-02	039SB00802	Soil	10/02/95	140.0000	J	UG/KG	L5506	VAL
039-S-B009-01	039SB00901	Soil	10/02/95	11.0000		UG/KG	L5506	VAL
039-S-B009-02	039SB00902	Soil	10/02/95	45.0000		UG/KG	L5506	VAL
039-S-B010-01	039SB01001	Soil	10/02/95	48.0000		UG/KG	L5506	VAL
039-S-B010-02	039SB01002	Soil	10/02/95	65.0000		UG/KG	L5506	VAL
039-S-B011-01	039SB01101	Soil	10/02/95	74.0000		UG/KG	L5506	VAL
039-S-B011-02	039SB01102	Soil	10/02/95	38.0000		UG/KG	L5506	VAL
039-S-B012-01	039SB01201	Soil	10/03/95	17.0000		UG/KG	L5510	VAL
039-S-B012-02	039SB01202	Soil	10/03/95	8.7000	J	UG/KG	L5510	VAL
039-S-B013-01	039SB01301	Soil	10/03/95	47.0000		UG/KG	L5510	VAL
039-S-B013-02	039SB01302	Soil	10/03/95	11.0000	J	UG/KG	L5510	VAL
039-S-B014-01	039SB01401	Soil	10/03/95	21.0000		UG/KG	L5510	VAL
039-C-B014-01	039CB01401	Soil	10/03/95	17.0000	J	UG/KG	L5509	VAL
039-S-B015-01	039SB01501	Soil	10/03/95	32.0000		UG/KG	L5510	VAL
039-S-P009-LH	039SP009LH	Soil	06/18/96	960.0000	D	UG/KG	L7263	VAL
039-S-P011-LH	039SP011LH	Soil	06/18/96	3500.0000	D	UG/KG	L7263	VAL
039-S-P015-LH	039SP015LH	Soil	06/19/96	4.1000	J	UG/KG	L7278	VAL
042-S-B001-02	042SB00102	Soil	10/05/95	32.0000		UG/KG	L5545	VAL
042-S-B006-02	042SB00602	Soil	10/06/95	14.0000		UG/KG	L5554	VAL
042-S-B009-02	042SB00902	Soil	10/06/95	12.0000	J	UG/KG	L5554	VAL
043-S-B001-02	043SB00102	Soil	10/07/95	1600.0000	D	UG/KG	L5563	VAL
43-S-B002-01	043SB00201	Soil	10/07/95	9.0000	J	UG/KG	L5563	VAL
043-S-B004-01	043SB00401	Soil	10/09/95	63.0000		UG/KG	L5563	VAL
043-S-B004-02	043SB00402	Soil	10/09/95	50.0000		UG/KG	L5563	VAL
043-S-B005-01	043SB00501	Soil	10/09/95	30.0000		UG/KG	L5563	VAL

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2901-00001 - NAVAL BASE CHARLESTON ZONE A (NBCH)

Samples by Chemical Report

67-64-1 - Acetone

>= 1.0000 for All Concentration Units - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
043-S-B005-02	043SB00502	Soil	10/09/95	290.0000	D	UG/KG	L5563	VAL
043-S-P002-LH	043SP002LH	Soil	06/19/96	12.0000		UG/KG	L7278	VAL
043-G-P002-LH	043GP002LH	Water	06/19/96	8.2000	J	UG/L	L7278	VAL
505-S-B004-02	505SB00402	Soil	10/06/95	23.0000		UG/KG	L5554	VAL
505-S-B007-02	505SB00702	Soil	10/07/95	55.0000	J	UG/KG	L5563	VAL
505-S-B008-01	505SB00801	Soil	10/07/95	10.0000	J	UG/KG	L5563	VAL
505-S-B008-02	505SB00802	Soil	10/07/95	50.0000	J	UG/KG	L5563	VAL
505-S-B011-02	505SB01102	Soil	10/07/95	15.0000		UG/KG	L5563	VAL
506-S-B001-01	506SB00101	Soil	10/11/95	60.0000		UG/KG	L5586	VAL
506-S-B002-02	506SB00202	Soil	10/11/95	56.0000		UG/KG	L5586	VAL
506-S-B003-02	506SB00302	Soil	10/11/95	7.7000	J	UG/KG	L5586	VAL
506-S-B004-01	506SB00401	Soil	10/11/95	15.0000		UG/KG	L5586	VAL
506-S-B005-01	506SB00501	Soil	10/11/95	34.0000		UG/KG	L5586	VAL
GDA-S-B002-01	GDASB00201	Soil	10/05/95	10.0000	J	UG/KG	L5545	VAL
GDA-S-B002-02	GDASB00202	Soil	10/05/95	12.0000		UG/KG	L5545	VAL
GDA-S-B003-01	GDASB00301	Soil	10/05/95	17.0000		UG/KG	L5545	VAL
GDA-S-B003-02	GDASB00302	Soil	10/05/95	12.0000		UG/KG	L5545	VAL
GDA-C-B003-02	GDACB00302	Soil	10/05/95	12.0000	J	UG/KG	L5542	VAL
GDA-S-B006-02	GDASB00602	Soil	10/09/95	18.0000		UG/KG	L5563	VAL
GDA-S-B007-02	GDASB00702	Soil	10/09/95	23.0000		UG/KG	L5563	VAL
GDA-S-B011-01	GDASB01101	Soil	10/09/95	210.0000		UG/KG	L5563	VAL
GDA-C-B011-01	GDACB01101	Soil	10/09/95	45.0000	J	UG/KG	L5557	VAL
GDA-S-B011-02	GDASB01102	Soil	10/09/95	260.0000	J	UG/KG	L5563	VAL
S01-S-B002-01	S01B0201	Soil	10/27/93	90.0000		ug/kg	CNS14	VAL
S01-S-B002-02	S01B0202	Soil	10/27/93	110.0000		ug/kg	CNS14	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2901-00001 - NAVAL BASE CHARLESTON ZONE A (NBCH)

Samples by Chemical Report

75-09-2 - Methylene chloride

>= 1.0000 for All Concentration Units - Hits Only

Sample ID	Ext.	Orig. ID	Type	Date	Result	VQual	Units	SDG #	
039-M-0004-01		039M000401	Soil	01/28/97	86.0000		UG/KG	28316	VAL
039-M-0005-01		039M000501	Soil	01/28/97	55.0000		UG/KG	28316	VAL
039-C-B003-01		039CB00301	Soil	10/03/95	1.2000	J	UG/KG	L5509	VAL
043-S-B001-02		043SB00102	Soil	10/07/95	100.0000	J	UG/KG	L5563	VAL
043-S-B006-01		043SB00601	Soil	10/07/95	15.0000		UG/KG	L5563	VAL
505-S-B011-02		505SB01102	Soil	10/07/95	2.9000	J	UG/KG	L5563	VAL
506-S-B002-02		506SB00202	Soil	10/11/95	1.2000	J	UG/KG	L5586	VAL
S01-S-B002-01		S01B0201	Soil	10/27/93	1.8000	J	ug/kg	CNS14	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2901-00001 - NAVAL BASE CHARLESTON ZONE A (NBCH)

Samples by Chemical Report

117-81-7 - bis(2-Ethylhexyl)phthalate (BEHP)

>= 1.0000 for All Concentration Units - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
038-S-B006-01	038SB00601	Soil	10/03/95	210.0000	J	UG/KG	L5510	VAL
039-S-B009-01	039SB00901	Soil	10/02/95	210.0000	J	UG/KG	L5506	VAL
039-S-B011-01	039SB01101	Soil	10/02/95	6200.0000		UG/KG	L5506	VAL
039-S-B022-01	039SB02201	Soil	03/27/96	770.0000		UG/KG	25080	VAL
039-S-B024-01	039SB02401	Soil	03/27/96	82.0000	J	UG/KG	25080	VAL
042-S-B017-01	042SB01701	Soil	03/29/96	90.0000	J	UG/KG	25106	VAL
505-S-B012-01	505SB01201	Soil	03/28/96	67.0000	J	UG/KG	25095	VAL
505-S-B012-02	505SB01202	Soil	03/28/96	220.0000	J	UG/KG	25095	VAL
505-S-B014-01	505SB01401	Soil	03/28/96	99.0000	J	UG/KG	25095	VAL
505-S-B015-01	505SB01501	Soil	03/28/96	86.0000	J	UG/KG	25095	VAL
505-S-B015-02	505SB01502	Soil	03/28/96	89.0000	J	UG/KG	25095	VAL
505-S-B016-01	505SB01601	Soil	03/28/96	51.0000	J	UG/KG	25095	VAL
505-S-B016-02	505SB01602	Soil	03/28/96	120.0000	J	UG/KG	25095	VAL
505-S-B017-01	505SB01701	Soil	03/28/96	46.0000	J	UG/KG	25095	VAL
505-S-B017-02	505SB01702	Soil	03/28/96	90.0000	J	UG/KG	25095	VAL
505-C-B017-02	505CB01702	Soil	03/28/96	160.0000	J	UG/KG	25095	VAL
GDA-S-B005-01	GDASB00501	Soil	10/09/95	290.0000	J	UG/KG	L5563	VAL

*** End of Report ***

SWMU/AOC	Well ID	Notes
ZONE E - SWMU 65 AREA		
65	NBCE\065001	COCs are primarily chlorinated VOCs. Not all wells contain COCs.
65	NBCE\065002	
65	NBCE\065003	
65	NBCE\065004	
65	NBCE\065005	
65	NBCE\065006	
65	NBCE\06504D	
65	NBCE\065007	
65	NBCE\065008	
550	NBCE\550001	
GDE	NBCE\GDE020	
GDE	NBCE\GDE20D	
GDE	NBCE\GDE023	
GDE	NBCE\GDE23D	
ZONE E - SWMU 70 AREA		
25	NBCE\025001	COCs are primarily chlorinated VOCs. Not all wells contain COCs.
25	NBCE\025002	
25	NBCE\025003	
25	NBCE\025004	
70	NBCE\070001	
70	NBCE\070002	
70	NBCE\07001D	
549	NBCE\549001	
549	NBCE\549002	
549	NBCE\549003	
551	NBCE\551001	
551	NBCE\551002	
551	NBCE\55102D	
559	NBCE\559001	
GDE	NBCE\GDE017	
GDE	NBCE\GDE17D	
GDE	NBCE\GDE026	

GDE	NBCE\GDE26D	
ZONE E - SWMU 172 AREA		
172	NBCE\172001	COCs are primarily chlorinated VOCs. Not all wells contain COCs.
576	NBCE\576001	
576	NBCE\576002	
576	NBCE\57602D	
GDE	NBCE\GDE013	
GDE	NBCE\GDE13D	
ZONE E - AOC 563 AREA		
559	NBCE\559005	COCs are primarily chlorinated VOCs. Not all wells contain COCs.
563	NBCE\563001	
563	NBCE\563002	
563	NBCE\563003	
563	NBCE\56301D	
569	NBCE\569001	
569	NBCE\569002	
569	NBCE\56901D	
570	NBCE\570001	
570	NBCE\570003	
570	NBCE\57003D	
572	NBCE\572002	
GDE	NBCE\GDE014	
GDE	NBCE\GDE14D	
ZONE E - MISCELLANEOUS WELLS		
539	NBCE\539001	COCs are primarily chlorinated VOCs. Not all wells contain COCs.
539	NBCE\53901D	
559	NBCE\55903D	
583	NBCE\583001	
583	NBCE\583002	
GDE	NBCE\GDE001	
GDE	NBCE\GDE002	
GDE	NBCE\GDE009	
GDE	NBCE\GDE09D	
GDE	NBCE\GDE018	
GDE	NBCE\GDE18D	

GDE	NBCE\GDE019	
GDE	NBCE\GDE19D	
GDE	NBCE\GDE024	
GDE	NBCE\GDE024D	
GDE	NBCE\GDE025	
GDE	NBCE\GDE25D	
ZONE F - AOC 613 AREA		
613	NBCF\613001	COCs are petroleum constituents.
613	NBCF\613003	
613	NBCF\613004	
613	NBCF\613005	
613	NBCF\61302D	
ZONE G - SWMU 8 AREA		
8	NBCG\008001	The evaluation should also include SWMU 9 wells in the area of SWMU since a dissolved
8	NBCG\008002	phase petroleum plume extends across the zone boundary to Shipyard Creek. Multiple
8	NBCG\008003	wells in this area contain hydrazine.
8	NBCG\008004	
8	NBCG\008005	
8	NBCG\008006	
637	NBCG\637001	
637	NBCG\637002	
637	NBCG\637003	
ZONE H - SWMU 9 AREA		
9	NBCH\009001	COCs are chlorinated VOCs and petroleum constituents. Not all wells listed contain COCs.
9	NBCH\009002	
9	NBCH\009003	
9	NBCH\009004	
9	NBCH\009005	
9	NBCH\009006	
9	NBCH\009007	
9	NBCH\009008	
9	NBCH\009009	

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2901-00002 - CHARLESTON ZONE A - QUARTERLY GW

Samples by Chemical Report

67-64-1 - Acetone

>= 1.0000 for UG/L - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
039-G-P018-LH	039GP018LH	Water	06/20/96	6.5000	J	UG/L	L7287	VAL
039-G-P019-LH	039GP019LH	Water	06/20/96	6.3000	J	UG/L	L7287	VAL
039-G-P025-10	039GP02510	Water	09/27/96	6.0000	JB	UG/L	27136	VAL
039-G-P025-20	039GP02520	Water	09/27/96	14.0000		UG/L	27136	VAL
039-G-P026-11	039GP02611	Water	09/30/96	16.0000	B	UG/L	27136	VAL
039-G-P027-11	039GP02711	Water	09/27/96	10.0000	JB	UG/L	27136	VAL
039-G-P029-10	039GP02910	Water	09/30/96	16.0000	B	UG/L	27136	VAL
039-G-P032-11	039GP03211	Water	09/27/96	8.0000	JB	UG/L	27136	VAL
039-G-P034-11	039GP03411	Water	09/27/96	12.0000	B	UG/L	27136	VAL
039-G-P035-11	039GP03511	Water	09/27/96	11.0000	B	UG/L	27136	VAL
039-G-P036-11	039GP03611	Water	09/27/96	6.0000	JB	UG/L	27136	VAL
039-G-P037-11	039GP03711	Water	09/30/96	10.0000	JB	UG/L	27136	VAL
039-G-W011-04	039GW01104	Water	10/15/96	34.0000		UG/L	6434	VAL
039-G-W014-01	039GW01401	Water	02/06/97	10.0000		UG/L	28417	VAL
039-G-W08D-04	039GW08D04	Water	10/15/96	13.0000		UG/L	6434	VAL
039-G-W09D-A1	039GW09DA1	Water	09/28/96	11.0000	B	UG/L	27136	VAL
039-G-W09I-A1	039GW09IA1	Water	09/28/96	9.0000	JB	UG/L	27136	VAL
039-G-W13D-A1	039GW13DA1	Water	09/29/96	6.0000	JB	UG/L	27136	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2901-00002 - CHARLESTON ZONE A - QUARTERLY GW

Samples by Chemical Report

75-09-2 - Methylene chloride

>= 1.0000 for All Concentration Units - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
039-G-P025-10	039GP02510	Water	09/27/96	6.0000	B	UG/L	27136	VAL
039-G-P026-11	039GP02611	Water	09/30/96	3.0000	J	UG/L	27136	VAL
039-G-P027-11	039GP02711	Water	09/27/96	14.0000	B	UG/L	27136	VAL
039-G-P032-11	039GP03211	Water	09/27/96	6.0000	B	UG/L	27136	VAL
039-G-P034-11	039GP03411	Water	09/27/96	6.0000	B	UG/L	27136	VAL
039-G-P035-11	039GP03511	Water	09/27/96	13.0000	B	UG/L	27136	VAL
039-G-P036-11	039GP03611	Water	09/27/96	6.0000	B	UG/L	27136	VAL
039-G-W014-01	039GW01401	Water	02/06/97	5.0000		UG/L	28417	VAL
039-G-W09D-A1	039GW09DA1	Water	09/28/96	3.0000	J	UG/L	27136	VAL
039-G-W09I-A1	039GW09IA1	Water	09/28/96	4.0000	J	UG/L	27136	VAL
039-G-W12I-0A	039GW12I0A	Water	08/02/96	2.8000	J	UG/L	L7586	VAL
039-G-W13D-A1	039GW13DA1	Water	09/29/96	3.0000	J	UG/L	27136	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2901-00002 - CHARLESTON ZONE A - QUARTERLY GW

Samples by Chemical Report

117-81-7 - bis(2-Ethylhexyl)phthalate (BEHP)

>= 1.0000 for UG/L - Hits Only

Sample ID	Ext.	Orig. ID	Type	Date	Result	VQual	Units	SDG #	
039-G-W001-03		039GW00103	Water	06/20/96	13.0000		UG/L	L7287	VAL
039-H-W003-04		039HW00304	Water	10/08/96	2.0000	J	UG/L	6414	VAL
039-G-W005-03	RE	039GW00503	Water	06/21/96	5.1000	J	UG/L	L7294	VAL
039-G-W006-06		039GW00606	Water	10/04/97	2.0000	J	UG/L	31345	VAL
039-H-W011-04		039HW01104	Water	10/10/96	8.0000	J	UG/L	6414	VAL
039-G-W012-06		039GW01206	Water	10/03/97	5.0000	JB	UG/L	31302	
039-G-W12D-06		039GW12D06	Water	10/03/97	5.0000	JB	UG/L	31302	
039-G-W12I-06		039GW12I06	Water	10/03/97	16.0000	B	UG/L	31302	

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2902-00001 - CHARLESTON ZONE B
Samples by Chemical Report
67-64-1 - Acetone
>= 1.0000 for All Concentration Units - Hits Only

Sample ID	Ext.	Orig. ID	Type	Date	Result	VQual	Units	SDG #	
507-S-B001-01		507SB00101	Soil	10/04/95	12.0000	J	UG/KG	L5540	VAL
507-S-B004-01		507SB00401	Soil	10/04/95	9.5000	J	UG/KG	L5540	VAL
GDB-S-B001-01		GDBSB00101	Soil	10/04/95	21.0000	J	UG/KG	L5540	VAL
GDB-C-B001-01		GDBCB00101	Soil	10/04/95	15.0000	J	UG/KG	L5530	VAL
GDB-S-B001-02		GDBSB00102	Soil	10/04/95	610.0000		UG/KG	L5540	VAL
GDB-S-B002-01	RE	GDBSB00201	Soil	10/04/95	10.0000	J	UG/KG	L5540	VAL
GDB-S-B002-02		GDBSB00202	Soil	10/04/95	150.0000	J	UG/KG	L5540	VAL
GDB-S-B004-02		GDBSB00402	Soil	10/04/95	7.7000	J	UG/KG	L5540	VAL
GDB-S-B005-01		GDBSB00501	Soil	10/04/95	18.0000		UG/KG	L5540	VAL
GDB-S-B005-02		GDBSB00502	Soil	10/04/95	84.0000	J	UG/KG	L5540	VAL
GDB-S-B006-01		GDBSB00601	Soil	10/04/95	19.0000		UG/KG	L5540	VAL
GDB-S-B006-02		GDBSB00602	Soil	10/04/95	24.0000		UG/KG	L5540	VAL
GDB-S-B010-02		GDBSB01002	Soil	10/04/95	17.0000	J	UG/KG	L5540	VAL
GDB-S-B011-01		GDBSB01101	Soil	10/04/95	12.0000	J	UG/KG	L5540	VAL
GDB-S-B011-02		GDBSB01102	Soil	10/04/95	19.0000		UG/KG	L5540	VAL
GDB-S-B015-01		GDBSB01501	Soil	10/04/95	10.0000	J	UG/KG	L5540	VAL
GDB-H-W04D-01		GDBHW04D01	Water	12/11/95	6.5000	J	UG/L	L6022	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2902-00002 - CHARLESTON ZONE B - QUARTERLY SAMPLES

Samples by Chemical Report

67-64-1 - Acetone

>= 1.0000 for UG/L - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
GDB-H-W04D-03	GDBHW04D03	Water	06/26/96	23.0000	J	UG/L	L7330	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2902-00002 - CHARLESTON ZONE B - QUARTERLY SAMPLES

Samples by Chemical Report

117-81-7 - bis(2-Ethylhexyl)phthalate (BEHP)

>= 1.0000 for UG/L - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
GDB-G-W003-03	GDBGW00303	Water	06/25/96	3.8000	J	UG/L	L7320	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2903-00001 - CHARLESTON ZONE C

Samples by Chemical Report

67-64-1 - Acetone

>= 1.0000 for All Concentration Units - Hits Only

Sample ID	Ext.	Orig. ID	Type	Date	Result	VQual	Units	SDG #	
047-S-B004-02		047SB00402	Soil	04/13/95	24.0000	J	UG/KG	0010V	VAL
047-S-B005-02		047SB00502	Soil	03/31/95	11.0000	J	UG/KG	0003V	VAL
047-S-B012-01		047SB01201	Soil	04/13/95	47.0000	J	UG/KG	0010V	VAL
508-S-B003-01		508SB00301	Soil	03/21/95	39.0000	J	UG/KG	0002V	VAL
510-G-W001-01		510GW00101	Water	06/12/95	18.0000	J	UG/L	0017V	VAL
511-S-B005-02		511SB00502	Soil	03/21/95	20.0000	J	UG/KG	0002V	VAL
512-S-B002-02		512SB00202	Soil	03/15/95	61.0000	J	UG/KG	0001V	VAL
516-S-B001-01		516SB00101	Soil	04/05/95	76.0000	J	UG/KG	0005V	VAL
516-S-B001-02		516SB00102	Soil	04/05/95	17.0000	J	UG/KG	0005V	VAL
516-S-B002-01		516SB00201	Soil	04/05/95	11.0000	J	UG/KG	0005V	VAL
516-S-B002-02		516SB00202	Soil	04/05/95	16.0000	J	UG/KG	0005V	VAL
517-S-B005-01		517SB00501	Soil	04/04/95	28.0000	J	UG/KG	0004V	VAL
518-S-B001-01		518SB00101	Soil	04/05/95	34.0000	J	UG/KG	0005V	VAL
518-S-B001-02		518SB00102	Soil	04/05/95	15.0000	J	UG/KG	0005V	VAL
518-S-B002-02		518SB00202	Soil	04/05/95	38.0000	J	UG/KG	0005V	VAL
518-S-B004-02		518SB00402	Soil	04/05/95	48.0000	J	UG/KG	0005V	VAL
518-S-B005-01		518SB00501	Soil	04/05/95	24.0000	J	UG/KG	0005V	VAL
518-S-B005-02		518SB00502	Soil	04/05/95	10.0000	J	UG/KG	0005V	VAL
GDC-S-B003-01		GRDSB00301	Soil	03/17/95	35.0000	J	UG/KG	0002V	VAL
GDC-S-B005-01		GRDSB00501	Soil	03/17/95	22.0000	J	UG/KG	0002V	VAL
GDC-S-B008-01		GRDSB00801	Soil	03/17/95	12.0000	J	UG/KG	0002V	VAL
GDC-S-B008-02		GRDSB00802	Soil	03/17/95	29.0000	J	UG/KG	0002V	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2903-00001 - CHARLESTON ZONE C

Samples by Chemical Report

75-09-2 - Methylene chloride

>= 1.0000 for All Concentration Units - Hits Only

Sample ID	Ext.	Orig. ID	Type	Date	Result	VQual	Units	SDG #	
518-S-B004-01		518SB00401	Soil	04/05/95	12.0000	J	UG/KG	0004V	VAL
519-S-B001-01		519SB00101	Soil	04/22/95	15.0000	J	UG/KG	0015V	VAL
520-S-B002-02		520SB00202	Soil	04/07/95	37.0000		UG/KG	0005V	VAL
522-S-B001-01		522SB00101	Soil	06/06/96	34.0000		UG/KG	25887	VAL
522-S-B001-02		522SB00102	Soil	06/06/96	40.0000		UG/KG	25887	VAL
522-S-B002-01		522SB00201	Soil	06/06/96	50.0000	J	UG/KG	25887	VAL
522-S-B002-02	RE	522SB00202	Soil	06/06/96	9.0000	J	UG/KG	25887	VAL
522-S-B003-02		522SB00302	Soil	06/06/96	29.0000		UG/KG	25887	VAL
522-S-B004-01		522SB00401	Soil	06/06/96	27.0000		UG/KG	25887	VAL
522-S-B004-02		522SB00402	Soil	06/06/96	23.0000		UG/KG	25887	VAL
GDC-C-B017-01		GRDCB01701	Soil	04/10/95	14.0000	J	UG/KG	0010V	VAL
GDC-G-W01D-01		GDCGW01D01	Water	06/12/95	12.0000		UG/L	0017V	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2903-00001 - CHARLESTON ZONE C

Samples by Chemical Report

117-81-7 - bis(2-Ethylhexyl)phthalate (BEHP)

>= 1.0000 for All Concentration Units - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
044-G-W006-01	044GW00601	Water	04/25/95	8.0000	J	UG/L	0016S	VAL
047-S-B005-01	047SB00501	Soil	03/31/95	420.0000	J	UG/KG	0003S	VAL
047-S-B017-01	047SB01701	Soil	07/06/95	89.0000	J	UG/KG	0022S	VAL
508-S-B005-01	508SB00501	Soil	03/21/95	72.0000	J	UG/KG	0002S	VAL
508-C-B006-01	508CB00601	Soil	03/21/95	76.0000	J	UG/KG	0003S	VAL
508-S-B007-01	508SB00701	Soil	06/27/95	98.0000	J	UG/KG	0021S	VAL
508-S-B008-01	508SB00801	Soil	06/27/95	160.0000	J	UG/KG	0021S	VAL
508-S-B009-01	508SB00901	Soil	06/27/95	96.0000	J	UG/KG	0021S	VAL
510-S-B005-01	510SB00501	Soil	03/14/95	120.0000	J	UG/KG	0001S	VAL
511-S-B006-01	511SB00601	Soil	03/21/95	110.0000	J	UG/KG	0002S	VAL
517-S-B002-01	517SB00201	Soil	04/04/95	540.0000	J	UG/KG	0004S	VAL
517-S-B002-02	517SB00202	Soil	04/04/95	170.0000	J	UG/KG	0004S	VAL
517-C-B002-02	517CB00202	Soil	04/04/95	97.0000	J	UG/KG	0004S	VAL
517-S-B003-01	517SB00301	Soil	04/04/95	74.0000	J	UG/KG	0004S	VAL
518-S-B002-01	518SB00201	Soil	04/05/95	490.0000	J	UG/KG	0005S	VAL
518-S-B003-01	518SB00301	Soil	04/05/95	910.0000		UG/KG	0005S	VAL
700-S-B001-01	700SB00101	Soil	06/05/96	81.0000	J	UG/KG	25887	VAL
700-S-B002-01	700SB00201	Soil	06/05/96	37.0000	J	UG/KG	25887	VAL
700-S-B002-02	700SB00202	Soil	06/05/96	54.0000	J	UG/KG	25887	VAL
700-S-B003-01	700SB00301	Soil	06/05/96	55.0000	J	UG/KG	25887	VAL
00-C-B003-01	700CB00301	Soil	06/05/96	51.0000	J	UG/KG	25887	VAL
700-S-B003-02	700SB00302	Soil	06/05/96	51.0000	J	UG/KG	25887	VAL
GDC-S-B038-01	GDCSB03801	Soil	06/29/95	86.0000	J	UG/KG	0021S	VAL
GDC-S-B040-01	GDCSB04001	Soil	06/29/95	1200.0000		UG/KG	0022S	VAL
GDC-C-B045-01	GDCCB04501	Soil	06/27/95	150.0000	J	UG/KG	0021S	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2903-00002 - CHARLESTON ZONE C - QUARTERLY SAMPLING

Samples by Chemical Report

67-64-1 - Acetone

>= 1.0000 for UG/L - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
047-G-W010-02	047GW01002	Water	01/25/96	13.0000	J	UG/L	24561	VAL
047-G-W012-03	047GW01203	Water	05/09/96	3.0000	J	UG/L	25504	VAL
GDC-G-W02D-02	GDCGW02D02	Water	01/19/96	15.0000	J	UG/L	24514	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2903-00002 - CHARLESTON ZONE C - QUARTERLY SAMPLING

Samples by Chemical Report

75-09-2 - Methylene chloride

>= 1.0000 for UG/L - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #
510-G-W002-03	510GW00203	Water	05/10/96	12.0000		UG/L	25568 VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2903-00002 - CHARLESTON ZONE C - QUARTERLY SAMPLING

Samples by Chemical Report

117-81-7 - bis(2-Ethylhexyl)phthalate (BEHP)

>= 1.0000 for UG/L - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
044-G-W006-02 RE	044GW00602	Water	01/17/96	1.0000	J	UG/L	24514	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2904-00002 - CHARLESTON ZONE D GW

Samples by Chemical Report

75-09-2 - Methylene chloride

>= 1.0000 for UG/L - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
GDD-G-W001-03	GDDGW00103	Water	08/11/97	2.0000	J	UG/L	30570	VAL

*** End of Report ***

ENVIRONMENTAL SAFETY & DESIGNS

2905-00001 - CHARLESTON ZONE E
Samples by Chemical Report
67-64-1 - Acetone
>= 1.0000 for UG/KG - Hits Only

Sample ID	Ext.	Orig. ID	Type	Date	Result	VQual	Units	SDG #	
005-S-B003-02	RE	005SB00302	Soil	09/22/95	99.0000		UG/KG	23593	VAL
022-C-B001-01		022CB00101	Soil	09/07/95	12.0000		UG/KG	23447	VAL
022-S-B002-02		022SB00202	Soil	09/07/95	95.0000		UG/KG	23447	VAL
025-S-B011-02		025SB01102	Soil	02/28/96	16.0000		UG/KG	24830	VAL
053-S-B002-01		053SB00201	Soil	11/16/95	150.0000	J	UG/KG	24094	VAL
054-S-B011-02		054SB01102	Soil	11/21/95	79.0000	J	UG/KG	24133	VAL
054-S-B012-02		054SB01202	Soil	11/21/95	33.0000		UG/KG	24133	VAL
054-S-B013-02		054SB01302	Soil	11/21/95	170.0000		UG/KG	24133	VAL
054-S-B014-02		054SB01402	Soil	11/21/95	99.0000		UG/KG	24133	VAL
054-S-B024-02		054SB02402	Soil	11/28/95	30.0000		UG/KG	24159	VAL
054-S-B033-02		054SB03302	Soil	11/30/95	35.0000	J	UG/KG	24170	VAL
054-S-B034-01		054SB03401	Soil	11/30/95	35.0000	J	UG/KG	24170	VAL
065-S-B001-01		065SB00101	Soil	12/04/95	230.0000		UG/KG	24212	VAL
065-C-B001-01		065CB00101	Soil	12/04/95	160.0000	D	UG/KG	24212	VAL
065-S-B003-02		065SB00302	Soil	09/27/95	69.0000		UG/KG	23663	VAL
065-S-B004-01		065SB00401	Soil	09/27/95	34.0000		UG/KG	23663	VAL
065-S-B005-01		065SB00501	Soil	09/27/95	27.0000		UG/KG	23663	VAL
065-C-B005-01		065CB00501	Soil	09/27/95	290.0000		UG/KG	23663	VAL
065-S-B005-02		065SB00502	Soil	09/27/95	520.0000		UG/KG	23663	VAL
065-C-B005-02		065CB00502	Soil	09/27/95	140.0000		UG/KG	23663	VAL
65-S-B006-01		065SB00601	Soil	09/28/95	44.0000		UG/KG	23663	VAL
065-S-B006-02		065SB00602	Soil	09/28/95	18.0000		UG/KG	23663	VAL
065-S-B006-03		065SB00603	Soil	11/07/95	63.0000		UG/KG	24010	VAL
083-S-B001-01		083SB00101	Soil	11/30/95	6.0000	J	UG/KG	24170	VAL
083-S-B002-02		083SB00202	Soil	12/18/95	13.0000	J	UG/KG	24326	VAL
083-S-B003-01		083SB00301	Soil	12/14/95	88.0000	J	UG/KG	24326	VAL
083-S-B003-02		083SB00302	Soil	12/14/95	31.0000	J	UG/KG	24326	VAL
083-S-B004-01		083SB00401	Soil	12/14/95	58.0000	J	UG/KG	24326	VAL
083-S-B004-02	RE	083SB00402	Soil	12/14/95	60.0000	J	UG/KG	24326	VAL
083-S-B006-01		083SB00601	Soil	12/19/95	82.0000		UG/KG	24364	VAL
083-S-B007-01		083SB00701	Soil	12/14/95	27.0000	J	UG/KG	24326	VAL
083-S-B007-02		083SB00702	Soil	12/14/95	92.0000	J	UG/KG	24326	VAL
083-S-B008-01		083SB00801	Soil	12/14/95	67.0000		UG/KG	24326	VAL
083-S-B008-02		083SB00802	Soil	12/14/95	28.0000	J	UG/KG	24326	VAL
084-S-B004-02		084SB00402	Soil	12/01/95	730.0000		UG/KG	24206	VAL
084-S-B005-01		084SB00501	Soil	12/01/95	170.0000		UG/KG	24206	VAL
097-S-B003-01		097SB00301	Soil	09/18/95	34.0000		UG/KG	23535	VAL
097-C-B003-01		097CB00301	Soil	09/18/95	40.0000		UG/KG	23535	VAL
097-S-B003-02		097SB00302	Soil	09/18/95	40.0000		UG/KG	23535	VAL
100-S-B001-02		100SB00102	Soil	09/27/95	37.0000		UG/KG	23663	VAL
100-S-B002-02		100SB00202	Soil	09/27/95	130.0000		UG/KG	23663	VAL
100-S-B003-01		100SB00301	Soil	09/27/95	16.0000		UG/KG	23663	VAL
100-S-B003-02		100SB00302	Soil	09/27/95	24.0000		UG/KG	23663	VAL
102-S-B046-01		102SB04601	Soil	06/04/96	59.0000	J	UG/KG	25846	VAL
106-S-B002-01		106SB00201	Soil	09/21/95	58.0000		UG/KG	23593	VAL
06-S-B002-02		106SB00202	Soil	09/21/95	84.0000		UG/KG	23593	VAL
06-S-B003-01		106SB00301	Soil	09/21/95	28.0000		UG/KG	23593	VAL
106-S-B003-02		106SB00302	Soil	09/21/95	79.0000		UG/KG	23593	VAL
170-S-B001-02		170SB00102	Soil	01/03/96	19.0000	J	UG/KG	24431	VAL

ENVIRONMENTAL SAFETY & DESIGNS

2905-00001 - CHARLESTON ZONE E
Samples by Chemical Report
67-64-1 - Acetone
>= 1.0000 for UG/KG - Hits Only

Sample ID	Ext.	Orig. ID	Type	Date	Result	VQual	Units	SDG #	
170-S-B008-02		170SB00802	Soil	01/03/96	16.0000	J	UG/KG	24431	VAL
170-S-B011-01		170SB01101	Soil	01/04/96	73.0000	J	UG/KG	24436	VAL
170-S-B011-02		170SB01102	Soil	01/04/96	19.0000		UG/KG	24436	VAL
170-S-B012-02		170SB01202	Soil	01/04/96	470.0000	J	UG/KG	24436	VAL
170-S-B013-01		170SB01301	Soil	01/04/96	4400.0000		UG/KG	24436	VAL
170-S-B014-01		170SB01401	Soil	01/04/96	210.0000	D	UG/KG	24436	VAL
170-S-B014-02		170SB01402	Soil	01/04/96	50.0000		UG/KG	24436	VAL
170-S-B015-01		170SB01501	Soil	01/04/96	310.0000	DJ	UG/KG	24436	VAL
172-S-B001-01		172SB00101	Soil	09/08/95	300.0000	D	UG/KG	23447	VAL
172-S-B001-02		172SB00102	Soil	09/08/95	66.0000	J	UG/KG	23447	VAL
172-S-B003-01		172SB00301	Soil	09/08/95	75.0000	J	UG/KG	23447	VAL
172-S-B003-02		172SB00302	Soil	09/08/95	100.0000	J	UG/KG	23447	VAL
172-S-B004-01		172SB00401	Soil	09/08/95	31.0000	J	UG/KG	23447	VAL
172-S-B004-02		172SB00402	Soil	09/08/95	77.0000	J	UG/KG	23447	VAL
172-S-B005-01		172SB00501	Soil	09/08/95	180.0000	J	UG/KG	23447	VAL
172-S-B005-02		172SB00502	Soil	09/08/95	45.0000	J	UG/KG	23447	VAL
172-S-B006-01		172SB00601	Soil	09/08/95	250.0000	D	UG/KG	23447	VAL
525-S-B001-02		525SB00102	Soil	12/19/95	49.0000	J	UG/KG	24364	VAL
525-S-B002-02		525SB00202	Soil	12/19/95	65.0000	J	UG/KG	24364	VAL
525-S-B003-01		525SB00301	Soil	12/19/95	52.0000	J	UG/KG	24364	VAL
525-S-B003-02		525SB00302	Soil	12/19/95	63.0000	J	UG/KG	24364	VAL
525-S-B004-01		525SB00401	Soil	12/19/95	4500.0000		UG/KG	24364	VAL
525-S-B004-02		525SB00402	Soil	12/19/95	3900.0000		UG/KG	24364	VAL
526-S-B007-01		526SB00701	Soil	11/17/95	120.0000	J	UG/KG	24105	VAL
530-S-B001-01		530SB00101	Soil	01/09/96	24.0000	J	UG/KG	24464	VAL
530-S-B001-02		530SB00102	Soil	01/09/96	10.0000	J	UG/KG	24464	VAL
530-C-B001-02		530CB00102	Soil	01/09/96	25.0000	J	UG/KG	24464	VAL
530-S-B002-01		530SB00201	Soil	01/09/96	68.0000		UG/KG	24464	VAL
530-S-B002-02		530SB00202	Soil	01/09/96	11.0000	J	UG/KG	24464	VAL
530-S-B003-01		530SB00301	Soil	01/09/96	41.0000		UG/KG	24464	VAL
530-S-B003-02		530SB00302	Soil	01/09/96	25.0000		UG/KG	24464	VAL
530-S-B004-01		530SB00401	Soil	01/09/96	60.0000		UG/KG	24464	VAL
530-S-B004-02		530SB00402	Soil	01/09/96	20.0000	J	UG/KG	24464	VAL
530-S-B005-01		530SB00501	Soil	01/09/96	480.0000	J	UG/KG	24464	VAL
530-S-B005-02		530SB00502	Soil	01/09/96	35.0000		UG/KG	24464	VAL
538-S-B004-01		538SB00401	Soil	08/28/95	38.0000	J	UG/KG	23359	VAL
538-S-B004-02	RE	538SB00402	Soil	08/28/95	34.0000	J	UG/KG	23359	VAL
538-S-B005-01		538SB00501	Soil	08/28/95	37.0000	J	UG/KG	23359	VAL
538-S-B005-02		538SB00502	Soil	08/28/95	36.0000	J	UG/KG	23359	VAL
538-S-B006-01		538SB00601	Soil	08/28/95	44.0000	J	UG/KG	23359	VAL
538-S-B006-02		538SB00602	Soil	08/28/95	37.0000	J	UG/KG	23359	VAL
538-S-B007-01		538SB00701	Soil	08/28/95	52.0000	J	UG/KG	23359	VAL
538-S-B007-02		538SB00702	Soil	08/28/95	22.0000	J	UG/KG	23359	VAL
538-S-B008-01		538SB00801	Soil	08/28/95	20.0000	J	UG/KG	23359	VAL
538-S-B008-02		538SB00802	Soil	08/28/95	17.0000	J	UG/KG	23359	VAL
538-S-B009-01		538SB00901	Soil	08/28/95	120.0000		UG/KG	23359	VAL
538-S-B010-01		538SB01001	Soil	08/28/95	71.0000	J	UG/KG	23359	VAL
538-S-B010-02		538SB01002	Soil	08/28/95	24.0000		UG/KG	23359	VAL
539-S-B003-02		539SB00302	Soil	08/29/95	15.0000		UG/KG	23359	VAL

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2905-00001 - CHARLESTON ZONE E
Samples by Chemical Report
67-64-1 - Acetone
>= 1.0000 for UG/KG - Hits Only

Sample ID	Ext.	Orig. ID	Type	Date	Result	VQual	Units	SDG #	
542-S-B002-02		542SB00202	Soil	08/29/95	100.0000		UG/KG	23359	VAL
544-S-B001-01		544SB00101	Soil	09/28/95	120.0000		UG/KG	23663	VAL
544-S-B001-02		544SB00102	Soil	09/28/95	57.0000		UG/KG	23663	VAL
544-S-B002-02		544SB00202	Soil	09/28/95	150.0000		UG/KG	23663	VAL
544-S-B004-01		544SB00401	Soil	09/27/95	14.0000		UG/KG	23663	VAL
544-S-B004-02		544SB00402	Soil	09/27/95	43.0000		UG/KG	23663	VAL
548-S-B004-02		548SB00402	Soil	09/05/95	14.0000		UG/KG	23424	VAL
551-C-B002-01		551CB00201	Soil	09/29/95	12.0000		UG/KG	23704	VAL
551-C-B006-01	RE	551CB00601	Soil	09/29/95	18.0000	J	UG/KG	23704	VAL
551-S-B006-02		551SB00602	Soil	09/29/95	580.0000		UG/KG	23704	VAL
552-S-B001-01		552SB00101	Soil	09/28/95	110.0000		UG/KG	23663	VAL
552-S-B001-02		552SB00102	Soil	09/28/95	120.0000		UG/KG	23663	VAL
552-S-B002-01		552SB00201	Soil	09/28/95	18.0000		UG/KG	23663	VAL
552-S-B002-02		552SB00202	Soil	09/28/95	17.0000		UG/KG	23663	VAL
556-M-0004-01		556M000401	Sedmt	11/03/95	2000.0000	J	UG/KG	23969	VAL
556-M-0005-01		556M000501	Sedmt	11/03/95	600.0000		UG/KG	23969	VAL
556-M-0006-01		556M000601	Sedmt	11/03/95	300.0000		UG/KG	23969	VAL
556-M-0007-01		556M000701	Sedmt	11/03/95	350.0000		UG/KG	23969	VAL
556-M-0008-01		556M000801	Sedmt	11/03/95	560.0000		UG/KG	23969	VAL
556-N-0008-01		556N000801	Sedmt	11/03/95	580.0000		UG/KG	23969	VAL
558-C-C004-01		558CC00401	Soil	01/11/96	96.0000	J	UG/KG	24474	VAL
559-S-B002-01		559SB00201	Soil	11/09/95	200.0000		UG/KG	24024	VAL
559-S-B002-02		559SB00202	Soil	11/09/95	69.0000		UG/KG	24024	VAL
559-S-B003-01	RE	559SB00301	Soil	11/09/95	110.0000		UG/KG	24024	VAL
559-S-B004-01		559SB00401	Soil	11/10/95	14.0000		UG/KG	24029	VAL
559-S-B008-02		559SB00802	Soil	11/06/95	220.0000		UG/KG	23980	VAL
559-S-B009-01		559SB00901	Soil	11/13/95	19.0000	J	UG/KG	24029	VAL
559-S-B009-02		559SB00902	Soil	11/13/95	79.0000		UG/KG	24029	VAL
559-S-B010-01	RE	559SB01001	Soil	11/07/95	3.0000	J	UG/KG	23998	VAL
559-S-B012-01		559SB01201	Soil	11/07/95	11.0000	J	UG/KG	23998	VAL
559-S-B012-02		559SB01202	Soil	11/07/95	28.0000		UG/KG	23998	VAL
559-S-B013-02	DL	559SB01302	Soil	11/06/95	1200.0000		UG/KG	23980	VAL
559-S-B016-01		559SB01601	Soil	11/14/95	32.0000	J	UG/KG	24056	VAL
559-S-B016-02		559SB01602	Soil	11/14/95	32.0000		UG/KG	24056	VAL
559-S-B018-01		559SB01801	Soil	11/13/95	160.0000		UG/KG	24029	VAL
559-S-B018-02		559SB01802	Soil	11/13/95	23.0000		UG/KG	24029	VAL
559-S-B019-01		559SB01901	Soil	11/13/95	11.0000	J	UG/KG	24029	VAL
559-S-B019-02		559SB01902	Soil	11/13/95	85.0000		UG/KG	24029	VAL
559-S-B020-01		559SB02001	Soil	11/13/95	46.0000	J	UG/KG	24029	VAL
559-S-B022-01		559SB02201	Soil	11/13/95	3.0000	J	UG/KG	24029	VAL
559-S-B022-02		559SB02202	Soil	11/13/95	28.0000		UG/KG	24029	VAL
559-S-B023-01		559SB02301	Soil	05/28/96	150.0000	J	UG/KG	25775	VAL
559-S-B023-02		559SB02302	Soil	05/28/96	75.0000	J	UG/KG	25775	VAL
559-S-B024-01		559SB02401	Soil	05/29/96	44.0000	J	UG/KG	25775	VAL
562-S-B001-01		562SB00101	Soil	12/05/95	62.0000		UG/KG	24230	VAL
562-S-B001-02		562SB00102	Soil	12/05/95	65.0000		UG/KG	24230	VAL
563-S-B005-01		563SB00501	Soil	01/29/96	72.0000	J	UG/KG	24605	VAL
564-S-B001-01	RE	564SB00101	Soil	09/08/95	81.0000	J	UG/KG	23447	VAL
564-S-B002-01		564SB00201	Soil	09/08/95	58.0000	J	UG/KG	23447	VAL

ENVIRONMENTAL SAFETY & DESIGNS

2905-00001 - CHARLESTON ZONE E
Samples by Chemical Report
67-64-1 - Acetone
>= 1.0000 for UG/KG - Hits Only

Sample ID	Ext.	Orig. ID	Type	Date	Result	VQual	Units	SDG #	
564-S-B002-02		564SB00202	Soil	09/08/95	32.0000	J	UG/KG	23447	VAL
564-S-B003-01		564SB00301	Soil	09/08/95	10.0000	J	UG/KG	23447	VAL
564-S-B003-02		564SB00302	Soil	09/08/95	34.0000	J	UG/KG	23447	VAL
566-S-B001-01		566SB00101	Soil	09/09/95	44.0000		UG/KG	23474	VAL
566-S-B001-02		566SB00102	Soil	09/09/95	72.0000		UG/KG	23474	VAL
566-S-B002-01		566SB00201	Soil	09/09/95	50.0000		UG/KG	23474	VAL
566-S-B002-02		566SB00202	Soil	09/09/95	94.0000		UG/KG	23474	VAL
566-S-B003-01	RE	566SB00301	Soil	09/09/95	120.0000		UG/KG	23474	VAL
566-S-B003-02		566SB00302	Soil	09/09/95	770.0000		UG/KG	23474	VAL
566-S-B004-02		566SB00402	Soil	09/09/95	9.0000	J	UG/KG	23474	VAL
566-S-B005-01		566SB00501	Soil	09/09/95	74.0000		UG/KG	23474	VAL
566-S-B005-02		566SB00502	Soil	09/09/95	24.0000		UG/KG	23474	VAL
569-S-B005-02		569SB00502	Soil	10/13/95	47000.0000		UG/KG	23801	VAL
570-S-B002-02	DL	570SB00202	Soil	11/06/95	150.0000		UG/KG	23980	VAL
570-S-B003-01		570SB00301	Soil	11/14/95	15.0000	J	UG/KG	24056	VAL
570-S-B005-01		570SB00501	Soil	01/16/96	30.0000	J	UG/KG	24503	VAL
570-S-B005-02		570SB00502	Soil	01/16/96	22.0000	J	UG/KG	24503	VAL
570-S-B006-01		570SB00601	Soil	01/16/96	340.0000	J	UG/KG	24503	VAL
570-S-B006-02		570SB00602	Soil	01/16/96	19.0000	J	UG/KG	24503	VAL
570-S-B007-01		570SB00701	Soil	01/16/96	86.0000	J	UG/KG	24503	VAL
70-S-B007-02	RE	570SB00702	Soil	01/16/96	7.0000	J	UG/KG	24503	VAL
570-S-B008-02		570SB00802	Soil	01/16/96	17.0000		UG/KG	24503	VAL
570-S-B009-01		570SB00901	Soil	01/16/96	57.0000	J	UG/KG	24503	VAL
570-C-B009-01		570CB00901	Soil	01/16/96	89.0000		UG/KG	24503	VAL
570-S-B009-02		570SB00902	Soil	01/16/96	100.0000	J	UG/KG	24503	VAL
570-S-B010-01		570SB01001	Soil	01/16/96	81.0000		UG/KG	24503	VAL
570-S-B010-02	RE	570SB01002	Soil	01/16/96	28.0000	J	UG/KG	24503	VAL
570-S-B015-02		570SB01502	Soil	11/14/95	15.0000	J	UG/KG	24056	VAL
571-C-C002-01		571LL00201	Soil	03/20/96	13.0000		UG/KG	24988	VAL
571-C-C003-01		571LL00301	Soil	03/20/96	10.0000		UG/KG	24988	VAL
572-S-B001-01		572SB00101	Soil	09/11/95	19.0000		UG/KG	23471	VAL
572-S-B002-01		572SB00201	Soil	09/10/95	46.0000		UG/KG	23473	VAL
572-S-B002-02		572SB00202	Soil	09/10/95	120.0000		UG/KG	23473	VAL
572-S-B003-01		572SB00301	Soil	09/10/95	150.0000	J	UG/KG	23473	VAL
572-S-B003-02	RE	572SB00302	Soil	09/10/95	270.0000		UG/KG	23473	VAL
572-S-B004-01		572SB00401	Soil	09/10/95	29.0000		UG/KG	23473	VAL
572-S-B004-02		572SB00402	Soil	09/10/95	44.0000		UG/KG	23473	VAL
572-S-B005-01	RE	572SB00501	Soil	09/10/95	76.0000		UG/KG	23473	VAL
572-S-B005-02		572SB00502	Soil	09/10/95	59.0000		UG/KG	23473	VAL
572-S-B006-01		572SB00601	Soil	09/10/95	35.0000		UG/KG	23473	VAL
572-S-B006-02		572SB00602	Soil	09/10/95	330.0000	J	UG/KG	23473	VAL
572-S-B007-01		572SB00701	Soil	09/10/95	46.0000		UG/KG	23473	VAL
572-S-B007-02		572SB00702	Soil	09/10/95	100.0000		UG/KG	23473	VAL
572-S-B008-01	RE	572SB00801	Soil	09/10/95	36.0000	J	UG/KG	23473	VAL
573-C-B001-01		573CB00101	Soil	10/31/95	48.0000		UG/KG	23922	VAL
73-S-B002-01		573SB00201	Soil	09/11/95	22.0000		UG/KG	23471	VAL
573-C-B002-01		573CB00201	Soil	09/11/95	39.0000		UG/KG	23471	VAL
573-S-B002-02		573SB00202	Soil	09/11/95	72.0000		UG/KG	23471	VAL
573-S-B003-01		573SB00301	Soil	09/11/95	46.0000		UG/KG	23471	VAL

ENVIRONMENTAL SAFETY & DESIGNS

2905-00001 - CHARLESTON ZONE E

Samples by Chemical Report

67-64-1 - Acetone

>= 1.0000 for UG/KG - Hits Only

Sample ID	Ext.	Orig. ID	Type	Date	Result	VQual	Units	SDG #	
573-S-B003-02		573SB00302	Soil	09/11/95	54.0000		UG/KG	23471	VAL
573-C-B003-02		573CB00302	Soil	09/11/95	36.0000		UG/KG	23471	VAL
573-C-B005-02		573CB00502	Soil	09/11/95	23.0000		UG/KG	23471	VAL
574-S-B001-01	RE	574SB00101	Soil	11/30/95	28.0000	J	UG/KG	24170	VAL
574-S-B001-02		574SB00102	Soil	11/30/95	69.0000	J	UG/KG	24170	VAL
574-S-B002-01	RE	574SB00201	Soil	11/30/95	200.0000	J	UG/KG	24170	VAL
574-S-B002-02		574SB00202	Soil	11/30/95	15.0000	J	UG/KG	24170	VAL
574-S-B003-01		574SB00301	Soil	11/30/95	40.0000	J	UG/KG	24170	VAL
574-S-B003-02		574SB00302	Soil	11/30/95	31.0000	J	UG/KG	24170	VAL
574-S-B004-01		574SB00401	Soil	11/30/95	46.0000	J	UG/KG	24170	VAL
574-S-B004-02		574SB00402	Soil	11/30/95	32.0000		UG/KG	24170	VAL
574-S-B005-01		574SB00501	Soil	11/30/95	90.0000	J	UG/KG	24170	VAL
574-S-B005-02		574SB00502	Soil	11/30/95	190.0000		UG/KG	24170	VAL
576-S-B001-02		576SB00102	Soil	09/09/95	20.0000		UG/KG	23474	VAL
576-S-B002-01		576SB00201	Soil	09/09/95	38.0000		UG/KG	23474	VAL
576-S-B003-02		576SB00302	Soil	09/06/95	68.0000		UG/KG	23424	VAL
576-S-B004-01		576SB00401	Soil	09/06/95	70.0000		UG/KG	23424	VAL
576-S-B005-01		576SB00501	Soil	09/06/95	27.0000		UG/KG	23424	VAL
576-S-B005-02		576SB00502	Soil	09/06/95	19.0000		UG/KG	23424	VAL
578-S-B001-01		578SB00101	Soil	05/16/96	40.0000	J	UG/KG	25630	VAL
78-S-B003-01	DL	578SB00301	Soil	05/16/96	300.0000	DJ	UG/KG	25630	VAL
579-C-B004-01		579CB00401	Soil	09/12/95	13.0000		UG/KG	23484	VAL
580-S-B001-01		580SB00101	Soil	09/14/95	160.0000		UG/KG	23502	VAL
580-S-B001-02		580SB00102	Soil	09/14/95	27.0000		UG/KG	23502	VAL
580-S-B002-01		580SB00201	Soil	09/14/95	120.0000		UG/KG	23502	VAL
580-C-B002-01		580CB00201	Soil	09/14/95	63.0000		UG/KG	23502	VAL
580-S-B003-01		580SB00301	Soil	09/14/95	180.0000		UG/KG	23502	VAL
580-S-B003-02		580SB00302	Soil	09/14/95	220.0000		UG/KG	23502	VAL
580-S-B005-01		580SB00501	Soil	09/14/95	38.0000		UG/KG	23502	VAL
580-S-B006-01		580SB00601	Soil	09/14/95	58.0000		UG/KG	23502	VAL
580-S-B006-02		580SB00602	Soil	09/14/95	51.0000		UG/KG	23502	VAL
583-S-B002-01		583SB00201	Soil	09/15/95	93.0000		UG/KG	23535	VAL
583-S-B003-02		583SB00302	Soil	09/18/95	66.0000		UG/KG	23535	VAL
583-S-B004-02		583SB00402	Soil	09/15/95	40.0000		UG/KG	23535	VAL
583-S-B005-02		583SB00502	Soil	09/15/95	24.0000		UG/KG	23535	VAL
583-C-B006-01		583CB00601	Soil	09/15/95	82.0000		UG/KG	23535	VAL
583-S-B007-02		583SB00702	Soil	09/18/95	110.0000		UG/KG	23535	VAL
590-M-0001-01		590M000101	Sedmt	01/05/96	460.0000		UG/KG	24445	VAL
590-S-B001-01		590SB00101	Soil	01/04/96	160.0000	J	UG/KG	24436	VAL
590-S-B001-02		590SB00102	Soil	01/04/96	440.0000	J	UG/KG	24436	VAL
590-S-B002-01		590SB00201	Soil	01/05/96	91.0000		UG/KG	24445	VAL
590-S-B002-02		590SB00202	Soil	01/05/96	140.0000		UG/KG	24445	VAL
590-S-B003-01		590SB00301	Soil	01/05/96	58.0000		UG/KG	24445	VAL
590-S-B003-02		590SB00302	Soil	01/05/96	27.0000		UG/KG	24445	VAL
590-S-B004-01		590SB00401	Soil	01/05/96	57.0000		UG/KG	24445	VAL
0-S-B004-02		590SB00402	Soil	01/05/96	52.0000		UG/KG	24445	VAL
90-S-B005-01		590SB00501	Soil	01/05/96	200.0000		UG/KG	24445	VAL
590-S-B005-02		590SB00502	Soil	01/05/96	100.0000		UG/KG	24445	VAL
596-S-B002-01	RE	596SB00201	Soil	10/23/95	150.0000		UG/KG	23859	VAL

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2905-00001 - CHARLESTON ZONE E
Samples by Chemical Report
67-64-1 - Acetone
>= 1.0000 for UG/KG - Hits Only

Sample ID	Ext.	Orig. ID	Type	Date	Result	VQual	Units	SDG #	
596-S-B007-02		596SB00702	Soil	10/23/95	260.0000		UG/KG	23859	VAL
598-S-B001-02		598SB00102	Soil	09/19/95	78.0000		UG/KG	23560	VAL
598-C-B002-02		598CB00202	Soil	09/19/95	38.0000		UG/KG	23560	VAL
598-S-B003-02		598SB00302	Soil	09/20/95	26.0000		UG/KG	23560	VAL
598-S-B004-01		598SB00401	Soil	09/20/95	29.0000	J	UG/KG	23560	VAL
598-S-B004-02		598SB00402	Soil	09/20/95	37.0000		UG/KG	23560	VAL
599-S-B003-01	RE	599SB00301	Soil	09/20/95	50.0000	J	UG/KG	23560	VAL
599-S-B004-02	RE	599SB00402	Soil	09/20/95	58.0000		UG/KG	23560	VAL
599-S-B005-01		599SB00501	Soil	09/20/95	60.0000		UG/KG	23560	VAL
599-C-B005-02	RE	599CB00502	Soil	09/20/95	36.0000		UG/KG	23560	VAL
602-S-B004-02		602SB00402	Soil	01/08/96	85.0000	J	UG/KG	24456	VAL
603-S-B004-02		603SB00402	Soil	09/21/95	44.0000		UG/KG	23593	VAL
604-S-B003-01	RE	604SB00301	Soil	01/08/96	90.0000	J	UG/KG	24456	VAL
604-S-B003-02		604SB00302	Soil	01/08/96	110.0000	J	UG/KG	24456	VAL
605-S-B003-01		605SB00301	Soil	09/21/95	44.0000		UG/KG	23593	VAL
605-S-B004-01		605SB00401	Soil	09/21/95	180.0000		UG/KG	23593	VAL
605-S-B006-02		605SB00602	Soil	09/22/95	54.0000		UG/KG	23593	VAL
605-S-B008-01		605SB00801	Soil	09/22/95	41.0000		UG/KG	23593	VAL
605-S-B008-02		605SB00802	Soil	09/22/95	45.0000		UG/KG	23593	VAL
605-C-B010-01		605CB01001	Soil	09/21/95	40.0000		UG/KG	23593	VAL
605-S-B011-01		605SB01101	Soil	09/21/95	160.0000		UG/KG	23593	VAL
605-C-B011-02		605CB01102	Soil	09/21/95	17.0000		UG/KG	23593	VAL
605-S-B012-02		605SB01202	Soil	05/31/96	48.0000	J	UG/KG	25805	VAL
605-S-B015-02		605SB01502	Soil	05/31/96	170.0000	J	UG/KG	25805	VAL
GDE-C-B001-01		GDECB00101	Soil	09/13/95	64.0000		UG/KG	23502	VAL
GDE-C-B002-02		GDECB00202	Soil	09/13/95	33.0000		UG/KG	23502	VAL
GDE-S-B003-01		GDESB00301	Soil	09/13/95	19.0000		UG/KG	23502	VAL
GDE-S-B003-02		GDESB00302	Soil	09/13/95	26.0000		UG/KG	23502	VAL
GDE-S-B006-01		GDESB00601	Soil	01/04/96	5800.0000		UG/KG	24436	VAL
GDE-C-B006-01		GDECB00601	Soil	01/04/96	2500.0000		UG/KG	24436	VAL
GDE-S-B006-02		GDESB00602	Soil	01/04/96	160.0000	J	UG/KG	24436	VAL
GDE-S-B007-01		GDESB00701	Soil	01/08/96	230.0000	J	UG/KG	24456	VAL
GDE-S-B007-02		GDESB00702	Soil	01/08/96	18.0000	J	UG/KG	24456	VAL
GDE-S-B008-01		GDESB00801	Soil	09/13/95	38.0000		UG/KG	23502	VAL
GDE-S-B008-02		GDESB00802	Soil	09/13/95	120.0000	J	UG/KG	23502	VAL
GDE-S-B009-01		GDESB00901	Soil	09/12/95	85.0000		UG/KG	23484	VAL
GDE-C-B009-01		GDECB00901	Soil	09/12/95	98.0000		UG/KG	23484	VAL
GDE-S-B009-02	RE	GDESB00902	Soil	09/12/95	40.0000		UG/KG	23484	VAL
GDE-S-B010-01		GDESB01001	Soil	09/12/95	18.0000		UG/KG	23484	VAL
GDE-S-B010-02		GDESB01002	Soil	09/12/95	42.0000		UG/KG	23484	VAL
GDE-C-B010-02		GDECB01002	Soil	09/12/95	76.0000		UG/KG	23484	VAL
GDE-S-B011-01	RE	GDESB01101	Soil	01/16/96	59.0000	J	UG/KG	24503	VAL
GDE-S-B011-02		GDESB01102	Soil	01/16/96	40.0000	J	UG/KG	24503	VAL
GDE-S-B012-01		GDESB01201	Soil	09/12/95	14.0000		UG/KG	23484	VAL
GDE-S-B013-01		GDESB01301	Soil	09/12/95	25.0000		UG/KG	23484	VAL
GDE-S-B014-01		GDESB01401	Soil	11/10/95	38.0000	J	UG/KG	24029	VAL
GDE-S-B014-02	RE	GDESB01402	Soil	11/10/95	11.0000	J	UG/KG	24029	VAL
GDE-S-B016-02		GDESB01602	Soil	01/03/96	12.0000	J	UG/KG	24431	VAL
GDE-S-B017-01		GDESB01701	Soil	02/28/96	10.0000	J	UG/KG	24830	VAL

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2905-00001 - CHARLESTON ZONE E
Samples by Chemical Report
67-64-1 - Acetone
>= 1.0000 for UG/KG - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
GDE-C-B017-01	GDECB01701	Soil	02/28/96	23.0000		UG/KG	24830	VAL
GDE-S-B017-02	GDESB01702	Soil	02/28/96	9.0000	J	UG/KG	24830	VAL
GDE-S-B021-01	GDESB02101	Soil	03/01/96	72.0000		UG/KG	24855	VAL
GDE-S-B021-02	GDESB02102	Soil	03/01/96	26.0000		UG/KG	24855	VAL
GDE-S-B022-01	GDESB02201	Soil	02/28/96	12.0000	J	UG/KG	24830	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2905-00001 - CHARLESTON ZONE E
Samples by Chemical Report
75-09-2 - Methylene chloride
>= 1.0000 for UG/KG - Hits Only

Sample ID	Ext.	Orig. ID	Type	Date	Result	VQual	Units	SDG #	
022-C-B001-01		022CB00101	Soil	09/07/95	13.0000		UG/KG	23447	VAL
025-M-0001-01		025M000101	Sedmt	03/20/96	7.0000	J	UG/KG	24988	VAL
025-S-B005-02		025SB00502	Soil	02/05/96	4.0000	J	UG/KG	24648	VAL
025-S-B006-01		025SB00601	Soil	02/02/96	43.0000		UG/KG	24642	VAL
025-S-B007-01		025SB00701	Soil	02/02/96	39.0000		UG/KG	24642	VAL
025-S-B008-01		025SB00801	Soil	02/02/96	2.0000	J	UG/KG	24642	VAL
025-S-B008-02		025SB00802	Soil	02/02/96	2.0000	J	UG/KG	24642	VAL
025-S-B009-01		025SB00901	Soil	02/02/96	5.0000		UG/KG	24642	VAL
025-S-B009-02		025SB00902	Soil	02/02/96	2.0000	J	UG/KG	24642	VAL
025-S-B010-01		025SB01001	Soil	02/05/96	3.0000	J	UG/KG	24648	VAL
025-S-B011-01		025SB01101	Soil	02/28/96	5.0000	J	UG/KG	24830	VAL
025-S-B011-02		025SB01102	Soil	02/28/96	10.0000		UG/KG	24830	VAL
063-S-B002-02		063SB00202	Soil	08/30/95	18.0000	J	UG/KG	23386	VAL
065-S-B003-01		065SB00301	Soil	09/27/95	60.0000		UG/KG	23663	VAL
065-S-B006-01		065SB00601	Soil	09/28/95	19.0000	J	UG/KG	23663	VAL
065-S-B006-02		065SB00602	Soil	09/28/95	35.0000	J	UG/KG	23663	VAL
065-S-B006-03		065SB00603	Soil	11/07/95	19.0000		UG/KG	24010	VAL
081-C-C003-01		081CC00301	Soil	12/05/95	13.0000	J	UG/KG	24230	VAL
083-S-B003-02		083SB00302	Soil	12/14/95	2.0000	J	UG/KG	24326	VAL
083-S-B004-01		083SB00401	Soil	12/14/95	1.0000	J	UG/KG	24326	VAL
083-S-B004-02	RE	083SB00402	Soil	12/14/95	4.0000	J	UG/KG	24326	VAL
083-S-B006-01		083SB00601	Soil	12/19/95	2.0000	J	UG/KG	24364	VAL
083-S-B007-01		083SB00701	Soil	12/14/95	2.0000	J	UG/KG	24326	VAL
083-S-B008-01		083SB00801	Soil	12/14/95	1.0000	J	UG/KG	24326	VAL
084-S-B007-01	RE	084SB00701	Soil	05/24/96	14.0000		UG/KG	25722	VAL
084-S-B007-02		084SB00702	Soil	05/24/96	7.0000		UG/KG	25722	VAL
084-S-B008-01		084SB00801	Soil	05/24/96	6.0000		UG/KG	25722	VAL
084-S-B008-02		084SB00802	Soil	05/24/96	6.0000		UG/KG	25722	VAL
087-C-B001-01		087CB00101	Soil	09/08/95	18.0000		UG/KG	23447	VAL
097-S-B002-02		097SB00202	Soil	09/18/95	1.0000	J	UG/KG	23535	VAL
097-C-B003-01		097CB00301	Soil	09/18/95	2.0000	J	UG/KG	23535	VAL
172-S-B001-01		172SB00101	Soil	09/08/95	8.0000	J	UG/KG	23447	VAL
172-S-B002-01		172SB00201	Soil	09/09/95	6.0000	J	UG/KG	23474	VAL
172-S-B003-01		172SB00301	Soil	09/08/95	6.0000	J	UG/KG	23447	VAL
172-C-B003-01		172CB00301	Soil	09/08/95	18.0000		UG/KG	23447	VAL
525-S-B001-01		525SB00101	Soil	12/19/95	2.0000	J	UG/KG	24364	VAL
525-S-B001-02		525SB00102	Soil	12/19/95	11.0000		UG/KG	24364	VAL
525-S-B002-01		525SB00201	Soil	12/19/95	4.0000	J	UG/KG	24364	VAL
525-S-B002-02		525SB00202	Soil	12/19/95	3.0000	J	UG/KG	24364	VAL
525-S-B003-01		525SB00301	Soil	12/19/95	2.0000	J	UG/KG	24364	VAL
525-S-B003-02		525SB00302	Soil	12/19/95	4.0000	J	UG/KG	24364	VAL
530-S-B001-01		530SB00101	Soil	01/09/96	4.0000	J	UG/KG	24464	VAL
530-S-B001-02		530SB00102	Soil	01/09/96	2.0000	J	UG/KG	24464	VAL
530-S-B002-01		530SB00201	Soil	01/09/96	1.0000	J	UG/KG	24464	VAL
530-S-B003-02		530SB00302	Soil	01/09/96	1.0000	J	UG/KG	24464	VAL
530-S-B004-01		530SB00401	Soil	01/09/96	2.0000	J	UG/KG	24464	VAL
530-S-B004-02		530SB00402	Soil	01/09/96	2.0000	J	UG/KG	24464	VAL
538-S-B010-01		538SB01001	Soil	08/28/95	2.0000	J	UG/KG	23359	VAL
538-S-B010-02		538SB01002	Soil	08/28/95	4.0000	J	UG/KG	23359	VAL

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2905-00001 - CHARLESTON ZONE E
Samples by Chemical Report
75-09-2 - Methylene chloride
>= 1.0000 for UG/KG - Hits Only

Sample ID	Ext.	Orig. ID	Type	Date	Result	VQual	Units	SDG #	
543-S-B002-01		543SB00201	Soil	10/13/95	2.0000	J	UG/KG	23801	VAL
544-S-B001-02		544SB00102	Soil	09/28/95	34.0000		UG/KG	23663	VAL
544-S-B002-01		544SB00201	Soil	09/28/95	24.0000		UG/KG	23663	VAL
544-S-B002-02		544SB00202	Soil	09/28/95	28.0000	J	UG/KG	23663	VAL
548-S-B002-01		548SB00201	Soil	09/05/95	11.0000		UG/KG	23424	VAL
548-S-B002-02		548SB00202	Soil	09/05/95	12.0000		UG/KG	23424	VAL
548-S-B003-01		548SB00301	Soil	09/05/95	10.0000		UG/KG	23424	VAL
548-S-B003-02		548SB00302	Soil	09/05/95	9.0000		UG/KG	23424	VAL
548-S-B004-01		548SB00401	Soil	09/05/95	10.0000		UG/KG	23424	VAL
548-S-B004-02		548SB00402	Soil	09/05/95	11.0000		UG/KG	23424	VAL
549-S-B004-01		549SB00401	Soil	09/05/95	10.0000		UG/KG	23424	VAL
549-S-B004-02		549SB00402	Soil	09/05/95	14.0000		UG/KG	23424	VAL
549-S-B005-01		549SB00501	Soil	09/05/95	14.0000		UG/KG	23424	VAL
551-C-B002-01		551CB00201	Soil	09/29/95	17.0000	J	UG/KG	23704	VAL
551-C-B006-01	RE	551CB00601	Soil	09/29/95	23.0000	J	UG/KG	23704	VAL
552-S-B001-02		552SB00102	Soil	09/28/95	30.0000	J	UG/KG	23663	VAL
559-S-B010-01	RE	559SB01001	Soil	11/07/95	5.0000	J	UG/KG	23998	VAL
559-S-B012-01		559SB01201	Soil	11/07/95	5.0000	J	UG/KG	23998	VAL
559-S-B013-01		559SB01301	Soil	11/06/95	4.0000	J	UG/KG	23980	VAL
559-S-B024-01		559SB02401	Soil	05/29/96	2.0000	J	UG/KG	25775	VAL
559-S-B025-01		559SB02501	Soil	05/29/96	2.0000	J	UG/KG	25775	VAL
559-S-B028-01		559SB02801	Soil	05/29/96	3.0000	J	UG/KG	25775	VAL
559-S-B028-02	RE	559SB02802	Soil	05/29/96	3.0000	J	UG/KG	25775	VAL
559-S-B029-02		559SB02902	Soil	05/29/96	2.0000	J	UG/KG	25775	VAL
561-C-B006-01		561CB00601	Soil	06/04/96	44.0000		UG/KG	25846	VAL
563-S-B001-01		563SB00101	Soil	01/29/96	14.0000		UG/KG	24605	VAL
563-S-B001-02		563SB00102	Soil	01/29/96	10.0000		UG/KG	24605	VAL
563-S-B002-01		563SB00201	Soil	01/29/96	16.0000		UG/KG	24605	VAL
563-S-B002-02		563SB00202	Soil	01/29/96	25.0000		UG/KG	24605	VAL
563-S-B003-01		563SB00301	Soil	01/29/96	13.0000		UG/KG	24605	VAL
563-S-B003-02		563SB00302	Soil	01/29/96	8.0000		UG/KG	24605	VAL
563-S-B004-02		563SB00402	Soil	01/29/96	7.0000		UG/KG	24605	VAL
563-S-B005-02		563SB00502	Soil	01/29/96	8.0000		UG/KG	24605	VAL
564-S-B001-01	RE	564SB00101	Soil	09/08/95	5.0000	J	UG/KG	23447	VAL
564-S-B003-01		564SB00301	Soil	09/08/95	2.0000	J	UG/KG	23447	VAL
566-S-B001-02		566SB00102	Soil	09/09/95	3.0000	J	UG/KG	23474	VAL
566-S-B006-01		566SB00601	Soil	05/30/96	10.0000	J	UG/KG	25805	VAL
570-S-B005-01		570SB00501	Soil	01/16/96	9.0000	J	UG/KG	24503	VAL
570-S-B005-02		570SB00502	Soil	01/16/96	11.0000	J	UG/KG	24503	VAL
570-S-B006-01		570SB00601	Soil	01/16/96	17.0000	J	UG/KG	24503	VAL
570-S-B006-02		570SB00602	Soil	01/16/96	7.0000	J	UG/KG	24503	VAL
570-S-B007-01		570SB00701	Soil	01/16/96	15.0000	J	UG/KG	24503	VAL
570-S-B007-02	RE	570SB00702	Soil	01/16/96	4.0000	J	UG/KG	24503	VAL
570-S-B008-01		570SB00801	Soil	01/16/96	12.0000	J	UG/KG	24503	VAL
570-S-B008-02		570SB00802	Soil	01/16/96	11.0000	J	UG/KG	24503	VAL
570-S-B009-01		570SB00901	Soil	01/16/96	12.0000	J	UG/KG	24503	VAL
570-C-B009-01		570CB00901	Soil	01/16/96	12.0000		UG/KG	24503	VAL
570-S-B009-02		570SB00902	Soil	01/16/96	19.0000	J	UG/KG	24503	VAL
570-S-B010-01		570SB01001	Soil	01/16/96	14.0000	J	UG/KG	24503	VAL

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2905-00001 - CHARLESTON ZONE E
Samples by Chemical Report
75-09-2 - Methylene chloride
>= 1.0000 for UG/KG - Hits Only

Sample ID	Ext.	Orig. ID	Type	Date	Result	VQual	Units	SDG #	
570-S-B010-02	RE	570SB01002	Soil	01/16/96	3.0000	J	UG/KG	24503	VAL
571-C-C003-01		571LL00301	Soil	03/20/96	1.0000	J	UG/KG	24988	VAL
572-S-B002-01		572SB00201	Soil	09/10/95	8.0000		UG/KG	23473	VAL
572-S-B002-02		572SB00202	Soil	09/10/95	5.0000	J	UG/KG	23473	VAL
572-S-B003-01		572SB00301	Soil	09/10/95	20.0000	J	UG/KG	23473	VAL
572-S-B003-02	RE	572SB00302	Soil	09/10/95	9.0000	J	UG/KG	23473	VAL
572-S-B004-01		572SB00401	Soil	09/10/95	4.0000	J	UG/KG	23473	VAL
572-S-B004-02		572SB00402	Soil	09/10/95	3.0000	J	UG/KG	23473	VAL
572-S-B005-01	RE	572SB00501	Soil	09/10/95	4.0000	J	UG/KG	23473	VAL
572-S-B005-02		572SB00502	Soil	09/10/95	2.0000	J	UG/KG	23473	VAL
572-S-B006-01		572SB00601	Soil	09/10/95	3.0000	J	UG/KG	23473	VAL
572-S-B006-02		572SB00602	Soil	09/10/95	26.0000	J	UG/KG	23473	VAL
572-S-B007-01		572SB00701	Soil	09/10/95	6.0000	J	UG/KG	23473	VAL
572-S-B008-01	RE	572SB00801	Soil	09/10/95	12.0000	J	UG/KG	23473	VAL
574-S-B005-02		574SB00502	Soil	11/30/95	7.0000		UG/KG	24170	VAL
576-S-B003-01		576SB00301	Soil	09/06/95	24.0000		UG/KG	23424	VAL
576-C-B003-01		576CB00301	Soil	09/06/95	16.0000	J	UG/KG	23424	VAL
576-S-B003-02		576SB00302	Soil	09/06/95	8.0000		UG/KG	23424	VAL
576-S-B004-01		576SB00401	Soil	09/06/95	25.0000		UG/KG	23424	VAL
576-S-B004-02		576SB00402	Soil	09/06/95	18.0000		UG/KG	23424	VAL
576-S-B005-01		576SB00501	Soil	09/06/95	24.0000		UG/KG	23424	VAL
576-S-B005-02		576SB00502	Soil	09/06/95	14.0000		UG/KG	23424	VAL
578-S-B003-01	DL	578SB00301	Soil	05/16/96	57.0000	DJ	UG/KG	25630	VAL
578-C-B004-01		578CB00401	Soil	05/16/96	8.0000	J	UG/KG	25630	VAL
580-S-B001-01		580SB00101	Soil	09/14/95	3.0000	J	UG/KG	23502	VAL
580-S-B005-01		580SB00501	Soil	09/14/95	4.0000	J	UG/KG	23502	VAL
583-S-B001-01		583SB00101	Soil	09/15/95	5.0000	J	UG/KG	23535	VAL
583-S-B001-02		583SB00102	Soil	09/15/95	2.0000	J	UG/KG	23535	VAL
583-S-B002-01		583SB00201	Soil	09/15/95	26.0000		UG/KG	23535	VAL
583-S-B003-01		583SB00301	Soil	09/18/95	2.0000	J	UG/KG	23535	VAL
583-S-B004-02		583SB00402	Soil	09/15/95	4.0000	J	UG/KG	23535	VAL
583-S-B005-02		583SB00502	Soil	09/15/95	29.0000		UG/KG	23535	VAL
583-S-B006-01		583SB00601	Soil	09/15/95	28.0000		UG/KG	23535	VAL
583-S-B006-02		583SB00602	Soil	09/15/95	37.0000		UG/KG	23535	VAL
583-S-B007-02		583SB00702	Soil	09/18/95	2.0000	J	UG/KG	23535	VAL
596-S-B006-01		596SB00601	Soil	10/20/95	2.0000	J	UG/KG	23814	VAL
598-S-B004-01		598SB00401	Soil	09/20/95	4.0000	J	UG/KG	23560	VAL
602-S-B004-02		602SB00402	Soil	01/08/96	2.0000	J	UG/KG	24456	VAL
GDE-S-B011-01	RE	GDESB01101	Soil	01/16/96	9.0000	J	UG/KG	24503	VAL
GDE-S-B011-02		GDESB01102	Soil	01/16/96	14.0000	J	UG/KG	24503	VAL
GDE-S-B017-01		GDESB01701	Soil	02/28/96	4.0000	J	UG/KG	24830	VAL
GDE-C-B017-01		GDECB01701	Soil	02/28/96	2.0000	J	UG/KG	24830	VAL
GDE-S-B017-02		GDESB01702	Soil	02/28/96	11.0000		UG/KG	24830	VAL
GDE-S-B022-01		GDESB02201	Soil	02/28/96	5.0000	J	UG/KG	24830	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2905-00001 - CHARLESTON ZONE E
Samples by Chemical Report
117-81-7 - bis(2-Ethylhexyl)phthalate (BEHP)
>= 1.0000 for UG/KG - Hits Only

Sample ID	Ext.	Orig. ID	Type	Date	Result	VQual	Units	SDG #	
005-S-B001-01		005SB00101	Soil	09/25/95	280.0000	J	UG/KG	23626	VAL
005-S-B001-02		005SB00102	Soil	09/25/95	340.0000	J	UG/KG	23626	VAL
005-S-B002-01		005SB00201	Soil	09/25/95	620.0000	J	UG/KG	23626	VAL
005-S-B002-02		005SB00202	Soil	09/25/95	220.0000	J	UG/KG	23626	VAL
005-S-B003-01		005SB00301	Soil	09/22/95	370.0000	J	UG/KG	23593	VAL
005-S-B003-02		005SB00302	Soil	09/22/95	280.0000	J	UG/KG	23593	VAL
018-S-B001-01		018SB00101	Soil	09/25/95	230.0000	J	UG/KG	23626	VAL
018-S-B002-01		018SB00201	Soil	09/25/95	130.0000	J	UG/KG	23626	VAL
018-S-B002-02		018SB00202	Soil	09/25/95	330.0000	J	UG/KG	23626	VAL
018-S-B004-01		018SB00401	Soil	09/25/95	340.0000	J	UG/KG	23626	VAL
018-S-B005-01		018SB00501	Soil	09/25/95	280.0000	J	UG/KG	23626	VAL
018-S-B005-02		018SB00502	Soil	09/25/95	130.0000	J	UG/KG	23626	VAL
022-S-B001-01		022SB00101	Soil	09/07/95	3200.0000	J	UG/KG	23447	VAL
022-C-B001-01		022CB00101	Soil	09/07/95	3900.0000		UG/KG	23447	VAL
023-S-B001-02		023SB00102	Soil	10/13/95	140.0000	J	UG/KG	23801	VAL
025-M-0001-01	RE	025M000101	Sedmt	03/20/96	3200.0000	J	UG/KG	24988	VAL
025-S-B009-01		025SB00901	Soil	02/02/96	63.0000	J	UG/KG	24642	VAL
025-S-B010-01		025SB01001	Soil	02/05/96	130.0000	J	UG/KG	24648	VAL
025-C-B010-01		025CB01001	Soil	02/05/96	120.0000	J	UG/KG	24648	VAL
025-S-B010-02		025SB01002	Soil	02/05/96	72.0000	J	UG/KG	24648	VAL
025-C-B010-02		025CB01002	Soil	02/05/96	85.0000	J	UG/KG	24648	VAL
025-S-B011-01		025SB01101	Soil	02/28/96	470.0000		UG/KG	24830	VAL
054-S-B001-01		054SB00101	Soil	11/09/95	610.0000		UG/KG	24024	VAL
054-S-B001-02		054SB00102	Soil	11/09/95	210.0000	J	UG/KG	24024	VAL
054-S-B002-01		054SB00201	Soil	11/09/95	360.0000	J	UG/KG	24024	VAL
054-S-B002-02		054SB00202	Soil	11/09/95	320.0000	J	UG/KG	24024	VAL
054-S-B015-01		054SB01501	Soil	11/27/95	330.0000	J	UG/KG	24152	VAL
054-S-B016-01		054SB01601	Soil	11/27/95	480.0000	J	UG/KG	24152	VAL
054-S-B017-01		054SB01701	Soil	11/27/95	350.0000	J	UG/KG	24152	VAL
054-S-B017-02		054SB01702	Soil	11/27/95	120.0000	J	UG/KG	24152	VAL
054-S-B018-01		054SB01801	Soil	11/27/95	490.0000	J	UG/KG	24152	VAL
054-S-B020-01		054SB02001	Soil	11/27/95	400.0000	J	UG/KG	24152	VAL
054-S-B020-02		054SB02002	Soil	11/27/95	80.0000	J	UG/KG	24152	VAL
054-S-B021-02		054SB02102	Soil	11/27/95	250.0000	J	UG/KG	24152	VAL
054-S-B022-02		054SB02202	Soil	11/27/95	110.0000	J	UG/KG	24152	VAL
054-S-B023-01		054SB02301	Soil	11/27/95	91.0000	J	UG/KG	24152	VAL
054-S-B023-02		054SB02302	Soil	11/27/95	310.0000	J	UG/KG	24152	VAL
054-S-B024-01		054SB02401	Soil	11/28/95	91.0000	J	UG/KG	24159	VAL
054-S-B024-02		054SB02402	Soil	11/28/95	120.0000	J	UG/KG	24159	VAL
054-S-B025-02		054SB02502	Soil	11/28/95	88.0000	J	UG/KG	24159	VAL
054-S-B027-02		054SB02702	Soil	11/28/95	110.0000	J	UG/KG	24159	VAL
054-S-B029-01		054SB02901	Soil	11/28/95	150.0000	J	UG/KG	24159	VAL
054-S-B030-01		054SB03001	Soil	11/28/95	400.0000	J	UG/KG	24159	VAL
054-S-B030-02		054SB03002	Soil	11/28/95	93.0000	J	UG/KG	24159	VAL
054-S-B031-01		054SB03101	Soil	11/28/95	7600.0000	D	UG/KG	24159	VAL
054-S-B032-01		054SB03201	Soil	11/27/95	390.0000	J	UG/KG	24152	VAL
054-S-B032-02		054SB03202	Soil	11/27/95	380.0000	J	UG/KG	24152	VAL
065-S-B001-01		065SB00101	Soil	12/04/95	300.0000	J	UG/KG	24212	VAL
065-C-B001-01		065CB00101	Soil	12/04/95	280.0000	J	UG/KG	24212	VAL

ENVIRONMENTAL SAFETY & DESIGNS

2905-00001 - CHARLESTON ZONE E
Samples by Chemical Report
117-81-7 - bis(2-Ethylhexyl)phthalate (BEHP)
>= 1.0000 for UG/KG - Hits Only

Sample ID	Ext.	Orig. ID	Type	Date	Result	VQual	Units	SDG #	
065-S-B002-01		065SB00201	Soil	10/30/95	1300.0000	J	UG/KG	23922	VAL
083-S-B003-01		083SB00301	Soil	12/14/95	140.0000	J	UG/KG	24326	VAL
084-S-B004-01		084SB00401	Soil	12/01/95	320.0000	J	UG/KG	24206	VAL
102-S-B004-02		102SB00402	Soil	01/31/96	220.0000	J	UG/KG	24621	VAL
102-S-B034-01		102SB03401	Soil	05/17/96	600.0000	J	UG/KG	25657	VAL
102-S-B036-01		102SB03601	Soil	05/17/96	140.0000	J	UG/KG	25657	VAL
102-C-B036-01		102CB03601	Soil	05/17/96	140.0000	J	UG/KG	25657	VAL
102-S-B037-01		102SB03701	Soil	05/17/96	480.0000	J	UG/KG	25657	VAL
102-S-B042-01	RE	102SB04201	Soil	05/20/96	44.0000	J	UG/KG	25657	VAL
102-S-B042-02		102SB04202	Soil	05/20/96	64.0000	J	UG/KG	25657	VAL
106-S-B001-02		106SB00102	Soil	10/03/95	140.0000	J	UG/KG	23720	VAL
172-M-0001-01		172M000101	Sedmt	09/23/95	12000.0000	J	UG/KG	23626	VAL
173-M-0001-01		173M000101	Sedmt	10/12/95	380.0000	J	UG/KG	23720	VAL
173-M-0002-01	RE	173M000201	Sedmt	10/12/95	720.0000	J	UG/KG	23720	VAL
173-M-0003-01		173M000301	Sedmt	10/12/95	330.0000	J	UG/KG	23720	VAL
528-M-0001-01		528MO00101	Soil	09/26/96	17000.0000	D	UG/KG	26978	VAL
530-C-B001-02		530CB00102	Soil	01/09/96	300.0000	J	UG/KG	24464	VAL
538-S-B008-01		538SB00801	Soil	08/28/95	81.0000	J	UG/KG	23359	VAL
538-S-B009-01		538SB00901	Soil	08/28/95	100.0000	J	UG/KG	23359	VAL
538-S-B010-01		538SB01001	Soil	08/28/95	160.0000	J	UG/KG	23359	VAL
538-S-B010-02		538SB01002	Soil	08/28/95	120.0000	J	UG/KG	23359	VAL
539-S-B002-01		539SB00201	Soil	08/29/95	190.0000	J	UG/KG	23359	VAL
539-S-B002-02		539SB00202	Soil	08/29/95	65.0000	J	UG/KG	23359	VAL
539-S-B003-01		539SB00301	Soil	08/29/95	80.0000	J	UG/KG	23359	VAL
539-S-B003-02		539SB00302	Soil	08/29/95	150.0000	J	UG/KG	23359	VAL
542-S-B001-01		542SB00101	Soil	08/29/95	52.0000	J	UG/KG	23359	VAL
542-S-B001-02		542SB00102	Soil	08/29/95	76.0000	J	UG/KG	23359	VAL
542-S-B002-01		542SB00201	Soil	08/29/95	120.0000	J	UG/KG	23359	VAL
542-S-B002-02		542SB00202	Soil	08/29/95	170.0000	J	UG/KG	23359	VAL
542-S-B005-01		542SB00501	Soil	08/29/95	91.0000	J	UG/KG	23359	VAL
542-S-B005-02		542SB00502	Soil	08/29/95	66.0000	J	UG/KG	23359	VAL
546-M-0001-01		546M000101	Sedmt	10/31/95	27000.0000		UG/KG	23922	VAL
549-S-B013-01		549SB01301	Soil	09/24/96	64.0000	J	UG/KG	26978	VAL
549-S-B013-02		549SB01302	Soil	09/24/96	66.0000	J	UG/KG	26978	VAL
549-S-B014-01		549SB01401	Soil	09/24/96	82.0000	J	UG/KG	26978	VAL
549-S-B014-02		549SB01402	Soil	09/24/96	54.0000	J	UG/KG	26978	VAL
559-S-B002-01		559SB00201	Soil	11/09/95	430.0000		UG/KG	24024	VAL
559-S-B002-02		559SB00202	Soil	11/09/95	580.0000		UG/KG	24024	VAL
559-S-B003-01		559SB00301	Soil	11/09/95	450.0000		UG/KG	24024	VAL
559-S-B003-02		559SB00302	Soil	11/09/95	500.0000		UG/KG	24024	VAL
559-S-B005-01		559SB00501	Soil	11/09/95	120.0000	J	UG/KG	24024	VAL
559-C-B006-01		559CB00601	Soil	11/06/95	290.0000	J	UG/KG	23980	VAL
559-S-B010-01		559SB01001	Soil	11/07/95	6800.0000		UG/KG	23998	VAL
559-S-B011-01		559SB01101	Soil	11/14/95	230.0000	J	UG/KG	24056	VAL
559-C-B013-01		559CB01301	Soil	11/06/95	210.0000	J	UG/KG	23980	VAL
559-S-B020-01		559SB02001	Soil	11/13/95	270.0000	J	UG/KG	24029	VAL
559-S-B020-02		559SB02002	Soil	11/13/95	87.0000	J	UG/KG	24029	VAL
559-S-B022-02		559SB02202	Soil	11/13/95	83.0000	J	UG/KG	24029	VAL
559-S-B024-01		559SB02401	Soil	05/29/96	56.0000	J	UG/KG	25775	VAL

ENVIRONMENTAL SAFETY & DESIGNS

2905-00001 - CHARLESTON ZONE E
Samples by Chemical Report
117-81-7 - bis(2-Ethylhexyl)phthalate (BEHP)
>= 1.0000 for UG/KG - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
559-S-B025-01	559SB02501	Soil	05/29/96	110.0000	J	UG/KG	25775	VAL
559-S-B027-01	559SB02701	Soil	05/30/96	65.0000	J	UG/KG	25805	VAL
559-S-B027-02	559SB02702	Soil	05/30/96	310.0000	J	UG/KG	25805	VAL
559-S-B028-01	559SB02801	Soil	05/29/96	230.0000	J	UG/KG	25775	VAL
559-S-B029-02	559SB02902	Soil	05/29/96	460.0000		UG/KG	25775	VAL
561-S-B006-02	561SB00602	Soil	06/04/96	45.0000	J	UG/KG	25846	VAL
563-S-B001-01	563SB00101	Soil	01/29/96	71.0000	J	UG/KG	24605	VAL
563-S-B002-01	563SB00201	Soil	01/29/96	44.0000	J	UG/KG	24605	VAL
563-S-B002-02	563SB00202	Soil	01/29/96	46.0000	J	UG/KG	24605	VAL
563-S-B003-01	563SB00301	Soil	01/29/96	140.0000	J	UG/KG	24605	VAL
563-S-B004-01	563SB00401	Soil	01/29/96	47.0000	J	UG/KG	24605	VAL
563-S-B006-01	563SB00601	Soil	01/30/96	13000.0000	D	UG/KG	24605	VAL
563-S-B006-02	563SB00602	Soil	01/30/96	66.0000	J	UG/KG	24605	VAL
563-C-B006-02	563CB00602	Soil	01/30/96	5300.0000		UG/KG	24605	VAL
563-S-B007-01	563SB00701	Soil	01/30/96	5400.0000	D	UG/KG	24605	VAL
563-C-B007-01	563CB00701	Soil	01/30/96	900.0000		UG/KG	24605	VAL
563-S-B007-02	563SB00702	Soil	01/30/96	1400.0000		UG/KG	24605	VAL
563-S-B008-01	563SB00801	Soil	01/30/96	54.0000	J	UG/KG	24605	VAL
563-S-B008-02	563SB00802	Soil	01/30/96	54.0000	J	UG/KG	24605	VAL
563-S-B009-01	563SB00901	Soil	01/30/96	100.0000	J	UG/KG	24605	VAL
563-S-B009-02	563SB00902	Soil	01/30/96	49.0000	J	UG/KG	24605	VAL
566-S-B002-02	566SB00202	Soil	09/09/95	510.0000		UG/KG	23474	VAL
566-S-B004-02	566SB00402	Soil	09/09/95	440.0000		UG/KG	23474	VAL
566-S-B006-01	566SB00601	Soil	05/30/96	120.0000	J	UG/KG	25805	VAL
566-S-B007-01	566SB00701	Soil	05/30/96	72.0000	J	UG/KG	25805	VAL
566-S-B007-02	566SB00702	Soil	05/30/96	84.0000	J	UG/KG	25805	VAL
569-S-B001-01	569SB00101	Soil	10/13/95	80.0000	J	UG/KG	23801	VAL
569-S-B003-01	569SB00301	Soil	10/13/95	130.0000	J	UG/KG	23801	VAL
569-S-B004-02	569SB00402	Soil	10/13/95	90.0000	J	UG/KG	23801	VAL
570-S-B005-01	570SB00501	Soil	01/16/96	79.0000	J	UG/KG	24503	VAL
570-S-B005-02	570SB00502	Soil	01/16/96	81.0000	J	UG/KG	24503	VAL
570-S-B007-01	570SB00701	Soil	01/16/96	130.0000	J	UG/KG	24503	VAL
570-S-B007-02	570SB00702	Soil	01/16/96	1200.0000		UG/KG	24503	VAL
570-S-B008-01	570SB00801	Soil	01/16/96	2100.0000		UG/KG	24503	VAL
570-S-B008-02	570SB00802	Soil	01/16/96	100.0000	J	UG/KG	24503	VAL
570-S-B009-01	570SB00901	Soil	01/16/96	140.0000	J	UG/KG	24503	VAL
570-C-B009-01	570CB00901	Soil	01/16/96	350.0000		UG/KG	24503	VAL
570-S-B009-02	570SB00902	Soil	01/16/96	110.0000	J	UG/KG	24503	VAL
570-S-B010-01	570SB01001	Soil	01/16/96	130.0000	J	UG/KG	24503	VAL
570-S-B010-02	570SB01002	Soil	01/16/96	89.0000	J	UG/KG	24503	VAL
571-C-C001-01	571LL00101	Soil	03/20/96	230.0000	J	UG/KG	24988	VAL
571-C-C002-01	571LL00201	Soil	03/20/96	80000.0000		UG/KG	24988	VAL
571-C-C003-01	571LL00301	Soil	03/20/96	950.0000		UG/KG	24988	VAL
572-M-0001-01	572M000101	Sedmt	10/31/95	5500.0000		UG/KG	23922	VAL
573-M-0001-01	573M000101	Sedmt	09/24/95	12000.0000		UG/KG	23626	VAL
573-M-0002-01	573M000201	Sedmt	09/23/95	4900.0000	J	UG/KG	23626	VAL
573-C-B001-01	573CB00101	Soil	10/31/95	48.0000	J	UG/KG	23922	VAL
574-S-B008-01	574SB00801	Soil	05/22/96	680.0000		UG/KG	25722	VAL
574-C-B008-01	574CB00801	Soil	05/22/96	530.0000	J	UG/KG	25722	VAL

ENVIRONMENTAL SAFETY & DESIGNS

2905-00001 - CHARLESTON ZONE E
Samples by Chemical Report
117-81-7 - bis(2-Ethylhexyl)phthalate (BEHP)
>= 1.0000 for UG/KG - Hits Only

Sample ID	Ext.	Orig. ID	Type	Date	Result	VQual	Units	SDG #	
576-S-B001-01		576SB00101	Soil	09/09/95	440.0000		UG/KG	23474	VAL
576-S-B003-02		576SB00302	Soil	09/06/95	3200.0000		UG/KG	23424	VAL
578-S-B001-01		578SB00101	Soil	05/16/96	190.0000	J	UG/KG	25630	VAL
578-S-B001-02		578SB00102	Soil	05/16/96	110.0000	J	UG/KG	25630	VAL
578-S-B002-01		578SB00201	Soil	05/16/96	38.0000	J	UG/KG	25630	VAL
578-S-B003-01		578SB00301	Soil	05/16/96	130.0000	J	UG/KG	25630	VAL
578-S-B003-02		578SB00302	Soil	05/16/96	42.0000	J	UG/KG	25630	VAL
578-S-B004-01		578SB00401	Soil	05/16/96	260.0000	J	UG/KG	25630	VAL
578-C-B004-01	RE	578CB00401	Soil	05/16/96	90.0000	R	UG/KG	25630	VAL
578-S-B005-01		578SB00501	Soil	05/16/96	100.0000	J	UG/KG	25630	VAL
578-S-B006-01		578SB00601	Soil	05/16/96	85.0000	J	UG/KG	25630	VAL
579-S-B002-01		579SB00201	Soil	09/12/95	2200.0000		UG/KG	23484	VAL
583-S-B008-01		583SB00801	Soil	05/30/96	40.0000	J	UG/KG	25805	VAL
583-S-B008-02		583SB00802	Soil	05/30/96	38.0000	J	UG/KG	25805	VAL
590-M-0001-01		590M000101	Sedmt	01/05/96	8900.0000	J	UG/KG	24445	VAL
590-S-B001-01		590SB00101	Soil	01/04/96	180.0000	J	UG/KG	24436	VAL
590-S-B001-02		590SB00102	Soil	01/04/96	170.0000	J	UG/KG	24436	VAL
590-S-B002-02		590SB00202	Soil	01/05/96	350.0000	J	UG/KG	24445	VAL
596-S-B001-01		596SB00101	Soil	10/23/95	86.0000	J	UG/KG	23859	VAL
596-S-B002-01		596SB00201	Soil	10/23/95	100.0000	J	UG/KG	23859	VAL
596-S-B007-01		596SB00701	Soil	10/23/95	130.0000	J	UG/KG	23859	VAL
596-S-B007-02		596SB00702	Soil	10/23/95	420.0000	J	UG/KG	23859	VAL
598-M-0001-01		598M000101	Sedmt	09/24/95	1700.0000		UG/KG	23626	VAL
599-M-0001-01		599M000101	Sedmt	09/24/95	3600.0000		UG/KG	23626	VAL
605-S-B001-01		605SB00101	Soil	09/25/95	190.0000	J	UG/KG	23626	VAL
605-S-B003-01		605SB00301	Soil	09/21/95	1600.0000		UG/KG	23593	VAL
605-S-B004-01		605SB00401	Soil	09/21/95	1200.0000		UG/KG	23593	VAL
605-S-B006-01		605SB00601	Soil	09/22/95	460.0000	J	UG/KG	23593	VAL
605-S-B006-02		605SB00602	Soil	09/22/95	340.0000	J	UG/KG	23593	VAL
605-S-B007-01		605SB00701	Soil	09/22/95	430.0000	J	UG/KG	23593	VAL
605-S-B008-01		605SB00801	Soil	09/22/95	150.0000	J	UG/KG	23593	VAL
605-S-B008-02		605SB00802	Soil	09/22/95	180.0000	J	UG/KG	23593	VAL
605-S-B009-01		605SB00901	Soil	09/22/95	240.0000	J	UG/KG	23593	VAL
605-S-B009-02		605SB00902	Soil	09/22/95	4500.0000		UG/KG	23593	VAL
605-S-B010-01		605SB01001	Soil	09/21/95	280.0000	J	UG/KG	23593	VAL
605-S-B011-01		605SB01101	Soil	09/21/95	90.0000	J	UG/KG	23593	VAL
605-S-B012-01		605SB01201	Soil	05/31/96	990.0000		UG/KG	25805	VAL
605-C-B012-01		605CB01201	Soil	05/31/96	210.0000	J	UG/KG	25805	VAL
605-S-B012-02		605SB01202	Soil	05/31/96	1400.0000	J	UG/KG	25805	VAL
605-S-B013-01		605SB01301	Soil	05/31/96	400.0000	J	UG/KG	25805	VAL
605-S-B014-01		605SB01401	Soil	05/31/96	2400.0000		UG/KG	25805	VAL
605-C-B014-01		605CB01401	Soil	05/31/96	280.0000	J	UG/KG	25805	VAL
605-S-B014-02		605SB01402	Soil	05/31/96	140.0000	J	UG/KG	25805	VAL
605-S-B015-01		605SB01501	Soil	05/31/96	180.0000	J	UG/KG	25805	VAL
605-S-B015-02		605SB01502	Soil	05/31/96	320.0000	J	UG/KG	25805	VAL
5-S-B017-01	RE	605SB01701	Soil	09/17/96	69.0000	J	UG/KG	26978	VAL
605-S-B017-02		605SB01702	Soil	09/17/96	82.0000	J	UG/KG	26978	VAL
GDE-S-B004-02		GDESB00402	Soil	10/25/95	180.0000	J	UG/KG	23879	VAL
GDE-C-B006-01		GDECB00601	Soil	01/04/96	50.0000	J	UG/KG	24436	VAL

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2905-00001 - CHARLESTON ZONE E

Samples by Chemical Report

117-81-7 - bis(2-Ethylhexyl)phthalate (BEHP)

>= 1.0000 for UG/KG - Hits Only

Sample ID	Ext.	Orig. ID	Type	Date	Result	VQual	Units	SDG #	
GDE-S-B011-01		GDESB01101	Soil	01/16/96	150.0000	J	UG/KG	24503	VAL
GDE-S-B011-02		GDESB01102	Soil	01/16/96	280.0000	J	UG/KG	24503	VAL
GDE-S-B015-01	RE	GDESB01501	Soil	11/09/95	480.0000		UG/KG	24024	VAL
GDE-S-B015-02		GDESB01502	Soil	11/09/95	720.0000		UG/KG	24024	VAL
GDE-S-B019-01		GDESB01901	Soil	10/25/95	110.0000	J	UG/KG	23879	VAL
GDE-S-B019-02		GDESB01902	Soil	10/25/95	660.0000	J	UG/KG	23879	VAL
GDE-S-B024-01		GDESB02401	Soil	10/25/95	270.0000	J	UG/KG	23879	VAL
GDE-S-B024-02		GDESB02402	Soil	10/25/95	200.0000	J	UG/KG	23879	VAL
GDE-S-B025-01		GDESB02501	Soil	10/23/95	220.0000	J	UG/KG	23859	VAL
GDE-C-B025-01		GDECB02501	Soil	10/23/95	1700.0000	J	UG/KG	23859	VAL
GDE-S-B025-02		GDESB02502	Soil	10/23/95	180.0000	J	UG/KG	23859	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2905-00002 - CHARLESTON ZONE E - QUARTERLY SAMPLING

Samples by Chemical Report

67-64-1 - Acetone

>= 1.0000 for UG/L - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
065-G-W002-01	065GW00201	Water	04/19/96	380.0000	D	UG/L	25330	VAL
106-G-W01D-01	106EW01D01	Water	03/21/96	13.0000		UG/L	25020	VAL
543-G-W001-01	543GW00101	Water	04/19/96	800.0000	D	UG/L	25330	VAL
549-G-W001-03	549GW00103	Water	11/25/96	10.0000	u	UG/L	27754	VAL
563-G-W003-03	563GW00303	Water	11/22/96	2.0000	J	UG/L	27754	VAL
583-G-W002-01	583GW00201	Water	03/25/96	56.0000	J	UG/L	25049	VAL
583-G-W003-01	583GW00301	Water	03/26/96	7.0000	J	UG/L	25049	VAL
583-G-W02D-01	583GW02D01	Water	03/26/96	10.0000	J	UG/L	25049	VAL
590-G-W01D-01	590GW01D01	Water	03/25/96	16.0000	J	UG/L	25049	VAL
GDE-G-W006-01	GDEGW00601	Water	03/25/96	11.0000	J	UG/L	25049	VAL
GDE-G-W007-01	GDEGW00701	Water	03/26/96	13.0000	J	UG/L	25049	VAL
GDE-G-W011-01	GDEGW01101	Water	04/01/96	10.0000	J	UG/L	25097	VAL
GDE-G-W012-01	GDEGW01201	Water	04/03/96	22.0000		UG/L	25153	VAL
GDE-G-W07D-01	GDEGW07D01	Water	03/26/96	11.0000	J	UG/L	25049	VAL
GDE-G-W08D-01	GDEGW08D01	Water	04/02/96	39.0000		UG/L	25097	VAL
GDE-G-W12D-01	GDEGW12D01	Water	04/03/96	22.0000	J	UG/L	25153	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2905-00002 - CHARLESTON ZONE E - QUARTERLY SAMPLING

Samples by Chemical Report

75-09-2 - Methylene chloride

>= 1.0000 for UG/L - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
563-G-W001-03	563GW00103	Water	11/20/96	7.0000		UG/L	27716	VAL
563-G-W01D-03	563GW01D03	Water	11/20/96	2.0000	J	UG/L	27716	VAL
570-G-W003-03	570GW00303	Water	11/20/96	8.0000		UG/L	27716	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2905-00002 - CHARLESTON ZONE E - QUARTERLY SAMPLING

Samples by Chemical Report

117-81-7 - bis(2-Ethylhexyl)phthalate (BEHP)

>= 1.0000 for UG/L - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
023-G-W01D-01	023GW01D01	Water	04/23/96	2.0000	J	UG/L	25361	VAL
070-G-W002-02	070GW00202	Water	07/29/96	2.0000	J	UG/L	26436	VAL
070-G-W01D-02	070GW01D02	Water	07/29/96	24.0000		UG/L	26436	VAL
083-G-W001-02	083GW00102	Water	07/19/96	2.0000	J	UG/L	26356	VAL
102-G-W001-01	102GW00101	Water	03/22/96	3.0000	J	UG/L	25020	VAL
106-G-W001-02	106GW00102	Water	07/09/96	1.0000	J	UG/L	26253	VAL
106-G-W01D-02	106GW01D02	Water	07/09/96	1.0000	J	UG/L	26253	VAL
172-G-W002-01	172GW00201	Water	04/03/96	2.0000	J	UG/L	25153	VAL
526-G-W002-02	526GW00202	Water	08/13/96	1.0000	J	UG/L	26598	VAL
542-G-W002-01	542GW00201	Water	04/23/96	2.0000	J	UG/L	25361	VAL
549-G-W001-01	549GW00101	Water	04/24/96	1.0000	J	UG/L	25361	VAL
559-G-W03D-03	559GW03D03	Water	11/25/96	5.0000	J	UG/L	27754	VAL
598-G-W001-02	598GW00102	Water	07/09/96	1.0000	J	UG/L	26253	VAL
GDE-G-W004-02	GDEGW00402	Water	07/09/96	2.0000	J	UG/L	26253	VAL
GDE-G-W006-01	GDEGW00601	Water	03/25/96	1.0000	J	UG/L	25049	VAL
GDE-G-W009-01	GDEGW00901	Water	04/04/96	2.0000	J	UG/L	25153	VAL
GDE-G-W009-02	GDEGW00902	Water	07/19/96	10.0000	J	UG/L	26356	VAL
GDE-G-W021-04	GDEGW02104	Water	02/05/97	13.0000		UG/L	28394	VAL
GDE-G-W02D-02	GDEGW02D02	Water	07/09/96	2.0000	J	UG/L	26253	VAL
GDE-G-W03D-01	GDEGW03D01	Water	04/05/96	89.0000	J	UG/L	25153	VAL
GDE-H-W04D-04	GDEHW04D04	Water	01/15/97	3.0000	J	UG/L	28179	VAL
GDE-G-W07D-01	GDEGW07D01	Water	03/26/96	70.0000		UG/L	25049	VAL
GDE-G-W09D-01	GDEGW09D01	Water	04/05/96	1.0000	J	UG/L	25153	VAL
GDE-G-W09D-02	GDEGW09D02	Water	07/19/96	5.0000	J	UG/L	26356	VAL
GDE-G-W10D-01	GDEGW10D01	Water	04/05/96	2.0000	J	UG/L	25153	VAL
GDE-G-W15D-01	GDEGW15D01	Water	05/10/96	40.0000		UG/L	25532	VAL
GDE-G-W15D-03	GDEGW15D03	Water	11/14/96	80.0000		UG/L	27639	VAL
GDE-G-W23D-03	GDEGW23D03	Water	11/22/96	2.0000	J	UG/L	27754	VAL
GDE-G-W30D-01	GDEGW30D01	Water	10/31/96	7.0000	J	UG/L	27478	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2906-00001 - CHARLESTON ZONE F SOIL (ONLY)

Samples by Chemical Report

67-64-1 - Acetone

>= 1.0000 for UG/KG - Hits Only

Sample ID	Ext.	Orig. ID	Type	Date	Result	VQual	Units	SDG #	
607-S-B002-02		607SB00202	Soil	09/25/96	1000.0000	DJ	UG/KG	27064	VAL
609-S-B001-01		609SB00101	Soil	09/27/96	860.0000	J	UG/KG	27133	VAL
609-C-B002-01		609CB00201	Soil	09/27/96	62.0000	J	UG/KG	27133	VAL
620-S-B001-01		620SB00101	Soil	09/16/96	42.0000		UG/KG	26883	VAL
GDE-C-B009-01		GDECB00901	Soil	09/12/95	98.0000		UG/KG	23484	VAL
GDE-S-B009-01		GDESB00901	Soil	09/12/95	85.0000		UG/KG	23484	VAL
GDE-S-B009-02	RE	GDESB00902	Soil	09/12/95	40.0000		UG/KG	23484	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2906-00001 - CHARLESTON ZONE F SOIL (ONLY)

Samples by Chemical Report

75-09-2 - Methylene chloride

>= 1.0000 for UG/KG - Hits Only

Sample ID	Ext.	Orig. ID	Type	Date	Result	VQual	Units	SDG #	
004-S-B004-01		004SB00401	Soil	09/17/96	6.0000		UG/KG	26979	VAL
607-S-B001-01		607SB00101	Soil	09/25/96	3.0000	J	UG/KG	27064	VAL
619-S-B004-02		619SB00402	Soil	09/09/96	98.0000		UG/KG	26816	VAL
619-S-B005-01		619SB00501	Soil	09/09/96	2.0000	J	UG/KG	26816	VAL
619-S-B015-01	RE	619SB01501	Soil	09/17/96	2.0000	J	UG/KG	26979	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2906-00001 - CHARLESTON ZONE F SOIL (ONLY)

Samples by Chemical Report

117-81-7 - bis(2-Ethylhexyl)phthalate (BEHP)

>= 1.0000 for UG/KG - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
004-S-B002-01	004SB00201	Soil	09/17/96	420.0000	J	UG/KG	26979	VAL
004-C-B002-01	004CB00201	Soil	10/25/96	87.0000	J	UG/KG	27426	VAL
109-M-0001-01	109M000101	Soil	10/01/96	420.0000		UG/KG	27162	VAL
109-M-0003-01	109M000301	Soil	10/01/96	41.0000	J	UG/KG	27162	VAL
607-M-0002-01	607M000201	Soil	10/01/96	3200.0000	J	UG/KG	27162	VAL
607-M-0003-01	607M000301	Soil	10/01/96	980.0000	J	UG/KG	27162	VAL
607-M-0004-01	607M000401	Soil	10/01/96	2800.0000	J	UG/KG	27162	VAL
609-S-B001-02	609SB00102	Soil	09/27/96	58.0000	J	UG/KG	27133	VAL
609-S-B002-01	609SB00201	Soil	09/27/96	84.0000	J	UG/KG	27133	VAL
609-S-B002-02	609SB00202	Soil	09/27/96	47.0000	J	UG/KG	27133	VAL
609-S-B003-02	609SB00302	Soil	09/27/96	53.0000	J	UG/KG	27133	VAL
609-S-B005-01	609SB00501	Soil	09/30/96	43.0000	J	UG/KG	27133	VAL
609-S-B006-01	609SB00601	Soil	09/30/96	65.0000	J	UG/KG	27133	VAL
613-M-0001-01	613M000101	Soil	09/27/96	120.0000	J	UG/KG	27133	VAL
613-M-0002-01	613M000201	Soil	09/27/96	570.0000	J	UG/KG	27133	VAL
616-S-B002-01	616SB00201	Soil	09/03/96	98.0000	J	UG/KG	26816	VAL
617-S-B001-02	617SB00102	Soil	08/29/96	77.0000	J	UG/KG	26739	VAL
617-S-B003-02	617SB00302	Soil	08/30/96	350.0000	J	UG/KG	26739	VAL
617-S-B004-01	617SB00401	Soil	08/30/96	91.0000	J	UG/KG	26739	VAL
617-S-B004-02	617SB00402	Soil	08/30/96	390.0000		UG/KG	26739	VAL
19-M-0001-01	619M000101	Soil	09/27/96	410.0000	J	UG/KG	27133	VAL
619-S-B001-01	619SB00101	Soil	08/26/96	85.0000	J	UG/KG	26739	VAL
619-S-B004-01	619SB00401	Soil	09/09/96	45.0000	J	UG/KG	26816	VAL
619-C-B005-01	619CB00501	Soil	09/09/96	44.0000	J	UG/KG	26816	VAL
619-S-B007-01	619SB00701	Soil	09/12/96	60.0000	J	UG/KG	26883	VAL
619-S-B008-01	619SB00801	Soil	09/10/96	1400.0000		UG/KG	26883	VAL
619-S-B011-01	619SB01101	Soil	09/10/96	57.0000	J	UG/KG	26883	VAL
620-S-B007-01	620SB00701	Soil	01/09/97	1300.0000		UG/KG	28136	VAL
GDF-S-B002-01	GDFSB00201	Soil	10/04/96	140.0000	J	UG/KG	27162	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2906-00005 - CHARLESTON ZONE F DPT SOIL AND GW

Samples by Chemical Report

67-64-1 - Acetone

>= 1.0000 for All Concentration Units - Hits Only

Sample ID	Rxt.	Orig. ID	Type	Date	Result	VQual	Units	SDG #	
613-S-P027-01		613SP02701	Soil	09/14/96	170.0000		UG/KG	26964	VAL
613-G-P035-01		613GP03501	Water	09/16/96	18.0000		UG/L	26964	VAL
613-G-P036-01		613GP03601	Water	09/09/96	4.0000	J	UG/L	26864	VAL
613-G-P038-01		613GP03801	Water	09/16/96	8.0000	J	UG/L	26964	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2906-00005 - CHARLESTON ZONE F DPT SOIL AND GW

Samples by Chemical Report

75-09-2 - Methylene chloride

>= 1.0000 for All Concentration Units - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
607-S-P026-01	607SP026	Soil	09/18/96	14.6000		UG/KG	00001	
607-S-P028-01	607SP028	Soil	09/18/96	14.2000		UG/KG	00001	
607-G-P028-01	607GP027	Water	09/18/96	4.2500		UG/L	00001	
607-S-P029-01	607SP029	Soil	09/19/96	15.6000		UG/KG	00001	
607-G-P029-01	607GP029	Water	09/18/96	4.6000		UG/L	00001	
607-S-P030-01	607SP030	Soil	09/18/96	15.6000		UG/KG	00001	
613-S-P002-01	613SP00201	Soil	09/13/96	1.0000	J	UG/KG	26913	VAL
613-S-P014-01	613SP01401	Soil	09/12/96	2.0000	J	UG/KG	26913	VAL
613-S-P020-01	613SP02001	Soil	09/11/96	2.0000	J	UG/KG	26864	VAL
613-S-P023-01	613SP02301	Soil	09/14/96	50.0000		UG/KG	26964	VAL
613-S-P026-01	613SP02601	Soil	09/15/96	50.0000		UG/KG	26964	VAL
613-S-P027-01	613SP02701	Soil	09/14/96	3.0000	J	UG/KG	26964	VAL
613-S-P051-01	613SP05101	Soil	08/27/96	4.0000	J	UG/KG	26756	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2906-00005 - CHARLESTON ZONE F DPT SOIL AND GW

Samples by Chemical Report

117-81-7 - bis(2-Ethylhexyl)phthalate (BEHP)

>= 1.0000 for All Concentration Units - Hits Only

Sample ID	Ext.	Orig. ID	Type	Date	Result	VQual	Units	SDG #	
613-S-P001-01		613SP00101	Soil	09/12/96	120.0000	J	UG/KG	26913	VAL
613-C-P001-01		613CP00101	Soil	09/12/96	98.0000	J	UG/KG	26913	VAL
613-G-P003-01	RE	613GP00301	Water	08/29/96	2.0000	J	UG/L	26756	VAL
613-S-P009-01		613SP00901	Soil	08/29/96	130.0000	J	UG/KG	26756	VAL
613-S-P021-01		613SP02101	Soil	08/29/96	47.0000	J	UG/KG	26756	VAL
613-S-P022-01		613SP02201	Soil	09/15/96	140.0000	J	UG/KG	26964	VAL
613-S-P023-01		613SP02301	Soil	09/14/96	68.0000	J	UG/KG	26964	VAL
613-S-P025-01		613SP02501	Soil	08/28/96	380.0000	J	UG/KG	26756	VAL
613-G-P025-01		613GP02501	Water	08/29/96	100.0000	J	UG/L	26756	VAL
613-S-P026-01		613SP02601	Soil	09/15/96	79.0000	J	UG/KG	26964	VAL
613-S-P027-01		613SP02701	Soil	09/14/96	41.0000	J	UG/KG	26964	VAL
613-S-P033-01		613SP03301	Soil	08/28/96	380.0000		UG/KG	26756	VAL
613-G-P033-01		613GP03301	Water	08/28/96	100.0000		UG/L	26756	VAL
613-G-P035-01	RE	613GP03501	Water	09/16/96	4.0000	J	UG/L	26964	VAL
613-G-P037-01		613GP03701	Water	08/30/96	3.0000	J	UG/L	26797	VAL
613-S-P041-01		613SP04101	Soil	09/10/96	45.0000	J	UG/KG	26864	VAL
613-S-P042-01		613SP04201	Soil	09/03/96	67.0000	J	UG/KG	26797	VAL
613-G-P042-01		613GP04201	Water	09/03/96	4.0000	J	UG/L	26797	VAL
613-S-P050-01		613SP05001	Soil	09/04/96	130.0000	J	UG/KG	26797	VAL
613-G-P050-01		613GP05001	Water	09/04/96	1.0000	J	UG/L	26797	VAL
613-S-P056-01		613SP05601	Soil	09/03/96	73.0000	J	UG/KG	26797	VAL
613-G-P057-01		613GP05701	Water	08/30/96	4.0000	J	UG/L	26797	VAL
613-S-P058-01		613SP05801	Soil	08/30/96	43.0000	J	UG/KG	26797	VAL
613-G-P058-01		613GP05801	Water	08/30/96	3.0000	J	UG/L	26797	VAL
613-G-P059-01		613GP05901	Water	09/03/96	4.0000	J	UG/L	26797	VAL
613-G-P060-01		613GP06001	Water	09/04/96	4.0000	J	UG/L	26797	VAL
613-S-P061-01		613SP06101	Soil	09/16/96	190.0000	J	UG/KG	26964	VAL
613-S-P062-01		613SP06201	Soil	09/16/96	63.0000	J	UG/KG	26964	VAL
613-S-P063-01		613SP06301	Soil	10/16/96	110.0000	J	UG/KG	27338	VAL
613-S-P065-01		613SP06501	Soil	10/14/96	150.0000	J	UG/KG	27307	VAL
613-S-P066-01		613SP06601	Soil	10/13/96	49.0000	J	UG/KG	27307	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2907-00001 - CHARLESTON ZONE G SOIL (ONLY)

Samples by Chemical Report

67-64-1 - Acetone

>= 1.0000 for UG/KG - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
006-S-B001-02	006SB00102	Soil	09/19/96	540.0000	D	UG/KG	27016	VAL
638-S-B004-02	638SB00402	Soil	09/19/96	120.0000	D	UG/KG	27016	VAL
GDG-S-B007-01	GDGSB00701	Soil	01/08/97	12.0000	J	UG/KG	28114	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2907-00001 - CHARLESTON ZONE G SOIL (ONLY)

Samples by Chemical Report

75-09-2 - Methylene chloride

>= 1.0000 for UG/KG - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
628-S-B001-02	628SB00102	Soil	10/01/96	32.0000		UG/KG	27159	VAL
638-S-B004-02	638SB00402	Soil	09/19/96	10.0000		UG/KG	27016	VAL
GDG-S-B002-02 RE	GDGSB00202	Soil	08/26/96	10.0000	J	UG/KG	26725	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2907-00001 - CHARLESTON ZONE G SOIL (ONLY)

Samples by Chemical Report

117-81-7 - bis(2-Ethylhexyl)phthalate (BEHP)

>= 1.0000 for UG/KG - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
636-C-B002-01	636CB00201	Soil	09/11/96	420.0000		UG/KG	26879	VAL
637-M-0001-01	637M000101	Soil	03/19/97	190.0000	J	UG/KG	28896	VAL
637-S-B002-01	637SB00201	Soil	09/13/96	84.0000	J	UG/KG	26938	VAL
637-S-B005-01	637SB00501	Soil	09/13/96	160.0000	J	UG/KG	26938	VAL
637-C-B005-01	637CB00501	Soil	09/13/96	40.0000	J	UG/KG	26938	VAL
638-S-B001-02	638SB00102	Soil	09/10/96	700.0000		UG/KG	26879	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2907-00002 - CHARLESTON ZONE G QUARTERLY GW

Samples by Chemical Report

67-64-1 - Acetone

>= 1.0000 for UG/L - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
008-G-W002-04	008GW00204	Water	12/09/97	4.0000	J	UG/L	32103	NV
008-G-W003-04	008GW00304	Water	12/11/97	57.0000		UG/L	32103	NV
008-G-W004-04	008GW00404	Water	12/09/97	5.0000		UG/L	32103	NV
008-G-W005-04	008GW00504	Water	12/08/97	2.0000	J	UG/L	32103	NV
008-G-W006-04	008GW00604	Water	12/09/97	9.0000		UG/L	32103	NV
637-G-W001-04	637GW00104	Water	12/10/97	3.0000	J	UG/L	32103	NV
637-G-W002-A1	637GW002A1	Water	04/30/97	25.0000		UG/L	29227	VAL
637-G-W003-A1	637GW003A1	Water	04/30/97	8.0000	J	UG/L	29227	VAL
637-H-W003-A1	637HW003A1	Water	04/30/97	5.0000	J	UG/L	29227	VAL
637-G-W003-A3	637GW003A3	Water	12/10/97	6.0000		UG/L	32103	NV
638-G-W001-03	638GW00103	Water	09/15/97	3.0000	J	UG/L	31030	VAL
638-G-W001-04	638GW00104	Water	12/11/97	7.0000		UG/L	32103	NV
FDS-G-W09C-02	FDSGW09C02	Water	06/10/97	6.0000	J	UG/L	29656	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2907-00002 - CHARLESTON ZONE G QUARTERLY GW

Samples by Chemical Report

75-09-2 - Methylene chloride

>= 1.0000 for UG/L - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
008-G-W002-04	008GW00204	Water	12/09/97	5.0000		UG/L	32103	NV
008-G-W003-04	008GW00304	Water	12/11/97	4.0000	JB	UG/L	32103	NV
008-G-W004-04	008GW00404	Water	12/09/97	4.0000	J	UG/L	32103	NV
008-G-W006-04	008GW00604	Water	12/09/97	4.0000	J	UG/L	32103	NV
636-G-W001-04	636GW00104	Water	12/11/97	5.0000	B	UG/L	32103	NV
637-G-W003-A3	637GW003A3	Water	12/10/97	6.0000		UG/L	32103	NV
638-G-W001-04	638GW00104	Water	12/11/97	6.0000	B	UG/L	32103	NV
GDG-G-W001-04	GDGGW00104	Water	12/16/97	9.0000	B	UG/L	32225	NV
GDG-G-W002-04	GDGGW00204	Water	12/15/97	11.0000	B	UG/L	32225	NV
GDG-G-W01D-04	GDGGW01D04	Water	12/16/97	6.0000	B	UG/L	32225	NV
GDG-G-W02D-04	GDGGW02D04	Water	12/15/97	8.0000	B	UG/L	32225	NV

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2907-00002 - CHARLESTON ZONE G QUARTERLY GW

Samples by Chemical Report

117-81-7 - bis(2-Ethylhexyl)phthalate (BEHP)

>= 1.0000 for UG/L - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
008-G-W004-01	008GW00401	Water	11/15/96	46.0000		UG/L	27651	VAL
706-G-W001-A3	706GW001A3	Water	12/12/97	10.0000	B	UG/L	32103	NV
FDS-G-W02A-01	FDSGW02A01	Water	01/16/97	2.0000	J	UG/L	28185	VAL
FDS-H-W02A-01	FDSHW02A01	Water	01/16/97	1.0000	J	UG/L	28185	VAL
FDS-G-W02C-01	FDSGW02C01	Water	01/16/97	1.0000	J	UG/L	28185	VAL
GDG-G-W001-04	GDGGW00104	Water	12/16/97	4.0000	J	UG/L	32225	NV
GDG-G-W002-04	GDGGW00204	Water	12/15/97	6.0000	JB	UG/L	32225	NV
GDG-G-W01D-04	GDGGW01D04	Water	12/16/97	5.0000	J	UG/L	32225	NV

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2907-00005 - CHARLESTON ZONE G DPT SOIL AND GW

Samples by Chemical Report

117-81-7 - bis(2-Ethylhexyl)phthalate (BEHP)

>= 1.0000 for All Concentration Units - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
FDS-S-C030-01	FDSSC03001	Soil	12/04/96	86.0000	J	UG/KG	27869	VAL
FDS-S-C051-01	FDSSC05101	Soil	01/13/97	1500.0000		UG/KG	28314	VAL
FDS-S-C095-01	FDSSC09501	Soil	12/05/96	47.0000	J	UG/KG	27869	VAL
FDS-C-C097-01	FDSCC09701	Soil	12/05/96	67.0000	J	UG/KG	27869	VAL
FDS-S-C114-01	FDSSC11401	Soil	12/05/96	46.0000	J	UG/KG	27869	VAL
FDS-S-H024-01	FDSSH02401	Soil	10/21/96	55.0000	J	UG/KG	27377	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

0064-00001 - NAVAL BASE CHARLESTON ZONE H (NBCH)

Samples by Chemical Report

67-64-1 - Acetone

>= 1.0000 for All Concentration Units - Hits Only

Sample ID	Ext.	Orig. ID	Type	Date	Result	VQual	Units	SDG #	
009-M-0011-01		009M001101	Soil	09/09/94	220.0000		UG/KG	CHS12	VAL
009-M-0015-01		009M001501	Soil	09/09/94	350.0000		UG/KG	CHS12	VAL
013-S-B004-01	RE	013SB00401	Soil	08/12/94	43.0000	J	UG/KG	CHS02	VAL
013-S-B005-01		013SB00501	Soil	08/12/94	51.0000		UG/KG	CHS02	VAL
013-S-B006-01		013SB00601	Soil	08/12/94	98.0000		UG/KG	CHS02	VAL
013-S-B007-01		013SB00701	Soil	08/12/94	81.0000		UG/KG	CHS02	VAL
013-S-B008-01		013SB00801	Soil	08/12/94	98.0000	J	UG/KG	CHS02	VAL
013-S-B008-02		013SB00802	Soil	08/12/94	84.0000		UG/KG	CHS02	VAL
013-S-B009-01		013SB00901	Soil	08/12/94	80.0000		UG/KG	CHS02	VAL
013-S-B010-01		013SB01001	Soil	08/12/94	66.0000		UG/KG	CHS02	VAL
013-S-B010-02		013SB01002	Soil	08/12/94	44.0000		UG/KG	CHS02	VAL
013-S-B011-01		013SB01101	Soil	08/12/94	62.0000	J	UG/KG	CHS02	VAL
013-S-B011-02		013SB01102	Soil	08/12/94	92.0000		UG/KG	CHS02	VAL
013-S-B012-01		013SB01201	Soil	08/12/94	190.0000		UG/KG	CHS02	VAL
013-S-B012-02		013SB01202	Soil	08/12/94	180.0000		UG/KG	CHS02	VAL
013-S-B013-01		013SB01301	Soil	08/12/94	90.0000		UG/KG	CHS02	VAL
013-S-B013-02		013SB01302	Soil	08/12/94	1800.0000	J	UG/KG	CHS02	VAL
013-S-B014-01		013SB01401	Soil	08/15/94	92.0000		UG/KG	CHS02	VAL
013-S-B014-02		013SB01402	Soil	08/15/94	62.0000	J	UG/KG	CHS02	VAL
013-S-B015-01		013SB01501	Soil	08/15/94	81.0000		UG/KG	CHS02	VAL
013-S-B016-01		013SB01601	Soil	08/15/94	190.0000		UG/KG	CHS02	VAL
013-S-B017-01		013SB01701	Soil	08/15/94	160.0000		UG/KG	CHS03	VAL
013-S-B017-02		013SB01702	Soil	08/15/94	31.0000		UG/KG	CHS03	VAL
013-S-B018-01		013SB01801	Soil	08/15/94	33.0000		UG/KG	CHS03	VAL
013-S-B018-02		013SB01802	Soil	08/15/94	86.0000		UG/KG	CHS03	VAL
013-S-B019-01		013SB01901	Soil	08/15/94	28.0000		UG/KG	CHS03	VAL
013-S-B019-02		013SB01902	Soil	08/15/94	42.0000		UG/KG	CHS03	VAL
013-S-B020-01		013SB02001	Soil	08/15/94	150.0000		UG/KG	CHS03	VAL
013-S-B020-02		013SB02002	Soil	08/15/94	49.0000		UG/KG	CHS03	VAL
013-S-B021-01		013SB02101	Soil	08/15/94	25.0000	J	UG/KG	CHS03	VAL
013-S-B021-02		013SB02102	Soil	08/15/94	23.0000	J	UG/KG	CHS03	VAL
014-S-W001-14		014SW00114	Soil	09/22/94	136.0000		UG/KG	APX08	VAL
015-S-B001-01		015SB00101	Soil	09/10/94	36.0000		UG/KG	CHS11	VAL
015-S-B001-02		015SB00102	Soil	09/10/94	60.0000		UG/KG	CHS11	VAL
015-S-B002-01		015SB00201	Soil	09/10/94	13.0000	J	UG/KG	CHS11	VAL
015-S-B002-02		015SB00202	Soil	09/10/94	85.0000		UG/KG	CHS11	VAL
015-S-B003-01		015SB00301	Soil	09/10/94	69.0000	J	UG/KG	CHS11	VAL
015-S-B003-02	RE	015SB00302	Soil	09/10/94	91.0000	J	UG/KG	CHS11	VAL
015-S-B004-01		015SB00401	Soil	09/12/94	27.0000	J	UG/KG	CHS13	VAL
015-S-B004-02		015SB00402	Soil	09/12/94	83.0000		UG/KG	CHS13	VAL
017-S-B003-01		017SB00301	Soil	08/16/94	13.0000	J	UG/KG	CHS04	VAL
017-S-B003-02		017SB00302	Soil	08/16/94	12.0000	J	UG/KG	CHS04	VAL
017-S-B004-01		017SB00401	Soil	08/16/94	31.2000		UG/KG	CHS04	VAL
017-S-B004-02		017SB00402	Soil	08/16/94	40.4000		UG/KG	CHS04	VAL
017-S-B005-02		017SB00502	Soil	08/17/94	69.2000	J	UG/KG	CHS04	VAL
017-S-B006-01		017SB00601	Soil	08/16/94	14.4000	J	UG/KG	CHS04	VAL
017-S-B006-02		017SB00602	Soil	08/16/94	60.9000	J	UG/KG	CHS04	VAL
017-S-B007-01		017SB00701	Soil	08/17/94	23.3000	J	UG/KG	CHS04	VAL
017-S-B007-02		017SB00702	Soil	08/17/94	176.0000		UG/KG	CHS04	VAL

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

0064-00001 - NAVAL BASE CHARLESTON ZONE H (NBCH)

Samples by Chemical Report

67-64-1 - Acetone

>= 1.0000 for All Concentration Units - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
017-S-B008-01	017SB00801	Soil	08/17/94	34.7000		UG/KG	CHS04	VAL
017-S-B008-02	017SB00802	Soil	08/17/94	110.0000		UG/KG	CHS04	VAL
017-S-B009-02	017SB00902	Soil	08/17/94	56.5000		UG/KG	CHS04	VAL
017-S-B010-02	017SB01002	Soil	08/17/94	16.9000	J	UG/KG	CHS05	VAL
017-S-B011-01	017SB01101	Soil	08/17/94	195.0000		UG/KG	CHS05	VAL
017-S-B011-02	017SB01102	Soil	08/17/94	87.1000		UG/KG	CHS05	VAL
019-S-B001-01	019SB00101	Soil	08/27/94	21.0000	J	UG/KG	CHS07	VAL
019-S-B001-02	019SB00102	Soil	08/27/94	42.0000		UG/KG	CHS07	VAL
019-S-B002-01	019SB00201	Soil	08/27/94	31.0000		UG/KG	CHS07	VAL
019-S-B003-01	019SB00301	Soil	08/29/94	20.0000	J	UG/KG	CHS08	VAL
019-S-B004-01	019SB00401	Soil	08/29/94	33.0000		UG/KG	CHS08	VAL
019-S-B004-02	019SB00402	Soil	08/29/94	47.0000		UG/KG	CHS08	VAL
121-S-B001-01	121SB00101	Soil	08/26/94	38.0000		UG/KG	CHS07	VAL
121-S-B002-01	121SB00201	Soil	08/26/94	130.0000		UG/KG	CHS07	VAL
121-C-B002-01	121CB00201	Soil	08/26/94	257.0000	J	UG/KG	APX02	VAL
121-S-B003-01	121SB00301	Soil	08/26/94	15.0000	J	UG/KG	CHS08	VAL
121-S-B004-01	121SB00401	Soil	08/26/94	26.0000	J	UG/KG	CHS07	VAL
138-S-B001-01	138SB00101	Soil	08/29/94	56.0000		UG/KG	CHS08	VAL
138-S-B001-02	138SB00102	Soil	08/29/94	96.0000		UG/KG	CHS08	VAL
138-S-B002-02	138SB00202	Soil	08/29/94	21.1000	J	UG/KG	CHS09	VAL
138-S-B003-01	138SB00301	Soil	08/29/94	52.5000		UG/KG	CHS09	VAL
138-S-B003-02	138SB00302	Soil	08/29/94	37.4000		UG/KG	CHS09	VAL
159-M-0001-01	159M000101	Soil	06/20/95	210.0000	J	UG/KG	CHS46	VAL
159-S-B001-02	159SB00102	Soil	06/19/95	67.0000	J	UG/KG	CHS46	VAL
159-S-B005-01	159SB00501	Soil	06/19/95	41.0000	J	UG/KG	CHS46	VAL
159-S-B011-02	159SB01102	Soil	06/19/95	180.0000	J	UG/KG	CHS46	VAL
159-S-B012-02	159SB01202	Soil	06/19/95	170.0000	J	UG/KG	CHS46	VAL
178-S-B006-02	178SB00602	Soil	08/25/94	52.0000		UG/KG	CHS07	VAL
649-S-B004-01	649SB00401	Soil	08/22/94	25.2000	J	UG/KG	CHS05	VAL
653-S-B001-01	653SB00101	Soil	08/26/94	50.0000	J	UG/KG	CHS08	VAL
653-S-B001-02	653SB00102	Soil	08/26/94	76.0000		UG/KG	CHS08	VAL
653-S-B002-01	653SB00201	Soil	08/26/94	25.0000	J	UG/KG	CHS08	VAL
653-S-B003-01	653SB00301	Soil	08/26/94	110.0000		UG/KG	CHS08	VAL
653-C-B003-01	653CB00301	Soil	08/26/94	153.0000	J	UG/KG	APX02	VAL
653-S-B003-02	653SB00302	Soil	08/26/94	83.0000	J	UG/KG	CHS08	VAL
653-S-B004-01	653SB00401	Soil	08/26/94	59.0000		UG/KG	CHS08	VAL
654-S-B001-01	654SB00101	Soil	09/07/94	54.0000		UG/KG	CHS10	VAL
654-S-B001-02	654SB00102	Soil	09/07/94	85.0000	J	UG/KG	CHS10	VAL
654-S-B002-01	654SB00201	Soil	09/07/94	52.0000		UG/KG	CHS10	VAL
654-S-B002-02	654SB00202	Soil	09/07/94	91.0000		UG/KG	CHS10	VAL
654-S-B003-01	654SB00301	Soil	09/07/94	77.0000		UG/KG	CHS10	VAL
654-S-B003-02	654SB00302	Soil	09/07/94	210.0000	J	UG/KG	CHS10	VAL
654-S-B006-02	654SB00602	Soil	09/07/94	1700.0000	J	UG/KG	CHS10	VAL
654-S-B007-01	654SB00701	Soil	09/07/94	4000.0000	J	UG/KG	CHS11	VAL
655-S-B001-01	655SB00101	Soil	09/01/94	290.0000		UG/KG	CHS10	VAL
655-S-B001-02	655SB00102	Soil	09/01/94	72.0000		UG/KG	CHS10	VAL
655-S-B002-01	655SB00201	Soil	09/01/94	26.0000	J	UG/KG	CHS10	VAL
655-S-B003-01	655SB00301	Soil	09/01/94	17.0000	J	UG/KG	CHS10	VAL
655-S-B003-02	655SB00302	Soil	09/01/94	77.0000		UG/KG	CHS10	VAL

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

0064-00001 - NAVAL BASE CHARLESTON ZONE H (NBCH)

Samples by Chemical Report

67-64-1 - Acetone

>= 1.0000 for All Concentration Units - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
655-S-B004-01	655SB00401	Soil	09/01/94	20.0000	J	UG/KG	CHS10	VAL
655-S-B004-02	655SB00402	Soil	09/01/94	140.0000		UG/KG	CHS10	VAL
655-S-B005-01	655SB00501	Soil	09/07/94	26.0000	J	UG/KG	CHS10	VAL
655-S-B005-02	655SB00502	Soil	09/07/94	180.0000		UG/KG	CHS10	VAL
655-S-B006-01	655SB00601	Soil	09/07/94	230.0000		UG/KG	CHS10	VAL
655-S-B007-01	655SB00701	Soil	09/07/94	29.0000		UG/KG	CHS10	VAL
655-S-B008-01	655SB00801	Soil	10/11/94	4400.0000		UG/KG	CHS21	VAL
655-S-SGC9-01	SGCSB00901	Soil	10/12/94	180.0000		UG/KG	CHS21	VAL
656-S-B002-02	656SB00202	Soil	08/09/94	210.0000		UG/KG	CHS01	VAL
659-S-B002-02	659SB00202	Soil	08/31/94	71.1000	J	UG/KG	CHS09	VAL
659-S-B004-01	659SB00401	Soil	08/31/94	8.7500	J	UG/KG	CHS09	VAL
659-S-B004-02	659SB00402	Soil	08/31/94	45.6000	J	UG/KG	CHS09	VAL
660-S-B002-01	660SB00201	Soil	08/25/94	23.0000	J	UG/KG	CHS07	VAL
660-C-B005-01	660CB00501	Soil	08/24/94	73.7000		UG/KG	APX02	VAL
662-S-B001-02	662SB00102	Soil	08/15/94	28.0000	J	UG/KG	CHS03	VAL
662-S-B002-01	662SB00201	Soil	08/15/94	27.0000		UG/KG	CHS03	VAL
662-S-B002-02	662SB00202	Soil	08/15/94	25.0000	J	UG/KG	CHS03	VAL
662-S-B003-01	662SB00301	Soil	08/15/94	33.0000		UG/KG	CHS03	VAL
662-S-B004-02	662SB00402	Soil	08/15/94	79.0000		UG/KG	CHS03	VAL
663-S-B004-02	663SB00402	Soil	08/31/94	46.4000	J	UG/KG	CHS09	VAL
63-S-B005-02	663SB00502	Soil	08/31/94	32.1000	J	UG/KG	CHS09	VAL
665-S-B002-01	665SB00201	Soil	08/26/94	34.0000		UG/KG	CHS07	VAL
665-S-B002-02	665SB00202	Soil	08/26/94	40.0000		UG/KG	CHS07	VAL
665-S-B003-01	665SB00301	Soil	08/26/94	210.0000		UG/KG	CHS07	VAL
665-S-B003-02	665SB00302	Soil	08/26/94	96.0000		UG/KG	CHS07	VAL
665-S-B004-02	665SB00402	Soil	08/26/94	59.0000		UG/KG	CHS07	VAL
666-S-B001-02	666SB00102	Soil	08/23/94	8.1200	J	UG/KG	CHS05	VAL
666-S-B003-02	666SB00302	Soil	08/23/94	9.6400	J	UG/KG	CHS05	VAL
667-S-B001-01	667SB00101	Soil	08/29/94	82.0000		UG/KG	CHS08	VAL
667-S-B001-02	667SB00102	Soil	08/29/94	25.0000	J	UG/KG	CHS08	VAL
667-S-B002-01	667SB00201	Soil	08/29/94	44.0000		UG/KG	CHS08	VAL
667-S-B002-02	667SB00202	Soil	08/29/94	62.0000		UG/KG	CHS08	VAL
667-S-B003-01	667SB00301	Soil	08/29/94	120.0000		UG/KG	CHS08	VAL
667-S-B003-02	667SB00302	Soil	08/29/94	66.0000		UG/KG	CHS08	VAL
667-S-B004-01	667SB00401	Soil	08/29/94	34.0000		UG/KG	CHS08	VAL
667-S-B004-02	667SB00402	Soil	08/29/94	780.0000		UG/KG	CHS08	VAL
670-S-B002-01	670SB00201	Soil	09/10/94	78.0000	J	UG/KG	CHS11	VAL
670-S-B002-02	670SB00202	Soil	09/10/94	62.0000		UG/KG	CHS11	VAL
670-S-B005-02	670SB00502	Soil	09/13/94	34.0000	J	UG/KG	CHS13	VAL
670-S-B007-02	670SB00702	Soil	09/12/94	120.0000		UG/KG	CHS13	VAL
670-S-B010-02	670SB01002	Soil	09/13/94	44.0000	J	UG/KG	CHS13	VAL
670-S-B012-02	670SB01202	Soil	09/12/94	93.0000		UG/KG	CHS11	VAL
670-S-B013-01	670SB01301	Soil	09/12/94	36.0000	J	UG/KG	CHS11	VAL
670-S-B014-02	670SB01402	Soil	09/12/94	43.0000		UG/KG	CHS13	VAL
670-S-B016-01	670SB01601	Soil	09/14/94	67.0000	J	UG/KG	CHS14	VAL
70-S-B016-02	670SB01602	Soil	09/14/94	96.0000	J	UG/KG	CHS14	VAL
670-S-B017-02	670SB01702	Soil	09/14/94	200.0000		UG/KG	CHS14	VAL
670-S-B018-02	670SB01802	Soil	09/14/94	66.0000		UG/KG	CHS14	VAL
670-S-B021-02	670SB02102	Soil	09/14/94	98.0000		UG/KG	CHS14	VAL

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

0064-00001 - NAVAL BASE CHARLESTON ZONE H (NBCH)

Samples by Chemical Report

67-64-1 - Acetone

>= 1.0000 for All Concentration Units - Hits Only

Sample ID	Ext.	Orig. ID	Type	Date	Result	VQual	Units	SDG #	
670-S-B022-02		670SB02202	Soil	09/14/94	110.0000		UG/KG	CHS14	VAL
670-S-B023-02		670SB02302	Soil	09/23/94	43.0000		UG/KG	CHS14	VAL
670-S-B024-01		670SB02401	Soil	09/23/94	43.0000		UG/KG	CHS14	VAL
670-S-B024-02		670SB02402	Soil	09/23/94	140.0000	J	UG/KG	CHS14	VAL
684-M-0001-01		684M00101	Soil	09/24/94	361.0000	J	UG/KG	APX09	VAL
684-M-0002-01	RE	684M00201	Soil	09/24/94	156.0000		UG/KG	APX09	VAL
684-S-B008-02		684SB00802	Soil	09/19/94	80.5000		UG/KG	APX05	VAL
684-S-B009-01		684SB00901	Soil	09/19/94	7.6000	J	UG/KG	APX05	VAL
684-S-B009-02		684SB00902	Soil	09/19/94	112.0000	J	UG/KG	APX05	VAL
684-S-B011-02		684SB01102	Soil	09/20/94	60.6000	J	UG/KG	APX05	VAL
684-S-B019-01		684SB01901	Soil	09/21/94	97.4000	J	UG/KG	APX07	VAL
684-S-B019-02		684SB01902	Soil	09/21/94	76.0000	J	UG/KG	APX07	VAL
684-S-B022-02		684SB02202	Soil	09/21/94	284.0000		UG/KG	APX07	VAL
684-S-B023-02		684SB02302	Soil	09/21/94	113.0000		UG/KG	APX07	VAL
684-S-B024-02		684SB02402	Soil	09/21/94	99.9000		UG/KG	APX07	VAL
684-S-B025-02		684SB02502	Soil	09/21/94	79.0000		UG/KG	APX07	VAL
G80-S-B003-01		GDHSB10101	Soil	02/03/95	160.0000		UG/KG	CHS34	VAL
GDH-S-B003-02		GDHSB00302	Soil	09/27/94	28.0000	J	UG/KG	CHS15	VAL
GDH-S-B008-02		GDHSB00802	Soil	09/27/94	27.0000	J	UG/KG	CHS15	VAL
DH-S-B009-02		GDHSB00902	Soil	09/27/94	20.0000	J	UG/KG	CHS15	VAL
H-S-B010-02		GDHSB01002	Soil	09/27/94	100.0000		UG/KG	CHS15	VAL
GDH-S-B011-01		GDHSB01101	Soil	09/27/94	20.0000	J	UG/KG	CHS14	VAL
GDH-S-B011-02		GDHSB01102	Soil	09/27/94	340.0000		UG/KG	CHS14	VAL
GDH-S-B012-01		GDHSB01201	Soil	09/27/94	22.0000	J	UG/KG	CHS14	VAL
GDH-S-B017-02		GDHSB01702	Soil	10/03/94	70.0000		UG/KG	CHS16	VAL
GDH-S-B018-01		GDHSB01801	Soil	10/03/94	27.0000	J	UG/KG	CHS16	VAL
GDH-S-B020-02		GDHSB02002	Soil	10/03/94	52.0000		UG/KG	CHS16	VAL
GDH-S-B022-01		GDHSB02201	Soil	10/03/94	150.0000		UG/KG	CHS16	VAL
GDH-S-B026-02		GDHSB02602	Soil	10/04/94	16.0000	J	UG/KG	CHS17	VAL
GDH-S-B027-02		GDHSB02702	Soil	10/04/94	30.0000		UG/KG	CHS17	VAL
GDH-S-B028-01		GDHSB02801	Soil	10/04/94	17.0000	J	UG/KG	CHS17	VAL
GDH-S-B029-01		GDHSB02901	Soil	10/04/94	18.0000	J	UG/KG	CHS17	VAL
GDH-S-B031-02		GDHSB03102	Soil	10/04/94	20.0000	J	UG/KG	CHS17	VAL
GDH-S-B032-01		GDHSB03201	Soil	10/04/94	22.0000	J	UG/KG	CHS17	VAL
GDH-S-B032-02		GDHSB03202	Soil	10/04/94	530.0000		UG/KG	CHS17	VAL
GDH-S-B033-01		GDHSB03301	Soil	10/04/94	21.0000	J	UG/KG	CHS17	VAL
GDH-S-B033-02		GDHSB03302	Soil	10/04/94	30.0000	J	UG/KG	CHS17	VAL
GDH-S-B034-01		GDHSB03401	Soil	10/04/94	20.0000	J	UG/KG	CHS17	VAL
GDH-S-B034-02		GDHSB03402	Soil	10/04/94	1200.0000		UG/KG	CHS17	VAL
GDH-S-B036-01		GDHSB03601	Soil	10/04/94	210.0000	J	UG/KG	CHS18	VAL
GDH-S-B037-01		GDHSB03701	Soil	10/05/94	17.0000	J	UG/KG	CHS18	VAL
GDH-S-B037-02		GDHSB03702	Soil	10/05/94	46.0000		UG/KG	CHS18	VAL
GDH-S-B038-01		GDHSB03801	Soil	10/05/94	20.0000	J	UG/KG	CHS18	VAL
GDH-S-B038-02		GDHSB03802	Soil	10/05/94	110.0000	J	UG/KG	CHS18	VAL
GDH-S-B039-02		GDHSB03902	Soil	10/05/94	130.0000	J	UG/KG	CHS18	VAL
H-S-B041-01		GDHSB04101	Soil	10/05/94	52.0000	J	UG/KG	CHS18	VAL
GDH-S-B042-02		GDHSB04202	Soil	10/05/94	78.0000	J	UG/KG	CHS18	VAL
GDH-S-B043-01		GDHSB04301	Soil	10/05/94	73.0000	J	UG/KG	CHS18	VAL
GDH-S-B043-02		GDHSB04302	Soil	10/05/94	270.0000	J	UG/KG	CHS18	VAL

ENVIRONMENTAL SAFETY & DESIGNS

0064-00001 - NAVAL BASE CHARLESTON ZONE H (NBCH)

Samples by Chemical Report

67-64-1 - Acetone

>= 1.0000 for All Concentration Units - Hits Only

Sample ID	Ext.	Orig. ID	Type	Date	Result	VQual	Units	SDG #	
GDH-S-B044-01		GDHSB04401	Soil	10/05/94	100.0000	J	UG/KG	CHS18	VAL
GDH-S-B045-01		GDHSB04501	Soil	10/05/94	60.0000	J	UG/KG	CHS18	VAL
GDH-S-B045-02		GDHSB04502	Soil	10/05/94	73.0000	J	UG/KG	CHS18	VAL
GDH-S-B046-02		GDHSB04602	Soil	10/05/94	380.0000	J	UG/KG	CHS18	VAL
GDH-S-B047-01		GDHSB04701	Soil	10/06/94	27.0000	J	UG/KG	CHS19	VAL
GDH-S-B047-02		GDHSB04702	Soil	10/06/94	57.0000		UG/KG	CHS19	VAL
GDH-S-B048-01		GDHSB04801	Soil	10/06/94	17.0000	J	UG/KG	CHS19	VAL
GDH-S-B049-01	RE	GDHSB04901	Soil	10/06/94	32.0000	J	UG/KG	CHS19	VAL
GDH-S-B050-01	RE	GDHSB05001	Soil	10/06/94	20.0000	J	UG/KG	CHS19	VAL
GDH-S-B051-02		GDHSB05102	Soil	10/06/94	61.0000		UG/KG	CHS19	VAL
GDH-S-B052-01		GDHSB05201	Soil	10/06/94	17.0000	J	UG/KG	CHS19	VAL
GDH-S-B052-02		GDHSB05202	Soil	10/06/94	33.0000		UG/KG	CHS19	VAL
GDH-S-B053-01		GDHSB05301	Soil	10/06/94	23.0000	J	UG/KG	CHS19	VAL
GDH-S-B053-02		GDHSB05302	Soil	10/06/94	61.0000		UG/KG	CHS19	VAL
GDH-S-B054-02		GDHSB05402	Soil	10/06/94	67.0000		UG/KG	CHS19	VAL
GDH-S-B055-01		GDHSB05501	Soil	10/06/94	12.0000	J	UG/KG	CHS19	VAL
GDH-S-B056-02		GDHSB05602	Soil	10/07/94	27.0000	J	UG/KG	CHS19	VAL
GDH-S-B057-01		GDHSB05701	Soil	10/07/94	17.0000	J	UG/KG	CHS20	VAL
GDH-S-B058-01	RE	GDHSB05801	Soil	10/07/94	24.0000	J	UG/KG	CHS19	VAL
GDH-S-B058-02		GDHSB05802	Soil	10/07/94	58.0000		UG/KG	CHS19	VAL
GDH-S-B059-01		GDHSB05901	Soil	10/07/94	14.0000	J	UG/KG	CHS20	VAL
GDH-S-B060-01		GDHSB06001	Soil	10/07/94	32.0000	J	UG/KG	CHS20	VAL
GDH-S-B061-01		GDHSB06101	Soil	10/07/94	15.0000	J	UG/KG	CHS19	VAL
GDH-S-B062-01		GDHSB06201	Soil	10/08/94	75.0000	J	UG/KG	CHS20	VAL
GDH-S-B063-01		GDHSB06301	Soil	10/08/94	64.0000		UG/KG	CHS20	VAL
GDH-S-B063-02		GDHSB06302	Soil	10/08/94	14.0000	J	UG/KG	CHS20	VAL
GDH-S-B064-02		GDHSB06402	Soil	10/08/94	27.0000	J	UG/KG	CHS20	VAL
GDH-S-B065-01		GDHSB06501	Soil	10/08/94	26.0000	J	UG/KG	CHS20	VAL
GDH-S-B071-02		GDHSB07102	Soil	10/11/94	1300.0000		UG/KG	CHS21	VAL
GDH-S-B072-01		GDHSB07201	Soil	10/11/94	520.0000		UG/KG	CHS21	VAL
GDH-S-B072-02		GDHSB07202	Soil	10/11/94	370.0000		UG/KG	CHS21	VAL
GDH-S-B073-01		GDHSB07301	Soil	10/12/94	170.0000		UG/KG	CHS21	VAL
GDH-S-B073-02		GDHSB07302	Soil	10/12/94	2300.0000		UG/KG	CHS21	VAL
GDH-S-B074-01		GDHSB07401	Soil	10/21/94	106.0000	J	UG/KG	CHS23	VAL
GDH-S-B075-01		GDHSB07501	Soil	10/21/94	88.0000	J	UG/KG	CHS23	VAL
GDH-S-B076-01		GDHSB07601	Soil	10/21/94	49.0000	J	UG/KG	CHS23	VAL
GDH-S-B078-02		GDHSB07802	Soil	10/21/94	137.0000		UG/KG	CHS23	VAL
GDH-S-B079-01		GDHSB07901	Soil	10/21/94	8.0000	J	UG/KG	CHS23	VAL
GDH-S-B079-02		GDHSB07902	Soil	10/21/94	399.0000	J	UG/KG	CHS23	VAL
GDH-S-B080-01		GDHSB08001	Soil	10/21/94	21.0000		UG/KG	CHS23	VAL
GDH-S-B080-02		GDHSB08002	Soil	10/21/94	11.0000	J	UG/KG	CHS23	VAL
GDH-S-B081-01		GDHSB08101	Soil	10/21/94	48.0000		UG/KG	CHS23	VAL
GDH-S-B082-01		GDHSB08201	Soil	10/22/94	37.0000		UG/KG	CHS23	VAL
GDH-S-B082-02		GDHSB08202	Soil	10/22/94	147.0000		UG/KG	CHS23	VAL
GDH-S-B083-01		GDHSB08301	Soil	10/22/94	34.0000		UG/KG	CHS23	VAL
GDH-S-B084-01		GDHSB08401	Soil	11/09/94	17.0000	J	UG/KG	CHS25	VAL
GDH-S-B084-02		GDHSB08402	Soil	11/09/94	18.0000	J	UG/KG	CHS25	VAL
GDH-S-B085-01		GDHSB08501	Soil	11/09/94	12000.0000	J	UG/KG	CHS25	VAL
GDH-S-B085-02		GDHSB08502	Soil	11/09/94	16.0000	J	UG/KG	CHS25	VAL

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

0064-00001 - NAVAL BASE CHARLESTON ZONE H (NBCH)

Samples by Chemical Report

67-64-1 - Acetone

>= 1.0000 for All Concentration Units - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
GDH-S-B092-02	GDHSB09202	Soil	12/14/94	140.0000	J	UG/KG	CHS28	VAL
GDH-S-B093-01	GDHSB09301	Soil	12/19/94	250.0000	J	UG/KG	CHS28	VAL
SGC-S-B001-01	SGCSB00101	Soil	10/10/94	56.0000		UG/KG	CHS20	VAL
SGC-S-B002-01	SGCSB00201	Soil	10/10/94	18.0000	J	UG/KG	CHS20	VAL
SGC-S-B002-02	SGCSB00202	Soil	10/10/94	33.0000	J	UG/KG	CHS20	VAL
SGC-S-B003-01	SGCSB00301	Soil	10/10/94	120.0000		UG/KG	CHS20	VAL
SGC-S-B003-02	SGCSB00302	Soil	10/10/94	29.0000	J	UG/KG	CHS20	VAL
SGC-S-B004-01	SGCSB00401	Soil	10/10/94	45.0000		UG/KG	CHS20	VAL
SGC-S-B005-01	SGCSB00501	Soil	10/10/94	74.0000		UG/KG	CHS20	VAL
SGC-S-B006-01	SGCSB00601	Soil	10/10/94	190.0000		UG/KG	CHS20	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

0064-00001 - NAVAL BASE CHARLESTON ZONE H (NBCH)

Samples by Chemical Report

75-09-2 - Methylene chloride

>= 1.0000 for All Concentration Units - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
009-M-0014-01	009M001401	Soil	09/09/94	72.0000		UG/KG	CHS12	VAL
138-S-B001-02	138SB00102	Soil	08/29/94	5.0000	J	UG/KG	CHS08	VAL
138-S-B002-01	138SB00201	Soil	08/29/94	12.9000		UG/KG	CHS09	VAL
138-S-B003-02	138SB00302	Soil	08/29/94	12.4000	J	UG/KG	CHS09	VAL
654-S-B001-02	654SB00102	Soil	09/07/94	34.0000	J	UG/KG	CHS10	VAL
654-S-B002-01	654SB00201	Soil	09/07/94	25.0000	J	UG/KG	CHS10	VAL
654-S-B003-02	654SB00302	Soil	09/07/94	36.0000	J	UG/KG	CHS10	VAL
655-S-B001-01	655SB00101	Soil	09/01/94	34.0000	J	UG/KG	CHS10	VAL
655-S-B001-02	655SB00102	Soil	09/01/94	10.0000	J	UG/KG	CHS10	VAL
655-S-B002-01	655SB00201	Soil	09/01/94	10.0000	J	UG/KG	CHS10	VAL
655-S-B003-01	655SB00301	Soil	09/01/94	11.0000	J	UG/KG	CHS10	VAL
655-S-B003-02	655SB00302	Soil	09/01/94	19.0000	J	UG/KG	CHS10	VAL
655-S-B004-01	655SB00401	Soil	09/01/94	12.0000	J	UG/KG	CHS10	VAL
655-S-B004-02	655SB00402	Soil	09/01/94	11.0000	J	UG/KG	CHS10	VAL
655-S-B005-01	655SB00501	Soil	09/07/94	22.0000	J	UG/KG	CHS10	VAL
655-S-B005-02	655SB00502	Soil	09/07/94	29.0000	J	UG/KG	CHS10	VAL
655-S-B006-01	655SB00601	Soil	09/07/94	25.0000	J	UG/KG	CHS10	VAL
655-S-B007-01	655SB00701	Soil	09/07/94	20.0000	J	UG/KG	CHS10	VAL
659-S-B001-02	659SB00102	Soil	08/31/94	264.0000	J	UG/KG	CHS09	VAL
659-S-B003-02	659SB00302	Soil	08/31/94	328.0000	J	UG/KG	CHS09	VAL
663-S-B004-01	663SB00401	Soil	08/31/94	11.2000	J	UG/KG	CHS09	VAL
670-M-0001-01	670M00101	Soil	09/24/94	172.0000		UG/KG	APX09	VAL
670-S-B006-02	670SB00602	Soil	09/13/94	20.0000	J	UG/KG	CHS14	VAL
670-S-B011-01	670SB01101	Soil	09/12/94	12.0000	J	UG/KG	CHS11	VAL
670-S-B011-02	670SB01102	Soil	09/12/94	11.0000	J	UG/KG	CHS11	VAL
670-S-B012-01	670SB01201	Soil	09/12/94	17.0000	J	UG/KG	CHS11	VAL
670-S-B012-02	670SB01202	Soil	09/12/94	21.0000	J	UG/KG	CHS11	VAL
670-S-B013-01	670SB01301	Soil	09/12/94	18.0000	J	UG/KG	CHS11	VAL
670-S-B016-01	670SB01601	Soil	09/14/94	29.0000	J	UG/KG	CHS14	VAL
670-S-B016-02	670SB01602	Soil	09/14/94	34.0000	J	UG/KG	CHS14	VAL
670-S-B017-01	670SB01701	Soil	09/14/94	26.0000	J	UG/KG	CHS14	VAL
670-S-B017-02	670SB01702	Soil	09/14/94	39.0000	J	UG/KG	CHS14	VAL
670-S-B018-01	670SB01801	Soil	09/14/94	21.0000	J	UG/KG	CHS14	VAL
670-S-B018-02	670SB01802	Soil	09/14/94	26.0000	J	UG/KG	CHS14	VAL
670-S-B021-01	670SB02101	Soil	09/14/94	14.0000	J	UG/KG	CHS14	VAL
670-S-B021-02	670SB02102	Soil	09/14/94	27.0000	J	UG/KG	CHS14	VAL
670-S-B022-01	670SB02201	Soil	09/14/94	19.0000	J	UG/KG	CHS14	VAL
670-S-B022-02	670SB02202	Soil	09/14/94	27.0000	J	UG/KG	CHS14	VAL
670-S-B023-01	670SB02301	Soil	09/23/94	11.0000	J	UG/KG	CHS14	VAL
670-S-B023-02	670SB02302	Soil	09/23/94	13.0000	J	UG/KG	CHS14	VAL
670-S-B024-01	670SB02401	Soil	09/23/94	15.0000		UG/KG	CHS14	VAL
670-S-B024-02	670SB02402	Soil	09/23/94	51.0000	J	UG/KG	CHS14	VAL
684-S-B003-02	684SB00302	Soil	09/19/94	23.5000	J	UG/KG	APX04	VAL
684-S-B006-01	684SB00601	Soil	09/19/94	78.1000	J	UG/KG	APX04	VAL
684-S-B007-01	684SB00701	Soil	09/19/94	212.0000	J	UG/KG	APX04	VAL
684-S-B009-02	684SB00902	Soil	09/19/94	44.8000		UG/KG	APX05	VAL
684-S-B010-01	684SB01001	Soil	09/19/94	27.1000		UG/KG	APX05	VAL
GDH-S-B001-01	GDHSB00101	Soil	09/27/94	4.4000	J	UG/KG	CHS15	VAL
GDH-S-B001-02	GDHSB00102	Soil	09/27/94	13.0000	J	UG/KG	CHS15	VAL

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

0064-00001 - NAVAL BASE CHARLESTON ZONE H (NBCH)

Samples by Chemical Report

75-09-2 - Methylene chloride

>= 1.0000 for All Concentration Units - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
GDH-S-B002-01	GDHSB00201	Soil	09/27/94	7.0000	J	UG/KG	CHS15	VAL
GDH-S-B003-01	GDHSB00301	Soil	09/27/94	6.0000	J	UG/KG	CHS15	VAL
GDH-S-B003-02	GDHSB00302	Soil	09/27/94	9.0000	J	UG/KG	CHS15	VAL
GDH-S-B004-02	GDHSB00402	Soil	09/27/94	9.0000	J	UG/KG	CHS15	VAL
GDH-S-B005-01	GDHSB00501	Soil	09/27/94	3.8000	J	UG/KG	CHS15	VAL
GDH-S-B006-02	GDHSB00602	Soil	09/27/94	3.7000	J	UG/KG	CHS15	VAL
GDH-S-B007-01	GDHSB00701	Soil	09/27/94	4.9000	J	UG/KG	CHS15	VAL
GDH-S-B007-02	GDHSB00702	Soil	09/27/94	5.0000	J	UG/KG	CHS15	VAL
GDH-S-B008-01	GDHSB00801	Soil	09/27/94	6.0000	J	UG/KG	CHS15	VAL
GDH-S-B009-01	GDHSB00901	Soil	09/27/94	4.5000	J	UG/KG	CHS15	VAL
GDH-S-B010-02	GDHSB01002	Soil	09/27/94	8.0000	J	UG/KG	CHS15	VAL
GDH-S-B011-01	GDHSB01101	Soil	09/27/94	8.0000	J	UG/KG	CHS14	VAL
GDH-S-B011-02	GDHSB01102	Soil	09/27/94	14.0000	J	UG/KG	CHS14	VAL
GDH-S-B012-01	GDHSB01201	Soil	09/27/94	8.0000	J	UG/KG	CHS14	VAL
GDH-S-B014-01	GDHSB01401	Soil	09/29/94	11.0000	J	UG/KG	CHS16	VAL
GDH-S-B017-02	GDHSB01702	Soil	10/03/94	16.0000	J	UG/KG	CHS16	VAL
GDH-S-B018-01	GDHSB01801	Soil	10/03/94	10.0000	J	UG/KG	CHS16	VAL
GDH-S-B020-01	GDHSB02001	Soil	10/03/94	10.0000	J	UG/KG	CHS16	VAL
GDH-S-B020-02	GDHSB02002	Soil	10/03/94	11.0000	J	UG/KG	CHS16	VAL
GDH-S-B021-01	GDHSB02101	Soil	10/03/94	10.0000	J	UG/KG	CHS16	VAL
DH-S-B022-01	GDHSB02201	Soil	10/03/94	9.0000	J	UG/KG	CHS16	VAL
GDH-S-B023-01	GDHSB02301	Soil	10/04/94	4.7000	J	UG/KG	CHS17	VAL
GDH-S-B023-02	GDHSB02302	Soil	10/04/94	6.0000	J	UG/KG	CHS17	VAL
GDH-S-B024-01	GDHSB02401	Soil	10/04/94	9.0000	J	UG/KG	CHS17	VAL
GDH-S-B025-01	GDHSB02501	Soil	10/04/94	7.0000	J	UG/KG	CHS17	VAL
GDH-S-B031-01	GDHSB03101	Soil	10/04/94	3.8000	J	UG/KG	CHS17	VAL
GDH-S-B031-02	GDHSB03102	Soil	10/04/94	3.9000	J	UG/KG	CHS17	VAL
GDH-S-B032-01	GDHSB03201	Soil	10/04/94	7.0000	J	UG/KG	CHS17	VAL
GDH-S-B032-02	GDHSB03202	Soil	10/04/94	18.0000	J	UG/KG	CHS17	VAL
GDH-S-B034-01	GDHSB03401	Soil	10/04/94	9.0000	J	UG/KG	CHS17	VAL
GDH-S-B034-02	GDHSB03402	Soil	10/04/94	10.0000	J	UG/KG	CHS17	VAL
GDH-S-B079-02	GDHSB07902	Soil	10/21/94	7.0000	J	UG/KG	CHS23	VAL
SGC-S-B002-02	SGCSB00202	Soil	10/10/94	27.0000	J	UG/KG	CHS20	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

0064-00001 - NAVAL BASE CHARLESTON ZONE H (NBCH)

Samples by Chemical Report

117-81-7 - bis(2-Ethylhexyl)phthalate (BEHP)

>= 1.0000 for All Concentration Units - Hits Only

Sample ID	Ext.	Orig. ID	Type	Date	Result	VQual	Units	SDG #	
009-M-0002-01		009M000201	Soil	09/08/94	160.0000	J	UG/KG	CHS12	VAL
009-M-0005-01		009M000501	Soil	09/07/94	830.0000		UG/KG	CHS12	VAL
009-M-0015-01		009M001501	Soil	09/09/94	130.0000	J	UG/KG	CHS12	VAL
009-N-0015-01		009N001501	Soil	09/09/94	162.0000	J	UG/KG	APX03	VAL
014-S-B002-01		014SB00201	Soil	09/22/94	63.6000	J	UG/KG	APX08	VAL
014-S-B004-02		014SB00402	Soil	09/22/94	71.0000	J	UG/KG	APX08	VAL
014-S-B008-01		014SB00801	Soil	09/22/94	89.2000	J	UG/KG	APX07	VAL
014-S-B008-02		014SB00802	Soil	09/22/94	57.6000	J	UG/KG	APX07	VAL
014-S-B009-02		014SB00902	Soil	09/22/94	153.0000	J	UG/KG	APX07	VAL
014-S-W001-14		014SW00114	Soil	09/22/94	70.2000	J	UG/KG	APX08	VAL
015-C-B004-01		015CB00401	Soil	09/12/94	156.0000	J	UG/KG	APX03	VAL
015-S-B007-01		015SB00701	Soil	01/20/95	91.0000	J	UG/KG	CHS32	VAL
017-S-B001-01		017SB00101	Soil	08/16/94	267.0000	J	UG/KG	CHS04	VAL
017-S-B002-01		017SB00201	Soil	08/16/94	233.0000	J	UG/KG	CHS04	VAL
017-S-B009-01		017SB00901	Soil	08/17/94	609.0000		UG/KG	CHS04	VAL
017-S-B010-01		017SB01001	Soil	08/17/94	157.0000	J	UG/KG	CHS05	VAL
017-S-B010-02		017SB01002	Soil	08/17/94	11300.0000		UG/KG	CHS05	VAL
017-S-B011-01		017SB01101	Soil	08/17/94	228.0000	J	UG/KG	CHS05	VAL
017-S-B011-02		017SB01102	Soil	08/17/94	546.0000	J	UG/KG	CHS05	VAL
017-S-B019-01		017SB01901	Soil	01/11/95	830.0000		UG/KG	CHS29	VAL
17-S-B022-01		017SB02201	Soil	01/11/95	260.0000	J	UG/KG	CHS29	VAL
017-S-B023-01		017SB02301	Soil	01/11/95	150.0000	J	UG/KG	CHS29	VAL
017-S-B024-01		017SB02401	Soil	01/13/95	670.0000		UG/KG	CHS30	VAL
017-S-B025-01		017SB02501	Soil	01/13/95	250.0000	J	UG/KG	CHS30	VAL
017-S-B026-01		GDHSB09901	Soil	02/02/95	200.0000	J	UG/KG	CHS33	VAL
019-S-B002-01		019SB00201	Soil	08/27/94	80.0000	J	UG/KG	CHS07	VAL
019-C-B002-01		019CB00201	Soil	08/27/94	446.0000		UG/KG	APX02	VAL
019-S-B003-01		019SB00301	Soil	08/29/94	160.0000	J	UG/KG	CHS08	VAL
019-S-B004-01		019SB00401	Soil	08/29/94	3000.0000		UG/KG	CHS08	VAL
019-S-B004-02		019SB00402	Soil	08/29/94	260.0000	J	UG/KG	CHS08	VAL
019-S-B005-01		019SB00501	Soil	01/17/95	160.0000	J	UG/KG	CHS31	VAL
019-S-B007-01		019SB00701	Soil	01/17/95	4200.0000		UG/KG	CHS31	VAL
019-S-B009-01		019SB00901	Soil	01/17/95	180.0000	J	UG/KG	CHS31	VAL
019-S-B010-01		019SB01001	Soil	01/17/95	280.0000	J	UG/KG	CHS30	VAL
019-S-B011-01	RE	019SB01101	Soil	01/17/95	160.0000	J	UG/KG	CHS30	VAL
019-S-B014-01		019SB01401	Soil	01/16/95	390.0000		UG/KG	CHS31	VAL
019-C-B014-01		019CB01401	Soil	01/16/95	876.0000		UG/KG	APX15	VAL
019-S-B018-01		019SB01801	Soil	03/22/95	9700.0000	J	UG/KG	CHS35	VAL
020-S-B001-01		020SB00101	Soil	03/27/95	180.0000	J	UG/KG	CHS37	VAL
020-C-B001-01		020CB00101	Soil	03/27/95	200.0000	J	UG/KG	CHS36	VAL
020-S-B002-01		020SB00201	Soil	03/27/95	240.0000	J	UG/KG	CHS37	VAL
020-S-B003-01		020SB00301	Soil	03/27/95	110.0000	J	UG/KG	CHS37	VAL
020-S-B004-01		020SB00401	Soil	03/27/95	1000.0000	J	UG/KG	CHS37	VAL
020-S-B005-01		020SB00501	Soil	03/27/95	220.0000	J	UG/KG	CHS37	VAL
020-S-B008-01		020SB00801	Soil	03/27/95	360.0000	J	UG/KG	CHS37	VAL
20-S-B009-01		020SB00901	Soil	03/28/95	610.0000	J	UG/KG	CHS37	VAL
020-S-B010-01		020SB01001	Soil	03/28/95	140.0000	J	UG/KG	CHS37	VAL
020-S-B011-01		020SB01101	Soil	03/28/95	16000.0000	J	UG/KG	CHS37	VAL
020-C-B011-01		020CB01101	Soil	03/28/95	330.0000	J	UG/KG	CHS36	VAL

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

0064-00001 - NAVAL BASE CHARLESTON ZONE H (NBCH)

Samples by Chemical Report

117-81-7 - bis(2-Ethylhexyl)phthalate (BEHP)

>= 1.0000 for All Concentration Units - Hits Only

Sample ID	Ext.	Orig. ID	Type	Date	Result	VQual	Units	SDG #	
020-S-B011-02		020SB01102	Soil	03/28/95	380.0000	J	UG/KG	CHS37	VAL
121-S-B002-01		121SB00201	Soil	08/26/94	62.0000	J	UG/KG	CHS07	VAL
121-S-B005-01		121SB00501	Soil	08/26/94	1000.0000	J	UG/KG	CHS07	VAL
121-S-B006-01		121SB00601	Soil	01/16/95	140.0000	J	UG/KG	CHS31	VAL
121-S-B007-01		121SB00701	Soil	01/13/95	82.0000	J	UG/KG	CHS30	VAL
121-S-B009-01		121SB00901	Soil	01/16/95	140.0000	J	UG/KG	CHS31	VAL
121-S-B011-01		121SB01101	Soil	01/16/95	120.0000	J	UG/KG	CHS31	VAL
121-S-B013-01		121SB01301	Soil	03/22/95	170.0000	J	UG/KG	CHS35	VAL
121-S-B014-01		121SB01401	Soil	03/22/95	590.0000	J	UG/KG	CHS35	VAL
121-S-B016-01		121SB01601	Soil	03/22/95	690.0000	J	UG/KG	CHS35	VAL
136-S-B002-01		136SB00201	Soil	08/31/94	904.0000		UG/KG	CHS09	VAL
138-S-B002-02		138SB00202	Soil	08/29/94	111.0000	J	UG/KG	CHS09	VAL
159-M-0001-01		159M000101	Soil	06/20/95	2400.0000		UG/KG	CHS46	VAL
159-M-0002-01		159M000201	Soil	06/20/95	280.0000	J	UG/KG	CHS46	VAL
159-S-B002-01		159SB00201	Soil	06/19/95	100.0000	J	UG/KG	CHS46	VAL
159-S-B004-01		159SB00401	Soil	06/19/95	190.0000	J	UG/KG	CHS46	VAL
159-S-B010-01		159SB01001	Soil	06/19/95	130.0000	J	UG/KG	CHS46	VAL
159-S-B013-01		159SB01301	Soil	06/19/95	140.0000	J	UG/KG	CHS46	VAL
649-S-B001-01		649SB00101	Soil	08/22/94	234.0000	J	UG/KG	CHS05	VAL
649-C-B001-01	RE	649CB00101	Soil	08/22/94	126.0000	J	UG/KG	APX02	VAL
649-S-B002-01		649SB00201	Soil	08/22/94	107.0000	J	UG/KG	CHS05	VAL
650-S-B001-01		650SB00101	Soil	08/22/94	100.0000	J	UG/KG	CHS05	VAL
650-S-B002-01		650SB00201	Soil	08/22/94	125.0000	J	UG/KG	CHS05	VAL
650-S-B004-01		650SB00401	Soil	08/22/94	504.0000		UG/KG	CHS05	VAL
650-S-B005-01		650SB00501	Soil	01/19/95	190.0000	J	UG/KG	CHS32	VAL
653-S-B001-01		653SB00101	Soil	08/26/94	350.0000	J	UG/KG	CHS08	VAL
653-S-B001-02		653SB00102	Soil	08/26/94	110.0000	J	UG/KG	CHS08	VAL
653-S-B002-01		653SB00201	Soil	08/26/94	340.0000	J	UG/KG	CHS08	VAL
653-S-B003-01		653SB00301	Soil	08/26/94	4300.0000		UG/KG	CHS08	VAL
653-C-B003-01	RE	653CB00301	Soil	08/26/94	9090.0000		UG/KG	APX02	VAL
653-S-B004-01		653SB00401	Soil	08/26/94	110.0000	J	UG/KG	CHS08	VAL
654-S-B001-01		654SB00101	Soil	09/07/94	110.0000	J	UG/KG	CHS10	VAL
654-C-B001-01		654CB00101	Soil	09/07/94	124.0000	J	UG/KG	APX03	VAL
655-S-B005-01		655SB00501	Soil	09/07/94	1800.0000		UG/KG	CHS10	VAL
655-S-B006-01		655SB00601	Soil	09/07/94	150.0000	J	UG/KG	CHS10	VAL
656-S-B006-01		656SB00601	Soil	08/10/94	280.0000	J	UG/KG	CHS01	VAL
659-S-B001-01		659SB00101	Soil	08/31/94	106.0000	J	UG/KG	CHS09	VAL
659-S-B004-01		659SB00401	Soil	08/31/94	423.0000		UG/KG	CHS09	VAL
663-S-B002-01		663SB00201	Soil	08/31/94	131.0000	J	UG/KG	CHS09	VAL
663-S-B004-01		663SB00401	Soil	08/31/94	61.9000	J	UG/KG	CHS09	VAL
663-S-B004-02		663SB00402	Soil	08/31/94	159.0000	J	UG/KG	CHS09	VAL
663-S-B005-01		663SB00501	Soil	08/31/94	65.8000	J	UG/KG	CHS09	VAL
663-S-B005-02		663SB00502	Soil	08/31/94	117.0000	J	UG/KG	CHS09	VAL
665-S-B003-02		665SB00302	Soil	08/26/94	150.0000	J	UG/KG	CHS07	VAL
665-S-B004-01		665SB00401	Soil	08/26/94	130.0000	J	UG/KG	CHS07	VAL
666-S-B003-02		666SB00302	Soil	08/23/94	137.0000	J	UG/KG	CHS05	VAL
666-S-B004-01		666SB00401	Soil	08/23/94	116.0000	J	UG/KG	CHS05	VAL
667-S-B001-01		667SB00101	Soil	08/29/94	310.0000	J	UG/KG	CHS08	VAL
667-S-B002-01		667SB00201	Soil	08/29/94	460.0000	J	UG/KG	CHS08	VAL

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

0064-00001 - NAVAL BASE CHARLESTON ZONE H (NBCH)

Samples by Chemical Report

117-81-7 - bis(2-Ethylhexyl)phthalate (BEHP)

>= 1.0000 for All Concentration Units - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
667-C-B002-01	667CB00201	Soil	08/29/94	500.0000	J	UG/KG	APX02	VAL
670-S-B033-01	670SB03301	Soil	03/28/95	800.0000	J	UG/KG	CHS37	VAL
670-S-B033-02	670SB03302	Soil	03/28/95	350.0000	J	UG/KG	CHS37	VAL
670-S-B035-01	670SB03201	Soil	03/28/95	110.0000	J	UG/KG	CHS37	VAL
684-M-0001-01	684M00101	Soil	09/24/94	156.0000	J	UG/KG	APX09	VAL
684-C-B002-01	684CB00201	Soil	09/19/94	49.0000	J	UG/KG	APX06	VAL
684-S-B008-01	684SB00801	Soil	09/19/94	75.2000	J	UG/KG	APX05	VAL
684-S-B009-02	684SB00902	Soil	09/19/94	113.0000	J	UG/KG	APX05	VAL
684-S-B010-01	684SB01001	Soil	09/19/94	55.8000	J	UG/KG	APX05	VAL
684-S-B012-01	684SB01201	Soil	09/20/94	127.0000	J	UG/KG	APX05	VAL
684-S-B014-01	684SB01401	Soil	09/20/94	45.7000	J	UG/KG	APX05	VAL
684-S-B015-01	684SB01501	Soil	09/20/94	79.2000	J	UG/KG	APX05	VAL
684-S-B015-02	684SB01502	Soil	09/20/94	5670.0000		UG/KG	APX05	VAL
684-S-B016-02	684SB01602	Soil	09/20/94	86.0000	J	UG/KG	APX05	VAL
684-S-B018-01	684SB01801	Soil	09/21/94	52.7000	J	UG/KG	APX05	VAL
684-S-B018-02	684SB01802	Soil	09/21/94	48.1000	J	UG/KG	APX05	VAL
684-S-B020-01	684SB02001	Soil	09/21/94	62.1000	J	UG/KG	APX07	VAL
684-S-B024-02	684SB02402	Soil	09/21/94	114.0000	J	UG/KG	APX07	VAL
684-S-B032-01	684SB03201	Soil	01/25/95	71.0000	J	UG/KG	CHS33	VAL
684-C-B036-01	684CB03601	Soil	01/25/95	95.7000	J	UG/KG	APX16	VAL
84-S-B041-01	684SB04101	Soil	03/29/95	320.0000	J	UG/KG	CHS40	VAL
G07-S-B002-01	GDHSB09701	Soil	02/02/95	93.0000	J	UG/KG	CHS33	VAL
G80-S-B001-01	GDHSB10001	Soil	02/03/95	110.0000	J	UG/KG	CHS34	VAL
G80-C-B004-01	GDHCB09701	Soil	02/02/95	70.6000	J	UG/KG	APX16	VAL
GDH-S-B001-01	GDHSB00101	Soil	09/27/94	110.0000	J	UG/KG	CHS15	VAL
GDH-S-B005-01	GDHSB00501	Soil	09/27/94	110.0000	J	UG/KG	CHS15	VAL
GDH-S-B007-01	GDHSB00701	Soil	09/27/94	93.0000	J	UG/KG	CHS15	VAL
GDH-C-B007-01	GDHCB00701	Soil	09/27/94	407.0000		UG/KG	APX06	VAL
GDH-S-B008-01	GDHSB00801	Soil	09/27/94	390.0000	J	UG/KG	CHS15	VAL
GDH-C-B009-01	GDHCB00901	Soil	09/22/94	111.0000	J	UG/KG	APX06	VAL
GDH-C-B011-01	GDHCB01101	Soil	09/27/94	74.2000	J	UG/KG	APX06	VAL
GDH-S-B011-02	GDHSB01102	Soil	09/27/94	400.0000	J	UG/KG	CHS14	VAL
GDH-S-B012-01	GDHSB01201	Soil	09/27/94	180.0000	J	UG/KG	CHS14	VAL
GDH-S-B014-01	GDHSB01401	Soil	09/29/94	680.0000	J	UG/KG	CHS16	VAL
GDH-S-B015-01	GDHSB01501	Soil	09/29/94	150.0000	J	UG/KG	CHS16	VAL
GDH-S-B018-01	GDHSB01801	Soil	10/03/94	100.0000	J	UG/KG	CHS16	VAL
GDH-S-B019-01	GDHSB01901	Soil	10/03/94	180.0000	J	UG/KG	CHS16	VAL
GDH-S-B022-01	GDHSB02201	Soil	10/03/94	130.0000	J	UG/KG	CHS16	VAL
GDH-S-B026-01	GDHSB02601	Soil	10/04/94	100.0000	J	UG/KG	CHS17	VAL
GDH-S-B027-01	GDHSB02701	Soil	10/04/94	300.0000	J	UG/KG	CHS17	VAL
GDH-S-B029-01	GDHSB02901	Soil	10/04/94	110.0000	J	UG/KG	CHS17	VAL
GDH-S-B042-01	GDHSB04201	Soil	10/05/94	340.0000	J	UG/KG	CHS18	VAL
GDH-S-B053-01	GDHSB05301	Soil	10/06/94	99.0000	J	UG/KG	CHS19	VAL
GDH-S-B054-01	GDHSB05401	Soil	10/06/94	170.0000	J	UG/KG	CHS19	VAL
GDH-S-B055-01	GDHSB05501	Soil	10/06/94	94.0000	J	UG/KG	CHS19	VAL
DH-S-B061-01	GDHSB06101	Soil	10/07/94	290.0000	J	UG/KG	CHS19	VAL
GDH-S-B068-01	GDHSB06801	Soil	10/11/94	360.0000	J	UG/KG	CHS21	VAL
GDH-S-B078-01	GDHSB07801	Soil	10/21/94	210.0000	J	UG/KG	CHS23	VAL
GDH-S-B080-01	GDHSB08001	Soil	10/21/94	39.0000	J	UG/KG	CHS23	VAL

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

0064-00001 - NAVAL BASE CHARLESTON ZONE H (NBCH)

Samples by Chemical Report

117-81-7 - bis(2-Ethylhexyl)phthalate (BEHP)

>= 1.0000 for All Concentration Units - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
GDH-S-B092-01	GDHSB09201	Soil	12/14/94	160.0000	J	UG/KG	CHS28	VAL
GDH-S-B105-01	GDHSB10501	Soil	02/06/95	92.0000	J	UG/KG	CHS34	VAL
GDH-S-B107-01	GDHSB10701	Soil	02/07/95	210.0000	J	UG/KG	CHS34	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2908-00005 - CHARLESTON ZONE H - QUARTERLY '95

Samples by Chemical Report

67-64-1 - Acetone

>= 1.0000 for UG/L - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
009-H-W004-04	009HW00404	Water	04/04/96	8.0000	J	UG/L	25150	VAL
009-H-W005-01	009HW00501	Water	11/02/94	11.7000	J	UG/L	APX12	VAL
009-G-W005-03	009GW00503	Water	09/28/95	19.0000	J	UG/L	CHS52	VAL
009-G-W008-03	009GW00803	Water	09/28/95	21.0000	J	UG/L	CHS52	VAL
009-G-W009-02	009GW00902	Water	04/14/95	22.0000	J	UG/L	CHS44	VAL
009-G-W009-04	009GW00904	Water	04/05/96	4.0000	J	UG/L	25150	VAL
009-G-W010-02	009GW01002	Water	04/25/95	230.0000	J	UG/L	CHS44	VAL
009-G-W011-03	009GW01103	Water	09/28/95	27.0000		UG/L	CHS52	VAL
009-G-W012-04	009GW01204	Water	04/11/96	8.0000	J	UG/L	25236	VAL
009-G-W013-04	009GW01304	Water	04/12/96	11.0000		UG/L	25236	VAL
009-G-W015-04	009GW01504	Water	04/12/96	13.0000		UG/L	25236	VAL
009-G-W016-01	009GW01601	Water	04/19/95	36.0000		UG/L	CHS45	VAL
009-H-W016-01	009HW01601	Water	04/19/95	53.2000	J	UG/L	APX17	VAL
009-G-W019-04	009GW01904	Water	04/15/96	5.0000	J	UG/L	25286	VAL
009-G-W03D-04	009GW03D04	Water	04/04/96	2.0000	J	UG/L	25150	VAL
009-G-W04D-01	009GW04D01	Water	11/21/94	25.0000		UG/L	CHS26	VAL
014-G-W002-04	014GW00204	Water	03/20/96	5.0000	J	UG/L	24968	VAL
014-G-W03D-04	014GW03D04	Water	03/13/96	10.0000	J	UG/L	24897	VAL
017-G-W002-03	017GW00203	Water	09/19/95	750.0000	J	UG/L	CHS50	VAL
017-G-W004-03	017GW00403	Water	09/19/95	180.0000		UG/L	CHS50	VAL
17-H-W005-01	017HW00501	Water	04/18/95	17.9000	J	UG/L	APX17	VAL
017-G-W005-03	017GW00503	Water	09/20/95	360.0000		UG/L	CHS50	VAL
020-T-HP01-01	020THP0101	Water	09/21/94	3.5000	J	UG/L	TSU	
020-G-HP01-16	020GHP0116	Water	09/19/94	131.0000		UG/L	TSU	
020-G-HP01-65	020GHP0165	Water	09/20/94	5.9000	J	UG/L	TSU	
020-G-HP02-52	020GHP0252	Water	09/21/94	3.2000	J	UG/L	TSU	
020-G-HP03-38	020GHP0338	Water	09/21/94	21.6000		UG/L	TSU	
020-G-HP04-40	020GHP0440	Water	09/22/94	17.2000		UG/L	TTN	
020-G-TW02-00	020GTW0200	Water	10/06/94	28.0000		UG/L	CHARL	VAL
020-G-TW05-00	020GTW0500	Water	10/07/94	25.0000		UG/L	CHARL	VAL
121-G-TW02-00	121GTW0200	Water	10/06/94	64.0000		UG/L	CHARL	VAL
121-G-TW04-00	121GTW0400	Water	10/07/94	30.0000		UG/L	CHARL	VAL
121-H-TW04-00	121HTW0400	Water	10/07/94	59.0000		UG/L	CHARL	VAL
656-G-W001-03	656GW00103	Water	09/13/95	130.0000		UG/L	CHS48	VAL
656-G-W002-03	656GW00203	Water	09/13/95	35.0000	J	UG/L	CHS48	VAL
663-G-W002-03	663GW00203	Water	09/13/95	25.0000	J	UG/L	CHS48	VAL
GDH-G-W004-01	GDHGW00401	Water	11/17/94	23.0000	J	UG/L	CHS26	VAL
GDH-G-W07D-02	GDHGW07D02	Water	03/31/95	32.0000		UG/L	CHS41	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2908-00005 - CHARLESTON ZONE H - QUARTERLY '95

Samples by Chemical Report

75-09-2 - Methylene chloride

>= 1.0000 for UG/L - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
009-G-W007-02	009GW00702	Water	04/24/95	130.0000	J	UG/L	CHS44	VAL
009-H-W007-02	009HW00702	Water	04/24/95	110.0000	J	UG/L	CHS43	VAL
009-G-W007-03	009GW00703	Water	09/14/95	68.0000		UG/L	CHS48	VAL
009-G-W007-04	009GW00704	Water	03/20/96	280.0000	D	UG/L	24968	VAL
009-H-W007-04	009HW00704	Water	03/20/96	330.0000	D	UG/L	24968	VAL
009-G-W012-04	009GW01204	Water	04/11/96	4.0000	JB	UG/L	25236	VAL
009-G-W015-02	009GW01502	Water	04/19/95	9.0000	J	UG/L	CHS44	VAL
009-G-W12D-04	009GW12D04	Water	04/11/96	2.0000	JB	UG/L	25236	VAL
014-G-W002-04	014GW00204	Water	03/20/96	10.0000		UG/L	24968	VAL
017-H-W002-02	017HW00202	Water	03/29/95	520.0000	J	UG/L	CHS39	VAL
017-G-W002-03	017GW00203	Water	09/19/95	240.0000	J	UG/L	CHS50	VAL
017-G-W004-03	017GW00403	Water	09/19/95	16.0000	J	UG/L	CHS50	VAL
020-T-HP01-01	020THP0101	Water	09/21/94	2.1000	J	UG/L	TSU	
020-G-HP01-16	020GHP0116	Water	09/19/94	1.4000	J	UG/L	TSU	
020-G-HP01-65	020GHP0165	Water	09/20/94	1.8000	J	UG/L	TSU	
020-G-HP02-52	020GHP0252	Water	09/21/94	1.3000	J	UG/L	TSU	
020-G-HP03-38	020GHP0338	Water	09/21/94	1.9000	J	UG/L	TSU	
020-G-HP04-40	020GHP0440	Water	09/22/94	2.2000	J	UG/L	TTN	
020-G-TW05-00	020GTW0500	Water	10/07/94	5.0000	J	UG/L	CHARL	VAL
020-G-TW07-00	020GTW0700	Water	10/06/94	5.0000	J	UG/L	CHARL	VAL
121-H-TW04-00	121HTW0400	Water	10/07/94	4.9000	J	UG/L	CHARL	VAL
121-G-W001-04	121GW00104	Water	04/02/96	5.0000	J	UG/L	25067	VAL
656-G-W003-04	656GW00304	Water	03/20/96	10.0000		UG/L	24968	VAL
GDH-G-W004-03	GDHGW00403	Water	10/09/95	12.0000		UG/L	CHS53	VAL
GDH-G-W01D-01	GDHGW01D01	Water	11/03/94	6.0000	J	UG/L	CHS25	VAL
GDH-G-W11D-01	GDHGW11D01	Water	12/15/94	5.0000	J	UG/L	CHS27	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2908-00005 - CHARLESTON ZONE H - QUARTERLY '95

Samples by Chemical Report

117-81-7 - bis(2-Ethylhexyl)phthalate (BEHP)

>= 1.0000 for UG/L - Hits Only

Sample ID	Ext.	Orig. ID	Type	Date	Result	VQual	Units	SDG #	
009-G-W007-04		009GW00704	Water	03/20/96	1.0000	J	UG/L	24968	VAL
009-H-W007-04		009HW00704	Water	03/20/96	3.0000	J	UG/L	24968	VAL
009-G-W008-04		009GW00804	Water	04/08/96	3.0000	J	UG/L	25191	VAL
009-G-W009-04		009GW00904	Water	04/05/96	2.0000	J	UG/L	25150	VAL
009-G-W010-01		009GW01001	Water	11/07/94	2.4000	J	UG/L	CHS25	VAL
009-G-W012-02		009GW01202	Water	04/24/95	2.7000	J	UG/L	CHS44	VAL
009-G-W016-01		009GW01601	Water	04/19/95	5.2000	J	UG/L	CHS45	VAL
009-G-W03D-03		009GW03D03	Water	09/26/95	25.0000		UG/L	CHS51	VAL
009-G-W04D-04		009GW04D04	Water	04/05/96	1.0000	J	UG/L	25150	VAL
009-G-W05D-04		009GW05D04	Water	04/09/96	4.0000	J	UG/L	25191	VAL
009-G-W08D-04		009GW08D04	Water	04/09/96	3.0000	J	UG/L	25191	VAL
013-G-1302-04		013G130204	Water	03/21/96	35.0000		UG/L	25015	VAL
013-G-W004-04		013GW00404	Water	03/20/96	59.0000		UG/L	24968	VAL
013-H-W007-04		013HW00704	Water	03/21/96	2.0000	J	UG/L	25015	VAL
014-G-W001-01		014GW00101	Water	11/15/94	2.2000	J	UG/L	APX13	VAL
014-G-W002-01		014GW00201	Water	11/14/94	11.8000		UG/L	APX13	VAL
014-G-W003-01		014GW00301	Water	11/16/94	5.0000	J	UG/L	APX13	VAL
014-G-W003-04		014GW00304	Water	03/12/96	2.0000	J	UG/L	24897	VAL
014-G-W004-01		014GW00401	Water	11/16/94	5.8000	J	UG/L	APX13	VAL
014-G-W005-01		014GW00501	Water	11/16/94	1.8000	J	UG/L	APX13	VAL
14-G-W005-04		014GW00504	Water	03/14/96	220.0000		UG/L	24897	VAL
014-G-W01D-01	RE	014GW01D01	Water	11/15/94	1.7000	J	UG/L	APX13	VAL
014-G-W03D-01	RE	014GW03D01	Water	11/16/94	7.5000	J	UG/L	APX13	VAL
014-G-W04D-03		014GW04D03	Water	09/12/95	740.0000		UG/L	CHS48	VAL
017-G-W002-03		017GW00203	Water	09/19/95	140.0000		UG/L	CHS50	VAL
017-G-W005-01		017GW00501	Water	04/18/95	3.3000	J	UG/L	CHS45	VAL
017-G-W006-01		017GW00601	Water	04/18/95	4.0000	J	UG/L	CHS45	VAL
178-H-W001-02		178HW00102	Water	04/26/95	530.0000	J	UG/L	CHS43	VAL
178-G-W001-03		178GW00103	Water	09/21/95	290.0000		UG/L	CHS51	VAL
653-G-W001-02		653GW00102	Water	04/05/95	2.9000	J	UG/L	CHS42	VAL
655-H-W003-04		655HW00304	Water	03/26/96	2.0000	J	UG/L	25067	VAL
663-G-W002-03	RE	663GW00203	Water	09/13/95	180.0000		UG/L	CHS48	VAL
663-G-W002-04		663GW00204	Water	03/14/96	59.0000		UG/L	24897	VAL
GDH-H-W006-04		GDHHW00604	Water	04/10/96	65.0000		UG/L	25191	VAL
GDH-G-W06D-01		GDHGW06D01	Water	11/18/94	3.9000	J	UG/L	CHS26	VAL
GDH-G-W06D-02		GDHGW06D02	Water	03/28/95	230.0000		UG/L	CHS38	VAL
GDH-G-W09D-02		GDHGW09D02	Water	04/12/95	6.9000	J	UG/L	CHS42	VAL
GDH-G-W09D-04		GDHGW09D04	Water	04/12/96	2.0000	J	UG/L	25236	VAL
GDH-G-W10D-02		GDHGW10D02	Water	04/14/95	9.0000	J	UG/L	CHS42	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2909-00001 - CHARLESTON ZONE I

Samples by Chemical Report

67-64-1 - Acetone

>= 1.0000 for All Concentration Units - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
012-S-B001-01	012SB00101	Soil	03/08/95	31.0000	J	UG/KG	00808	VAL
012-C-B001-01	012CB00101	Soil	03/08/95	48.0000	J	UG/KG	00681	VAL
012-S-B002-01	012SB00201	Soil	03/08/95	60.0000	J	UG/KG	00808	VAL
012-S-B003-01	012SB00301	Soil	03/09/95	15.0000	J	UG/KG	00808	VAL
012-S-B007-01	012SB00701	Soil	03/09/95	12.0000	J	UG/KG	00808	VAL
012-S-B008-01	012SB00801	Soil	03/09/95	45.0000	J	UG/KG	00808	VAL
012-S-B009-01	012SB00901	Soil	03/09/95	47.0000	J	UG/KG	00808	VAL
012-S-B010-01	012SB01001	Soil	03/09/95	10.0000	J	UG/KG	00808	VAL
012-C-B010-01	012CB01001	Soil	03/09/95	8.0000	J	UG/KG	00808	VAL
012-S-B011-01	012SB01101	Soil	03/09/95	13.0000	J	UG/KG	00808	VAL
012-S-B012-01	012SB01201	Soil	03/09/95	67.0000	J	UG/KG	00808	VAL
012-G-W002-01	012GW00201	Water	06/08/95	8.0000	J	UG/L	0010V	VAL
177-S-B001-01	177SB00101	Soil	06/07/96	18.0000	J	UG/KG	25933	VAL
177-S-B003-02	177SB00302	Soil	06/07/96	28.0000	J	UG/KG	25933	VAL
177-S-B005-01	177SB00501	Soil	06/07/96	160.0000	D	UG/KG	25933	VAL
671-S-B001-01	671SB00101	Soil	02/21/95	28.0000	J	UG/KG	00315	VAL
671-S-B006-01	671SB00601	Soil	02/27/95	31.0000	J	UG/KG	00579	VAL
671-S-B006-02	671SB00602	Soil	02/27/95	36.0000	J	UG/KG	00579	VAL
671-S-B007-01	671SB00701	Soil	02/27/95	21.0000	J	UG/KG	00579	VAL
671-S-B008-02	671SB00802	Soil	02/27/95	33.0000	J	UG/KG	00579	VAL
672-S-B001-02	672SB00102	Soil	02/20/95	27.0000	J	UG/KG	00315	VAL
672-S-B003-01	672SB00301	Soil	02/20/95	100.0000	J	UG/KG	00315	VAL
672-S-B003-02	672SB00302	Soil	02/20/95	28.0000	J	UG/KG	00315	VAL
673-S-B002-01	673SB00201	Soil	02/20/95	140.0000		UG/KG	00315	VAL
673-S-B004-01	673SB00401	Soil	02/21/95	52.0000	J	UG/KG	00315	VAL
673-S-B004-02	673SB00402	Soil	02/21/95	65.0000	J	UG/KG	00315	VAL
673-S-B005-01	673SB00501	Soil	02/21/95	150.0000	J	UG/KG	00315	VAL
673-S-B006-01	673SB00601	Soil	02/21/95	120.0000		UG/KG	00315	VAL
673-C-B006-01	673CB00601	Soil	02/21/95	79.0000	J	UG/KG	00229	VAL
675-M-0001-01	675M000101	Soil	06/22/95	95.0000	J	UG/KG	0011V	VAL
676-S-B001-02	676SB00102	Soil	02/21/95	17.0000	J	UG/KG	00391	VAL
677-S-B002-01	677SB00201	Soil	02/21/95	32.0000	J	UG/KG	00391	VAL
677-S-B002-02	677SB00202	Soil	02/21/95	26.0000	J	UG/KG	00391	VAL
677-S-B004-02	677SB00402	Soil	02/28/95	64.0000	J	UG/KG	00681	VAL
677-S-B006-01	677SB00601	Soil	02/27/95	72.0000	J	UG/KG	00579	VAL
677-S-B006-02	677SB00602	Soil	02/27/95	200.0000	J	UG/KG	00579	VAL
677-C-B010-01	677CB01001	Soil	02/28/95	52.0000	J	UG/KG	00579	VAL
678-S-B001-01	678SB00101	Soil	02/22/95	17.0000	J	UG/KG	00391	VAL
678-S-B001-02	678SB00102	Soil	02/22/95	17.0000	J	UG/KG	00391	VAL
678-S-B002-02	678SB00202	Soil	03/01/95	25.0000	J	UG/KG	00681	VAL
678-S-B003-01	678SB00301	Soil	03/06/95	28.0000	J	UG/KG	00681	VAL
678-S-B003-02	678SB00302	Soil	03/06/95	19.0000	J	UG/KG	00681	VAL
678-S-B006-02	678SB00602	Soil	03/06/95	11.0000	J	UG/KG	00681	VAL
678-C-B006-02	678CB00602	Soil	03/06/95	14.0000	J	UG/KG	00681	VAL
679-S-B002-01	679SB00201	Soil	03/10/95	15.0000	J	UG/KG	00808	VAL
679-S-B003-01	679SB00301	Soil	03/10/95	50.0000	J	UG/KG	01057	VAL
679-S-B004-01	679SB00401	Soil	03/10/95	16.0000	J	UG/KG	01057	VAL
679-S-B005-02	679SB00502	Soil	03/10/95	11.0000	J	UG/KG	01057	VAL
679-S-B006-01	679SB00601	Soil	03/10/95	8.0000	J	UG/KG	01057	VAL

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2909-00001 - CHARLESTON ZONE I

Samples by Chemical Report

67-64-1 - Acetone

>= 1.0000 for All Concentration Units - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
679-S-B007-01	679SB00701	Soil	03/10/95	31.0000	J	UG/KG	01057	VAL
679-S-B008-01	679SB00801	Soil	03/10/95	38.0000	J	UG/KG	01057	VAL
679-S-B009-01	679SB00901	Soil	03/10/95	49.0000	J	UG/KG	01057	VAL
679-S-B010-02	679SB01002	Soil	03/10/95	29.0000	J	UG/KG	01057	VAL
679-S-B011-01	679SB01101	Soil	03/10/95	13.0000	J	UG/KG	01057	VAL
679-C-B011-01	679CB01101	Soil	03/10/95	19.0000	J	UG/KG	00808	VAL
679-S-B011-02	679SB01102	Soil	03/10/95	8.0000	J	UG/KG	01057	VAL
681-S-B002-02	681SB00202	Soil	03/01/95	54.0000	J	UG/KG	00681	VAL
685-S-B001-01	685SB00101	Soil	02/22/95	26.0000	J	UG/KG	00391	VAL
685-S-B007-01	685SB00701	Soil	02/22/95	36.0000	J	UG/KG	00391	VAL
687-S-B003-01	687SB00301	Soil	03/30/95	7.0000	J	UG/KG	0002V	VAL
687-C-B003-01	687CB00301	Soil	03/30/95	10.0000	J	UG/KG	0002V	VAL
687-S-B003-02	687SB00302	Soil	03/30/95	22.0000	J	UG/KG	0002V	VAL
687-S-B004-01	687SB00401	Soil	03/30/95	8.0000	J	UG/KG	0002V	VAL
687-G-W003-01	687GW00301	Water	06/08/95	8.0000	J	UG/L	0010V	VAL
690-S-B003-01	690SB00301	Soil	12/16/94	44.0000	J	UG/KG	CHS28	VAL
690-S-B005-01	690SB00501	Soil	12/16/94	870.0000	J	UG/KG	CHS28	VAL
690-S-B006-01	690SB00601	Soil	12/16/94	60.0000	J	UG/KG	CHS28	VAL
690-S-B010-01	690SB01001	Soil	12/16/94	1500.0000	J	UG/KG	CHS28	VAL
690-S-B015-01	690SB01501	Soil	02/08/95	38.0000	J	UG/KG	00008	VAL
690-C-B026-01	690CB02601	Soil	02/13/95	38.0000	J	UG/KG	00008	VAL
690-S-B029-02	690SB02902	Soil	02/13/95	66.0000	J	UG/KG	00008	VAL
690-S-B030-01	690SB03001	Soil	02/13/95	96.0000	J	UG/KG	00008	VAL
DMA-W-0001-01	DMAW000101	Water	04/04/95	6.0000	J	UG/L	0003V	VAL
DMA-M-0003-01	DMAM000301	Soil	04/05/95	46.0000	J	UG/KG	0002V	VAL
DMA-W-0005-01	DMAW000501	Water	04/04/95	12.0000	J	UG/L	0003V	VAL
DMA-M-0006-01	DMAM000601	Soil	04/05/95	38.0000	J	UG/KG	0002V	VAL
DMA-M-0009-01	DMAM000901	Soil	04/05/95	28.0000	J	UG/KG	0002V	VAL
DMA-S-B003-01	DMASB00301	Soil	03/20/95	5.0000	J	UG/KG	01057	VAL
GDI-C-B006-01	GRDCB00601	Soil	02/16/95	56.0000	J	UG/KG	00105	VAL
GDI-S-B013-02	GRDSB01302	Soil	02/17/95	55.0000	J	UG/KG	00229	VAL
GDI-S-B014-01	GRDSB01401	Soil	02/17/95	22.0000	J	UG/KG	00229	VAL
GDI-S-B014-02	GRDSB01402	Soil	02/17/95	110.0000	J	UG/KG	00229	VAL
GDI-S-B015-01	GRDSB01501	Soil	02/17/95	43.0000	J	UG/KG	00229	VAL
GDI-S-B015-02	GRDSB01502	Soil	02/17/95	48.0000	J	UG/KG	00229	VAL
GDI-S-B017-01	GRDSB01701	Soil	02/16/95	62.0000	J	UG/KG	00105	VAL
GDI-S-B018-01	GRDSB01801	Soil	/ /	58.0000	J	UG/KG	00105	VAL
GDI-S-B018-02	GRDSB01802	Soil	/ /	42.0000	J	UG/KG	00105	VAL
GDI-G-W001-01	GRDGW00101	Water	04/24/95	9.0000	J	UG/L	0005V	VAL
GDI-G-W002-01	GRDGW00201	Water	04/24/95	9.0000	J	UG/L	0005V	VAL
GDI-G-W003-01	GRDGW00301	Water	04/24/95	60.0000		UG/L	0005V	VAL
GDI-G-W005-01	GRDGW00501	Water	04/25/95	10.0000	J	UG/L	0005V	VAL
GDI-G-W006-01	GRDGW00601	Water	04/25/95	7.0000	J	UG/L	0005V	VAL
GDI-G-W013-01	GRDGW01301	Water	04/26/95	19.0000		UG/L	0005V	VAL
GDI-G-W03D-01	GDIGW03D01	Water	06/09/95	27.0000	J	UG/L	0010V	VAL
GDI-G-W14D-01	GDIGW14D01	Water	06/07/95	21.0000		UG/L	0010V	VAL
RTC-S-B002-01	RTCSB00201	Soil	05/26/95	13.0000	J	UG/KG	0009V	VAL
RTC-C-B002-01	RTCCB00201	Soil	05/26/95	15.0000	J	UG/KG	0009V	VAL
RTC-S-B004-01	RTCSB00401	Soil	05/26/95	98.0000	J	UG/KG	0009V	VAL

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2909-00001 - CHARLESTON ZONE I

Samples by Chemical Report

67-64-1 - Acetone

>= 1.0000 for All Concentration Units - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
RTC-S-B007-01	RTCSB00701	Soil	05/26/95	130.0000	J	UG/KG	0009V	VAL
RTC-S-B008-01	RTCSB00801	Soil	05/26/95	12.0000	J	UG/KG	0009V	VAL
RTC-S-B009-01	RTCSB00901	Soil	05/26/95	8.0000	J	UG/KG	0009V	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2909-00001 - CHARLESTON ZONE I

Samples by Chemical Report

75-09-2 - Methylene chloride

>= 1.0000 for All Concentration Units - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
177-S-B001-01	177SB00101	Soil	06/07/96	12.0000	J	UG/KG	25933	VAL
177-S-B003-01	177SB00301	Soil	06/07/96	7.0000		UG/KG	25933	VAL
177-S-B003-02	177SB00302	Soil	06/07/96	15.0000		UG/KG	25933	VAL
678-G-W002-01	678GW00201	Water	06/08/95	1.0000	J	UG/L	0010V	VAL
687-S-B001-01	687SB00101	Soil	03/30/95	28.0000	J	UG/KG	0002V	VAL
687-G-W002-01	687GW00201	Water	06/08/95	15.0000		UG/L	0010V	VAL
687-G-W003-01	687GW00301	Water	06/08/95	2.0000	J	UG/L	0010V	VAL
690-S-B003-01	690SB00301	Soil	12/16/94	14.0000	J	UG/KG	CHS28	VAL
690-S-B005-01	690SB00501	Soil	12/16/94	67.0000	J	UG/KG	CHS28	VAL
690-S-B010-01	690SB01001	Soil	12/16/94	62.0000	J	UG/KG	CHS28	VAL
GDI-G-W14D-01	GDIGW14D01	Water	06/07/95	3.0000	J	UG/L	0010V	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2909-00001 - CHARLESTON ZONE I

Samples by Chemical Report

117-81-7 - bis(2-Ethylhexyl)phthalate (BEHP)

>= 1.0000 for All Concentration Units - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
012-S-B013-01	012SB01301	Soil	06/20/95	62.0000	J	UG/KG	0011S	VAL
012-S-B014-01	012SB01401	Soil	06/20/95	2400.0000	J	UG/KG	0011S	VAL
177-S-B005-01	177SB00501	Soil	06/07/96	45.0000	J	UG/KG	25933	VAL
177-S-B006-01	177SB00601	Soil	06/10/96	100.0000	J	UG/KG	25933	VAL
177-S-B006-02	177SB00602	Soil	06/10/96	87.0000	J	UG/KG	25933	VAL
177-S-B007-01	177SB00701	Soil	06/07/96	770.0000		UG/KG	25933	VAL
177-S-B007-02	177SB00702	Soil	06/07/96	87.0000	J	UG/KG	25933	VAL
671-S-B002-02	671SB00202	Soil	02/20/95	76.0000	J	UG/KG	00215	VAL
672-S-B001-01	672SB00101	Soil	02/20/95	240.0000	J	UG/KG	00300	VAL
673-S-B004-01	673SB00401	Soil	02/21/95	59.0000	J	UG/KG	00300	VAL
673-S-B004-02	673SB00402	Soil	02/21/95	120.0000	J	UG/KG	00300	VAL
675-M-0001-01	675M000101	Soil	06/22/95	840.0000	J	UG/KG	0011S	VAL
677-S-B007-01	677SB00701	Soil	02/28/95	84.0000	J	UG/KG	00668	VAL
678-S-B006-01	678SB00601	Soil	03/06/95	240.0000	J	UG/KG	00668	VAL
681-S-B002-02	681SB00202	Soil	03/01/95	110.0000	J	UG/KG	00668	VAL
681-S-B003-01	681SB00301	Soil	03/01/95	72.0000	J	UG/KG	00668	VAL
681-S-B005-01	681SB00501	Soil	06/22/95	250.0000	J	UG/KG	011S1	VAL
685-S-B001-01	685SB00101	Soil	02/22/95	57.0000	J	UG/KG	00389	VAL
685-S-B007-01	685SB00701	Soil	02/22/95	120.0000	J	UG/KG	00389	VAL
685-S-B010-01	685SB01001	Soil	06/20/95	210.0000	J	UG/KG	0011S	VAL
685-S-B011-01	685SB01101	Soil	06/20/95	110.0000	J	UG/KG	0011S	VAL
685-S-B012-01	685SB01201	Soil	06/20/95	94.0000	J	UG/KG	0011S	VAL
685-S-B013-01	685SB01301	Soil	06/20/95	95.0000	J	UG/KG	0011S	VAL
685-S-B014-01	685SB01401	Soil	06/20/95	540.0000	J	UG/KG	0011S	VAL
685-S-B015-01	685SB01501	Soil	06/20/95	110.0000	J	UG/KG	0011S	VAL
685-C-B015-01	685CB01501	Soil	06/20/95	88.0000	J	UG/KG	0011S	VAL
687-M-0001-01	688M000101	Soil	06/22/95	180.0000	J	UG/KG	0011S	VAL
687-M-0002-01	688M000201	Soil	06/22/95	250.0000	J	UG/KG	0011S	VAL
687-N-0002-01	688N000201	Soil	06/22/95	250.0000	J	UG/KG	011S1	VAL
690-S-B001-01	690SB00101	Soil	12/14/94	130.0000	J	UG/KG	CHS28	VAL
690-S-B010-01	690SB01001	Soil	12/16/94	1200.0000		UG/KG	CHS28	VAL
690-S-B011-01	690SB01101	Soil	02/08/95	44.0000	J	UG/KG	00002	VAL
690-S-B014-02	690SB01402	Soil	02/08/95	110.0000	J	UG/KG	00002	VAL
690-S-B015-01	690SB01501	Soil	02/08/95	57.0000	J	UG/KG	00002	VAL
690-S-B016-01	690SB01601	Soil	02/09/95	76.0000	J	UG/KG	00002	VAL
690-S-B018-01	690SB01801	Soil	02/09/95	240.0000	J	UG/KG	00002	VAL
690-S-B019-01	690SB01901	Soil	02/09/95	270.0000	J	UG/KG	00002	VAL
690-S-B020-01	690SB02001	Soil	02/09/95	160.0000	J	UG/KG	00002	VAL
690-S-B021-01	690SB02101	Soil	02/09/95	150.0000	J	UG/KG	00002	VAL
690-S-B031-01	690SB03101	Soil	06/20/95	78.0000	J	UG/KG	0011S	VAL
690-S-B032-01	690SB03201	Soil	06/20/95	1300.0000	J	UG/KG	0011S	VAL
DMA-S-B001-01	DMASB00101	Soil	03/16/95	80.0000	J	UG/KG	01043	VAL
DMA-S-B003-01	DMASB00301	Soil	03/20/95	150.0000	J	UG/KG	01043	VAL
DMA-S-B005-01	DMASB00501	Soil	03/20/95	330.0000	J	UG/KG	0001S	VAL
GDI-S-B005-01	GRDSB00501	Soil	02/16/95	100.0000	J	UG/KG	00091	VAL
GDI-S-B006-01	GRDSB00601	Soil	02/16/95	65.0000	J	UG/KG	00091	VAL
GDI-S-B008-01	GRDSB00801	Soil	02/16/95	100.0000	J	UG/KG	00091	VAL
GDI-G-W001-01	GRDGW00101	Water	04/24/95	15.0000		UG/L	0005S	VAL
RTC-S-B003-01	RTCSB00301	Soil	05/26/95	270.0000	J	UG/KG	0009S	VAL

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2909-00001 - CHARLESTON ZONE I

Samples by Chemical Report

117-81-7 - bis(2-Ethylhexyl)phthalate (BEHP)

>= 1.0000 for All Concentration Units - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
RTC-S-B010-01	RTCSB01001	Soil	05/26/95	89.0000	J	UG/KG	0009S	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2909-00002 - CHARLESTON ZONE I - QUARTERLY SAMPLING

Samples by Chemical Report

67-64-1 - Acetone

>= 1.0000 for UG/L - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
GDI-G-W001-03	GDIGW00103	Water	05/15/96	5.0000	J	UG/L	25623	VAL
GDI-G-W010-03	GDIGW01003	Water	05/31/96	4800.0000	D	UG/L	25814	VAL
GDI-G-W014-02	GDIGW01402	Water	01/15/96	10.0000	J	UG/L	24492	VAL
GDI-H-W016-02	GDIHW01602	Water	12/06/95	64.0000		UG/L	24229	VAL
GDI-G-W14D-04	GDIGW14D04	Water	09/10/96	30.0000		UG/L	26836	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2909-00002 - CHARLESTON ZONE I - QUARTERLY SAMPLING

Samples by Chemical Report

75-09-2 - Methylene chloride

>= 1.0000 for UG/L - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
GDI-G-W012-02	GDIGW01202	Water	12/12/95	28.0000		UG/L	24276	VAL
GDI-H-W016-02	GDIHW01602	Water	12/06/95	27.0000		UG/L	24229	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2909-00002 - CHARLESTON ZONE I - QUARTERLY SAMPLING

Samples by Chemical Report

117-81-7 - bis(2-Ethylhexyl)phthalate (BEHP)

>= 1.0000 for UG/L - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
012-G-W003-04	012GW00304	Water	09/09/96	20.0000		UG/L	26836	VAL
GDI-G-W002-03	GDIGW00203	Water	05/16/96	2.0000	J	UG/L	25623	VAL
GDI-G-W007-03	GDIGW00703	Water	05/21/96	11.0000		UG/L	25623	VAL
GDI-G-W05D-02	GDIGW05D02	Water	12/08/95	380.0000	D	UG/L	24229	VAL
GDI-G-W06D-03	GDIGW06D03	Water	05/16/96	1.0000	J	UG/L	25623	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2910-00001 - CHARLESTON ZONE J SEDIMENT

Samples by Chemical Report

67-64-1 - Acetone

>= 1.0000 for All Concentration Units - Hits Only

Sample ID	Ext.	Orig. ID	Type	Date	Result	VQual	Units	SDG #	
CPR-M-0001-01		CPRM000101	Soil	06/09/97	2400.0000	D	UG/KG	7764	VAL
CPR-M-0005-01		CPRM000501	Soil	06/03/97	77.0000		UG/KG	7738	VAL
CPR-M-0006-01		CPRM000601	Soil	06/03/97	670.0000	D	UG/KG	7738	VAL
CPR-M-0011-01		CPRM001101	Soil	06/04/97	330.0000	DJ	UG/KG	7738	VAL
CPR-N-0011-01		CPRN001101	Soil	06/04/97	510.0000	DJ	UG/KG	7738	VAL
CPR-M-0013-01		CPRM001301	Soil	06/09/97	2200.0000	D	UG/KG	7764	VAL
CPR-M-0016-01		CPRM001601	Soil	06/03/97	320.0000		UG/KG	7738	VAL
CPR-M-0018-01		CPRM001801	Soil	06/03/97	430.0000		UG/KG	7738	VAL
CPR-M-0021-01		CPRM002101	Soil	06/09/97	4100.0000	D	UG/KG	7764	VAL
CPR-M-0022-01		CPRM002201	Soil	06/09/97	2700.0000	D	UG/KG	7764	VAL
CPR-M-0023-01		CPRM002301	Soil	06/25/97	230.0000	D	UG/KG	7818	VAL
CPR-M-0024-01		CPRM002401	Soil	06/05/97	400.0000	DJ	UG/KG	7738	VAL
CPR-M-0025-01		CPRM002501	Soil	06/09/97	1300.0000	D	UG/KG	7764	VAL
CPR-M-0026-01		CPRM002601	Soil	06/25/97	270.0000	D	UG/KG	7818	VAL
CPR-M-0029-01		CPRM002901	Soil	06/03/97	610.0000		UG/KG	7738	VAL
CPR-M-0030-01		CPRM003001	Soil	06/04/97	450.0000		UG/KG	7738	VAL
CPR-N-0031-01		CPRN003101	Soil	06/25/97	320.0000	J	UG/KG	7818	VAL
CPR-M-0032-01		CPRM003201	Soil	06/05/97	710.0000	DJ	UG/KG	7738	VAL
CPR-M-0036-01		CPRM003601	Soil	06/04/97	160.0000		UG/KG	7738	VAL
CPR-M-0039-01		CPRM003901	Soil	06/04/97	120.0000		UG/KG	7738	VAL
CPR-M-0041-01		CPRM004101	Soil	06/27/97	950.0000	D	UG/KG	7818	VAL
CPR-M-0045-01		CPRM004501	Soil	06/04/97	240.0000		UG/KG	7738	VAL
CPR-M-0049-01		CPRM004901	Soil	07/10/97	660.0000	D	UG/KG	7887	VAL
CPR-M-0050-01		CPRM005001	Soil	07/10/97	300.0000	D	UG/KG	7887	VAL
NOI-M-0008-01		NOIM000801	Soil	06/26/97	130.0000		UG/KG	7818	VAL
NOI-M-0009-01		NOIM000901	Soil	06/26/97	190.0000		UG/KG	7818	VAL
NOI-M-0010-01		NOIM001001	Soil	06/27/97	490.0000	D	UG/KG	7818	VAL
SYC-M-0003-01	RE	SYCM000301	Soil	07/08/97	380.0000		UG/KG	7887	VAL
SYC-M-0007-01	RE	SYCM000701	Soil	07/09/97	99.0000		UG/KG	7887	VAL
SYC-M-0010-01		SYCM001001	Soil	07/09/97	120.0000		UG/KG	7887	VAL
SYC-M-0017-01		SYCM001701	Soil	07/08/97	520.0000	D	UG/KG	7887	VAL
SYC-N-0017-01		SYCN001701	Soil	07/08/97	1500.0000	D	UG/KG	7887	VAL
SYC-M-0019-01		SYCM001901	Soil	06/19/97	420.0000		UG/KG	7795	VAL
SYC-M-0020-01		SYCM002001	Soil	09/17/97	6900.0000	D	UG/KG	8252	VAL
SYC-M-0021-01		SYCM002101	Soil	09/17/97	1500.0000		UG/KG	8252	VAL
SYC-N-0021-01		SYCN002101	Soil	09/17/97	1000.0000	D	UG/KG	8252	VAL
SYC-M-016A-01		SYCM016A01	Soil	06/17/97	1000.0000	DJ	UG/KG	7795	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2910-00001 - CHARLESTON ZONE J SEDIMENT

Samples by Chemical Report

117-81-7 - bis(2-Ethylhexyl)phthalate (BEHP)

>= 1.0000 for UG/KG - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
CPR-M-0001-01	CPRM000101	Soil	06/09/97	150.0000	J	UG/KG	7764	VAL
CPR-M-0002-01	CPRM000201	Soil	06/09/97	1100.0000		UG/KG	7764	VAL
CPR-M-0009-01	CPRM000901	Soil	06/09/97	140.0000	J	UG/KG	7764	VAL
CPR-M-0038-01	CPRM003801	Soil	06/20/97	55.0000	J	UG/KG	7818	VAL
NOI-M-0003-01	NOIM000301	Soil	06/09/97	1800.0000		UG/KG	7764	VAL
SYC-M-0003-01	SYCM000301	Soil	07/08/97	1600.0000		UG/KG	7887	VAL
SYC-M-0013-01	SYCM001301	Soil	07/09/97	150.0000	J	UG/KG	7887	VAL
SYC-M-0018-01	SYCM001801	Soil	07/09/97	51.0000	J	UG/KG	7887	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2910-00002 - CHARLESTON ZONE J SURFACE WATER

Samples by Chemical Report

117-81-7 - bis(2-Ethylhexyl)phthalate (BEHP)

>= 1.0000 for UG/L - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
NOI-W-0006-03	NOIW000603	Water	07/09/97	4.0000	J	UG/L	7826	VAL

*** End of Report ***

ENVIRONMENTAL SAFETY & DESIGNS

2911-00001 - CHARLESTON ZONE K SOIL

Samples by Chemical Report

67-64-1 - Acetone

>= 1.0000 for UG/KG - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
161-S-B002-02	161SB00202	Soil	11/20/96	8.0000	J	UG/KG	6699	VAL
161-S-B006-02	161SB00602	Soil	11/20/96	7.0000	J	UG/KG	6699	VAL
166-C-B002-02	166CB00202	Soil	12/04/96	3.0000	J	UG/KG	6811.1	VAL
694-S-B008-01	694SB00801	Soil	01/16/97	2.0000	J	UG/KG	7085	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2911-00001 - CHARLESTON ZONE K SOIL

Samples by Chemical Report

117-81-7 - bis(2-Ethylhexyl)phthalate (BEHP)

>= 1.0000 for UG/KG - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
694-S-B009-02	694SB00902	Soil	01/16/97	490.0000		UG/KG	7085	VAL
694-S-B014-01	694SB01401	Soil	01/17/97	620.0000		UG/KG	7090	VAL
694-S-B019-01	694SB01901	Soil	01/17/97	420.0000		UG/KG	7090	VAL
GDK-S-B004-02	GDKSB00402	Soil	12/05/96	88.0000	J	UG/KG	6830	VAL
GDK-S-BCL1-01	GDKSBCL101	Soil	01/16/97	140.0000	J	UG/KG	7085	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2911-00002 - CHARLESTON ZONE K (GROUNDWATER)

Samples by Chemical Report

67-64-1 - Acetone

>= 1.0000 for UG/L - Hits Only

Sample ID	Ext.	Orig. ID	Type	Date	Result	VQual	Units	SDG #	
166-G-P080-11		166GP08011	Water	05/01/97	12.0000		UG/L	29236	VAL
166-G-W003-01		166GW00301	Water	07/24/97	1500.0000	D	UG/L	7974	VAL
694-G-W002-03		694GW00203	Water	12/17/97	3.0000	J	UG/L	32259	NV
694-G-W003-03		694GW00303	Water	12/17/97	6.0000		UG/L	32259	NV
694-G-W006-03		694GW00603	Water	12/19/97	14.0000		UG/L	32259	NV
694-H-W007-03		694HW00703	Water	12/18/97	3.0000	J	UG/L	32259	NV

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2911-00002 - CHARLESTON ZONE K (GROUNDWATER)

Samples by Chemical Report

75-09-2 - Methylene chloride

>= 1.0000 for UG/L - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
166-G-P039-11	166GP03911	Water	03/19/97	2.0000	J	UG/L	28895	VAL
166-G-P042-11	166GP04211	Water	03/19/97	2.0000	J	UG/L	28895	VAL
166-G-P042-34	166GP04234	Water	03/19/97	10.0000		UG/L	28895	VAL
166-H-W05D-01	166HW05D01	Water	/ /	2.0000	J	UG/L	7990	VAL
694-G-W002-03	694GW00203	Water	12/17/97	7.0000		UG/L	32259	NV
694-G-W003-03	694GW00303	Water	12/17/97	1.0000	J	UG/L	32259	NV
694-G-W005-03	694GW00503	Water	12/18/97	3.0000	J	UG/L	32259	NV
694-G-W007-03	694GW00703	Water	12/18/97	1.0000	J	UG/L	32259	NV
694-H-W007-03	694HW00703	Water	12/18/97	4.0000	J	UG/L	32259	NV
GDK-G-WCL1-03	GDKGWCL103	Water	12/17/97	5.0000		UG/L	32259	NV

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2911-00002 - CHARLESTON ZONE K (GROUNDWATER)

Samples by Chemical Report

117-81-7 - bis(2-Ethylhexyl)phthalate (BEHP)

>= 1.0000 for UG/L - Hits Only

Sample ID	Ext.	Orig. ID	Type	Date	Result	VQual	Units	SDG #	
166-G-W001-04		166GW00104	Water	10/22/97	2.0000	J	UG/L	8403	VAL
694-G-W003-03		694GW00303	Water	12/17/97	2.0000	JB	UG/L	32259	VAL
694-G-W005-03		694GW00503	Water	12/18/97	2.0000	JB	UG/L	32259	VAL
694-H-W007-03		694HW00703	Water	12/18/97	1.0000	JB	UG/L	32259	VAL
GDK-G-W001-04	RE	GDKGW00104	Water	10/21/97	1.0000	J	UG/L	8403	VAL
GDK-G-WCL1-03		GDKGWCL103	Water	12/17/97	36.0000	B	UG/L	32259	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2912-00001 - CHARLESTON ZONE L-A DPT (SOIL & WATER)

Samples by Chemical Report

67-64-1 - Acetone

>= 1.0000 for All Concentration Units - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #
037-G-P001-A1	037GP001A1	Water	05/20/97	8.8700	J	UG/L	52097W
037-S-P002-A1	037SP002A1	Soil	05/19/97	48.3000		UG/KG	51997S
037-G-P002-A1	037GP002A1	Water	05/20/97	5.5000		UG/L	52097W
037-S-P003-A1	037SP003A1	Soil	05/19/97	8.2000		UG/KG	51997S
037-G-P003-A1	037GP003A1	Water	05/20/97	10.1000		UG/L	52097W
037-G-P004-A1	037GP004A1	Water	05/27/97	5.2900		UG/L	52797W
037-S-P005-A1	037SP005A1	Soil	05/19/97	23.0000		UG/KG	51997S
037-G-P005-A1	037GP005A1	Water	05/20/97	7.6900	J	UG/KG	52097W
037-G-P006-A1	037GP006A1	Water	05/20/97	43.4000		UG/L	52097W
037-S-P007-A1	037SP007A1	Soil	05/21/97	11.6000		UG/KG	52197S
037-G-P008-A1	037GP008A1	Water	05/20/97	26.5000		UG/KG	52097W
037-G-P009-A1	037GP009A1	Water	05/20/97	19.1000		UG/KG	52097W
037-G-P010-A1	037GP010A1	Water	05/20/97	253.0000		UG/L	52097W
037-G-P011-A1	037GP011A1	Water	05/20/97	8.2000	J	UG/KG	52097W
037-G-P012-A1	037GP012A1	Water	05/20/97	17.3000		UG/KG	52097W
037-G-P015-A1	037GP015A1	Water	05/20/97	37.8000		UG/KG	52097W
037-G-P016-A1	037GP016A1	Water	05/20/97	5.2800	J	UG/KG	52097W

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2912-00002 - CHARLESTON ZONE L-B DPT (SOIL & WATER)

Samples by Chemical Report

67-64-1 - Acetone

>= 1.0000 for All Concentration Units - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #
037-S-P001-B1	037SP001B1	Soil	05/21/97	118.0000		UG/KG	52197S
037-S-P003-B1	037SP003B1	Soil	05/21/97	222.0000		UG/KG	52197S
037-S-P004-B1	037SP004B1	Soil	05/21/97	69.8000		UG/KG	52197S
037-S-P005-B1	037SP005B1	Soil	05/21/97	7.6100		UG/KG	52197S
037-S-P006-B1	037SP006B1	Soil	05/21/97	30.4000		UG/KG	52197S
037-S-P007-B1	037SP007B1	Soil	05/21/97	8.0500		UG/KG	52197S
037-G-P010-B1	037GP010B	Water	05/21/97	12.8000		UG/L	52197W

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2912-00003 - CHARLESTON ZONE L-C DPT (SOIL & WATER)

Samples by Chemical Report

67-64-1 - Acetone

>= 1.0000 for All Concentration Units - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #
037-S-P004-C1	037SP004C1	Soil	05/22/97	20.2000		UG/KG	52297S
037-S-P007-C1	037SP007C1	Soil	05/22/97	26.7000		UG/KG	52297S
037-S-P008-C1	037SP008C1	Soil	05/23/97	569.0000		UG/KG	52397S
037-S-P009-C1	037SP009C1	Soil	05/23/97	170.0000		UG/KG	52397S
037-S-P012-C1	037SP012C1	Soil	05/22/97	9.6500		UG/KG	52297S
037-S-P014-C1	037SP014C1	Soil	06/03/97	9.1000		UG/KG	6397S
037-S-P021-C1	037SP021C1	Soil	05/23/97	17.1000		UG/KG	52397S
037-S-P023-C1	037SP023C1	Soil	05/23/97	61.6000		UG/KG	52397S
037-S-P025-C1	037SP025C1	Soil	05/23/97	9.1700		UG/KG	52397S
037-S-P026-C1	037SP026C1	Soil	05/23/97	17.6000		UG/KG	52397S
037-S-P027-C1	037SP027C1	Soil	05/23/97	23.5000		UG/KG	52397S
037-S-P029-C1	037SP029C1	Soil	05/23/97	13.2000		UG/KG	52397S
037-S-P02B-C1	037SP02BC1	Soil	06/03/97	111.0000		UG/KG	6397S
037-S-P030-C1	037SP030C1	Soil	05/27/97	426.0000		UG/KG	52797S
037-G-P032-C1	037GP032C1	Water	05/28/97	683.0000		UG/L	52897W
037-G-P032-C2	037GP032C2	Water	12/17/97	15.0000		UG/L	32275
037-G-P033-C1	037GP033C1	Water	05/28/97	94.8000		UG/L	52897W
037-G-P034-C1	037GP034C1	Water	05/28/97	232.0000		UG/L	52897W
037-G-P035-C1	037GP035C1	Water	05/28/97	14.7000		UG/L	52897W
037-G-P037-C1	037GP037C1	Water	05/28/97	209.0000		UG/L	52897W
037-G-P038-C1	037GP038C1	Water	05/28/97	36.7000		UG/L	52897W
037-G-P039-C1	037GP039C1	Water	05/28/97	39.7000		UG/L	52897W
037-S-P22A-C1	037SPA22C1	Soil	05/27/97	2150.0000		UG/KG	52897S
504-S-P004-C1	504SP004C1	Soil	08/08/97	239.0000		UG/KG	8897S

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2912-00004 - CHARLESTON ZONE L-E DPT (SOIL & WATER)

Samples by Chemical Report

67-64-1 - Acetone

>= 1.0000 for All Concentration Units - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #
037-S-P001-E1	037SP001E1	Soil	05/28/97	45.1000		UG/KG	52897S
037-S-P002-E1	037SP002E1	Soil	05/29/97	424.0000		UG/KG	52997S
037-S-P011-E1	037SP011E1	Soil	07/08/97	77.4000		UG/KG	7897S
037-S-P012-E1	037SP012E1	Soil	07/08/97	77.5000		UG/KG	7897S
037-S-P015-E1	037SP015E1	Soil	07/08/97	22.4000		UG/KG	7897S
699-S-P003-E1	699SP003E1	Soil	07/08/97	39.1000		UG/KG	7897S
699-S-P004-E1	699SP004E1	Soil	07/08/97	11.7000		UG/KG	7897S
699-S-P006-E1	699SP006E1	Soil	07/09/97	41.5000		UG/KG	7997S
699-S-P008-E1	699SP008E1	Soil	07/08/97	26.9000		UG/KG	7897S
699-S-P009-E1	699SP009E1	Soil	07/08/97	19.6000		UG/KG	7897S
699-S-P010-E1	699SP010E1	Soil	07/09/97	55.9000		UG/KG	7997S
699-G-P011-E2	699GP011E2	Water	12/29/97	3.0000	J	UG/L	32335
699-S-P016-E1	699SP016E1	Soil	07/09/97	19.6000		UG/KG	7997S
699-G-P087-E1	699GP087E1	Water	08/06/97	118.0000		UG/L	8697W

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2912-00005 - CHARLESTON ZONE L-F DPT (SOIL & WATER)

Samples by Chemical Report

67-64-1 - Acetone

>= 1.0000 for All Concentration Units - Hits Only

Sample ID	Ext.	Orig. ID	Type	Date	Result	VQual	Units	SDG #
037-G-P001-F1		037GP001F1	Water	05/29/97	65.8000		UG/L	52997W
037-S-P002-F1		037SP002F1	Soil	05/29/97	12.9000		UG/KG	52997S
037-G-P002-F1		037GP002F1	Water	05/29/97	5.6300		UG/L	52997W
037-G-P002-F2		037GP002F2	Water	12/30/97	2.0000	J	UG/L	32335
037-G-P003-F1		037GP003F1	Water	05/29/97	7.0300		UG/L	52997W
037-S-P004-F1		037SP004F1	Soil	05/29/97	13.5000		UG/KG	52997S
037-G-P006-F2		037GP006F2	Water	12/30/97	6.0000		UG/L	32335
037-G-P006-F5		037GP006F5	Water	12/30/97	7.0000		UG/L	32335
037-G-P012-F4		037GP012F4	Water	12/18/97	150.0000		UG/L	32275
037-S-P013-F1		037SP013F1	Soil	05/29/97	77.1000		UG/KG	52997S
037-S-P014-F1		037SP014F1	Soil	05/29/97	5.3700		UG/KG	52997S
037-S-P016-F1		037SP016F1	Soil	06/03/97	3545.0000		UG/KG	6397S
037-S-P017-F1		037SP017F1	Soil	05/31/97	5.1500		UG/L	53197S
037-S-P018-F1		037SP018F1	Soil	06/04/97	52.5000		UG/KG	6497S
037-S-P020-F1		037SP020F1	Soil	06/04/97	451.0000		UG/KG	6497S
037-S-P022-F1		037SP022F1	Soil	06/09/97	231.0000		UG/KG	6997S
037-S-P023-F1		037SP023F1	Soil	06/09/97	208.0000		UG/KG	6997S
037-S-P024-F1		037SP024F1	Soil	06/09/97	165.0000		UG/KG	6997S
037-S-P025-F1		037SP025F1	Soil	06/12/97	142.0000		UG/KG	61297S
037-S-P026-F1		037SP026F1	Soil	06/12/97	211.0000		UG/KG	61297S
37-S-P028-F1		037SP028F1	Soil	06/10/97	98.4000		UG/KG	61097S
037-S-P031-F1		037SP031F1	Soil	06/11/97	33.4000		UG/KG	61197S
037-S-P032-F1		037SP032F1	Soil	06/12/97	195.0000		UG/KG	61297S
037-S-P038-F1		037SP038F1	Soil	06/12/97	358.0000		UG/KG	61297S
037-S-P040-F1		037SP040F1	Soil	06/13/97	22.4000		UG/KG	61397S
037-S-P041-F1		037SP041F1	Soil	06/16/97	16.0000		UG/KG	61697S
037-S-P042-F1		037SP042F1	Soil	06/16/97	16.4000		UG/KG	61697S
037-S-P043-F1		037SP043F1	Soil	06/16/97	25.8000		UG/KG	61697S
037-S-P044-F1		037SP044F1	Soil	06/16/97	104.0000		UG/KG	61697S
699-S-P003-F1		699SP003F1	Soil	06/12/97	63.3000		UG/KG	61297S
699-S-P005-F1		699SP005F1	Soil	06/12/97	67.2000		UG/KG	61297S
699-S-P006-F1		699SP006F1	Soil	06/11/97	30.6000		UG/KG	61197S
699-S-P007-F1		699SP007F1	Soil	06/11/97	11.6000		UG/KG	61197S
699-G-P007-F5		699GP007F5	Water	12/17/97	18.0000		UG/L	32275
699-S-P027-F1		699SP027F1	Soil	08/11/97	121.0000		UG/KG	81197S

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2912-00006 - CHARLESTON ZONE L-G DPT (SOIL & WATER)

Samples by Chemical Report

67-64-1 - Acetone

>= 1.0000 for All Concentration Units - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #
037-S-P001-G1	037SP001G1	Soil	06/10/97	155.0000		UG/KG	61097S
037-S-P008-G1	037SP008G1	Soil	06/13/97	87.1000		UG/KG	61397S
037-S-P010-G1	037SP010G1	Soil	06/14/97	26.2000		UG/KG	61497S
037-S-P012-G1	037SP012G1	Soil	06/14/97	51.9000		UG/KG	61497S
037-G-P012-G2	037GP012G2	Water	12/30/97	6.0000		UG/L	32335
037-S-P014-G1	037SP014G1	Soil	06/14/97	26.1000		UG/KG	61497S
037-S-P016-G1	037SP016G1	Soil	06/16/97	12.7000		UG/KG	61697S
037-S-P017-G1	037SP017G1	Soil	06/17/97	326.0000		UG/KG	61797S

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2912-00006 - CHARLESTON ZONE L-G DPT (SOIL & WATER)

Samples by Chemical Report

75-09-2 - Methylene chloride

>= 1.0000 for All Concentration Units - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #
037-G-P012-G2	037GP012G2	Water	12/30/97	1.0000	J	UG/L	32335

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2912-00007 - CHARLESTON ZONE L-H DPT (SOIL & WATER)

Samples by Chemical Report

67-64-1 - Acetone

>= 1.0000 for All Concentration Units - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #
037-S-P005-H1	037SP005H1	Soil	06/18/97	10.6000		UG/KG	61897S
037-S-P006-H1	037SP006H1	Soil	06/18/97	6.1500		UG/KG	61897S
037-G-P017-H2	037GP017H2	Water	12/29/97	8.0000		UG/L	32335
037-S-P027-H1	037SP027H1	Soil	06/28/97	117.0000		UG/KG	62897S

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2912-00009 - CHARLESTON ZONE L-A SOIL

Samples by Chemical Report

67-64-1 - Acetone

>= 1.0000 for UG/KG - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
504-S-B006-A2	504SB006A2	Soil	07/17/97	8.0000	J	UG/KG	30147	VAL
504-S-B007-A2	504SB007A2	Soil	07/17/97	14.0000	J	UG/KG	30147	VAL
504-S-B008-A2	504SB008A2	Soil	07/17/97	20.0000	J	UG/KG	30147	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2912-00009 - CHARLESTON ZONE L-A SOIL

Samples by Chemical Report

117-81-7 - bis(2-Ethylhexyl)phthalate (BEHP)

>= 1.0000 for UG/KG - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
504-S-B002-A2	504SB002A2	Soil	07/17/97	110.0000	J	UG/KG	30147	VAL
504-S-B006-A1	504SB006A1	Soil	07/17/97	71.0000	J	UG/KG	30147	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2912-00010 - CHARLESTON ZONE L-B SOIL

Samples by Chemical Report

67-64-1 - Acetone

>= 1.0000 for UG/KG - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
504-S-B004-B2	504SB004B2	Soil	07/16/97	10.0000	J	UG/KG	30147	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2912-00011 - CHARLESTON ZONE L-C SOIL

Samples by Chemical Report

67-64-1 - Acetone

>= 1.0000 for UG/KG - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
504-S-B017-C2	504SB017C2	Soil	07/11/97	16.0000	J	UG/KG	30039	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2912-00011 - CHARLESTON ZONE L-C SOIL

Samples by Chemical Report

117-81-7 - bis(2-Ethylhexyl)phthalate (BEHP)

>= 1.0000 for UG/KG - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
037-S-B001-C1	037SB001C1	Soil	05/20/97	120.0000	J	UG/KG	29438	VAL
037-S-B002-C1	037SB002C1	Soil	05/20/97	290.0000	J	UG/KG	29438	VAL
504-S-B017-C1	504SB017C1	Soil	07/11/97	14.0000	J	UG/KG	30039	VAL
504-S-B018-C1	504SB018C1	Soil	07/11/97	21.0000	J	UG/KG	30039	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2912-00012 - CHARLESTON ZONE L-E SOIL

Samples by Chemical Report

117-81-7 - bis(2-Ethylhexyl)phthalate (BEHP)

>= 1.0000 for UG/KG - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
037-S-B007-E1	037SB007E1	Soil	06/07/97	82.0000	J	UG/KG	29634	VAL
037-S-B008-E1	037SB008E1	Soil	06/09/97	920.0000		UG/KG	29634	VAL
037-S-B008-E2	037SB008E2	Soil	06/09/97	540.0000	J	UG/KG	29634	VAL
037-S-B009-E1	037SB009E1	Soil	05/20/97	83.0000	J	UG/KG	29438	VAL
504-S-B006-E2	504SB006E2	Soil	07/09/97	460.0000		UG/KG	29996	VAL
504-S-B007-E1	504SB007E1	Soil	07/09/97	120.0000	J	UG/KG	29996	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2912-00013 - CHARLESTON ZONE L-F SOIL

Samples by Chemical Report

67-64-1 - Acetone

>= 1.0000 for UG/KG - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
504-S-B003-F1	504SB003F1	Soil	07/01/97	460.0000	DJ	UG/KG	29888	VAL
504-S-B004-F1	504SB004F1	Soil	07/01/97	21.0000	R	UG/KG	29888	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2912-00013 - CHARLESTON ZONE L-F SOIL

Samples by Chemical Report

75-09-2 - Methylene chloride

>= 1.0000 for UG/KG - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
504-S-B004-F1	504SB004F1	Soil	07/01/97	23.0000	R	UG/KG	29888	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2912-00013 - CHARLESTON ZONE L-F SOIL

Samples by Chemical Report

117-81-7 - bis(2-Ethylhexyl)phthalate (BEHP)

>= 1.0000 for UG/KG - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
504-S-B006-F1	504SB006F1	Soil	07/02/97	49.0000	J	UG/KG	29888	VAL
504-S-B009-F1	504SB009F1	Soil	07/02/97	49.0000	J	UG/KG	29888	VAL
504-S-B010-F1	504SB010F1	Soil	07/02/97	87.0000	J	UG/KG	29888	VAL
504-S-B010-F2	504SB010F2	Soil	07/02/97	71.0000	J	UG/KG	29888	VAL
504-S-B011-F1	504SB011F1	Soil	07/02/97	420.0000	J	UG/KG	29888	VAL
504-S-B011-F2	504SB011F2	Soil	07/02/97	72.0000	J	UG/KG	29888	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2912-00014 - CHARLESTON ZONE L-G SOIL

Samples by Chemical Report

117-81-7 - bis(2-Ethylhexyl)phthalate (BEHP)

>= 1.0000 for UG/KG - Hits Only

Sample ID	Ext.	Orig. ID	Type	Date	Result	VQual	Units	SDG #	
037-S-B002-G2		037SB002G2	Soil	06/10/97	49.0000	J	UG/KG	29659	VAL
037-S-B005-G1		037SB005G1	Soil	05/16/97	40.0000	J	UG/KG	29399	VAL
037-S-B005-G2		037SB005G2	Soil	05/16/97	140.0000	J	UG/KG	29399	VAL
037-S-B011-G2		037SB011G2	Soil	06/11/97	100.0000	J	UG/KG	29676	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2912-00015 - CHARLESTON ZONE L-H SOIL

Samples by Chemical Report

67-64-1 - Acetone

>= 1.0000 for UG/KG - Hits Only

Sample ID	Ext.	Orig. ID	Type	Date	Result	VQual	Units	SDG #	
037-S-B001-H1		037SB001H1	Soil	06/04/97	490.0000	D	UG/KG	29593	VAL
037-S-B001-H2		037SB001H2	Soil	06/04/97	56.0000		UG/KG	29593	VAL
037-S-B003-H1		037SB003H1	Soil	06/04/97	160.0000		UG/KG	29593	VAL
037-S-B004-H1		037SB004H1	Soil	06/04/97	6.0000	J	UG/KG	29593	VAL
037-S-B004-H2		037SB004H2	Soil	06/04/97	40.0000		UG/KG	29593	VAL
037-S-B007-H2		037SB007H2	Soil	06/04/97	230.0000		UG/KG	29593	VAL
037-S-B008-H2		037SB008H2	Soil	06/04/97	140.0000		UG/KG	29593	VAL
037-S-B017-H2	RE	037SB017H2	Soil	08/25/97	3.0000	J	UG/KG	30762	VAL
037-S-B018-H1	RE	037SB018H1	Soil	08/25/97	6.0000	J	UG/KG	30762	VAL
037-S-B018-H2		037SB018H2	Soil	08/25/97	7.0000	J	UG/KG	30762	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2912-00015 - CHARLESTON ZONE L-H SOIL

Samples by Chemical Report

75-09-2 - Methylene chloride

>= 1.0000 for UG/KG - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
037-S-B004-H2	037SB004H2	Soil	06/04/97	2.0000	J	UG/KG	29593	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2912-00015 - CHARLESTON ZONE L-H SOIL

Samples by Chemical Report

117-81-7 - bis(2-Ethylhexyl)phthalate (BEHP)

>= 1.0000 for UG/KG - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
037-S-B012-H1	037SB012H1	Soil	06/05/97	1600.0000		UG/KG	29607	VAL
037-S-B015-H1	037SB015H1	Soil	05/16/97	47.0000	J	UG/KG	29399	VAL
037-S-B015-H2	037SB015H2	Soil	05/16/97	61.0000	J	UG/KG	29399	VAL
037-C-B020-H1	037CB020H1	Soil	05/19/97	44.0000	J	UG/KG	29399	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2906-00002 - CHARLESTON ZONE F GW (ONLY)

Samples by Chemical Report

75-09-2 - Methylene chloride

>= 1.0000 for UG/L - Hits Only

Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
607-G-W006-02	607GW00602	Water	05/01/97	1.0000	J	UG/L	29230	VAL
GDF-G-W001-01	GDFGW00101	Water	11/07/96	3.0000	J	UG/L	27502	VAL

*** End of Report ***

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2906-00002 - CHARLESTON ZONE F GW (ONLY)

Samples by Chemical Report

117-81-7 - bis(2-Ethylhexyl)phthalate (BEHP)

>= 1.0000 for UG/L - Hits Only

Sample ID	Ext.	Orig. ID	Type	Date	Result	VQual	Units	SDG #	
GDE-G-W009-01		GDEGW00901	Water	04/04/96	2.0000	J	UG/L	25153	VAL
GDE-G-W009-02		GDEGW00902	Water	07/19/96	10.0000	J	UG/L	26356	VAL
GDE-G-W09D-01		GDEGW09D01	Water	04/05/96	1.0000	J	UG/L	25153	VAL
GDE-G-W09D-02		GDEGW09D02	Water	07/19/96	5.0000	J	UG/L	26356	VAL
GDF-G-W001-04		GDFGW00104	Water	11/24/97	10.0000	R	UG/L	31911	VAL
GEL-G-W014-01		GELGW01401	Water	11/12/96	40000.0000	J	UG/L	27598	VAL
GEL-G-W014-03		GELGW01403	Water	08/27/97	75.0000	J	UG/L	30761	VAL

*** End of Report ***

ATTACHMENT B

Fisher Scientific Company

Chemical Manufacturing Division

Certificate of Analysis

1 Reagent Lane
Fair Lawn, NJ 07410
Phone: (201) 796-7100 Fax: (201) 796-1329

Catalog Number	A520	**Report Date**	10/10/97	**Mfg. Date**	10/3/97
Lot Number	970873	**Sample ID**	A520..970873.B1.		
Description	2-PROPANOL				

This is to certify that units of the above mentioned lot number were tested and found to comply with the specifications of the grade listed. The following are the actual analytical results obtained:

Result Name	Units	Test Value
APPEARANCE	PASS/FAIL	PASS-CLEAR, COLORLESS LIQUID
ASSAY	%	99.9000
COLOR	APHA	5
COPPER (Cu)	PPM	0.020
CARBONYL COMPOUNDS	%	0.00010
DENSITY	GM/ML	0.7810
EVAPORATION RESIDUE	%	0.0001
HEAVY METALS	PPM	0.20
IDENTIFICATION		PASS
IRON (Fe)	PPM	0.020
NICKEL (Ni)	PPM	0.020
TITRAT. ACID OR BASE	MEQ/GM.	0.000020
WATER (H2O)	%	0.002
SOLUBILITY IN WATER	PASS/FAIL	PASS

CERTIFIED BY

Lab Manager Fair Lawn

Edgar Estevez
Lab Manager BPF

Note: The data listed is valid for all package sizes of this lot of product, expressed as a extension of the catalog number listed above. If there are any questions with this certificate, please call Chemical Services at (800) 227-6701

Analytical Report

Fisher Scientific Company
Chemical Manufacturing Division

REV: 4,4
DATED: 4/23/97

ITEM CAT. NO.	ITEM NAME		
A520	2-Propanol, Low Water, ACS		
LOT NUMBER	QUANTITY	BULK PART NO.	BULK LOT NO.
ITEM FORMULA	MANUFACTURER	VENDOR LOT	
$(CH_3)_2CHOH$			

TESTS	SPECIFICATIONS	ACTUAL FINDINGS
Assay	99.5% $(CH_3)_2CHOH$ Minimum	
Color (APHA)	10 Maximum	
Copper (Cu)	0.1 ppm Maximum	
Description	Clear, Colorless Liquid	
Heavy Metals (as Pb)	1 ppm Maximum	
Identification	Pass Test	
Iron (Fe)	0.1 ppm Maximum	
Nickel (Ni)	0.1 ppm Maximum	
Residue after Evaporation	0.001% Maximum	
Solubility in Water	Pass Test	
Titratable Acid or Base	0.0001 meq/g Maximum	
Water (H_2O)	0.015% Maximum	
Carbonyl Compounds	Not more than 0.002% each of Propionaldehyde or acetone	

IDENTIFICATION TESTS:

A) Run infrared spectral scan of the sample in NaCL cell (path 0.025 mm). The sample should coincide with Aldrich I.R.3 - 70B.

B) The refractive index of the sample at 25pC should be from 1.3740 - 1.3760.

Analytical Report(contd)

Fisher Scientific Co.
Chemical Manufacturing Division

Item Cat#	Effective Date:	Revision#	Supersedes	Page#
A520	4/23/97	4,4	9/15/94	2

Chemist Signature:	Date:
Approved by:	Date:

Specifications & Analytical Methods Sheet

Fisher Scientific Company
Chemical Manufacturing Division

ITEM CAT. NO.	ITEM NAME	
A520	2-Propanol, Low Water, ACS	
ITEM FORMULA	FORMULA WEIGHT	BULK PART NO.
$(CH_3)_2CHOH$	60.09	
REVISION NO.	EFFECTIVE DATE	SUPERSEDES
4,4	4/23/97	9/15/94
ISSUED BY	Kishor Desai	
APPROVED BY	David Chang Product Developement	

PRECAUTION: DO NOT BREATHE FUMES. WORK IN A WELL-VENTILATED AREA.

REQUIREMENTS:

Assay	99.5% $(CH_3)_2CHOH$ Minimum
Color (APHA)	10 Maximum
Copper (Cu)	0.1 ppm Maximum
Description	Clear, Colorless Liquid
Heavy Metals (as Pb)	1 ppm Maximum
Identification	Pass Test
Iron (Fe)	0.1 ppm Maximum
Nickel (Ni)	0.1 ppm Maximum
Residue after Evaporation	0.001% Maximum
Solubility in Water	Pass Test
Titratable Acid or Base	0.0001 meq/g Maximum
Water (H_2O)	0.015% Maximum
Carbonyl Compounds	Not more than 0.002% each of Propionaldehyde or acetone

TESTS:

Follow the methods and procedures as detailed in the latest edition and supplement (if any) of the American Chemical Society publication "Reagent Chemicals". The current edition/supplement is detailed in an addendum to Fisher SOP #1.

ADDITIONS/CHANGES TO TESTING LISTED ABOVE:

ASSAY - Analyze by gas chromatography using the following parameters.

Instrument	: Varian 3500 or HP 5890
Detector	: Flame Ionization
Injector	: Capillary with Split Liner
Helium Make-up Flow	: As required

SAMS (contd)

Fisher Scientific Co.
Chemical Manufacturing Division

Item Cat#	Effective Date:	Revision#	Supersedes	Page#
A520	4/23/97	4,4	9/15/94	2

Column	: DB1 (J&W Scientific) or Equivalent
Column Dimensions	: 30 M x 0.53 mm I.D.
Film Thickness	: 5.0 micron
Injector Temp	: 250þC
Detector Temp	: 250þC
Oven Temp Initial	: 40þC
Initial Time	: 15 min
Program Rate	: 10þC/min
Final Temp	: 220þC
Final Time	: 2 min
Linear Velocity at 200þC	: 15 ± 1 cm/sec
Split Ratio	: 10:1
Detector Range	: 10
Attenuation	: 1
S/N Ratio	: 3
Area Reject	: 10
Chart Speed	: 1 cm/min
Injection Volume	: 1 þl

The approximate retention time of 2-Propanol is 5.9 minutes. Correct for Water content.

SOLUTION A - Evaporate 320 ml (250 gram) of sample to dryness on a steam bath. Add 3 ml of Nitric Acid, and digest for 2 minutes on a steam bath. Transfer the solution to the flask, dilute to the 25 ml mark (1 ml = 10 gram). This solution will be used in the determination of Copper, Iron and Nickel.

COPPER - Observe the absorption for Solution A on a suitable Atomic Absorption Spectrophotometer at 324.8 nm using established parameters. The absorption found should be less than that of a 1 ppm Copper (Cu) control.

DENSITY - Determine the density of the sample at 25þC on a suitable density meter.

IRON - Observe the absorption of Solution A on a suitable Atomic Absorption Spectrophotometer at 248.3 nm using established parameters. The absorption found should be less than that of a 1 ppm Iron (Fe) control.

NICKEL - Observe the absorption of Solution A on a suitable Atomic Absorption Spectrophotometer at 232.0 nm using established parameters. The absorption found should be less than that of a 1 ppm Nickel (Ni) control.

Carbonyl Compounds: Analyze the sample by polarography using the following parameters.

Instrument	: Metrohm Polarecord Model 626
Mode	: DP
Pulse Amplitude (V/mVCm1)	:100
Scan Range (I/L)	:10 nA/mm
Drop Time(T drop/sec)	:1
Sweep Rate (T drop/sec)	:-2

SAMS (contd)

Fisher Scientific Co.
Chemical Manufacturing Division

Item Cat#	Effective Date:	Revision#	Supersedes	Page#
A520	4/23/97	4,4	9/15/94	3

Deareation Time : 10 minutes with helium or nitrogen

Procedure: To 5.0 g (6.4 ml) of sample in each of two 50 ml volumetric flasks, add 10.0 ml of pH 6.5 buffer[1], 2.0 ml of 2%; hydrazine sulfate solution and four drops of 0.2% TX-100[2]. To one of the flask, add 2.0 ml of 0.05 mg/ml standard[3] containing acetone & propionaldehyde.(sample plus standard mixture) Dilute each to volume with water and mix. Transfer a portion of the sample mixture into the cell, deareate and record the polarogram from -0.6V to -1.6V vs. SCE. Repeat with the sample plus standard mixture. The approximate peak potential for hydrazones of known carbonyl compounds are: acetone - 1.3V; propionaldehyde -1.2V.

The peak height for the sample should not be greater than one-half of the peak height for the sample plus standard.

HEAVY METALS - Evaporate 25.6 ml (20 gram) of sample in a beaker on the steam bath. Add 1 ml of 1 N Acetic Acid and 5 ml of Water, and digest on the steam bath for 3 minutes. Add 20 ml of Water to the beaker and adjust the pH to between 3 and 4 on a suitable pH meter, with either 1 N Acetic Acid or dilute Ammonium Hydroxide. Transfer the solution to a Nessler tube, dilute to 40 ml, and add 10 ml of Hydrogen Sulfide Water. The color developed in the sample tube should be less than a 0.02 mg Lead (Pb) control, and had 10 ml of Hydrogen sulfide water added to it.

WATER - Analyze by ACS method using 50.0 ml (39.7 gram) of sample.

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[1] Buffer Solution: Dissolve 10.0 g of anhydrous dibasic sodium phosphate (Na_2HPO_4) and 3.05 g of citric acid monohydrate in water and dilute to 500 ml.

[2] Available from Union Carbide Chemicals & Plastics Inc

[3] Standard: Into a 100 ml volumetric flask add about 90 ml of water. Pipet 0.62 ml of propionaldehyde and 0.64 ml of acetone (A18) into the flask and dilute to the mark with water (5 mg/ml standards). Pipet 1.0 ml of the 5 mg/ml standard into a 100 ml volumetric flask and dilute to the mark with water (0.05 mg/ml standard).

Findings regarding trace level methylene chloride and acetone contamination

Prepared for:Charlie Vernoy, EnSafe
February 9, 1998

Documentation concerning trace level methylene chloride and acetone contamination in a field investigation is very difficult to discover. Based on the review of many technical publications at several universities in St. Louis and extensive inquiries on the internet using five different databases for searches, Heartland ESI has not been able to discover evidence of prior papers concerning trace level contamination in the field. However, based on our extensive research, we have uncovered several documents which would support EnSafe's supposition that the concentrations of methylene chloride and acetone detected are field/laboratory contaminants.

Methylene chloride, CAS 75-09-2, is most widely used by companies that produce paint strippers, which have been determined to be a major contributor of hazardous waste generation in the Department of Defense. In addition, other companies use methylene chloride to clean metal surfaces. Thru the use of the strippers, it is plausible to ascertain that an uncertain amount of methylene chloride could randomly contaminate field samples without bias for quarterly monitoring. Methylene chloride is also categorized as a common laboratory contaminant that may be present in concentrations less than 25 μg/L or μg/Kg without being outside the technical acceptance criteria. Therefore, based on the presence of methylene chloride at the site in question as a component of paint strippers and cleaners and the allowable presence of methylene chloride in "blank" samples, all trace levels of methylene chloride, ($<$100 ppb or $<$10X methylene chloride CRQL) should be considered to be a field and/or laboratory contaminant.

The acetone, CAS 97-94-1, detected at the site can be attributed to the isopropanol utilized to decontaminate the sampling equipment. EnSafe used Fisher ACS grade isopropanol, which according to Ms. Deborah Hostetter, Senior Chemical Sales Specialist for Fisher Scientific, contains acetone as a contaminant. Deionized (DI) water rinses after the isopropanol decontamination is critical to insure that the isopropanol has been cleansed from the surface. After a field audit, EnSafe was instructed by the EPA to rinse the equipment with less DI water. If the equipment was not properly decontaminated with enough DI water to completely rid the equipment of isopropanol, traces of acetone would be present in field samples (as noted). Therefor, all trace acetone results ($<$100 ppb) can be attributed to the acetone contamination in the isopropanol.

Methylene chloride

Introduction

Methylene chloride, also known as dichloromethane, is a colorless liquid that has a mild sweet odor, evaporates very quickly, and will not easily burn. It is widely used as an industrial solvent and as a paint stripper. It can also be found in certain aerosol and pesticide products and is used in the manufacture of photographic film. Methylene chloride does not appear to occur naturally in the environment. It is made from methane gas or wood alcohol. Most of the methylene chloride released to the environment results from its use as an end product by various industries and the use of aerosol products and paint removers in the home.

Fate and Transport

Methylene chloride is mainly released to the environment in air and to a lesser extent in water and soil, due to industrial and consumer uses. Many chemical waste sites, including NPL sites, contain methylene chloride and these might act as additional sources of environmental contamination through spills, leaks, or evaporation. Because methylene chloride evaporates readily, most of it is released into the air. In air, it is broken down by sunlight and by reaction with other chemicals present in the air. About half of the methylene chloride disappears from air in 53-127 days. Although methylene chloride does not dissolve easily in water, small amounts may be found in some drinking water. Methylene chloride that is present in water is broken down slowly by reactions with other chemicals or by bacteria. Over 90 percent of the methylene chloride in the environment changes to carbon dioxide, which is non-toxic. It takes about 1 to 6 days for half the methylene chloride to break down in water. When methylene chloride is spilled on land, it attaches loosely to nearby surface soil particles. It moves from the soil into the air. Some may also move into groundwater. We do not know how long it remains in soil. We do not expect methylene chloride to build up in plants or animals.

Information excerpted from

Toxicological Profile for Methylene chloride October 1991 Update
Agency for Toxic Substances and Disease Registry
United States Public Health Service

Sites with Methylene chloride Contamination

- Lake Sandy Jo
- Midco I

- Contaminants List
- EcoIndiana Main Page
- Superfund Sites
- State Cleanup Sites

PACIFIC NW POLLUTION PREVENTION RESOURCE CENTER
POLLUTION PREVENTION RESEARCH PROJECTS DATABASE

Project Title: Solvent Substitution and Low VOC Cleaners

Date Last Updated: 11/96

Project Summary: The use of current chemical paint strippers containing hazardous components such as phenols, methylene chloride and chromates, and paint removal operations at maintenance depots have been determined to be a major contributor to hazardous waste generation in the Department of Defense. In addition, OSHA regulations have also reduced the permissible exposure for methylene chloride from 400ppm to 50ppm, forcing users to make extensive changes in ventilation and personal protection. The goal of this project is to identify non-toxic low volatile organic compound-content cleaning solvents for use on Navy aircraft, weapons systems, and ground support equipment and to identify replacements for methylene chloride-based chemical paint strippers. VOCs such as methyl ethyl ketone (MEK) are released in various cleaning and degreasing applications within the Department of Defense.

Solvent cleaners used by the DoD must be effective on a diverse combination of contaminants. This program will develop solvent blend formulations and aqueous cleaners which will be evaluated with laboratory performance and cleaning efficiency tests. The best materials will be further evaluated for performance, compatibility, vapor pressure, odor, evaporation rate, safety and cost. Enzyme cleaners, lubricant cleaners, low VOC solvent cleaners, and supercritical CO2 cleaning methods will also be evaluated in this program. Optimized material will be service tested and transitioned to fleet use.

Non-methylene chloride alternatives must exhibit workable performance characteristics while reducing the impact of stripper waste on disposal operations. Because there are so many different substrates, alloys and coatings systems currently used by the Navy, non-hazardous paint removers will also have to be versatile. This program will identify the best alternatives for ambient coatings removal operations. Procedure efficiency, effects on substrate surface, hazardous waste generation and applicability will be investigated in order to determine the best procedure for Navy applications. The best alternative material will be demonstrated and transitioned to fleet use through specification modification and design changes. This technology could also be transitioned to commercial aerospace, automotive, and marine industries.

03/97 Several biodegradable turbine engine cleaners have been evaluated and successfully field tested. Non-Hap chemical strippers have also been evaluated and one promising candidate was successfully field tested. An evaluation of the hydrogen embrittlement potential of these materials is currently in progress and must be completed before final implementation.

A non-VOC aircraft exterior cleaner has been developed which exceeds the requirements of the current specification. This product will proceed into the demonstration/validation phase in FY-96.

A low-VOC wheel well degreaser has been developed. This product will proceed into the demonstration/validation phase during FY-96.

Project Keywords: solvents, chemical paint strippers, materials substitution, cleaners, VOCs, methylene chloride replacement

Organizing Performing Research: US Navy, US Air Force

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Date research Started/Completed: 6/92 - 3/97

Publications Based on Research: none available

Approximate Project Budget: $720,000

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Search

OPPT Chemical Fact Sheet EPA 749-F-94-018

CHEMICALS IN THE ENVIRONMENT:
METHYLENE CHLORIDE (DICHLOROMETHANE) (CAS NO. 75-09-2)
prepared by
OFFICE OF POLLUTION PREVENTION AND TOXICS
U.S. ENVIRONMENTAL PROTECTION AGENCY
August 1994

Chemicals can be released to the environment as a result of their manufacture, processing, and use. The EPA has developed information summaries on selected chemicals to describe how you might be exposed to these chemicals, how exposure to them might affect you and the environment, what happens to them in the environment, who regulates them, and whom to contact for additional information. EPA is committed to reducing environmental releases of chemicals through source reduction and other practices that reduce creation of pollutants.

WHAT IS METHYLENE CHLORIDE, HOW IS IT USED, AND HOW MIGHT I BE EXPOSED?

Methylene chloride (also called dichloromethane) is a colorless, nonflammable liquid. It does not occur naturally but is produced in large amounts (350 million pounds in 1992) by three companies in the United States. Recent US production of methylene chloride has declined (about 10% a year since 1988). US demand for methylene chloride is likely to continue to fall. The largest users of methylene chloride are companies that make paint strippers. Foam makers use methylene chloride as a blowing agent. Other companies use it to clean metal surfaces. Methylene chloride can also be added to aerosol sprays or used to extract unwanted material from foods and beverages, such as coffee.

Exposure to methylene chloride can occur in the workplace or in the environment following releases to air, water, land, or groundwater. Exposure can also occur when people use certain aerosol paint sprays and paint strippers. Methylene chloride enters the body when breathed in with contaminated air or when consumed with contaminated food or water. It can also be absorbed through skin contact. It is not likely to remain in the body due to its breakdown and removal.

WHAT HAPPENS TO METHYLENE CHLORIDE IN THE ENVIRONMENT?

Methylene chloride evaporates when exposed to air. It dissolves when mixed with water. Most direct releases of methylene chloride to the environment are to air. Methylene chloride also evaporates from water and soil exposed to air. Once in air, it is expected to break down to other chemicals. Because it is a liquid that does not bind well to soil, methylene chloride that makes its way into the ground can move through the ground and enter groundwater. Plants and animals are not likely to store methylene chloride.

HOW DOES METHYLENE CHLORIDE AFFECT HUMAN HEALTH AND THE ENVIRONMENT?

Effects of methylene chloride on human health and the environment depend on how much methylene chloride is present and the length and frequency of exposure. Effects also depend on the health of a person or

the condition of the environment when exposure occurs.

Breathing large amounts of methylene chloride for short periods of time adversely affects the human nervous system and the heart. Effects range from unsteadiness and numbness in fingers and toes to unconsciousness and death. The heart has to work harder, and the blood carries less oxygen as the body breaks methylene chloride down to carbon monoxide. Direct contact with methylene chloride liquid or vapor irritates the skin and the eyes. These effects are not likely to occur at levels of methylene chloride that are normally found in the environment.

Human health effects associated with breathing or otherwise consuming smaller amounts of methylene chloride over long periods of time are not known. Laboratory studies show that repeat exposure to methylene chloride causes kidney and liver damage and cancer in animals that breathe air or drink water contaminated with the chemical. Repeat exposure to methylene chloride may likewise cause cancer in humans.

Methylene chloride is not likely to cause environmental harm at levels normally found in the environment. Reactions in air, although slow, tend to eliminate methylene chloride before it reaches the upper atmosphere in amounts sufficient to damage the ozone layer.

WHAT EPA PROGRAM OFFICES REGULATE METHYLENE CHLORIDE, AND UNDER WHAT LAWS IS IT REGULATED?

EPA OFFICE	LAW	PHONE NUMBER
Pollution Prevention & Toxics	Toxic Substances Control Act	(202) 554-1404
	Emergency Planning and Community Right-to-Know Act (EPCRA) Regulations (Sec. 313)	(800) 535-0202
	Toxics Release Inventory data	(202) 260-1531
Air	Clean Air Act	(919) 541-0888
Solid Waste & Emergency Response	Comprehensive Environmental Response, Compensation, and Liability Act (Superfund)/ Resource Conservation and Recovery Act / EPCRA (Sec. 304/311/312)	(800) 535-0202
Water	Clean Water Act	(202) 260-7588
	Safe Drinking Water Act (Drinking Water Standard: 0.005 mg/L)	(800) 426-4791

A technical support document is available from the TSCA Assistance Information Service, (202) 554-1404.

WHAT OTHER FEDERAL AGENCIES OR GROUPS CAN I CONTACT FOR INFORMATION ON METHYLENE CHLORIDE?

AGENCY/GROUP	PHONE NUMBER
Agency for Toxic Substances and Disease Registry	(404) 639-6000
American Conference of Governmental Industrial Hygienists	(513) 742-2020
Consumer Product Safety Commission	(301) 504-0994
Food and Drug Administration	(301) 443-3170
National Institute for Environmental Health Sciences (EnviroHealth Clearinghouse)	(800) 643-4794
National Institute for Occupational Safety and Health (NIOSH)	(800) 356-4674
Occupational Safety and Health Administration	

(Check your local phone book under U.S. Department of Labor)

Prepared: May 31 15:08:20 1995*Author:* Admin

Environmental Health Center

Environment Writer

Methylene Chloride (CH2Cl2) Chemical Backgrounder

Description:

Methylene chloride (C.A.S. 75-09-2), also known as dichloromethane (DCM), is an organic solvent that looks like water and has a mild sweet odor. It is widely used as an industrial solvent and as a component in certain aerosol products such as coatings, paint removers, hair sprays, room deodorants, herbicides, and insecticides. Methylene chloride is also used in foam blowing of polyurethanes, metal degreasing, stripping and degreasing in the electronics industry, polycarbonate resin production, photographic film-base manufacturing, adhesive production, and numerous other solvent, cleaning, and thinning uses. It is also used occasionally as an extractant for caffeine, spices, and hops.

Chemical and physical properties:

Synonyms for methylene chloride are dichloromethane; DCM; methane dichloride; methane, dichloro (8CI and 9CI); methylene bichloride; and methylene dichloride. Trade names are Aerothene MM, Freon 30, Narkotil, R30, Solaesthin, and Solmethine. Methylene chloride is a volatile liquid with high lipid solubility and modest solubility in water. It evaporates very quickly.

Health effects:

Acute exposure to methylene chloride has been associated with impairment of the central nervous system, liver and kidney damage, respiratory tract irritation, sluggishness, intoxication, lightheadedness, nausea, headache, tingling in limbs, unconscious-ness, and even death. Chronic exposure is associated with mild liver toxicity and memory loss.

High levels of methylene chloride in the air can irritate the eyes, nose, and throat. If methylene chloride gets on the skin, it usually evaporates quickly and causes mild irritation. However, if trapped against the skin by gloves, shoes, or clothes, it can cause a burn. If methylene chloride gets into the eyes, it may cause a severe but temporary eye irritation.

Epidemiological studies have not demonstrated a significant increase in cancer deaths in humans occupationally exposed to methylene chloride.

Populations downstream from methylene chloride production or use facilities may be at increased risk of exposure from discharges into surface waters. Populations near hazardous waste sites should be considered at high exposure risk, especially if their drinking water supply is derived from local groundwater. People with compromised cardiovascular systems are considered to be more sensitive to methylene chloride exposure.

Economics:

Approximately 265,000 metric tons (583 million pounds) of methylene chloride were produced in the U.S. in 1983. In 1983, 20,000 metric tons (44 million pounds) of methylene chloride were imported into the U.S., and 33,000 metric tons (72 million pounds) were exported, making approximately 252,000 metric tons (554 million pounds) available for U.S. consumptive use.

Of the total U.S. production in 1983, 26.3 percent was used in aerosol products, and 23.8 percent in paint removal products.

Producers of methylene chloride in 1989 included Al-Don Chemicals, Avon, N.Y.; Chemical Dynamics Co., South Plainfield, N.J.; Dow Chemical, Midland, Mich.; Hach Co., Ames, Iowa; LCP Chemicals and Plastics, Inc, Edison, N.J.; Mallinckrodt Inc., St. Louis, Mo.; Occidental Chemical Co., Dallas, Tx.; and Vulcan Chemicals, Birmingham, Ala.

Regulation:

The Occupational Safety and Health Administration issues permissible exposure limits for methylene chloride in workplace air; the Federal Drug Administration regulates its use in cosmetics (a proposed ban is pending), and limits its use in decaffeinated roasted coffee and instant coffee.

EPA offices overseeing regulations and guidelines applicable to methylene chloride include the Office of Drinking Water, the Office of Emergency and Remedial Response, the Office of Solid Waste, the Office of Toxic Substances, and the Office of Pesticide Programs.

Under the Emergency Planning and Community Right-to-Know Act of 1986, releases of more than one pound of methylene chloride into the air, water or land must be reported annually and entered into the national Toxic Release Inventory (TRI) data base.

Total air emissions of methylene chloride in the United States in 1987 were reported to total 112 million pounds. Methylene chloride was released in 43 states _ all but Alaska, Hawaii, Idaho, Montana, New Mexico, North Dakota, and Wyoming. The three states releasing the most methylene chloride were New York (13.24 million pounds), Illinois (10.57 million), and Indiana (10.24 million).

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National Safety Council

July 1, 1997| Disclaimer/Policy

Exhibit D Volatiles -- Section 12
Quality Control
Blank Analyses

12.1.4 Technical Acceptance Criteria for Blank Analyses

12.1.4.1 All blanks must be analyzed on a GC/MS system meeting the BFB, initial calibration and continuing calibration technical acceptance criteria and at the frequency described in Section 12.1.2.

12.1.4.2 The percent recovery of each of the system monitoring compounds in a blank must be within the acceptance windows in Table 7.

12.1.4.3 The EICP area for each of the internal standards in a blank must be within the inclusive range of -50.0 percent and +100.0 percent of the response of the internal standards in the most recent continuing calibration analysis.

12.1.4.4 The retention time shift for each of the internal standards in a blank must be within ±0.50 minutes (30 seconds) of its retention time in the most recent continuing calibration standard analysis.

12.1.4.5 The concentration of each target compound found in the blank must be less than its CRQL listed in Exhibit C (Volatiles), except for methylene chloride which must be less than 2.5 times its CRQL, and acetone and 2-butanone, which must be less than 5 times the CRQL.

12.1.5 Corrective Action for Blank Analyses

12.1.5.1 It is the Contractor's responsibility to ensure that method interferences caused by the contaminants in solvent, reagents, glassware, laboratory air and other sample storage and processing hardware that lead to discrete artifacts and/or elevated baselines in gas chromatograms be eliminated. If a Contractor's blanks exceed the criteria in Section 12.1.4.5, the Contractor must consider the analytical system to be out of control. The source of the contamination must be investigated and appropriate corrective measures must be taken and documented before further analysis proceeds.

12.1.5.2 Any method blank or instrument blank that fails to meet the technical acceptance criteria for blank analyses must be reanalyzed at no additional cost to the Agency. Furthermore, all samples, including MS/MSD samples, processed within the 12-hour period with a method blank or instrument blank that does not meet the technical acceptance criteria for blanks will require reanalysis at no additional cost to the Agency.

12.1.5.3 If the storage blank does not meet the technical acceptance criteria for blank analyses in Sections 12.1.4.1 through 12.1.4.4, correct system problems and reanalyze the storage blank. If the storage blank does not meet the criteria in Section 12.1.4.5, reanalyze the storage blank to determine whether the contamination occurred during storage or during the analysis. If, upon reanalysis, the storage blank meets the criteria in Section 12.1.4.5, the problem occurred during the analysis and the reanalyzed storage blank results must be reported. If upon

United States
Environmental Protection
Agency

Office of
Solid Waste and
Emergency Response

Publication 9240.1-05
EPA-540/R-94/012
PB94-963501
February 1990

Superfund

EPA

USEPA CONTRACT LABORATORY PROGRAM NATIONAL FUNCTIONAL GUIDELINES FOR ORGANIC DATA REVIEW

VOA

V. Blanks

A. **Review Items:** Form I VOA *[Form I LCV]*, Form IV VOA *[Form IV LCV]*, chromatograms, and quantitation reports.

B. **Objective:**

The purpose of laboratory (or field) blank analysis is to determine the existence and magnitude of contamination resulting from laboratory (or field) activities. The criteria for evaluation of blanks apply to any blank associated with the samples (e.g., method blanks, instrument blanks, trip blanks, and equipment blanks). If problems with any blank exist, all associated data must be carefully evaluated to determine whether or not there is an inherent variability in the data, or if the problem is an isolated occurrence not affecting other data.

C. **Criteria:**

1. No contaminants should be found in the blanks.

2. A method blank analysis must be performed after the calibration standards and once for every 12-hour time period beginning with the injection of BFB.

3. The method blank must be analyzed on each GC/MS system used to analyze samples for each type of analysis, i.e., unheated purge (water and medium level soil) and heated purge (low level soil).

4. A storage blank must be prepared upon receipt of the first samples from an SDG, and stored with samples until analysis. The storage blank must be analyzed once per SDG.

5. An instrument blank must be analyzed after any sample that has saturated ions from a given compound to check that the blank is free of interference and the system is not contaminated.

D. **Evaluation:**

1. Review the results of all associated blanks on the forms and raw data (chromatograms and quantitation reports) to evaluate the presence of target and non-target compounds in the blanks.

2. Verify that a method blank analysis has been reported per matrix, per concentration level, for each 12-hour time period on each GC/MS system used to analyze volatile samples. The reviewer can use the Method Blank Summary (Form IV VOA *[Form IV LCV]*) to identify the samples associated with each method blank.

3. Verify that a storage blank has been analyzed and included with each SDG and that the storage blanks are free of contamination.

4. Verify that the instrument blank analysis has been performed following any sample analysis where a target analyte(s) is/are reported at high concentration(s).

E. **Action:**

If the appropriate blanks were not analyzed with the frequency described in Criteria 2, 3, and 4, and 5 then the data reviewer should use professional judgement to determine if the associated sample data should be qualified. The reviewer may need to obtain additional information from the laboratory. The situation should be noted for TPO action.

Action regarding unsuitable blank results depends on the circumstances and origin of the blank. Positive sample results should be reported unless the concentration of the compound in the sample is less than or equal to 10 times (10x) the amount in any blank for the common volatile laboratory contaminants (methylene chloride, acetone, and 2-butanone), or 5 times (5x) the amount for other volatile target compounds. In instances where more than one blank is associated with a given sample, qualification should be based upon a comparison with the associated blank having the highest concentration of a contaminant. The results must not be corrected by subtracting any blank value.

Specific actions are as follows:

1. If a volatile compound is found in a blank but not found in the sample, no action is taken. If the contaminants found are volatile target compounds (or interfering non-target compounds) at significant concentrations above the CRQL, then this should be noted for TPO action.

2. Any volatile compound detected in the sample (other than the common volatile laboratory contaminants), that was also detected in any associated blank, is qualified if the sample concentration is less than five times (5x) the blank concentration. The quantitation limit may also be elevated. Typically, the sample CRQL is elevated to the concentration found in the sample. The reviewer should use professional judgement to determine if further elevation of the CRQL is required. For the common volatile laboratory contaminants, the results are qualified by elevating the quantitation limit to the concentration found in the sample when the sample concentration is less than 10 times (10x) the blank concentration.

   The reviewer should note that blanks may not involve the same weights, volumes, or dilution factors as the associated samples. These factors must be taken into consideration when applying the "5x" and "10x" criteria, such that a comparison of the total amount of contamination is actually made.

VOA

Additionally, there may be instances where little or no contamination was present in the associated blanks, but qualification of the sample is deemed necessary. If the reviewer determines that the contamination is from a source other than the sample, he/she should qualify the data. Contamination introduced through dilution water is one example. Although it is not always possible to determine, instances of this occurring can be detected when contaminants are found in the diluted sample result, but are absent in the undiluted sample result. Since both results are not routinely reported, it may be impossible to verify this source of contamination. In this case, the "5x" or "10x" rules may not apply: the target compound should be reported as not detected, and an explanation of the data qualification should be provided in the data review narrative.

3. If gross contamination exists (i.e., saturated peaks by GC/MS), all affected compounds in the associated samples should be qualified as unusable (R) due to interference. This should be noted for TPO action if the contamination is suspected of having an effect on the sample results.

4. If inordinate numbers of other target compounds are found at low levels in the blank(s), it may be indicative of a problem and should be noted for TPO action.

5. The same consideration given to the target compounds should also be given to Tentatively Identified Compounds (TICs), which are found in both the sample and associated blank(s). (See VOA Section XII for TIC guidance.)

6. If contaminants are found in the storage blanks, the following action is recommended.

   a. The associated method blank data should be reviewed to determine if the contaminant(s) was also present in the method blank. If the analyte was present at a comparable level in the method blank, then the source of the contamination may be in the analytical system and the action recommended for the method blank would apply.

      If the analyte was not present in the method blank, then the source of contamination may be in the storage and all associated samples should be considered for possible cross-contamination.

   b. If the storage blank contains a volatile TCL compound(s) at a concentration greater than the CRQL, then all positive results for that compounds(s) should be qualified with "J". If the concentration level in the blank is significantly high, then positive sample results may require rejection and be qualified with "R". Non-detected volatile target compounds should not require qualification unless the contamination is so high that it interferes with the analysis of the non-detect compounds.