INTERIM REPORT

Exposure Pathway Analysis Report for the Human Health Risk Assessment Former IFG Facility and Deferred Media, Syracuse, New York

General Motors Corporation
Syracuse, New York

June 2000

O'BRIEN & GERE
ENGINEERS, INC.

INTERIM REPORT

Exposure Pathway Analysis Report for the Human Health Risk Assessment Former IFG Facility and Deferred Media Syracuse, New York

General Motors Corporation
Syracuse, New York

Swiatoslav W. Kaczmar, Ph.D., C.I.H.
Vice President, Environmental Toxicology and Industrial Hygiene

June 2000

O'BRIEN & GERE
ENGINEERS, INC.

Contents

List of tables ii
List of attachments ii

1. Introduction 1
1.1. Site description and background information 2

2. HHRA methods and assumptions 5
2.1. Receptors 5
2.2. Constituents of potential concern (COPC) 5
2.2.1. Comparison with background 6
2.2.2. Evaluation of essential nutrients 6
2.3. Exposure pathway analysis 7
2.3.1. Contact with surface soil 7
2.3.2. Contact with surface and subsurface soil 7
2.3.3. Contact with shallow ground water 7
2.3.4. Ingestion of ground water 7
2.3.5. Inhalation of ambient air 8
2.3.6. Inhalation of indoor air 8
2.3.7. Contact with sediments/surface water 8
2.3.8. Ingestion of fish from Ley Creek 8
2.4. Exposure point concentrations 8
2.4.1. Soil/sediment 9
2.4.2. Surface water 10
2.4.3. Shallow ground water 10
2.4.4. Deep ground water 10
2.4.5. Indoor air 10
2.5. Exposure assumptions 11
2.6. Toxicity values 11
2.7. Risk characterization 11
2.8. Future submittals 12

References 13

List of tables

1. Occurrence, Distribution and Selection of Chemicals of Potential Concern for Surface Soil at IFG Site
2. Occurrence, Distribution and Selection of Chemicals of Potential Concern for Sub-surface Soil at IFG Site
3a. Occurrence, Distribution and Selection of Chemicals of Potential Concern for Shallow Ground Water at IFG Site
3b. Occurrence, Distribution and Selection of Chemicals of Potential Concern for Deep Ground Water at IFG Site
4. Occurrence, Distribution and Selection of Chemicals of Potential Concern for Sediments in the Ley Creek Study Area
5. Occurrence, Distribution and Selection of Chemicals of Potential Concern for Surface Water in the Ley Creek Study Area
6. Summary of IFG Site and Ley Creek Study Area COPCs
7. Occurrence, Distribution and Selection of Chemicals of Potential Concern for Sediments in the Ley Creek Upstream Area
8. Occurrence, Distribution and Selection of Chemicals of Potential Concern for Surface Water in the Ley Creek Upstream Area
9. Summary of Ley Creek Upstream Area COPCs
10a. Derived Indoor Air Concentrations from Subsurface Soil Vapor Migration
10b. Derived Indoor Air Concentrations from Ground Water Soil Vapor Migration
10c. Derived Indoor Air Concentrations Total from Subsurface Soil and Ground Water Vapor Migration
11. Vapor Migration Model Source and Soil Parameters
12. 1993 Remedial Investigation (O'Brien & Gere Engineers) Fish Tissue Analytical Data
13. Summary of Toxicity Data

List of attachments

A. Derivation of 95% Upper Confidence Limits
B. Summary of Indoor Air Migration Calculations
C. Previously negotiated exposure assumptions

1. Introduction

The purpose of this report is to document the Exposure Pathway Analysis Report (EPAR) for the Human Health Risk Assessment (HHRA) to be completed at the Former IFG Facility and the Ley Creek Deferred Media in Salina, New York. The report supplements and incorporates the HHRA Approach Interim Memorandum (IM) which was discussed by General Motors Corporation (GM), New York State Department of Environmental Conservation (NYSDEC) and United States Environmental Protection Agency (USEPA) on June 16 1998, commented on by NYSDEC and USEPA during 1998 and 1999, and finalized in October 1999 based on NYSDEC and USEPA comments (O'Brien & Gere, 1999). This EPAR incorporates the information presented in the IM, and together with the Ecological Assessment Problem Formulation Document submitted April 6, 2000, has been prepared to fulfill the requirements of the Risk Assessment Memorandum described in Section IV. A of the September 25 1997 Consent Order between GM and NYSDEC (the Consent Order)(Index # D-7-0001-97-06, effective September 25, 1997).

Consistent with the components of the Risk Assessment Memorandum described in the September 25, 1997 Consent Order, this EPAR contains the following sections:

- Site Description and Background Information
- Identification of Receptors
- Evaluation of Exposure Pathways
- Constituents of Potential Concern (COPCs)
- Exposure Point Concentrations
- Exposure Assumptions
- Toxicity Values
- Risk Characterization Approach
- Future Submittals

The HHRA will be conducted in accordance with the methods and procedures documented in USEPA 1989, *Risk Assessment Guidance for Superfund, Part A, Human Health Evaluation Manual*. The HHRA approach is based on analytical data and site information developed during the Preliminary Remedial Investigation (O'Brien & Gere 1998) and Supplemental Remedial Investigation (RI) (O'Brien & Gere 2000). The Supplemental RI concluded that, with the exception of the need for additional delineation of volatile organic compounds (VOCs) in ground water in the deep overburden ground water at the eastern and

northeastern boundaries of the Former IFG Facility, the nature and extent of contamination at the Former IFG Facility has been sufficiently evaluated. GM will submit an Addendum to the Supplemental RI Report to incorporate the results of an additional investigation to evaluate the extent of VOC ground water impacts in the deep overburden zone at the northeastern boundary of the Former IFG Facility and adjacent off-site areas. This investigation will be performed in accordance with the NYSDEC-approved work plan. The Supplemental Risk Assessment Report shall incorporate the results of this additional investigation, and be submitted following receipt of the results of the additional VOC investigation.

1.1. Site description and background information

This section presents a brief summary of the site history, physical characteristics, and land current and future land uses at the Former IFG Facility and surrounding areas. A detailed discussion of these factors has been presented in the Preliminary RI/FS and the Supplemental RI Report (O'Brien & Gere 1997, 2000).

The site includes both the Former IFG Facility and the Ley Creek Deferred Media. The Former IFG Facility comprises approximately 65 acres of property located at 1 General Motors Drive in the Town of Salina, Onondaga County, New York. Historically, the Former IFG Facility was used for the manufacture of metal automotive trim components such as bumpers, grills, wheel disks and hubcaps. More recently, the facility was used for the manufacture of interior and exterior plastic trim components such as bumpers, grills and door panels. The facility began operations in 1952, operating initially as a plating facility and later for the manufacture of plastic automotive components. The facility ceased manufacturing operations in December 1993.

Currently existing facility structures include the main manufacturing building, the attached administration building, the primary switch house, powerhouse, the industrial waste treatment (IWT) plant, mold storage (former tank farm) building and bulk handling building. Various paved parking lots and undeveloped areas are present on the property. The facility is bounded to the south by Conrail railroad tracks and a wood pallet recycling facility, to the east and northeast by GM Circle and Townline Road, to the west by a Niagara Mohawk Power Corporation (NMPC) electrical transfer station and to the north by Factory Avenue and an undeveloped area adjacent to Ley Creek. The facility is located in an area zoned for industrial use in the Town of Salina. The area surrounding the facility is generally characterized as highly urbanized.

The Ley Creek PCB Dredgings site is located directly north of the facility and Factory Ave. As described in the Consent Order, the Ley Creek PCB Dredgings site consists of the area between Factory Avenue

and Ley Creek, extending west from the Former IFG Facility Outfall 003 discharge for approximately 4,000 ft. The Ley Creek Deferred Media include ground water underlying the Ley Creek PCB Dredgings site and surface water and sediment in Ley Creek between Townline Road and Route 11.

Overburden underlying the Former IFG facility and the Ley Creek PCB Dredging site consists of fill, glaciolacustrine deposits, and lodgment till underlain by red shale bedrock. The fill is loose to dense and ranges in thickness from 1 to 16 ft, being thickest in the northwestern area of the site. Glaciolacustrine deposits located beneath the fill consist primarily of silt and fine sand with discrete clay layers, with thickness increasing northeast across the Former IFG Facility from 7 to 28 ft. In the northern portion of the Former IFG Facility, the glaciolacustrine deposits can be divided into an upper, middle and lower unit. The upper unit consists predominately of silt and fine sand and varies in thickness from approximately 4 to 14 ft. The middle unit consists predominately of silt and clay. The middle unit originates near the northern edge of the manufacturing building and is continuous in the northern portion of the Former IFG Facility. The middle portion varies in thickness from approximately 5 to 15 ft. The lower portion consists of silt and fine sand. The thickness of this layer varies from 5 to 11 ft. Lodgement till consists of very dense silt with embedded gravel of varying thickness overlying the bedrock.

Ground water is encountered between 3 and 13 ft below ground surface at the Former IFG Facility. The saturated portions of the fill and glaciolacustrine units comprise the unconfined overburden aquifer. The overburden overlies the lodgement till unit which limits hydraulic connection between the overburden and bedrock. The approximate upper 15 ft of the saturated overburden has been designated the shallow overburden aquifer zone, which encompasses the saturated portion of the fill and upper glaciolacustrine unit. The lower portion of the aquifer is not present in the southern portion of the Former IFG Facility due to the shallow depth to till. The lower unit starts near monitoring well MWI-3 and is located in the lower glaciolacustrine unit that encompasses the approximate 10 ft immediately above the lodgment till. The classifications were developed to evaluate ground water quality in the two zones and discuss variations in ground water flow regimes.

The shallow overburden ground water flow direction is northeast across the Former IFG Facility toward Ley Creek with an average hydraulic gradient of 0.009 ft/ft. Using an average porosity and a range of measured hydraulic conductivity, the shallow ground water flow velocity range was estimated to be 0.07 to 16.4 ft/year. Deep overburden ground water also flows towards the northeast, and has an average hydraulic gradient of 0.01 ft/ft. The deep ground water flow velocity range was estimated to be 0.44 to 32.5 ft/yr.

Ground water is not used for residential or industrial purposes at or in the vicinity of the Former IFG Facility (OBG 2000, telephone communication with Onondaga County and Town of Dewitt Water

Departments respectively). However, as discussed in the IM, it will be assumed that future industrial users may utilize ground water for potable and non-potable purposes since the ground water is classified as GA. Future land uses at the Former IFG Facility are identified as industrial / commercial since the IFG facility is zoned industrial and is located in an industrial/commercial area. Based on the current facility re-development plans, GM intends to decommission existing on-site buildings and redevelop them as commercial / industrial space for lease.

The Ley Creek Deferred Media is defined as sediments and surface water in the portion of Ley Creek bounded by Townline Road on the east and by the Route 11 bridge on the west, and ground water beneath the Ley Creek PCB Dredgings Site. Ley Creek is in an urban area and receives wastewater discharges from the Former IFG Facility and other industrial facilities as well as non-point source urban run-off. Access to the Ley Creek Deferred Media area is limited and is not routinely used for recreational purposes. However, for the purposes of the HHRA, it is assumed that adult or child recreators may occasionally access the Ley Creek Deferred Media area for fishing or other recreational purposes.

2. HHRA methods and assumptions

2.1. Receptors

The following potential human receptor populations were identified at the Former IFG Facility:

- Current and future industrial worker[1]
- Future construction workers
- Current adolescent trespasser

The following potential human receptor populations were identified for the Ley Creek Deferred Media Area:

- Adult and child recreators of Ley Creek.
- Dredging workers

2.2. Constituents of potential concern (COPC)

USEPA Region III has published analyte-specific risk-based soil and water screening concentrations (USEPA 2000). If the maximum detected concentration of a chemical in Site media is less than the published screening value, then it is highly unlikely that the chemical may represent a significant risk to human health, and may be deleted as a COPC. Consistent with the IM, the Region III residential screening values corresponding to an excess lifetime cancer risk of 10^{-6} for carcinogens, and a Hazard Quotient of 0.1 for non-carcinogens were used as a basis for comparison. If the maximum detected on-site concentration was less than the selected Region III screening level then the analyte was eliminated as a COPC. For soils and sediments, the residential surface soil screening values were used. For ground water and surface water, the published Region III tap water concentration was applied.

[1] Industrial worker is a generic category of human receptor populations designed to be representative of a generic worker at an industrial facility. This receptor category addresses individuals working at the facility 250 days/year, over a 25 year timeframe engaged in typical activities such as production, maintenance, and other commercial activities and is intended to be representative of current and future worker's at the facilities.

2.2.1. Comparison with background

According to USEPA guidance, (USEPA 1989) inorganic constituents may be eliminated as COPCs if the detected concentrations are less than naturally occurring background concentrations. Constituents in surface soil (0-2 ft) were not included as COPCs if the maximum detected concentrations were less than the range of naturally occurring background reported for New York State soils (McGovern 1983). One sub-surface soil sample from 5-6 ft was collected as a background sample (OBG TB-33). Inorganic constituents and low levels of organic constituents (Aroclor 1260, BEHP, methylene chloride) were detected in this sample. Constituents detected in sub-surface soil were eliminated as a COPC if the maximum detected concentration was less than 2 times the concentration reported in sample OBG TB-33.

Published ranges for naturally occurring inorganic constituents in sediments in New York State were not identified. Upstream samples were sampled and analyzed for metals. However, the upstream reaches of Ley Creek drain an urban/industrial area, and therefore upstream metal concentrations are likely reflective of anthropogenic sources rather than naturally occurring levels. In general, naturally occurring metal concentrations in sediments are expected to be comparable to or higher than the levels in surface soils, since sediments tend to act as sinks for metals. Therefore, the detected concentrations in Ley Creek sediments were compared with the reported soil background levels.

Two shallow wells (U-1S and OBG-11) and one deep well (U-1D) were installed as upgradient wells at the Former IFG Facility. Organic constituents (benzene and xylene) were detected in well U-1S, which suggests that the ground water in this well may be anthropogenically impacted. As such, data from this well were not applied as naturally occurring background levels. Constituents detected in well OBG-11 were applied as naturally occurring concentrations in shallow ground water. Since no inorganic constituents were detected in well U-1D, detected deep ground water constituents were assumed to be present at concentrations above naturally occurring background levels.

2.2.2. Evaluation of essential nutrients

Naturally occurring compounds were eliminated from the COPC list if they were essential nutrients, were present at concentrations only slightly elevated above naturally occurring levels, and were toxic only at very high doses. Based on these considerations, calcium, sodium, potassium, and magnesium were not included as COPCs for the risk assessment.

2.3. Exposure pathway analysis

2.3.1. Contact with surface soil

Under current and potential future land uses, the soil exposure pathway via incidental ingestion and dermal adsorption was identified as **complete** for current adolescent trespassers and current / future industrial workers. As agreed in the IM, surface soil is characterized by available data corresponding to samples collected from between 0 and 2 ft depths. The available surface soil data indicate the presence of polychlorinated biphenyls (PCBs) and other constituents above the identified soil screening levels.

2.3.2. Contact with surface and subsurface soil

Under current and potential future land uses, the soil exposure pathway via incidental ingestion and dermal adsorption was identified as **complete** for adult construction workers. It is highly unlikely that construction workers would excavate soils greater than 10 ft. in depth during routine construction activities. Therefore, for the construction workers, exposure was assumed to be to soil in the 0 – 10-ft. interval. The available soil data indicate the presence of PCBs and other constituents above the identified soil screening levels.

2.3.3. Contact with shallow ground water

Under current and potential future land uses, the shallow ground water exposure pathway via dermal adsorption and incidental ingestion was identified as **complete** for construction workers. During construction activities an exposure pathway exists for construction worker contact with ground water containing VOCs, PCBs and metals.

2.3.4. Ingestion of ground water

The ground water at or in the vicinity of the Former IFG Facility and Ley Creek Deferred Media is not used for domestic or industrial purposes, since the local community is served by municipal water from the Onondaga County Water Authority (OCWA). Nevertheless, at the request of NYSDEC the ingestion-of-ground-water pathway will be evaluated. As discussed in the IM, it will be assumed that future industrial users may utilize ground water for potable and non-potable purposes since the ground water is classified as GA. Therefore, for the purposes of the risk assessment, the industrial use ground water exposure pathway is classified as **complete**.

2.3.5. Inhalation of ambient air

Under current and future land uses, the ambient air pathway was identified as **complete** for human receptors. Given the observed concentrations of VOCs in subsurface soil and ground water, there is the potential for migration to ambient air. However, it is anticipated that resultant ambient air concentrations would be minimal due to the paved and vegetated surface conditions at the facility. Therefore, this pathway will be evaluated qualitatively.

2.3.6. Inhalation of indoor air

Under current and future land uses, the facility indoor air pathway was identified as **complete** for adult human receptors. Given the observed concentrations of VOCs in subsurface soil and ground water, there is the potential for migration of VOCs to indoor air of current or future buildings located above VOC impacted soil or ground water.

The extent of potential migration of VOCs and resultant VOCs concentrations in indoor air depend on various factors including structural integrity of the slab, volume of the indoor space, ventilation rates, extent and location of the source, and local geology.

2.3.7. Contact with sediments/surface water

This pathway is classified as **complete** for recreators and dredging workers. Access to the Ley Creek Deferred Media area is limited and is not routinely used for recreational purposes. However, for the purposes of the HHRA, it is assumed that adult or child recreators may occasionally access the Ley Creek Deferred Media area for fishing or other recreational purposes.

2.3.8. Ingestion of fish from Ley Creek

Since the Ley Creek Deferred Media area is in an urban setting, the stream has limited access and is not conducive to fishing. Nevertheless, at the request of NYSDEC the ingestion-of-fish pathway will be evaluated. For the purposes of the HHRA, it is assumed that adult or child recreators may occasionally consume fish caught at the Ley Creek Deferred Media area. This pathway, therefore, is classified as **complete** for recreators.

2.4. Exposure point concentrations

The proposed Reasonable Maximum Exposure (RME) Point Concentrations, as defined by USEPA (USEPA 1989), are summarized on Table 6 for the Former IFG Facility and the Ley Creek Deferred Media Area and on Table 9 for Ley creek upstream sediments and surface water. As per convention, the RME exposure point concentrations provide for a highly conservative calculated estimate of potential health risk related to constituents in site media. A more representative estimate of risk may be estimated based on the average concentrations. Estimates of health risk based on the average concentrations may be included in the discussion of uncertainties in the Supplemental Human Health Risk Assessment report.

The basis for the RME derived exposure point concentrations is presented below.

2.4.1. Soil/sediment

USEPA guidance states that the upper 95 % confidence level on the arithmetic mean (UCL), or the maximum detected concentration should be used as the RME exposure point concentration (USEPA 1989). However, the derived UCL depends on the shape of the underlying distribution for the data (e.g. normal, lognormal, other). It is difficult to assess the shape of the underlying data distribution of a given parameter if there are less than 15 detections at a site for that parameter. Therefore, the soil exposure point concentrations for COPCs were derived based on the following general rules:

- < 15 samples - the maximum detected concentration was utilized as the RME exposure point concentration.
- >15 samples - the underlying distribution was examined and statistically assessed, and the UCL calculated for a normal or lognormal distribution, as appropriate (using a value of ½ the detection limit for non-detects).
- Unknown Distribution > 25 samples - the normal distribution approximation was applied for the sampling distribution of the mean, based on the central limit theorem (i.e. a "normal" UCL was calculated) (using a value of ½ the detection limit for non-detects).

As per USEPA guidance (USEPA 1989), the lower of the UCL or the maximum detected concentration is used as the soil or sediment RME exposure point concentration. Attachment A presents a summary of the derived 95 % UCLs.

2.4.2. Surface water

Based on the low frequency of detections for surface water COPCs, the maximum detected concentration was applied as the RME exposure point concentration for surface water exposures.

2.4.3. Shallow ground water

On site construction workers may be exposed to COPCs in shallow ground water. It was assumed that future construction activities will occur in sub-areas of the site rather than on a site-wide basis. Therefore, the maximum detected concentration in shallow ground water will be applied as the RME exposure point concentration for shallow ground water.

2.4.4. Deep ground water

As per NYSDEC's request, it is assumed that deep ground water may be used as industrial process or potable water in the future. Therefore, the maximum detected concentration in deep ground water will be applied as the exposure point concentration for deep ground water.

2.4.5. Indoor air

Potential current and future indoor air screening concentrations were derived based on the USEPA's spreadsheet model of Johnson and Ettinger (1991) and the detected concentrations of VOCs in soils and ground water at the Former IFG Facility. For soils, the derived upper 95 % confidence levels in sub-surface soils were applied as the source concentrations. For ground water, the maximum detected concentrations in shallow ground water were applied as potential source concentrations. Based on consideration of current and potential future site uses, a conservative generic industrial scenario for building dimensions and air exchange rates was applied. A summary of the applied input parameters is presented on Table 10. The modeled indoor air screening levels, which will be applied as the indoor air exposure point concentrations, are summarized on Table 11. Details of the indoor air migration screening calculations are presented in Attachment B.

2.4.6 Fish

The fish community of Ley Creek in the area of the site has been previously sampled and analyzed for PCBs. Table 12 presents the fish species collected and PCB analytical results of samples submitted as part of site investigations conducted in 1992 (O'Brien & Gere 1993). Based on the data presented in Table 12, the maximum detected concentration of PCBs in fish (2.4 mg/kg Aroclor 1248 in pumpkinseed) will be applied as the exposure point concentration for the fish ingestion pathway.

2.5. Exposure assumptions

The exposure assumptions and parameter values for estimating receptor specific Chronic Daily Intakes (CDIs) previously finalized and presented to NYSDEC and USEPA in the IM will be applied in the HHRA (Attachment C).

2.6. Toxicity values

As per USEPA guidance (USEPA 1989), Reference Doses (RfDs) and cancer slope factors compiled from the following hierarchy of sources will be applied in the risk assessment:

- USEPA's Integrated Risk Information System (IRIS) database,
- Health Effects Summary Tables (HEAST),
- Agency for Toxic Substances and Disease Registry (ATSDR).

The selected toxicity values are summarized on Table 13.

2.7. Risk characterization

In this section of the HHRA, the toxicity and exposure assessments are summarized and integrated into numerical values which may be used to evaluate the likelihood of adverse health effects in populations potentially exposed to Site-related chemicals. RME estimates of potential health risks were developed for each potentially exposed receptor at the Site.

Chronic non-cancer health effects are evaluated by comparing the chemical-specific CDIs with the respective chronic RfD as given below.

1. For each receptor identified during the exposure assessment, and each individual exposure pathway, the chemical-specific hazard quotients (HQs) will be calculated where HQ is given by:

   Hazard Quotient = CDI/RfD

2. For each exposure pathway, the chemical-specific hazard quotients will be summed to calculate the Hazard Index (HI) for that pathway. For each receptor, the pathway specific hazard

indexes will be summed to obtain the Total HI for that receptor. A total HI of less than one indicates that it is highly unlikely that chronic non-cancer toxic effects would occur for the given receptor.

To evaluate carcinogenic effects, the incremental cancer risk associated with exposure to COPCs is calculated using chemical-specific slope factors as described below.

1. For each receptor identified during the exposure assessment and each exposure pathway, the chemical-specific risk is given by:

   Cancer risk = CDI * slope factor.

2. For each receptor the total incremental excess cancer risk will be calculated by summing the pathway specific cancer risk. This calculated risk estimate will then compared with an acceptable excess cancer risk. A total Site cancer risk that is less than 1.0E-04 to 1.0E-06 is considered to be acceptable, (NCP, *Federal Register*, March 8 1990, 40 CFR 300).

2.8. Future submittals

The methods, procedures, and assumptions described in this EPAR will be applied to complete the Supplemental Risk Assessment Report and the supplemental HHRA for the Former IFG Facility and Ley Creek Deferred Media Area following approval of this EPAR.

References

ATSDR 1998 - Agency for Toxic substances and Disease Registry (ATSDR). 1998. Toxicological profiles for COPCs or structural analogs of the RDAs Food Nutrition Board, US Department of Health and Human Services. October, 1998.

IRIS - USEPA 2000. 'Integrated Risk Information System (IRIS) - file for cadmium and other compounds".

Johnson, P.C. and R.A. Ettinger. 1991. Shell Development, Wesrthollow Research Center. *Heuristic Model for Predicting the Intrusion Ratew of Contaminant Vapors into Buildings*. Environ. Sci. Technol., 25, 1445-1452.

McGovern, 1983, Background concentrations of 20 elements in soils with special regard for New York State, NYSDEC report

NRC 1989 - National Research Council.1989. "Recommended Dietary Allowances", 10th Edition. Subcommittee on the 10th Edition Commission on Life Sciences. National Academy Press, Washington, DC.

NYSDEC. 1999. Table entitled "USEPA Recommended Dermal Absorbtion Factor for Soil" provided to GM by NYSDEC.

O'Brien & Gere Engineers, Inc. 1993. Remedial Investigation Ley Creek Dredged Material Area, General Motors Corporation IFG Facility. Syracuse, NY.

O'Brien & Gere Engineers, Inc. 1999. Human Health Risk Assessment Approach Former IFG Facility and Deferred Media, Syracuse, NY, Interim Memorandum, October 1999.

O'Brien & Gere Engineers, Inc. 2000, Supplemental Remedial Investigation Report, Former IFG Facility and Ley Creek Deferred Media Site

USEPA, 1989, Risk Assessment Guidance for Superfund, Part A, Human Health Evaluation Manual

USEPA 1992b -USEPA 1992. "Dermal Exposure Assessment: Principles and Applications.", Interim Report. Office of Research and Development. EPA/600/8-91/011B. January.

USEPA Region III 1995. "Assessing Dermal Exposure from Soil". Conservative estimate for VOCs based on partially occluded skin. http://www.epa.gov/reg3hwmd/risk/solabsg2.htm

USEPA Region IV. 1996. Human Health Risk Assessment Bulletin-Toxicity Assessment. Online OTS Guidance Document Office of Waste Management. October 1996.
http://www.epa.gov/region4/wastepgs/otsguid.htm

USEPA Region III. 2000. Risk-Based Concentration Tables. Online reference. March 2000.
http://www.epa.gov/reg3hwmd/risk/riskmenu.htm

TABLE 1
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Former IFG Facility and Ley Creek Deferred Media

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: IFG Facility Surface Soil

Chemical	Minimum Concentration	Maximum Concentration	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value (1)	Screening Toxicity Value (2)	COPC ? Y = Yes N = No
Aluminum	8360	14600	mg/kg	SS-99-17	7/7	-	25000	25000	7821	N
Antimony	0.38	1.4	mg/kg	SS-99-21	2/7	0.14-0.175	3.1		3.1	N
Arsenic	**2.2**	**162**	**mg/kg**	**SS-99-21**	**47/47**	-	**6.5**	**6.5**	**0.43**	**Y**
Barium	48.4	228	mg/kg	SS-99-10	7/7	-	548	350	548	N
Beryllium	0.44	0.94	mg/kg	SS-99-10	7/7	-	15.6	0.9	15.6	N
Cadmium	0.2	1	mg/kg	SS-99-21	7/12	0.25-0.3	3.9	1	3.9	N
Calcium	8090	76600	mg/kg	SS-99-13	7/7	-	0		EN	N
Chromium	**9.2**	**32000**	**mg/kg**	**SS-99-26**	**52/52**	-	**1000**	**1000**	**230**	**Y**
Cobalt	5.4	10.8	mg/kg	SS-99-17	7/7	-	469	70	469	N
Copper	**6.9**	**5410**	**mg/kg**	**T03-3**	**52/52**	-	**700**	**700**	**313**	**Y**
Cyanide	0.98	102	mg/kg	T04-1	9/52	0.265-0.455	156		156	N
Iron	**14300**	**31200**	**mg/kg**	**SS-99-10**	**7/7**	-	**25000**	**25000**	**2346**	**Y**
Lead	**3.7**	**717**	**mg/kg**	**SS-99-26**	**47/47**	-	**400**	**12.5**	**400**	**Y**
Magnesium	5780	19200	mg/kg	SS-99-13	7/7	-	6000	6000	EN	N
Manganese	228	524	mg/kg	SS-99-05	7/7	-	600	600	156	N
Mercury	0.025	0.14	mg/kg	T04-3	14/19	0.01-0.012	2.35	0.066	2.35	N
Nickel	**8.3**	**6630**	**mg/kg**	**SS-99-26**	**52/52**	-	**156**	**12.5**	**156**	**Y**
Potassium	1460	2530	mg/kg	SS-99-17	7/7	-	17500	17500	EN	N
Selenium	0.54	2.4	mg/kg	SS-99-10	7/7	-	39.1	0.125	39.1	N
Sodium	97.5	568	mg/kg	SS-99-10	7/7	-	8000	8000	EN	N
Thallium	0.4	0.4	mg/kg	SS-99-10	1/7	0.065-0.075	0.55		0.55	N
Vanadium	19.1	28.1	mg/kg	SS-99-10	7/7	-	60	60	54.8	N
Zinc	**25**	**8470**	**mg/kg**	**T03-3**	**47/47**	-	**2346**	**60**	**2346**	**Y**
2-Methylnaphthalene	0.047	11	mg/kg	T03-5	22/44	0.18-9	156		156	N
Acenaphthene	0.046	40	mg/kg	TB-46	9/44	0.18-3.6	469		469	N
Acenaphthylene	0.073	0.073	mg/kg	SS-99-16	1/44	0.175-9	2300		2300	N

TABLE 1
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Former IFG Facility and Ley Creek Deferred Media

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: IFG Facility Surface Soil

Chemical	Minimum Concentration	Maximum Concentration	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value (1)	Screening Toxicity Value (2)	COPC ? Y = Yes N = No
Anthracene	0.052	230	mg/kg	TB-46	13/44	0.18-3.6	2346		2346	N
Benzo(a)anthracene	**0.045**	**350**	**mg/kg**	**TB-46**	**28/42**	**0.18-2.7**	**0.87**		**0.87**	**Y**
Benzo(b)fluoranthene	**0.039**	**360**	**mg/kg**	**TB-46**	**30/42**	**0.18-11.5**	**0.87**		**0.87**	**Y**
Benzo(ghi)perylene	0.05	310	mg/kg	TB-46	17/39	0.18-7	2300		2300	N
Benzo(k)fluoranthene	**0.041**	**120**	**mg/kg**	**TB-46**	**23/42**	**0.18-3.65**	**8.75**		**8.75**	**Y**
Benzo[a]pyrene	**0.077**	**300**	**mg/kg**	**TB-46**	**23/41**	**0.18-7**	**0.09**		**0.09**	**Y**
Carbazole	**0.05**	**120**	**mg/kg**	**TB-46**	**10/44**	**0.175-3.6**	**31.9**		**31.9**	**Y**
Chrysene	**0.042**	**380**	**mg/kg**	**TB-46**	**32/42**	**0.18-2.7**	**87.5**		**87.5**	**Y**
Dibenzo(a,h)anthracene	**0.14**	**39**	**mg/kg**	**TB-46**	**5/37**	**0.175-3.6**	**0.09**		**0.09**	**Y**
Fluoranthene	**0.04**	**1200**	**mg/kg**	**TB-46**	**35/44**	**0.18-2.7**	**313**		**313**	**Y**
Fluorene	0.051	65	mg/kg	TB-46	10/44	0.175-3.6	312.86		312.86	N
Indeno(1,2,3-cd)pyrene	**0.067**	**190**	**mg/kg**	**TB-46**	**19/39**	**0.18-3.6**	**0.87**		**0.87**	**Y**
Naphthalene	0.04	8	mg/kg	T03-5	16/44	0.175-3.6	156		156	N
Phenanthrene	0.04	670	mg/kg	TB-46	31/44	0.18-2.7	2300		2300	N
Pyrene	**0.041**	**1000**	**mg/kg**	**TB-46**	**35/43**	**0.18-2.7**	**235**		**235**	**Y**
Aroclor 1242	**0**	**1500**	**mg/kg**	**B-11**	**21/99**	**0.01-255**	**0.32**		**0.32**	**Y**
Aroclor 1248	**0**	**3900**	**mg/kg**	**SS-99-26**	**69/99**	**0.01-110**	**0.32**		**0.32**	**Y**
Aroclor 1254	**0**	**99**	**mg/kg**	**T03-4**	**31/99**	**0.01-255**	**0.32**		**0.32**	**Y**
Aroclor 1260	**0**	**1.9**	**mg/kg**	**003-2**	**18/99**	**0.01-255**	**0.32**		**0.32**	**Y**
Total PCBs	**0**	**3848**	**mg/kg**	**B-17 COMP**	**69/93**	**0.25-2.7**	**0.32**		**0.32**	**Y**
1,2-Dichlorobenzene	0.059	0.81	mg/kg	T03-5	2/84	0.0025-9	560		560	N
2,4-Dimethylphenol	0.18	15	mg/kg	T03-5	3/44	0.175-9	156		156	N
2-Methylphenol	0.1	0.1	mg/kg	T03-3	1/44	0.175-9	391		391	N
4-Methylphenol	0.25	3.9	mg/kg	T03-3	4/44	0.175-9	39.1		39.1	N
Bis(2-ethylhexyl)phthalate (	0.042	16	mg/kg	T04-1	40/44	0.21-9	45.6		45.6	N

TABLE 1
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Former IFG Facility and Ley Creek Deferred Media

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: IFG Facility Surface Soil

Chemical	Minimum Concentration	Maximum Concentration	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value (1)	Screening Toxicity Value (2)	COPC ? Y = Yes N = No
Butyl benzyl phthalate	0.046	36	mg/kg	SS-99-30	9/43	0.175-9	930		930	N
Dibenzofuran	0.039	21	mg/kg	TB-46	12/44	0.18-3.6	31.3		31.3	N
Dimethyl phthalate	0.051	0.84	mg/kg	SS-99-04	4/44	0.175-9	78214		78214	N
Di-n-butyl phthalate	0.055	0.35	mg/kg	SS-99-03	4/44	0.175-9	782		782	N
Di-n-octyl phthalate	56	56	mg/kg	SS-99-09	1/38	0.175-9	156		156	N
Hexachlorobenzene	0.1	0.1	mg/kg	SS-99-01	1/44	0.175-9	0.4		0.4	N
Phenol	0.041	0.85	mg/kg	SS-99-26	5/44	0.175-9	4693		4693	N
Total TCDD TEQ	**5.89E-09**	**9.00E-07**	**mg/kg**	**SS-99-26**	**5/5**	-	**4.26E-06**		**4.26E-06**	**N**
1,2-Dichloroethene	**39**	**54**	**mg/kg**	**BH-6 COMP**	**2/2**	-	**0.07**		**0.07**	**Y**
Benzene	0.005	0.005	mg/kg	SS-99-10	1/49	0.0005-14.5	0.80		0.80	N
Carbon disulfide	0.038	0.038	mg/kg	SS-99-10	1/9	0.0055-14.5	720		720	N
Chloroform	0.019	0.019	mg/kg	SS-99-08	1/47	0.0005-0.405	105		105	N
cis-1,2-Dichloroethene	**0.34**	**0.45**	**mg/kg**	**T03-4**	**2/47**	**0.0005-0.405**	**0.07**		**0.07**	**Y**
Ethylbenzene	0.039	60	mg/kg	T-13	4/60	0.0005-14.5	400		400	N
Methylene chloride	0.001	0.05	mg/kg	SS-99-26	31/49	0.0005-14.5	13		13	N
Tetrachloroethene	0.002	0.012	mg/kg	SS-99-10	2/47	0.0005-0.405	11		11	N
Toluene	0.001	210	mg/kg	BH-7 COMP	11/60	0.0005-14.5	650		650	N
trans-1,2-Dichloroethene	0.009	0.009	mg/kg	T03-4	1/47	0.0005-0.405	156		156	N
Trichloroethene	**0.004**	**730**	**mg/kg**	**BH-7 COMP**	**8/49**	**0.0005-0.405**	**5**		**5**	**Y**
Xylene (total)	0.33	600	mg/kg	T-13	4/60	0.0015-15	15643		15643	N

Definitions: N/A = Not Applicable

(1) From McGovern, E.C. 1993. Background concentrations of 20 elements in soils with special regard for New York State. Wildlife pathology unit, Wildlife Resources Center, New York State Department of Environmental Conservation. Delmar, New York.

(2) Consistent with the IM, the Region III residential screening values corresponding to an excess lifetime cancer risk of 10-6 for carcinogens, and a Hazard Quotient of 0.1 for non-carcinogens were used a basis for comparison.

EN Essential Nutrient

TABLE 2
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Former IFG Facility and Ley Creek Deferred Media

Scenario Timeframe:
Medium: Soil
Exposure Medium: Subsurface Soil
Exposure Point: Subsurface Soil

Chemical	Minimum Concentration	Maximum Concentration	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value (1)	Screening Toxicity Value (2)	COPC ? Y = Yes N = No
Aluminum	3670	11500	mg/kg	T02-1	2/2	-	7821		7821	Y
Arsenic	1.7	65.7	mg/kg	T02-1	65/67	0.075-0.5	4.8	5	0.43	Y
Barium	1.24	311	mg/kg	T02-1	10/10	-	548		548	N
Beryllium	0.19	0.95	mg/kg	T02-1	2/2	-	15.6		15.6	N
Cadmium	0.28	0.93	mg/kg	HA-7	5/13	0.005-0.35	7.8		7.8	N
Calcium	23600	264000	mg/kg	T03-2	2/2	-	0		EN	N
Chromium	6.9	34900	mg/kg	T08-2	70/70	-	230	27.4	230	Y
Cobalt	2.2	6.3	mg/kg	T02-1	2/2	-	469		469	N
Copper	7.1	23200	mg/kg	T01-2	64/64	-	313	23.6	313	Y
Cyanide	0.68	166	mg/kg	T12-2	16/65	0.25-0.42	156		156	Y
Iron	10100	45900	mg/kg	T02-1	2/2	-	2346		2346	Y
Lead	0.47	291	mg/kg	T01-2	67/67	-	400	9.8	400	N
Magnesium	3540	8770	mg/kg	T03-2	2/2	-	0		EN	N
Manganese	213	235	mg/kg	T03-2	2/2	-	1095		1095	N
Mercury	0.027	0.16	mg/kg	T01-2	12/17	0.0005-0.05	2.35		2.35	N
Nickel	6.9	19700	mg/kg	T08-2	67/67	-	156		156	Y
Potassium	32.5	1120	mg/kg	T02-1	2/2	-	0		EN	N
Selenium	0.43	2.9	mg/kg	T02-1	6/10	0.09-0.35	39.1		39.1	N
Silver	0.23	0.23	mg/kg	T03-2	1/2	0.0485-0.0485	39.1		39.1	N
Sodium	369	5400	mg/kg	T03-2	2/2	-	0		EN	N
Thallium	0.97	0.97	mg/kg	T02-1	1/2	0.1-0.1	0.55		0.55	Y
Vanadium	4	24.2	mg/kg	T02-1	2/2	-	60	60	55	N
Zinc	14	53300	mg/kg	T03-2	59/59	-	2346		2346	Y

TABLE 2
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Former IFG Facility and Ley Creek Deferred Media

Scenario Timeframe:
Medium: Soil
Exposure Medium: Subsurface Soil
Exposure Point: Subsurface Soil

Chemical	Minimum Concentration	Maximum Concentration	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value (1)	Screening Toxicity Value (2)	COPC ? Y = Yes N = No
2-Methylnaphthalene	0.079	6.1	mg/kg	T02-3	10/47	0.175-9	156		156	N
Acenaphthene	0.058	21	mg/kg	TB-46	5/47	0.175-2.2	469		469	N
Acenaphthylene	0.052	0.052	mg/kg	OBG-TB-24	1/47	0.175-9	2300		2300	N
Anthracene	0.047	170	mg/kg	TB-46	5/47	0.175-2.2	2346		2346	N
Benzo(a)anthracene	0.057	150	mg/kg	TB-46	7/47	0.175-2.2	0.87		0.87	Y
Benzo(b)fluoranthene	0.041	140	mg/kg	TB-46	8/46	0.175-2.2	0.87		0.87	Y
Benzo(ghi)perylene	0.27	130	mg/kg	TB-46	3/46	0.175-2.2	2300		2300	N
Benzo(k)fluoranthene	0.065	59	mg/kg	TB-46	4/46	0.175-2.2	8.7		8.7	Y
Benzo[a]pyrene	0.059	110	mg/kg	TB-46	5/46	0.175-2.2	0.09		0.09	Y
Carbazole	0.1	71	mg/kg	TB-46	3/47	0.175-2.2	31.9		31.9	Y
Chrysene	0.071	170	mg/kg	TB-46	8/47	0.175-2.2	87.5		87.5	Y
Dibenzo[a,h]anthracene	0.18	65	mg/kg	TB-46	2/46	0.175-2.2	0.09		0.09	Y
Dibenzofuran	0.066	12	mg/kg	TB-46	5/47	0.175-2.2	31.3		31.3	N
Fluoranthene	0.042	560	mg/kg	TB-46	10/47	0.175-2.2	313		313	Y

TABLE 2
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Former IFG Facility and Ley Creek Deferred Media

Scenario Timeframe:
Medium: Soil
Exposure Medium: Subsurface Soil
Exposure Point: Subsurface Soil

Chemical	Minimum Concentration	Maximum Concentration	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value (1)	Screening Toxicity Value (2)	COPC ? Y = Yes N = No
Fluorene	0.052	37	mg/kg	TB-46	4/47	0.175-2.2	313		313	N
Indeno(1,2,3-cd)pyrene	0.28	76	mg/kg	TB-46	3/46	0.175-2.2	0.87		0.87	Y
Naphthalene	0.052	2.3	mg/kg	T01-2	10/47	0.175-9	156		156	N
Phenanthrene	0.057	450	mg/kg	TB-46	12/47	0.175-1.55	2300		2300	N
Pyrene	0.045	480	mg/kg	TB-46	14/47	0.175-2.2	235		235	Y
Aroclor 1242	0.04	9600	mg/kg	B-3	51/171	0.006-255	0.32		0.32	Y
Aroclor 1248	0.002	4300	mg/kg	T12-2	76/146	0.006-600	0.32		0.32	Y
Aroclor 1254	0.3	0.3	mg/kg	OBG-TB-27	1/145	0.006-600	0.32		0.32	N
Aroclor 1260	0.068	6.2	mg/kg	003-5	5/145	0.006-600	0.32		0.32	Y
Total PCBs	0.061	9600	mg/kg	B-3	109/192	0-3.5	0.32		0.32	Y
1,2-Dichlorobenzene	0.013	0.013	mg/kg	OBG-TB-30	1/103	0.0025-20	560		560	N
2,4-Dimethylphenol	0.078	7	mg/kg	T01-2	7/46	0.175-9	156		156	N
2-Methylphenol	0.11	0.44	mg/kg	T01-2	4/46	0.175-9	391		391	N
4-Bromophenyl phenyl eth	3.1	490	mg/kg	HA-12	2/53	0.175-12500	0		0	Y
4-Chloro-3-methylphenol	0.28	0.28	mg/kg	T01-2	1/46	0.175-9	0		0	Y
4-Methylphenol	0.043	1.6	mg/kg	T04-2	7/46	0.175-9	39.1		39.1	N
Bis(2-ethylhexyl)phthalate (B	0.045	21	mg/kg	T04-2	43/47	0.2-9	45.6		45.6	N
Butyl benzyl phthalate	0.14	0.14	mg/kg	T02-4	1/46	0.175-9	930		930	N
Chlorobenzene	13	13	mg/kg	T08-2	1/58	0.0005-3.95	156		156	N
Di-n-butyl phthalate	0.14	0.14	mg/kg	OBG-TB-31	1/47	0.175-9	782		782	N
Di-n-butylphthalate	590	940	mg/kg	HA-7	2/6	205-12500	782		782	Y
Phenol	0.067	0.099	mg/kg	T02-2	4/46	0.175-9	4693		4693	N

TABLE 2
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Former IFG Facility and Ley Creek Deferred Media

Scenario Timeframe:
Medium: Soil
Exposure Medium: Subsurface Soil
Exposure Point: Subsurface Soil

Chemical	Minimum Concentration	Maximum Concentration	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value (1)	Screening Toxicity Value (2)	COPC ? Y = Yes N = No
1,1-Dichloroethane	0.036	0.036	mg/kg	OBG-TB-30	1/58	0.0005-3.95	782		782	N
1,1-Dichloroethene	0.002	0.002	mg/kg	T02-1	1/58	0.0005-3.95	0.40		0.40	N
1,2-Dichloroethene	22	1000	mg/kg	BH-47	4/12	3-3000	0.07		0.07	Y
2-Butanone (MEK)	0.007	0.007	mg/kg	T03-2	1/2	0.006-0.006	4693		4693	N
Acetone	0.025	100	mg/kg	BH-1	7/13	6-700	782		782	N
Benzene	0.001	18	mg/kg	BH-2	4/71	0.0005-3000	0.80		0.80	Y
Carbon disulfide	0.002	7	mg/kg	BH-2	3/13	3-355	720		720	N
Chloroform	0.004	0.006	mg/kg	OBG-TB-25	3/58	0.0005-3.95	105		105	N
cis-1,2-Dichloroethene	0.002	11	mg/kg	T12-2	7/58	0.0005-3.95	0.07		0.07	Y
Ethylbenzene	0.0008	61000	mg/kg	T-23	30/122	0.0005-3000	400		400	Y
Methylene chloride	0.001	140	mg/kg	BH-1	33/70	0.0005-3000	0		0	Y
Toluene	0.001	720000	mg/kg	HA-1	38/122	0.0005-3000	650		650	Y
trans-1,2-Dichloroethene	0.001	0.011	mg/kg	T03-1	3/58	0.0005-3.95	156		156	N
Trichloroethene	0.001	150000	mg/kg	BH-47	19/70	0.0005-3000	5		5	Y
Vinyl chloride	11	120	mg/kg	BH-2	3/70	0.0005-3000	0.03		0.03	Y
Xylene (total)	0.002	330000	mg/kg	T-21	33/122	0.0015-3000	15643		15643	Y

(1) From McGovern, E.C. 1993. Background concentrations of 20 elements in soils with special regard for New York State. Wildlife pathology unit, Wildlife Resources Center, New York State Department of Environmental Conservation. Delmar, New York.

(2) Consistent with the IM, the Region III residential screening values corresponding to an excess lifetime cancer risk of 10-6 for carcinogens, and a Hazard Quotient of 0.1 for non-carcinogens were used a basis for comparison.

EN Essential Nutrient

TABLE 3a
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Former IFG Facility and Ley Creek Deferred Media

Scenario Timeframe: Future
Medium: Water
Exposure Medium: Ground Water
Exposure Point: IFG Facility Shallow Ground Water

Chemical	Minimum Concentration	Maximum Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	(2) Background Value	(1) Screening Toxicity Value	COPC ? Y = Yes N = No
2,4-Dimethylphenol	4	4	J	ug/L	OBG-9S	1/25	5-5.5	730		730	N
2,4-Dinitrophenol	0	0	R	ug/L	P-9	0/25	12.5-13.5	73		73	N
Aroclor 1242	**0.2**	**1700**		**ug/L**	**MW-2S**	**9/34**	**0.03-2.5**	**0.03**		**0.03**	**Y**
Aroclor 1248	**0.07**	**18**		**ug/L**	**MW-2S**	**12/34**	**0.25-165**	**0.03**		**0.03**	**Y**
Arsenic	**2.7**	**27.7**		**ug/L**	**OBG-9S**	**9/27**	**0.95-1.9**	**0.04**		**0.04**	**Y**
BEHP	**4**	**20**		**ug/L**	**MW-3S**	**2/25**	**5-5.5**	**4.78**		**4.78**	**Y**
Chloroform	**4**	**4**	**NJ**	**ug/L**	**OBG-13**	**1/34**	**0.5-500**	**0.15**		**0.15**	**Y**
Chromium	3.4	13.4		ug/L	MWI-2	13/27	1.75-3.5	180		180	N
Copper	0.8	12.5		ug/L	OBG-13	14/27	0.27-3	1460	5.2	1460	N
Ethylbenzene	**4**	**39000**		**ug/L**	**T-21**	**28/95**	**0.5-500**	**1340**		**1340**	**Y**
Lead	**19.8**	**19.8**		**ug/L**	**OBG-7A**	**1/27**	**0.55-0.65**	**15**		**15**	**Y**
Methylene chloride	**8**	**11**	**NJ**	**ug/L**	**OBG-15**	**2/34**	**0.5-500**	**4.10**		**4.10**	**Y**
Nickel	1	66.5		ug/L	MWI-1	27/27	.-.	730	6	730	N
Toluene	**2**	**2400**		**ug/L**	**T-21**	**3/97**	**0.5-2500**	**747**		**747**	**Y**
Total PCBs	**0.083**	**1**		**ug/L**	**MW-4S**	**4/6**	**1.65-165**	**0.03**		**0.03**	**Y**
Trichloroethene	**2**	**25000**		**ug/L**	**MWI-3**	**7/34**	**0.5-16.5**	**1.55**		**1.55**	**Y**
Vinyl chloride	**6**	**140**	**J**	**ug/L**	**MWI-3**	**2/34**	**0.5-500**	**0.02**		**0.02**	**Y**
Xylene (total)	**3**	**200000**		**ug/L**	**T-21**	**41/95**	**1.5-1500**	**12167**		**12167**	**Y**
Zinc	3.2	2280		ug/L	OBG-7A	16/27	0.42-6.2	10950	8	10950	N
cis-1,2-Dichloroethene	**2**	**4700**		**ug/L**	**MWI-3**	**8/29**	**0.5-9**	**60.8**		**60.8**	**Y**
trans-1,2-Dichloroethene	57	57		ug/L	W-11S	1/34	0.5-500	121.7		121.7	N

TABLE 3b
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Former IFG Facility and Ley Creek Deferred Media

Scenario Timeframe: Future
Medium: Water
Exposure Medium: Ground water
Exposure Point: IFG Facility Deep Ground Water

Chemical	Minimum Concentration	Maximum Concentration	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value	Screening Toxicity Value	COPC ?
1,2-Dichloroethene	17	2800	ug/L	MW-4D	4/5	0.5-0.5	54.75		54.75	Y
Aroclor 1242	0.2	2.0	ug/L	OBG-9D	2/20	0.033-0.25	0.03		0.03	Y
Aroclor 1248	3	3	ug/L	W-6D	1/20	0.033-0.25	0.03		0.03	Y
Arsenic	5.4	13.3	ug/L	OBG-6D	7/11	1.25-1.25	0.04		0.04	Y
BEHP	230	230	ug/L	U-1D	1/11	5-5	4.78		4.78	Y
Chloroform	2	2	ug/L	OBG-7D	1/20	0.5-1000	0.15		0.15	Y
Chromium	4.3	6.8	ug/L	W-6D	5/11	2.9-3.5	180		180	N
Copper	0.56	1.7	ug/L	W-1D	4/11	0.27-0.27	1460		1460	N
Diethyl phthalate	20	20	ug/L	OBG-9D	1/11	5-5	29200		29200	N
Lead	7.5	7.5	ug/L	W-11D	1/11	0.65-0.65	15		15	N
Nickel	1.2	33.1	ug/L	W-1D	11/11	-.	730		730	N
Trichloroethene	340	170000	ug/L	OBG-10D	10/20	0.5-5	1.55		1.55	Y
Vinyl chloride	12	45	ug/L	MW-2D	4/20	0.5-1000	0.02		0.02	Y
Zinc	2.8	981	ug/L	W-11D	6/11	1.75-4.55	10950		10950	N
cis-1,2-Dichloroethene	20	11000	ug/L	OBG-10D	6/15	0.5-1000	60.83		60.83	Y

TABLE 4
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Former IFG Facility and Ley Creek Deferred Media

Scenario Timeframe: Current / Future
Medium: Sediment
Exposure Medium: Sediments
Exposure Point: Ley Creek Study Area

Chemical	Minimum Concentration	Maximum Concentration	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value (1)	Screening Toxicity Value (2)	COPC ? Y = Yes N = No
Aluminum	4390	10300	mg/Kg	L11B	11/11	-	25000	25000	7821	N
Antimony	0.17	1.7	mg/Kg	L7	26/28	0.09-3.6	3.13		3.13	N
Arsenic	**2.2**	**14.1**	**mg/Kg**	**L10A**	**28/28**	-	**6.5**	**6.5**	**0.43**	Y
Barium	38.2	86.7	mg/Kg	L7	11/11	-	548	350	548	N
Beryllium	0.26	0.53	mg/Kg	L11B	11/11	-	16	0.9	16	N
Cadmium	0.25	2.5	mg/Kg	L7	11/11	-	3.91	1	3.91	N
Calcium	11200	105000	mg/Kg	L12C	11/11	-	3532	3532	EN	N
Chromium	10.9	164	mg/Kg	L7	28/28	-	1000	1000	230	N
Cobalt	3.9	8.2	mg/Kg	L11B	11/11	-	469	70	469	N
Copper	14.6	128	mg/Kg	GM98-SED01B-C	28/28	-	700	700	313	N
Cyanide	1.8	1.8	mg/Kg	GM98-SED06-C	1/25	0.29-0.5	156		156	N
Iron	11300	18700	mg/Kg	L8	11/11	-	25000	25000	2346	N
Lead	6.9	172	mg/Kg	GM98-SED08-C	28/28	-	400	12.5	400	N
Magnesium	5100	23600	mg/Kg	L12C	11/11	-	6000	6000	EN	N
Manganese	167	433	mg/Kg	L9B	11/11	-	600	600	156	N
Mercury	0.05	0.17	mg/Kg	L7	9/28	0.06-0.105	2.35	0.066	2.35	N
Nickel	6.5	57.9	mg/Kg	GM98-SED01B-C	28/28	-	156	12.5	156	N
Potassium	423	2810	mg/Kg	L11B	11/11	-	17500	17500	EN	N
Selenium	0.45	1.2	mg/Kg	GM98-SED08-C	17/28	0.145-0.325	39.1	0.125	39.1	N
Silver	0.12	1.4	mg/Kg	L7	9/11	0.045-0.05	39.1		39.1	N
Sodium	171	540	mg/Kg	L9C	11/11	-	8000	8000	EN	N
Thallium	**0.6**	**0.6**	**mg/Kg**	**L8**	**1/11**	**0.22-0.42**	**0.55**		**0.55**	Y
Vanadium	11	24.5	mg/Kg	L11B	11/11	-	60	60	55	N
Zinc	59.6	390	mg/Kg	GM98-SED10-C	19/19	-	2346	60	2346	N

TABLE 4
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Former IFG Facility and Ley Creek Deferred Media

Scenario Timeframe: Current / Future
Medium: Sediment
Exposure Medium: Sediments
Exposure Point: Ley Creek Study Area

Chemical	Minimum Concentration	Maximum Concentration	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value (1)	Screening Toxicity Value (2)	COPC ? Y = Yes N = No
2-Methylnaphthalene	0.061	3.5	mg/Kg	GM98-SED04-C	20/24	0.21-0.95	156		156	N
Acenaphthene	0.081	9.9	mg/Kg	GM98-SED04-C	21/24	0.21-0.95	469		469	N
Acenaphthylene	0.054	0.28	mg/Kg	L7	19/24	0.21-2.1	2300		2300	N
Anthracene	0.14	12	mg/Kg	GM98-SED04-C	23/24	0.21-0.21	2346		2346	N
Benzo(a)anthracene	**0.059**	**30**	**mg/Kg**	**GM98-SED04-C**	**24/24**	-	**0.87**		**0.87**	**Y**
Benzo(b)fluoranthene	**0.52**	**27**	**mg/Kg**	**GM98-SED04-C**	**23/24**	**0.21-0.21**	**0.87**		**0.87**	**Y**
Benzo(ghi)perylene	0.42	20	mg/Kg	GM98-SED04-C	23/24	0.21-0.21	2300		2300	N
Benzo(k)fluoranthene	**0.055**	**13**	**mg/Kg**	**GM98-SED04-C**	**24/24**	-	**8.75**		**8.75**	**Y**
Benzo[a]pyrene	**0.045**	**27**	**mg/Kg**	**GM98-SED04-C**	**24/24**	-	**0.09**		**0.09**	**Y**
Carbazole	0.058	10	mg/Kg	GM98-SED04-C	22/24	0.21-0.28	31.9		31.9	N
Chrysene	0.062	29	mg/Kg	GM98-SED04-C	24/24	-	87.5		87.5	N
Fluoranthene	0.14	57	mg/Kg	GM98-SED04-C	24/24	-	313		313	N
Fluorene	0.067	9.4	mg/Kg	GM98-SED04-C	22/24	0.21-0.95	313		313	N
Indeno(1,2,3-cd)pyrene	**0.4**	**17**	**mg/Kg**	**GM98-SED04-C**	**23/24**	**0.21-0.21**	**0.87**		**0.87**	**Y**
Naphthalene	0.057	9.3	mg/Kg	GM98-SED04-C	19/24	0.21-1.3	156		156	N
Phenanthrene	0.13	69	mg/Kg	GM98-SED04-C	24/24	-	2300		2300	N
Pyrene	0.13	68	mg/Kg	GM98-SED04-C	24/24	-	235		235	N
Aroclor 1016	**0.04**	**5.81**	**mg/Kg**	**L7**	**6/30**	**0.0115-2.95**	**0.55**		**0.55**	**Y**
Aroclor 1242	**0.019**	**36.3**	**mg/Kg**	**L7**	**6/30**	**0.0115-2.95**	**0.32**		**0.32**	**Y**
Aroclor 1248	**0.15**	**25**	**mg/Kg**	**GM98-SED08-C**	**24/30**	**0.019-2.905**	**0.32**		**0.32**	**Y**
Aroclor 1254	**0.019**	**2.9**	**mg/Kg**	**L7**	**5/30**	**0.0115-2.95**	**0.32**		**0.32**	**Y**
Aroclor 1260	**0.035**	**1.13**	**mg/Kg**	**L7**	**18/30**	**0.0205-2.95**	**0.32**		**0.32**	**Y**

TABLE 4
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Former IFG Facility and Ley Creek Deferred Media

Scenario Timeframe: Current / Future
Medium: Sediment
Exposure Medium: Sediments
Exposure Point: Ley Creek Study Area

Chemical	Minimum Concentration	Maximum Concentration	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value (1)	Screening Toxicity Value (2)	COPC ? Y = Yes N = No
1,4-Dichlorobenzene	0.067	0.067	mg/Kg	L7	1/41	0.003-2.6	26.6		26.6	N
2,4-Dimethylphenol	0.076	0.17	mg/Kg	GM98-SED07A-C	2/24	0.21-7	156		156	N
2-Methylphenol	0.073	0.073	mg/Kg	GM98-SED07A-C	1/24	0.21-7	391		391	N
4-Methylphenol	0.054	0.29	mg/Kg	GM98-SED06-C	7/24	0.21-2.1	39.1		39.1	N
(2-Ethylhexyl)phthalate (BE	0.045	0.83	mg/Kg	L7	3/24	0.22-4.65	45.6		45.6	N
Butyl benzyl phthalate	0.35	0.61	mg/Kg	GM98-SED15-C	2/24	0.21-7	930		930	N
Dibenzo(a,h)anthracene	**0.093**	**5.9**	**mg/Kg**	**GM98-SED04-C**	**14/24**	**0.21-7**	**0.09**		**0.09**	**Y**
Dibenzofuran	0.078	8.8	mg/Kg	GM98-SED04-C	20/24	0.21-0.95	31.3		31.3	N
Phenol	0.079	0.099	mg/Kg	GM98-SED07A-C	3/24	0.21-2.6	4693		4693	N
Total TCDD TEQ	**0.00000258**	**6.17E-05**	**mg/Kg**	**GM98-SED07A**	**6/6**	-	**4.26E-06**		**4.26E-06**	**Y**
2-Butanone (MEK)	0.005	0.006	mg/Kg	GM98-SED01B-G	2/8	0.006-0.0435	4693		4693	N
Acetone	0.015	0.065	mg/Kg	L7	5/8	0.006-0.008	782		782	N
Carbon disulfide	0.003	0.009	mg/Kg	L8	3/8	0.006-0.0435	720		720	N
Ethylbenzene	2.00E-03	2.00E-03	mg/Kg	L12C	2/25	0.0005-0.0435	400		400	N
Tetrachloroethene	0.002	0.002	mg/Kg	L12C	1/25	0.0005-0.0435	11		11	N
Trichloroethene	0.002	0.003	mg/Kg	GM98-SED09-G	2/25	0.0005-0.0435	5		5	N
Xylene (total)	0.004	0.006	mg/Kg	L12C	2/25	0.002-0.0435	15643		15643	N

(1) From McGovern, E.C. 1993. Background concentrations of 20 elements in soils with special regard for New York State. Wildlife pathology unit, Wildlife Resources Center, New York State Department of Environmental Conservation. Delmar, New York.

(2) Consistent with the IM, the Region III residential screening values corresponding to an excess lifetime cancer risk of 10-6 for carcinogens, and a Hazard Quotient of 0.1 for non-carcinogens were used a basis for comparison.

EN Essential Nutrient

TABLE 5
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Former IFG Facility and Ley Creek Deferred Media

Scenario Timeframe: Current / Future
Medium: Water
Exposure Medium: Surface Water
Exposure Point: Ley Creek Study Area

Chemical	Minimum Concentration	Maximum Concentration	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value	Screening Toxicity Value	COPC ? Y = Yes N = No
Aluminum	129	129	ug/l	GM98-SW1	1/1	--	36500		36500	N
Antimony	1.5	1.8	ug/l	GM98-SW2	2/5	1.25-30	15		14.6	N
Barium	66.1	66.1	ug/l	GM98-SW1	1/1	--	2555		2555	N
Beryllium	0.41	0.41	ug/l	GM98-SW1	1/1	--	73		73	N
Calcium	139000	139000	ug/l	GM98-SW1	1/1	--	0		EN	N
Chromium	5	7.4	ug/l	GM98-SW2	5/5	--	180		180	N
Copper	2.9	8.7	ug/l	GM99-SW2	5/5	--	1460		1460	N
Iron	430	430	ug/l	GM98-SW1	1/1	--	10950		10950	N
Lead	2.3	4	ug/l	GM99-SW2	3/5	2.5-2.5	15		15	N
Nickel	1	10.7	ug/l	GM99-SW2	5/5	--	730		730	N
Potassium	2650	2650	ug/l	GM98-SW1	1/1	--	0		EN	N
Sodium	102000	102000	ug/l	GM98-SW1	1/1	--	0		EN	N
Zinc	11.2	33.1	ug/l	GM99-SW2	5/5	--	10950		10950	N
Di-n-octyl phthalate	10	10	ug/l	GM98-SW3	3/5	5-5	730		730	N
Magnesium	24900	24900	ug/l	GM98-SW1	1/1	--	0		EN	N
Manganese	71.1	71.1	ug/l	GM98-SW1	1/1	--	730		730	N
Methylene chloride	0.2	0.2	ug/l	GM99-SW1RE	1/4	5-5	4.1		4.10	N
Acetone	2	2	ug/l	GM99-SW1RE	1/4	5-5	608		608	N
Chloromethane	0.2	0.2	ug/l	GM99-SW1RE	1/6	5-5	2.11		2.11	N
cis-1,2-Dichloroethene	0.7	2	ug/l	GM98-SW2	4/4	--	60.8		60.83	N
Trichloroethene	0.9	1	ug/l	GM98-SW2	3/4	5-5	1.55		1.55	N

Table 6 Summary of IFG Site and Ley Creek Study Area COPCs
Former IFG Facility and Ley Creek Deferred Media

	Surface Soil (mg/kg)			Sub-Surface Soil (mg/kg)			Study Area Sediment (mg/kg)			Shallow Ground Water (ug/l)			Deep Ground Water (ug/l)		
Chemical of Potential Concern	Maximum	95% UCL	Upper Bound (95 %UCL or Maximum)	Maximum	95% UCL	Upper Bound (95 %UCL or Maximum)	Maximum	95% UCL	Upper Bound (95 %UCL or Maximum)	Maximum	95% UCL	Upper Bound (95 %UCL or Maximum)	Maximum	95% UCL	Upper Bound (95 %UCL or Maximum)
Arsenic	162	14.9	14.9	65.7	9.6	9.6	14.1	5.8	5.8	27.7		27.7	13.3		13.3
Chromium	32000	969	969	34900	2204	2204									
Copper	5410	601	601	23200	1595	1595									
Cyanide				166	12	12									
Iron	31200		31200	45900		45900	18700		18700						
Lead	717	63.9	63.9	291	34	34	172	81.8	81.8	19.8		19.8			
Manganese	524		524	235		235	433		433						
Nickel	6630	475	475	19700	1435	1435									
Zinc	8470	1023	1023	53300	3265	3265									
Benzo(a)anthracene	350	11.9	11.9	150		150	30	7.1	7.1						
Benzo(b)fluoranthene	360	13	13	140		140	27	12.3	12.3						
Benzo(k)fluoranthene	120	4.5	4.5	59		59	13	3.3	3.3						
Benzo[a]pyrene	300	10.6	10.6	110		110	27	6.55	6.55						
Carbazole	120	4.12	4.12	71		71									
Chrysene	380	13.0	13.0	170		170									
Dibenzo(a,h)anthracene	39	2.3	2.3	65		65	5.9	3.49	3.49						
Fluoranthene	1200	36.2	36.2	560		560									
Indeno(1,2,3-cd)pyrene	190	7.34	7.34	76		76	17.0	7.13	7.13						
Pyrene	1000	32.2	32.2												
Aroclor 1242	1500	48.75	48.75	9600	415	415	36.3	3.0	3.0	1700		1700	2		2
Aroclor 1248	3900	364	364	4300	180	180	25	26.1	25.0	18		18	3		3
Aroclor 1254	99	14.0	14.0				2.9		2.9						
Aroclor 1260	1.9	11.3	1.9	6.2		6.2	1.13	0.8	0.8						
Total PCBs	3848	70.9	70.9	9600	453	453									

Table 6 Summary of IFG Site and Ley Creek Study Area COPCs
Former IFG Facility and Ley Creek Deferred Media

	Surface Soil (mg/kg)			Sub-Surface Soil (mg/kg)			Study Area Sediment (mg/kg)			Shallow Ground Water (ug/l)			Deep Ground Water (ug/l)		
Chemical of Potential Concern	Maximum	95% UCL	Upper Bound (95 %UCL or Maximum)	Maximum	95% UCL	Upper Bound (95 %UCL or Maximum)	Maximum	95% UCL	Upper Bound (95 %UCL or Maximum)	Maximum	95% UCL	Upper Bound (95 %UCL or Maximum)	Maximum	95% UCL	Upper Bound (95 %UCL or Maximum)
1,2-Dichlorobenzene	0.81		0.81	0.81		0.81									
2,4-Dimethylphenol	15		15	15		15									
2-Methylphenol	0.1		0.1	0.1		0.1									
4-Methylphenol	3.9		3.9	3.9		3.9									
s(2-ethylhexyl)phthalate (BEH	16		16	16		16				20		20	230		230
Butyl benzyl phthalate	36		36	36		36									
Dibenzofuran	21		21	21		21									
Di-n-octyl phthalate	56		56	56		56									
Hexachlorobenzene	0.1		0.1	0.1		0.1									
Phenol	0.85		0.85	0.85		0.85									
Total TCDD TEQ	1.34E-03		1.34E-03	9.00E-06		9.00E-06	6.17E-05		6.17E-05						
Carbon disulfide	0.04		0.04	0.04		0.04									
1,2-Dichloroethene	54		54	54		54				4700		4700	11000		11000
2-Butanone (MEK)															
Acetone															
Trichloroethene		25.5			7843.29					25000		25000	170000		170000
Vinyl chloride										140		140	45		45
Xylene				19761	21479	19761				200000		200000			
Toluene				13761	15828	13761				2400		2400			
Ethylbenzene				3681	3988	3681				39000		39000			

TABLE 7
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Former IFG Facility and Ley Creek Deferred Media

Scenario Timeframe: Current / Future
Medium: Sediment
Exposure Medium: Sediments
Exposure Point: Ley Creek Upstream Area

Chemical	Minimum Concentration	Maximum Concentration	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value (2)	Screening Toxicity Value (3)	COPC ?
2-Methylnaphthalene	0.05	5.5	mg/Kg	GM98-SED20A-C	23/37	0205-065	156		156	N
Acenaphthene	0.054	21	mg/Kg	GM98-SED20A-C	27/37	0205-0275	469		469	N
Acenaphthylene	0.058	1.7	mg/Kg	S101	25/37	0205-22	2300		2300	N
Anthracene	0.049	25	mg/Kg	GM98-SED20A-C	30/37	0205-0275	2346		2346	N
Benzo(a)anthracene	**0.061**	**60**	**mg/Kg**	**GM98-SED20A-C**	**32/37**	**0205-0275**	**0.87**		**0.87**	**Y**
Benzo(b)fluoranthene	**0.089**	**66**	**mg/Kg**	**GM98-SED20A-C**	**32/37**	**0205-0275**	**0.87**		**0.87**	**Y**
Benzo(ghi)perylene	0.092	36	mg/Kg	GM98-SED20A-C	31/37	0205-0275	2300		2300	N
Benzo(k)fluoranthene	**0.08**	**23**	**mg/Kg**	**L103**	**29/37**	**0205-0275**	**8.75**		**8.75**	**Y**
Benzo[a]pyrene	**0.054**	**50**	**mg/Kg**	**GM98-SED20A-C**	**32/37**	**0205-0275**	**0.09**		**0.09**	**Y**
Carbazole	0.078	20	mg/Kg	GM98-SED20A-C	27/37	0205-0275	31.9		31.9	N
Chrysene	0.083	59	mg/Kg	GM98-SED20A-C	33/37	0205-0245	87.5		87.5	N
Dibenzo(a,h)anthracene	**0.13**	**11**	**mg/Kg**	**GM98-SED20A-C**	**13/37**	**0205-33**	**0.09**		**0.09**	**Y**
Fluoranthene	0.041	130	mg/Kg	GM98-SED20A-C	33/37	0215-0255	313		313	N
Fluorene	0.071	18	mg/Kg	GM98-SED20A-C	27/37	0205-0275	313		313	N
Indeno(1,2,3-cd)pyrene	**0.074**	**34**	**mg/Kg**	**GM98-SED20A-C**	**31/37**	**0205-0275**	**0.87**		**0.87**	**Y**
Naphthalene	0.054	10	mg/Kg	GM98-SED20A-C	23/37	0205-065	156		156	N
Phenanthrene	0.066	130	mg/Kg	GM98-SED20A-C	32/37	0205-0275	2300		2300	N
Pyrene	0.05	130	mg/Kg	GM98-SED20A-C	34/37	0205-0245	235		235	N
Aroclor 1016	0.034	0.068	mg/Kg	L103	8/38	001-013	0.55		0.55	N
Aroclor 1242	**0.04**	**1.9**	**mg/Kg**	**L22**	**8/38**	**001-013**	**0.32**		**0.32**	**Y**
Aroclor 1248	**0.043**	**1.1**	**mg/Kg**	**S103**	**11/38**	**00125-013**	**0.32**		**0.32**	**Y**
Aroclor 1254	**0.013**	**2.133**	**mg/Kg**	**L102**	**20/38**	**001-013**	**0.32**		**0.32**	**Y**
Aroclor 1260	**0.012**	**7.9**	**mg/Kg**	**L103**	**29/38**	**00125-00275**	**0.32**		**0.32**	**Y**

TABLE 7
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Former IFG Facility and Ley Creek Deferred Media

Scenario Timeframe: Current / Future
Medium: Sediment
Exposure Medium: Sediments
Exposure Point: Ley Creek Upstream Area

Chemical	Minimum Concentration	Maximum Concentration	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value (2)	Screening Toxicity Value (3)	COPC ?
1,2-Dichlorobenzene	0.058	0.16	mg/Kg	S110	3/46	0003-11	560		560	N
2,4-Dimethylphenol	0.048	0.072	mg/Kg	L103	2/37	12086	156		156	N
4-Methylphenol	0.048	0.62	mg/Kg	S106	13/37	0205-33	39.1		39.1	N
(2-Ethylhexyl)phthalate (BE	0.051	12	mg/Kg	L26	21/37	0205-11	45.6		45.6	N
Butyl benzyl phthalate	0.15	34	mg/Kg	L27	6/37	0205-405	930		930	N
Chlorobenzene	0.002	0.012	mg/Kg	S110	3/36	00005-0041	156		156	N
Dibenzofuran	0.078	14	mg/Kg	GM98-SED20A-C	22/37	0205-33	31.3		31.3	N
Dimethyl phthalate	0.2	0.2	mg/Kg	S106	1/37	12086	78214		78214	N
Di-n-octyl phthalate	0.063	7.50E-01	mg/Kg	S106	7/37	0205-11	156		156	N
Isophorone	0.066	0.066	mg/Kg	S103	1/37	0205-405	672		672	N
n-Nitrosodiphenylamine	0.47	0.47	mg/Kg	L103	1/37	12086	130		130	N
Phenol	0.071	0.071	mg/Kg	GM98-SED24-C	1/37	36567	4693		4693	N
Total TCDD TEQ	**1.00E-06**	**5.73E-05**	**mg/Kg**	**GM98-SED17**	**6/6**	-	**4.26E-06**		**4.26E-06**	**Y**
-Dichloroethane	0.001	3.00E-03	mg/Kg	103	6	005-0041	782		782	N
1,1-Dichloroethene	0.01	0.01	mg/Kg	S103	1/36	00005-0041	0.40		0.40	N
1,2-Dichloroethene	0.002	0.013	mg/Kg	L17	7/27	0006-0041	0.07		0.07	N
2-Butanone (MEK)	0.006	0.1	mg/Kg	L104	10/27	0006-00115	4693		4693	N
Acetone	0.007	0.18	mg/Kg	L103	19/27	0006-00075	782		782	N
Benzene	0.002	0.002	mg/Kg	GM98-SED20B-G	1/37	00005-0041	0.80		0.80	N
Carbon disulfide	0.002	0.015	mg/Kg	S105	14/27	0006-001	720		720	N
Chloroform	0.002	0.002	mg/Kg	GM98-SED23-G	1/36	00005-0041	105		105	N
Chloromethane	0.009	0.009	mg/Kg	S108	1/36	0006-0041	49.1		49.1	N
cis-1,2-Dichloroethene	0.002	0.002	mg/Kg	GM98-SED20A-G	1/9	00005-00035	0.07		0.07	N
Ethylbenzene	0.002	0.003	mg/Kg	GM98-SED24-G	3/36	00005-0041	400		400	N
Methylene chloride	0.065	0.36	mg/Kg	GM98-SED20B-G	2/37	00005-0041	13		13	N
Tetrachloroethene	0.002	0.002	mg/Kg	L19	1/36	00005-0041	11		11	N
Toluene	0.002	0.027	mg/Kg	L20	6/37	00005-0041	650		650	N
Trichloroethene	0.002	0.038	mg/Kg	GM98-SED20A-G	8/37	00005-0041	5		5	N
Vinyl chloride	0.002	0.006	mg/Kg	S101	2/36	00005-0041	0.03		0.03	N
Xylene (total)	0.003	0.05	mg/Kg	L112	9/45	0002-0041	15643		15643	N

TABLE 8
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Former IFG Facility and Ley Creek Deferred Media

Scenario Timeframe: Current / Future
Medium: Water
Exposure Medium: Surface Water
Exposure Point: Ley Creek Upstream Surface Water

Chemical	Minimum Concentration	Maximum Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value (2)	Screening Toxicity Value (3)	COPC ?
Aluminum	166	264		ug/l	L21	2/2	--	36500		36500	N
Antimony	1.7	2.4	J	ug/l	GM98-SW6	3/8	1.25-1.35	15		14.6	N
Barium	81.9	88.7	B	ug/l	L23	2/2	--	2555		2555	N
Cadmium	0.2	0.2	B	ug/l	L23	1/2	0.1-0.1	18.3		18.3	N
Calcium	166000	196000		ug/l	L23	2/2	--	0		EN	N
Chromium	1.6	8	J	ug/l	GM98-SW7	8/8	--	180		180	N
Copper	3.8	9.8	B	ug/l	L21	8/8	--	1460		1460	N
Iron	582	595		ug/l	L23	2/2	--	10950		10950	N
Lead	1.4	4.5	J	ug/l	GM98-SW7	5/8	0.65-2.5	15		15	N
Magnesium	25700	29200		ug/l	L23	2/2	--	0		EN	N
Manganese	129	139		ug/l	L23	2/2	--	730		730	N
Nickel	1.6	13	J	ug/l	GM99-SW7	8/8	--	730		730	N
Potassium	9380	9760	EJ	ug/l	L23	2/2	--	0		EN	N
Silver	1.2	1.2	B	ug/l	L23	1/2	0.2-0.2	183		183	N
Sodium	263000	271000		ug/l	L23	2/2	--	0		EN	N
Thallium	2.5	2.5	B	ug/l	L21	1/2	0.95-0.95	2.56		2.56	N
Total cyanide-CLP-B	11	11		ug/l	GM99-SW6	1/3	5-5	730		730	N
Zinc	20.3	42.1		ug/l	GM98-SW7	6/6	--	10950		10950	N
(2-Ethylhexyl)phthalate (BE	1	1	J	ug/l	L23	1/5	5-5	4.78		4.78	N
Di-n-octyl phthalate	10	10	J	ug/l	GM98-SW7	3/9	5-5	730		730	N
1,2-Dichloroethene	1	2	J	ug/l	L23	2/2	--	60.83		60.83	N

Table 9 Summary of Ley Creek Upstream COPCs
Former IFG Facility and Ley Creek Deferred Media

		Upstream Sediment			
Chemical of Potential Concern	Units	Arithmetic Mean	Maximum	95% UCL	Upper Bound (95 %UCL or Maximum)
Aluminum	mg/Kg	9009	25900	10744	10744
Antimony	mg/Kg	1.28	18.7	2.12	2.12
Arsenic	mg/Kg	6.2	19.1	7.4	7.4
Cadmium	mg/Kg	1.6	10	6.8	6.8
Iron	mg/Kg	18699	36100	21323	21323
Lead	mg/Kg	103	1170	190	190
Magnesium	mg/Kg	13737	29900	17585	17585
Selenium	mg/Kg	1.75	43	3.70	3.70
Silver	mg/Kg	2.94	47.9	5.96	5.96
Thallium	mg/Kg	0.43	0.98	0.50	0.50
Benzo(a)anthracene	mg/Kg	5.9	60	24.8	24.8
Benzo(b)fluoranthene	mg/Kg	6.1	27	9.6	9.6
Benzo(k)fluoranthene	mg/Kg	3.2	23	4.6	4.6
Benzo[a]pyrene	mg/Kg	5.0	50	8.0	8.0
Aroclor 1242	mg/Kg	0.09	1.9	0.17	0.17
Aroclor 1248	mg/Kg	0.08	1.1	0.13	0.13
Aroclor 1254	mg/Kg	0.23	2.1	0.37	0.37
Aroclor 1260	mg/Kg	0.54	7.9	1.01	1.01
Total TCDD TEQ	mg/Kg	1.00E-06	5.70E-05		5.70E-05

GM - Ley Creek
Human Health Risk Assessment
Vapor Migration Exposure Point Concentration Evaluation

Table 10a. *Derived Indoor Air Concentrations from Subsurface Soil Vapor Migration*

Sample ID	Chemical	Maximum Detection mg/kg	95% UCL mg/kg	Indoor Air Screening Exp. Point Conc. ug/m3
T-23	Ethylbenzene	61	3.7	2.30E-03
HA-1	Toluene	720	14	5.03E-03
BH-47	Trichloroethene	150	7.0	8.10E-03
T-21	Xylene (total)	330	20	1.48E-03

Table 10b. *Derived Indoor Air Concentrations from Ground Water Vapor Migration*

Sample ID	Chemical	Maximum Concentration ug/L	ERQ	Indoor Air Screening Exp. Point Conc. ug/m3
T-21	Ethylbenzene	39000		3.04E-04
OBG-15	Methylene chloride	11	NJ	2.23E-04
T-21	Toluene	2400		3.10E-04
MWI-3	Trichloroethene	25000		3.84E-04
MWI-3	Vinyl chloride	140	J	7.26E-05
T-21	Xylene (total)	200000		2.93E-04
MWI-3	cis-1,2-Dichloroethene	4700		3.09E-04
W-11S	trans-1,2-Dichloroethene	57		4.67E-04

Table 10c. *Derived Indoor Air Concentrations Total from Subsurface Soil and Ground Water Vapor Migration*

Chemical	USEPA Region III Ambient Air RBC	Cancer/ Noncancer	Indoor Air Screening Exp. Point Conc. ug/m3
Ethylbenzene	**1.10E+03**	**N**	**2.60E-03**
Methylene chloride	**3.80E+00**	**C**	**2.23E-04**
Toluene	**4.20E+02**	**N**	**5.34E-03**
Trichloroethene	**1.00E+00**	**C**	**8.48E-03**
Vinyl chloride	**2.10E-02**	**C**	**7.26E-05**
Xylene (total)	**7.30E+03**	**N**	**1.77E-03**
cis-1,2-Dichloroethene	**3.70E+01**	**N**	**3.09E-04**
trans-1,2-Dichloroethene	**7.30E+01**	**N**	**4.67E-04**

GM - Ley Creek
Human Health Risk Assessment
Vapor Migration Exposure Point Concentration Evaluation

Table 11. *Vapor Migration Model Source and Soil Parameters*

Subsurface VOCs	Sample ID	Distance to GW Source (1) ft	Distance to GW Source (1) m
Ethylbenzene	T-21	8.45	2.6
Methylene chloride	OBG-15	6	1.8
Toluene	T-21	8.45	2.6
Trichloroethene	MWI-3	4.75	1.4
Vinyl chloride	MWI-3	4.75	1.4
Xylene (total)	T-21	8.45	2.6
cis-1,2-Dichloroethene	MWI-3	4.75	1.4
trans-1,2-Dichloroethene	W-11S	6.8	2.1

Key Site Parameters	Value	Units	Source
soil type	fine sand & silt	na	O'Brien & Gere (2000)
soil vertical permeability	1.0E-08	cm2	O'Brien & Gere (2000)
soil porosity	0.35	fraction	O'Brien & Gere (2000)
soil moisture	0.15	fraction	conservative default
soil bulk density	1.5	g/cm3	model default
building area (9.61m x 9.61m	92	m2	model default
building air exchange rate	1.0	per hour	industrial default
building slab thickness	0.33	m	industrial floor slab

Table 12. *1993 Remedial Investigation (O'Brien & Gere Engineers) Fish Tissue Analytical Data*

Fish Sample	#	Length (mm)	Mass (g)	Percent Lipids	Percent Moisture	Wet Weight Concentration (mg/kg)						
						Aroclor-1016	Aroclor-1221	Aroclor-1232	Aroclor-1242	Aroclor-1248	Aroclor-1254	Aroclor-1260
UPSTREAM												
Golden Shiner (Whole Fish)	3	65	7	0.5 %	N/A	0.1 U	0.2 U	0.1 U	0.1 U	0.86 JN	0.1 U	0.1 U
Longnose Dace (Whole Fish)	20	17 - 61	10	0.1 %	N/A	0.1 U	0.2 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
White Sucker Juv. (Whole Fish)	26	32 - 47	19	0.1 %	N/A	0.1 U	0.2 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Pumpkinseed #1 (Edible Portion)	1	95	11	0.1 %	N/A	0.5 U	1.0 U	0.5 U	0.5 U	2.4	0.5 U	0.5 U
Pumpkinseed #2 (Edible Portion)	1	77	8.5	0.1 %	N/A	0.1 U	0.2 U	0.1 U	0.1 U	1.7	0.1 U	0.1 U
Pumpkinseed #3 (Edible Portion)	1	84	9.5	0.1 %	N/A	0.1 U	0.2 U	0.1 U	0.1 U	0.11 J	0.1 U	0.1 U
OUTFALL												
Golden Shiner #1 (Whole Fish)	1	186	83	0.1 %	79.7 %	0.1 U	0.2 U	0.1 U	0.1 U	0.19	0.1 U	0.1 U
Golden Shiner #2 (Whole Fish)	1	96	12	0.5 %	N/A	0.1 U	0.2 U	0.1 U	0.1 U	0.38	0.1 U	0.1 U
Dace (Whole Fish)	25	30 - 61	25	0.2 %	N/A	0.1 U	0.2 U	0.1 U	0.1 U	0.24	0.1 U	0.1 U
White Sucker #3 (Whole Fish)	1	120	17	0.2 %	N/A	0.1 U	0.2 U	0.1 U	0.1 U	0.82	0.1 U	0.23 JN

Table 12. *1993 Remedial Investigation (O'Brien & Gere Engineers) Fish Tissue Analytical Data*

Fish Sample	#	Length (mm)	Mass (g)	Percent Lipids	Percent Moisture	Wet Weight Concentration (mg/kg)						
						Aroclor-1016	Aroclor-1221	Aroclor-1232	Aroclor-1242	Aroclor-1248	Aroclor-1254	Aroclor-1260
DOWNSTREAM												
Dace (Whole Fish)	14	32 - 80	22	0.5 %	N/A	0.1 U	0.2 U	0.1 U	0.1 U	0.87	0.1 U	0.33 JN
White Sucker #6 (Whole Fish)	1	120	19	0.1 % J	N/A	0.1 U	0.2 U	0.1 U	0.1 U	0.46 J	0.1 U	0.1 U
Carp #1 (Whole Fish)	1	550	2,727	2.3 %	76.0 %	0.1 U	0.2 U	0.1 U	0.1 U	0.47	0.1 U	0.7 J
Carp #4 (Whole Fish)	1	508	2,386	1.2 %	77.8 %	0.1 U	0.2 U	0.1 U	0.1 U	1.1	0.1 U	0.35
Carp #2 (Filet)	1	545	2,727	1.1 %	73.3 %	0.1 U	0.2 U	0.1 U	0.1 U	0.11	0.1 U	0.1 U
Carp #3 (Filet)	1	660	4,091	3.0 %	72.6 %	0.1 U	0.2 U	0.1 U	0.1 U	0.2	0.1 U	0.1 U
Pumpkinseed #1 (Edible Portion)	1	120	24	0.1 %	N/A	0.1 U	0.2 U	0.1 U	0.1 U	0.32	0.1 U	0.1 U

N/A Insufficient sample volume for analysis.
U Not detected at the indicated quantitation limit.
J Detected results are estimated.
UJ Detection limits are estimated.
JN Detected results are presumptively present at an approximated quantity.

ATTACHMENT A

Derivation of 95% Upper Confidence Limits

Derivation of Upper 95 % UCL - Surface Soils

STD_NAME	NDET	TOTN	% DET	Distribution	Comment	Maximum Detection SAMP_ID	Maximum Detection Conc (mg/kg)	MEAN	STD	STDERR	LNMEAN	LNSTD	Normal 95% UCL	H	Log-Normal UCL
Aroclor 1242	12	90	0.13	U	LP	B-11	1500	41.53	216.81	4.38	-0.59	2.62	48.75	4.23	55.97
Aroclor 1248	53	83	0.64	L		SS-99-26	3900	107.90	533.59	11.84	0.42	2.88	127.44	4.23	363.57
Aroclor 1254	15	83	0.18	U	LP	T03-4	99	11.84	41.88	1.30	-0.77	2.22	13.99	3.53	12.81
Aroclor 1260	2	83	0.02	U	LP	003-2	1.9	9.55	39.60	1.05	-1.07	2.22	11.28	3.53	9.60
Arsenic	47	47	1.00	U	OUT (h)	SS-99-21	162	12.04	26.12	1.76	1.87	0.85	14.94	2.11	12.17
Benzo(a)anthracene	28	42	0.67	U	OUT (h)	TB-46	350	9.48	53.88	1.46	-0.83	1.69	11.90	2.88	3.87
Benzo(b)fluoranthene	30	42	0.71	U	OUT (h)	TB-46	360	10.04	55.39	1.55	-0.63	1.81	12.60	3.20	6.84
Benzo(k)fluoranthene	23	42	0.55	U	OUT (h)	TB-46	120	3.60	18.43	0.56	-1.07	1.59	4.52	2.88	2.50
Benzo[a]pyrene	23	41	0.56	U	OUT (h)	TB-46	300	8.44	46.72	1.32	-0.65	1.59	10.61	2.88	3.83
Carbazole	10	44	0.23	U	LP	TB-46	120	3.30	18.03	0.50	-1.11	1.38	4.12	2.58	1.46
Chromium	52	52	1.00	U	OUT (h)	SS-99-26	32000	789	4442	109.41	3.92	1.58	969.49	2.88	334.19
Chrysene	32	42	0.76	U	OUT (h)	TB-46	380	10.33	58.52	1.59	-0.85	1.76	12.96	3.20	4.85
Copper	52	52	1.00	U	OUT (h)	T03-3	5410	489	1356	67.88	3.85	1.71	601.47	2.88	408.11
Dibenzo(a,h)anthracene	5	37	0.14	U	LP	TB-46	39	1.81	6.38	0.30	-0.87	1.33	2.30	2.58	1.77
Fluoranthene	35	44	0.80	U	OUT (h)	TB-46	1200	28.99	180.70	4.37	-0.87	2.01	36.20	3.53	9.25
Indeno(1,2,3-cd)pyrene	19	39	0.49	U	OUT (h)	TB-46	190	5.80	30.34	0.93	-0.83	1.54	7.34	2.88	2.91
Lead	47	47	1.00	L		SS-99-26	717	51.39	107.41	7.50	3.22	1.07	63.76	2.31	63.92
Nickel	52	52	1.00	U	OUT (h)	SS-99-26	6630	386.56	1173.38	53.61	3.95	1.64	475.01	2.88	383.35
Pyrene	35	43	0.81	U	OUT (h)	TB-46	1000	25.70	152.22	3.92	-0.31	1.94	32.16	3.20	12.57
Total PCBs	60	93	0.65	L		B-17 COMP	3848	69.48	425.78	7.20	1.31	2.09	81.37	3.53	70.94
Trichloroethene	8	49	0.16	U	LP	BH-7 COMP	730	21.57	110.93	3.08	-5.77	3.39	26.65	4.23	7.77
Zinc	47	47	1.00	U		T03-3	8470	824.32	1912.80	120.24	5.10	1.59	1022.71	2.88	1138.65

Normal UCL = Mean + (t*Stderr) (t = 1.3 for N=30, alpha = 0.95), Log-normal UCL = exp(lnmean + 0.5(lnstd^2) + (lnstd*H/((n-1)^0.5)))

N = Normal

L = Log-Normal

U = Unknown

OUT (h) = High end outlier

Derivation of Upper 95 % UCL - Sub-Surface Soils

STD_NAME	NDET	TOTN	% DET	Distribution	Comment	Maximum Detection		MEAN	STD	STDERR	LNMEAN	LNSTD	Normal 95% UCL
						SAMP_ID	Conc (mg/kg)						
Aroclor 1242	51	204	0.25	U	LP	B-3	9600	281.85	1154.05	80.80	4.06	4.06	415.17
Aroclor 1248	76	204	0.37	U	LP	BH-37	4300	112.85	581.13	40.69	3.40	3.40	179.98
Arsenic	65	67	0.97	U	OUT (l)	T02-1	65.7	7.44	10.92	1.33	0.97	0.97	9.64
Chromium	70	70	1.00	U	OUT (h)	T08-2	34900	1238.24	4897.83	585.40	2.08	2.08	2204.16
Copper	64	64	1.00	U	OUT (h)	T01-2	23200	941.72	3169.69	396.21	2.14	2.14	1595.47
Cyanide	16	65	0.25	U	LP	T12-2	166	6.70	26.83	3.33	1.52	1.52	12.19
Ethylbenzene	30	122	0.25	U	LP	T-23	61000	2544.29	9664.15	874.95	5.88	5.88	3987.96
Lead	67	67	1.00	U	OUT (l)	T01-2	291	23.90	51.16	6.25	1.11	1.11	34.22
Nickel	67	67	1.00	U	OUT (h)	T08-2	19700	813	3083	376.61	1.98	1.98	1434.76
Toluene	38	122	0.31	U	LP	HA-1	720000	6090.64	65172.74	5900.46	5.43	5.43	15826.40
Total PCBs	109	192	0.57	U		B-3	9600	316	1156	83.40	3.09	3.09	453.37
Trichloroethene	19	70	0.27	U	LP	BH-47	150000	3829.96	20350.27	2432.32	4.98	4.98	7843.29
Xylene (total)	32	122	0.26	U	LP	T-21	330000	13382.41	54200.14	4907.05	5.79	5.79	21479.05
Zinc	59	59	1.00	U	OUT (h)	T03-2	53300	1644.34	7542.59	981.96	1.84	1.84	3264.58

Normal UCL = Mean + (t*Stderr) (t = 1.65 for N=120, alpha = 0.95), Log-normal UCL = exp(lnmean + 0.5(lnstd^2) + (lnstd*H/((n-1)^0.5)))

N = Normal

L = Log-Normal

U = Unknown

UT (h) = High end outlier

Derivation of Upper 95 % UCL - Sediments

STD_NAME	NDET	TOTN	% DET	Distribution	Comment	Maximum Detection SAMP_ID	Maximum Detection Conc (mg/kg)	MEAN	STD	STDERR	LNMEAN	LNSTD	Normal 95% UCL	H	Log-Normal UCL
Aroclor 1016	6	30	0.25	L		L7	5.81	0.52	1.17	0.21	-1.97	1.54	0.80	3.31	1.18
Aroclor 1242	6	30	0.37	L		L7	36.3	1.59	6.58	1.20	-1.70	1.78	3.16	3.72	3.02
Aroclor 1248	24	30	0.97	L		GM98-SED08-C	25	3.32	5.81	1.06	-0.25	2.04	4.70	3.81	26.12
Aroclor 1260	18	30	1.00	L		L7	1.13	0.46	0.60	0.11	-1.40	1.16	0.60	2.56	0.84
Arsenic	28	28	1.00	L		L10A	14.1	5.10	2.22	0.42	1.56	0.37	5.65	1.83	5.82
Benzo(a)anthracene	24	24	0.25	U		GM98-SED04-C	30	5.32	6.57	1.34	1.08	1.24	7.06	2.56	12.38
Benzo(b)fluoranthene	23	24	1.00	L	OUT (I)	GM98-SED04-C	27	6.10	6.23	1.27	1.34	1.09	7.75	2.56	12.29
Benzo(k)fluoranthene	24	24	1.00	U	OUT (I)	GM98-SED04-C	13	3	3	0.56	0.48	1.07	3.27	2.56	5.05
Benzo[a]pyrene	24	24	0.31	U	OUT (I)	GM98-SED04-C	27	5.01	5.80	1.18	1.06	1.25	6.55	2.92	13.50
Dibenzo(a,h)anthracene	14	24	0.57	L		GM98-SED04-C	5.9	2	2	0.40	-0.07	1.18	2.24	2.56	3.49
Indeno(1,2,3-cd)pyrene	23	24	0.27	L		GM98-SED04-C	17	3.80	4.02	0.82	0.86	1.04	4.87	2.56	7.13
Lead	28	28	0.26	L		GM98-SED08-C	172	54.09	39.10	7.39	3.72	0.81	63.69	2.31	81.83

Normal UCL = Mean + (t*Stderr) (t = 1.7 for N=30, alpha = 0.95), Log-normal UCL = exp(lnmean + 0.5(lnstd^2) + (lnstd*H/((n-1)^0.5)))

N = Normal

L = Log-Normal

U = Unknown

OUT (h) = High end outlier

Derivation of Upper 95 % UCL - Upstream Sediments

STD_NAME	NDET	TOTN	% DET	Distribution	Comment	Maximum Detection SAMP_ID	Maximum Detection Conc (mg/kg)	MEAN	STD	STDERR	LNMEAN	LNSTD	Normal 95% UCL	H	Log-Normal UCL
Aluminum	27	27	1.00	U	OUT (l)	L28	25900	9009.67	5300.30	1020.04	8.91	0.74	10743.74	2.19	13345.64
Antimony	32	37	0.86	U		L24	18.7	1.28	3.01	0.49	-0.47	1.09	2.12	2.56	1.80
Aroclor 1242	8	38	0.21	U		L22	1.9	0.09	0.30	0.05	-3.39	0.95	0.17	2.43	0.08
Aroclor 1248	11	38	0.29	U	OUT (h)	S103	1.1	0.08	0.18	0.03	-3.23	0.92	0.13	2.43	0.09
Aroclor 1254	20	38	0.53	U		L102	2.133	0.23	0.53	0.09	-2.75	1.43	0.37	2.92	0.35
Aroclor 1260	29	38	0.76	U		L103	7.9	0.54	1.72	0.28	-2.60	1.61	1.01	3.31	0.65
Arsenic	36	37	0.97	U		L17	19.1	6.16	4.37	0.72	1.58	0.77	7.38	2.19	8.61
Benzo(a)anthracene	32	37	0.86	L		GM98-SED20A-C	60	5.93	10.75	1.77	0.59	1.75	8.93	3.72	24.80
Benzo(b)fluoranthene	32	37	0.86	U		GM98-SED20A-C	66	6.31	11.70	1.92	0.67	1.72	9.58	3.31	22.21
Benzo(k)fluoranthene	29	37	0.78	U		L103	23	3.20	5.11	0.84	0.08	1.58	4.63	3.31	9.08
Benzo[a]pyrene	32	37	0.86	U		GM98-SED20A-C	50	5	9	1.52	0.51	1.76	8.02	3.72	23.50
Cadmium	23	27	0.85	L		S101	10	1.60	2.58	0.50	-0.65	1.71	2.45	3.31	6.78
Dibenzo(a,h)anthracene	13	37	0.35	U		GM98-SED20A-C	11	1	2	0.30	-0.83	0.98	1.39	2.43	1.05
Indeno(1,2,3-cd)pyrene	31	37	0.84	L		GM98-SED20A-C	34	2.50	5.60	0.92	-0.14	1.45	4.07	2.92	5.04
Iron	27	27	1.00	N		L28	36100	18699.63	8019.30	1543.31	9.72	0.58	21323.26	1.99	24518.05
Lead	38	38	1.00	L		L24	1170	102.86	203.56	33.02	3.68	1.36	159.00	2.92	189.78
Magnesium	27	27	1.00	L		S106	29900	13737.78	7331.07	1410.87	9.38	0.58	16136.25	1.99	17584.81
Selenium	19	37	0.51	U	OUT (h)	GM98-SED19-C	43	1.75	6.98	1.15	-0.60	0.98	3.70	2.43	1.32
Silver	19	27	0.70	U		S101	47.9	2.94	9.23	1.78	-0.62	1.61	5.96	3.31	5.60
Thallium	4	27	0.15	U		S103	0.98	0.43	0.21	0.04	-0.92	0.40	0.50	1.91	0.50

Normal UCL = Mean + (t*Stderr) (t = 1.7 for N=30, alpha = 0.95), Log-normal UCL = exp(lnmean + 0.5(lnstd^2) + (lnstd*H/((n-1)^0.5)))

N = Normal

L = Log-Normal

U = Unknown

OUT (h) = High end outlier

OBS	STD_NAME	MINDET	MAXDET	MEANDET	MEAN	STD	MAXND	LNMAXDET	LNMEANDT	LNMEAN	LNSTD	LNCV	CAS_NUM	UNITS	SAMP_ID	ER_Q	FREQ	DETRANGE
1	Aroclor 1242	1.800	1500.00	254.875	41.531	216.81	255.000	7.3132	3.18167	-0.58903	2.62241	-445.205			B-11		12/90	0.01-255
2	Aroclor 1248	0.002	3900.00	166.381	107.901	533.59	110.000	8.2687	1.58883	0.41548	2.87659	692.347	12672-29-6		SS-99-26		53/83	0.01-110
3	Aroclor 1254	0.027	99.00	14.359	11.842	41.88	255.000	4.5951	-0.35962	-0.77111	2.21668	-287.465	11097-69-1		T03-4	J	15/83	0.01-255
4	Aroclor 1260	0.530	1.90	1.215	9.548	39.60	255.000	0.6419	0.00349	-1.06705	2.21950	-208.003			003-2		2/83	0.01-255
5	Arsenic	2.200	162.00	12.038	12.038	26.12	.	5.0876	1.87047	1.87047	0.85200	45.550	7440-38-2	mg/kg	SS-99-21		47/47	.-.
6	Benzo(a)anthracene	0.045	350.00	13.891	9.482	53.88	2.700	5.8579	-0.73829	-0.82863	1.68652	-203.531	56-55-3	mg/kg	TB-46	J	28/42	0.18-2.7
7	Benzo(b)fluoranthene	0.039	360.00	13.275	10.044	55.39	11.500	5.8861	-0.74393	-0.62523	1.81221	-289.849	205-99-2	mg/kg	TB-46	J	30/42	0.18-11.5
8	Benzo(k)fluoranthene	0.041	120.00	5.759	3.604	18.43	3.650	4.7875	-1.33044	-1.06635	1.59073	-149.175	207-08-9	mg/kg	TB-46	J	23/42	0.18-3.65
9	Benzo[a]pyrene	0.077	300.00	14.158	8.438	46.72	7.000	5.7038	-0.53990	-0.64929	1.59171	-245.147	50-32-8	mg/kg	TB-46	J	23/41	0.18-7
10	Carbazole	0.050	120.00	12.853	3.303	18.03	3.600	4.7875	-0.54798	-1.10531	1.37518	-124.416	86-74-8	mg/kg	TB-46		10/44	0.175-3.6
11	Chromium	9.200	32000.00	788.962	788.962	4442.37	.	10.3735	3.92327	3.92327	1.58143	40.309	7440-47-3		SS-99-26		52/52	.-.
12	Chrysene	0.042	380.00	13.287	10.326	58.52	2.700	5.9402	-0.87447	-0.84935	1.75980	-207.194	218-01-9	mg/kg	TB-46		32/42	0.18-2.7
13	Cobalt	5.400	10.80	7.414	7.414	2.03	.	2.3795	1.97293	1.97293	0.26287	13.324	7440-48-4	mg/kg	SS-99-17		7/7	.-.
14	Copper	6.900	5410.00	489.469	489.469	1356.08	.	8.5960	3.85195	3.85195	1.71364	44.488	7440-50-8		T03-3		52/52	.-.
15	Dibenzo(a,h)anthracene	0.140	39.00	8.714	1.809	6.38	3.600	3.6636	0.05296	-0.87465	1.32539	-151.533	53-70-3	mg/kg	TB-46	J	5/37	0.175-3.6
16	Fluoranthene	0.040	1200.00	36.209	28.992	180.70	2.700	7.0901	-0.92683	-0.87412	2.00840	-229.762	206-44-0	mg/kg	TB-46		35/44	0.18-2.7
17	Indeno(1,2,3-cd)pyrene	0.067	190.00	11.173	5.803	30.34	3.600	5.2470	-0.61954	-0.82829	1.53519	-185.345	193-39-5	mg/kg	TB-46	J	19/39	0.18-3.6
18	Lead	3.700	717.00	51.391	51.391	107.41	.	6.5751	3.22430	3.22430	1.06788	33.120	7439-92-1	mg/kg	SS-99-26		47/47	.-.
19	Nickel	8.300	6630.00	386.556	386.556	1173.38	.	8.7994	3.94763	3.94763	1.63750	41.481	7440-02-0		SS-99-26		52/52	.-.
20	Pyrene	0.041	1000.00	31.336	25.695	152.22	2.700	6.9078	-0.25475	-0.30888	1.94017	-628.138	129-00-0	mg/kg	TB-46		35/43	0.18-2.7
21	Total PCBs	0.000	3848.00	105.488	69.481	425.78	2.700	8.2553	2.00287	1.31193	2.08840	159.185			B-17 COMP		60/93	0-2.7
22	Trichloroethene	0.004	730.00	132.014	21.569	110.93	0.405	6.5930	-0.66371	-5.76897	3.39117	-58.783			BH-7 COMP		8/49	0.0005-0.405
23	Zinc	25.000	8470.00	824.319	824.319	1912.80	.	9.0443	5.10431	5.10431	1.58694	31.090	7440-66-6	mg/kg	T03-3		47/47	.-.
24	cis-1,2-Dichloroethene	0.340	0.45	0.395	0.033	0.10	0.405	-0.7985	-0.93866	-6.58646	2.02694	-30.774	156-59-2	mg/kg	T03-4		2/47	0.0005-0.405

STD_NAME=Aroclor 1254

Univariate Procedure

Variable=RESULT

Moments

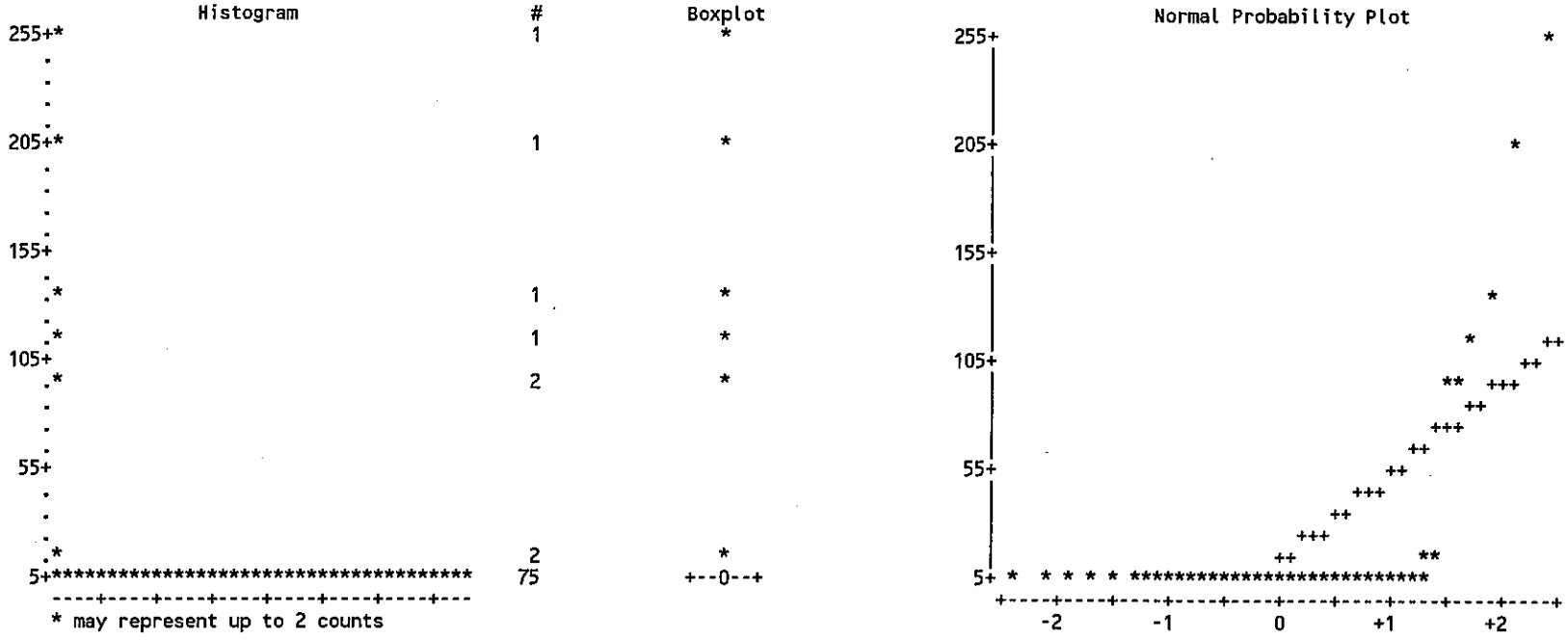
N	83	Sum Wgts	83
Mean	11.84222	Sum	982.904
Std Dev	41.87688	Variance	1753.673
Skewness	4.26203	Kurtosis	19.01384
USS	155441	CSS	143801.2
CV	353.6237	Std Mean	4.596585
T:Mean=0	2.576308	Pr>|T|	0.0118
Num ^= 0	83	Num > 0	83
M(Sign)	41.5	Pr>=|M|	0.0001
Sgn Rank	1743	Pr>=|S|	0.0001
W:Normal	0.328477	Pr<W	0.0001

Quantiles(Def=5)

100% Max	255	99%	255
75% Q3	0.7	95%	99
50% Med	0.4	90%	8
25% Q1	0.145	10%	0.03
0% Min	0.01	5%	0.02
		1%	0.01
Range	254.99		
Q3-Q1	0.555		
Mode	0.5		

Extremes

Lowest	Obs	Highest	Obs
0.01(	62)	99(	76)
0.01(	48)	110(	77)
0.01(	41)	135(	79)
0.02(	83)	200(	49)
0.02(	67)	255(	69)



STD_NAME=Aroclor 1254

Univariate Procedure

Variable=LNRESULT

Moments

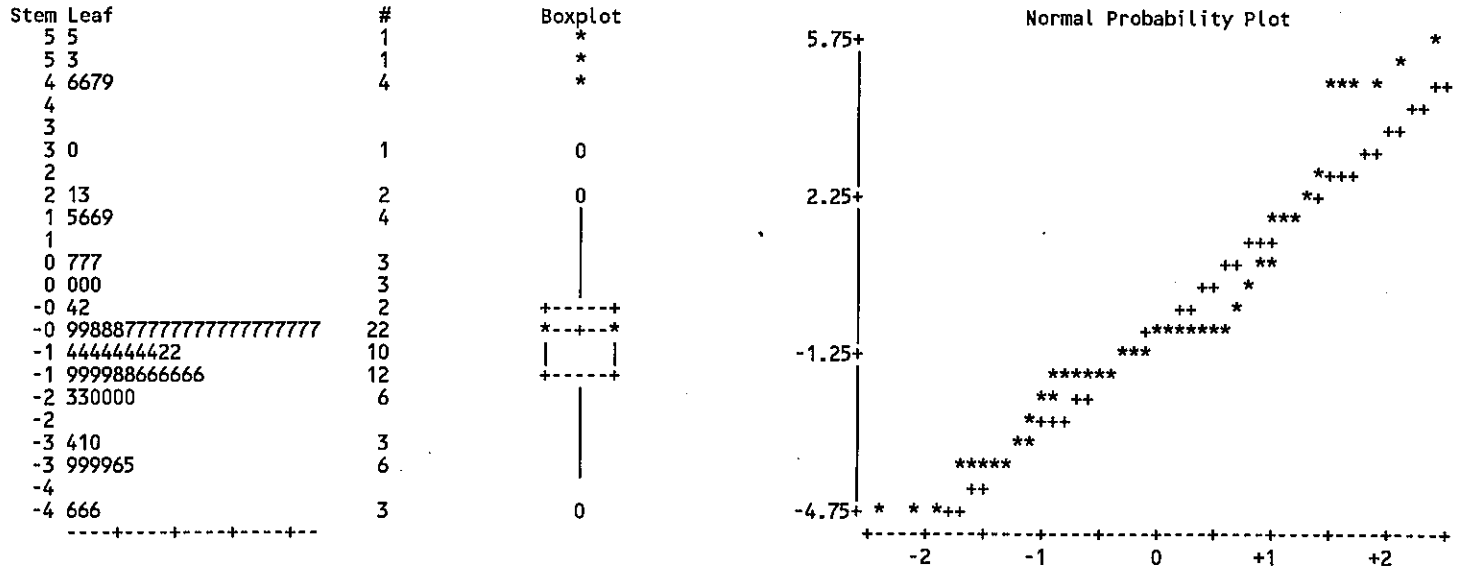
N	83	Sum Wgts	83
Mean	-0.77111	Sum	-64.0024
Std Dev	2.216683	Variance	4.913682
Skewness	1.029185	Kurtosis	1.41933
USS	452.2751	CSS	402.9219
CV	-287.465	Std Mean	0.243313
T:Mean=0	-3.16923	Pr>|T|	0.0021
Num ^= 0	80	Num > 0	16
M(Sign)	-24	Pr>=|M|	0.0001
Sgn Rank	-767.5	Pr>=|S|	0.0001
W:Normal	0.886779	Pr<W	0.0001

Quantiles(Def=5)

100% Max	5.541264	99%	5.541264
75% Q3	-0.35667	95%	4.59512
50% Med	-0.91629	90%	2.079442
25% Q1	-1.93102	10%	-3.50656
0% Min	-4.60517	5%	-3.91202
		1%	-4.60517
Range	10.14643		
Q3-Q1	1.574347		
Mode	-0.69315		

Extremes

Lowest	Obs	Highest	Obs
-4.60517(	62)	4.59512(	76)
-4.60517(	48)	4.70048(	77)
-4.60517(	41)	4.905275(	79)
-3.91202(	83)	5.298317(	49)
-3.91202(	67)	5.541264(	69)



Surface Soils
Univariate Output

STD_NAME=Aroclor 1260

Univariate Procedure

Variable=RESULT

Moments

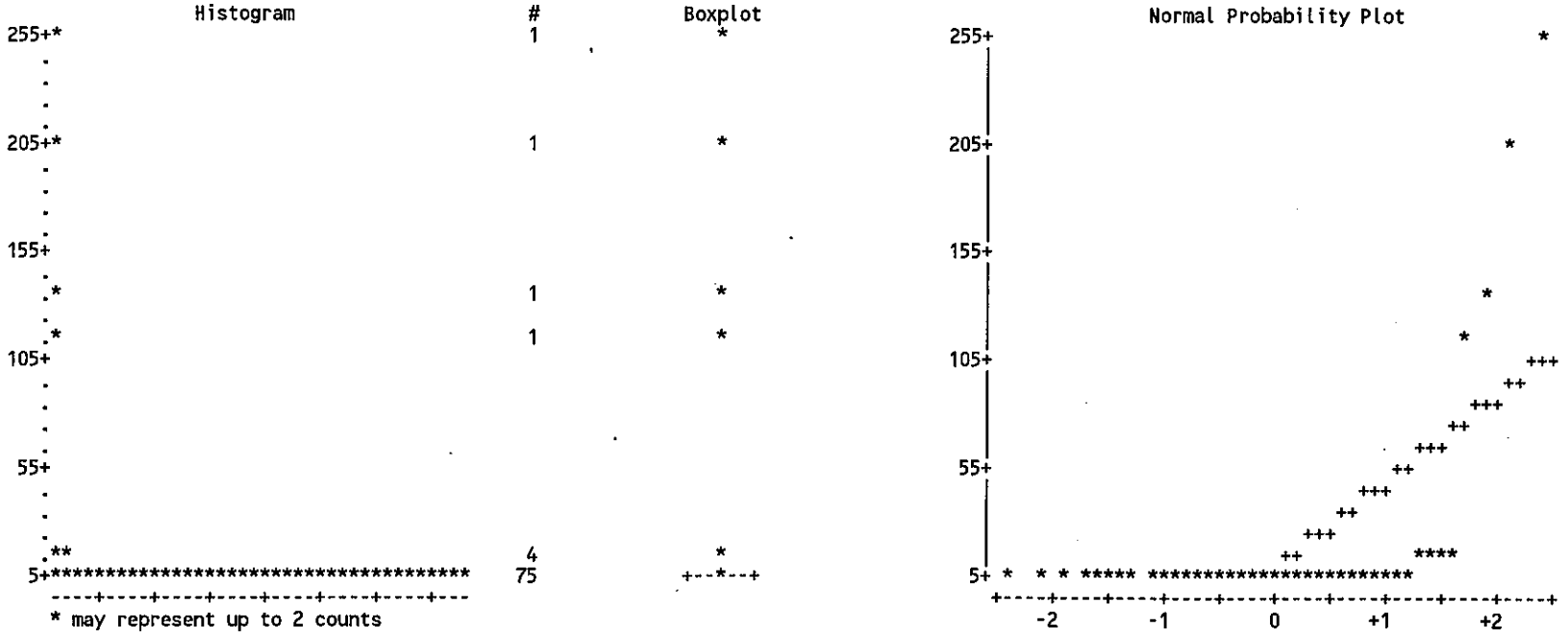
N	83	Sum Wgts	83
Mean	9.547789	Sum	792.4665
Std Dev	39.59721	Variance	1567.939
Skewness	4.957102	Kurtosis	25.1493
USS	136137.3	CSS	128571
CV	414.7265	Std Mean	4.346359
T:Mean=0	2.196733	Pr>|T|	0.0309
Num ^= 0	83	Num > 0	83
M(Sign)	41.5	Pr>=|M|	0.0001
Sgn Rank	1743	Pr>=|S|	0.0001
W:Normal	0.27197	Pr<W	0.0001

Quantiles(Def=5)

100% Max	255	99%	255
75% Q3	0.53	95%	19.5
50% Med	0.25	90%	5
25% Q1	0.1	10%	0.02
0% Min	0.01	5%	0.0105
		1%	0.01
Range	254.99		
Q3-Q1	0.43		
Mode	0.5		

Extremes

Lowest	Obs	Highest	Obs
0.01(	81)	19.5(	51)
0.01(	62)	110(	77)
0.01(	48)	135(	79)
0.01(	41)	200(	49)
0.0105(	28)	255(	69)



STD_NAME=Aroclor 1260

Univariate Procedure

Variable=LNRESULT

Moments

N	83	Sum Wgts	83
Mean	-1.06705	Sum	-88.565
Std Dev	2.219495	Variance	4.926159
Skewness	0.874397	Kurtosis	1.308234
USS	498.4482	CSS	403.945
CV	-208.003	Std Mean	0.243621
T:Mean=0	-4.37995	Pr>|T|	0.0001
Num ^= 0	78	Num > 0	15
M(Sign)	-24	Pr>=|M|	0.0001
Sgn Rank	-875	Pr>=|S|	0.0001
W:Normal	0.916238	Pr<W	0.0001

Quantiles(Def=5)

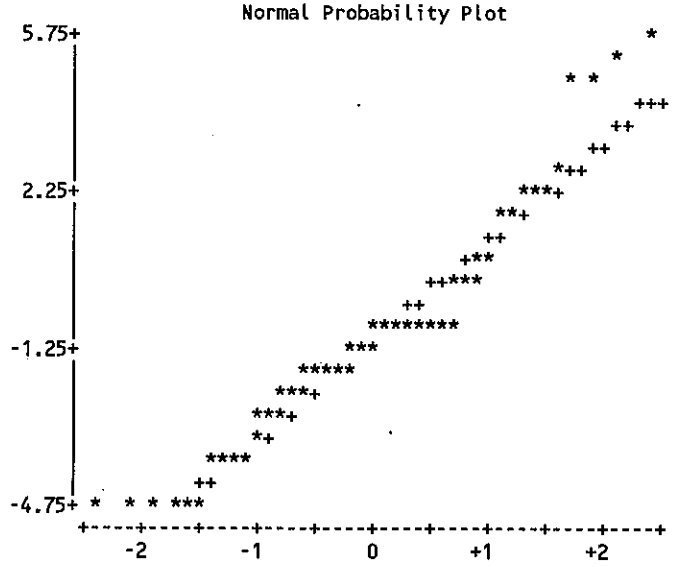
100% Max	5.541264	99%	5.541264
75% Q3	-0.63488	95%	2.970414
50% Med	-1.38629	90%	1.609438
25% Q1	-2.30259	10%	-3.91202
0% Min	-4.60517	5%	-4.55638
		1%	-4.60517
Range	10.14643		
Q3-Q1	1.667707		
Mode	-0.69315		

Extremes

Lowest	Obs	Highest	Obs
-4.60517(	81)	2.970414(	51)
-4.60517(	62)	4.70048(	77)
-4.60517(	48)	4.905275(	79)
-4.60517(	41)	5.298317(	49)
-4.55638(	28)	5.541264(	69)

```
Stem Leaf                    #          Boxplot
   5 5                       1             *
   5 3                       1             *
   4 79                      2             *
   4
   3
   3 0                       1             0
   2
   2 334                     3             0
   1 566                     3             |
   1                                       |
   0 6777                    4             |
   0 00000                   5             |
  -0                                       |
  -0 88877777777777777776   21          +-----+
  -1 444444                  6          *--+--*
  -1 9999886666             10          |     |
  -2 333330000               9          +-----+
  -2                                       |
  -3 10000                   5             |
  -3 999999                  6             |
  -4                                       |
  -4 666665                  6             |
     ----+----+----+----+-
```

Normal Probability Plot



Surface Soils
Univariate Output

---------- STD_NAME=Arsenic ----------

Univariate Procedure

Variable=RESULT

Moments

N	47	Sum Wgts	47
Mean	12.0383	Sum	565.8
Std Dev	26.12031	Variance	682.2707
Skewness	4.953097	Kurtosis	25.97823
USS	38195.72	CSS	31384.45
CV	216.9768	Std Mean	3.810039
T:Mean=0	3.159626	Pr>|T|	0.0028
Num ^= 0	47	Num > 0	47
M(Sign)	23.5	Pr>=|M|	0.0001
Sgn Rank	564	Pr>=|S|	0.0001
W:Normal	0.357253	Pr<W	0.0001

Quantiles(Def=5)

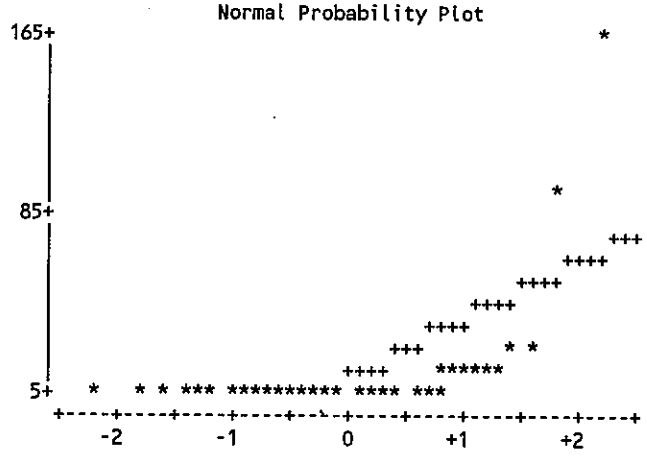
100% Max	162	99%	162
75% Q3	7.7	95%	27.1
50% Med	4.9	90%	16.7
25% Q1	4.2	10%	2.9
0% Min	2.2	5%	2.5
		1%	2.2
Range	159.8		
Q3-Q1	3.5		
Mode	4.6		

Extremes

Lowest	Obs	Highest	Obs
2.2(	8)	16.7(	44)
2.2(	7)	21(	47)
2.5(	5)	27.1(	36)
2.7(	22)	92.8(	28)
2.9(	19)	162(	31)

```
Stem Leaf                          #          Boxplot
  16 2                             1             *
  15
  14
  13
  12
  11
  10
   9 3                             1             *
   8
   7
   6
   5
   4
   3
   2 17                            2             *
   1 0044557                       7             0
   0 2223333344444455555555556666666666778   36        +-----+
     ----+----+----+----+----+----+----+-
Multiply Stem.Leaf by 10**+1
```

Normal Probability Plot



Surface Soils
Univariate Output

---------- STD_NAME=Arsenic ----------

Univariate Procedure

Variable=LNRESULT

Moments

N	47	Sum Wgts	47
Mean	1.870474	Sum	87.91229
Std Dev	0.851998	Variance	0.7259
Skewness	1.943635	Kurtosis	4.856913
USS	197.8291	CSS	33.39141
CV	45.54983	Std Mean	0.124277
T:Mean=0	15.05089	Pr>|T|	0.0001
Num ^= 0	47	Num > 0	47
M(Sign)	23.5	Pr>=|M|	0.0001
Sgn Rank	564	Pr>=|S|	0.0001
W:Normal	0.823852	Pr<W	0.0001

Quantiles(Def=5)

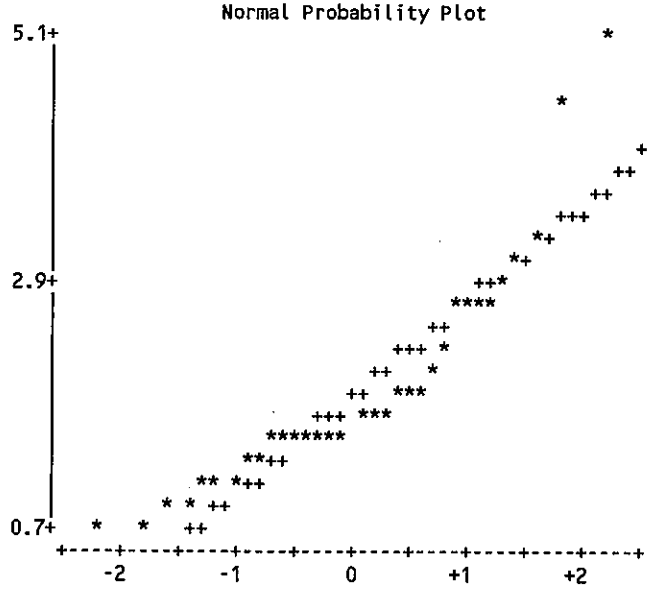
100% Max	5.087596	99%	5.087596
75% Q3	2.04122	95%	3.299534
50% Med	1.589235	90%	2.815409
25% Q1	1.435085	10%	1.064711
0% Min	0.788457	5%	0.916291
		1%	0.788457
Range	4.299139		
Q3-Q1	0.606136		
Mode	1.526056		

Extremes

Lowest	Obs	Highest	Obs
0.788457(	8)	2.815409(	44)
0.788457(	7)	3.044522(	47)
0.916291(	5)	3.299534(	36)
0.993252(	22)	4.530447(	28)
1.064711(	19)	5.087596(	31)

```
Stem Leaf                    #          Boxplot
  50 9                       1             *
  48
  46
  44 3                       1             *
  42
  40
  38
  36
  34
  32 0                       1             0
  30 4                       1             0
  28 2                       1             |
  26 2381                    4             |
  24                                       |
  22 95                      2             |
  20 4                       1          +-----+
  18 4409                    4          |  +  |
  16 2466699                 7          |     |
  14 4003335557799          13          *-----*
  12 584                     3             |
  10 6669                    4             |
   8 29                      2             |
   6 99                      2             |
     ----+----+----+----+
Multiply Stem.Leaf by 10**-1
```

Normal Probability Plot



Surface Soils
Univariate Output

STD_NAME=Benzo(a)anthracene

Univariate Procedure

Variable=RESULT

Moments

N	42	Sum Wgts	42
Mean	9.482476	Sum	398.264
Std Dev	53.88024	Variance	2903.081
Skewness	6.459954	Kurtosis	41.8134
USS	122802.8	CSS	119026.3
CV	568.2086	Std Mean	8.313902
T:Mean=0	1.140557	Pr>|T|	0.2607
Num ^= 0	42	Num > 0	42
M(Sign)	21	Pr>=|M|	0.0001
Sgn Rank	451.5	Pr>=|S|	0.0001
W:Normal	0.17865	Pr<W	0.0001

Quantiles(Def=5)

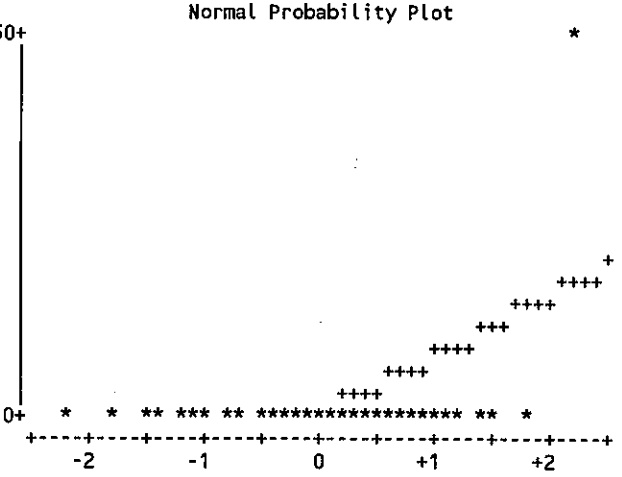
100% Max	350	99%	350
75% Q3	0.68	95%	7.7
50% Med	0.2425	90%	4.7
25% Q1	0.18	10%	0.1
0% Min	0.045	5%	0.089
		1%	0.045
Range	349.955		
Q3-Q1	0.5		
Mode	0.18		

Extremes

Lowest	Obs	Highest	Obs
0.045(	39)	4.7(	26)
0.078(	6)	7.6(	32)
0.089(	29)	7.7(	19)
0.092(	31)	12(	28)
0.1(	23)	350(	41)

```
Stem Leaf                          #          Boxplot
  34 0                             1             *
  32
  30
  28
  26
  24
  22
  20
  18
  16
  14
  12
  10
   8
   6
   4
   2
   0 00000000000000000000000000000111112235882   41          +--0--+
     ----+----+----+----+----+----+----+----+-
Multiply Stem.Leaf by 10**+1
```

Normal Probability Plot



Surface Soils
Univariate Output

---------- STD_NAME=Benzo(a)anthracene ----------

Univariate Procedure

Variable=LNRESULT

Moments

N	42	Sum Wgts	42
Mean	-0.82863	Sum	-34.8026
Std Dev	1.68652	Variance	2.84435
Skewness	1.969873	Kurtosis	5.051215
USS	145.4569	CSS	116.6183
CV	-203.531	Std Mean	0.260236
T:Mean=0	-3.18416	Pr>|T|	0.0028
Num ^= 0	42	Num > 0	8
M(Sign)	-13	Pr>=|M|	0.0001
Sgn Rank	-262.5	Pr>=|S|	0.0005
W:Normal	0.818127	Pr<W	0.0001

Quantiles(Def=5)

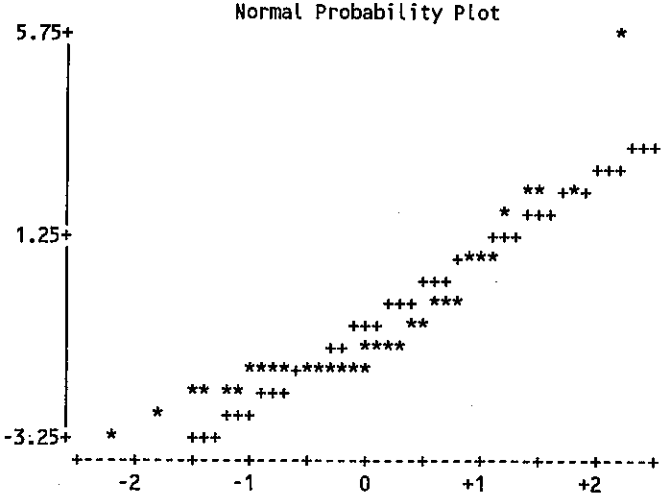
100% Max	5.857933	99%	5.857933
75% Q3	-0.38566	95%	2.04122
50% Med	-1.42323	90%	1.547563
25% Q1	-1.7148	10%	-2.30259
0% Min	-3.10109	5%	-2.41912
		1%	-3.10109
Range	8.959026		
Q3-Q1	1.329136		
Mode	-1.7148		

Extremes

Lowest	Obs	Highest	Obs
-3.10109(	39)	1.547563(	26)
-2.55105(	6)	2.028148(	32)
-2.41912(	29)	2.04122(	19)
-2.38597(	31)	2.484907(	28)
-2.30259(	23)	5.857933(	41)

```
Stem Leaf                     #          Boxplot
   5 9                        1             *
   5
   4
   4
   3
   3
   2 5                        1             0
   2 00                       2             0
   1 5                        1             |
   1 0                        1             |
   0 68                       2             |
   0                                        |
  -0 4421                     4          +-----+
  -0 995                      3          |  +  |
  -1 333211                   6          *-----*
  -1 998877777766665         15          +-----+
  -2 4431                     4             |
  -2 6                        1             |
  -3 1                        1             |
     ----+----+----+----+
```

Normal Probability Plot



```
5.75+                                                  *
    |
    |
    |
    |                                                 +++
    |                                               +++
    |                                            ** +*+
    |                                          * +++
1.25+                                         +++
    |                                       +***
    |                                    +++
    |                                 +++ ***
    |                              +++  **
    |                            ++ ****
    |                        ****+******
    |                    ** ** +++
    |                *     +++
-3.25+   *            +++
     +----+----+----+----+----+----+----+----+----+----+
        -2        -1         0        +1        +2
```

STD_NAME=Benzo(b)fluoranthene

Univariate Procedure

Variable=RESULT

Moments

N	42	Sum Wgts	42
Mean	10.04448	Sum	421.868
Std Dev	55.39225	Variance	3068.301
Skewness	6.45323	Kurtosis	41.75291
USS	130037.8	CSS	125800.3
CV	551.4697	Std Mean	8.547209
T:Mean=0	1.175176	Pr>|T|	0.2467
Num ^= 0	42	Num > 0	42
M(Sign)	21	Pr>=|M|	0.0001
Sgn Rank	451.5	Pr>=|S|	0.0001
W:Normal	0.183355	Pr<W	0.0001

Quantiles(Def=5)

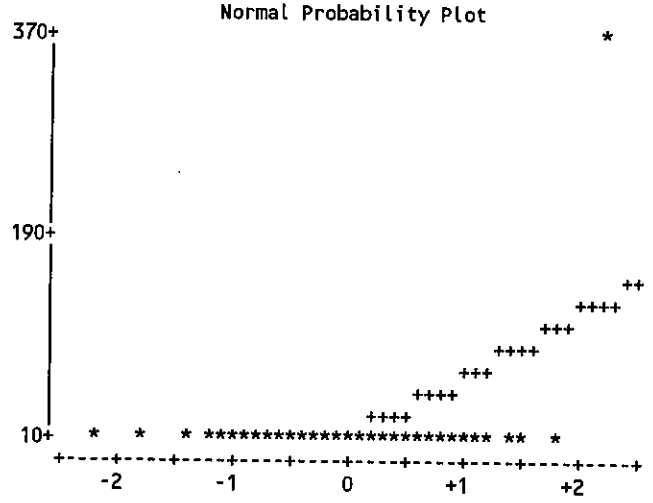
100% Max	360	99%	360
75% Q3	1.4	95%	11.5
50% Med	0.3725	90%	4.8
25% Q1	0.18	10%	0.06
0% Min	0.039	5%	0.043
		1%	0.039
Range	359.961		
Q3-Q1	1.22		
Mode	0.18		

Extremes

Lowest	Obs	Highest	Obs
0.039(	3)	4.8(	26)
0.043(	21)	10(	19)
0.043(	9)	11.5(	28)
0.051(	40)	12(	32)
0.06(	8)	360(	41)

```
Stem Leaf                          #          Boxplot
  36 0                             1             *
  34
  32
  30
  28
  26
  24
  22
  20
  18
  16
  14
  12
  10
   8
   6
   4
   2
   0 00000000000000000000000011111111222345022   41          +--0--+
     ----+----+----+----+----+----+----+----+-
Multiply Stem.Leaf by 10**+1
```

Normal Probability Plot



STD_NAME=Benzo(b)fluoranthene

Univariate Procedure

Variable=LNRESULT

Moments

N	42	Sum Wgts	42
Mean	-0.62523	Sum	-26.2595
Std Dev	1.812209	Variance	3.284101
Skewness	1.266618	Kurtosis	2.836895
USS	151.0662	CSS	134.6481
CV	-289.849	Std Mean	0.27963
T:Mean=0	-2.2359	Pr>|T|	0.0309
Num ^= 0	42	Num > 0	12
M(Sign)	-9	Pr>=|M|	0.0079
Sgn Rank	-216.5	Pr>=|S|	0.0053
W:Normal	0.916455	Pr<W	0.0049

Quantiles(Def=5)

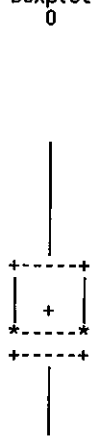
100% Max	5.886104	99%	5.886104
75% Q3	0.336472	95%	2.442347
50% Med	-0.99134	90%	1.568616
25% Q1	-1.7148	10%	-2.81341
0% Min	-3.24419	5%	-3.14656
		1%	-3.24419
Range	9.130298		
Q3-Q1	2.051271		
Mode	-1.7148		

Extremes

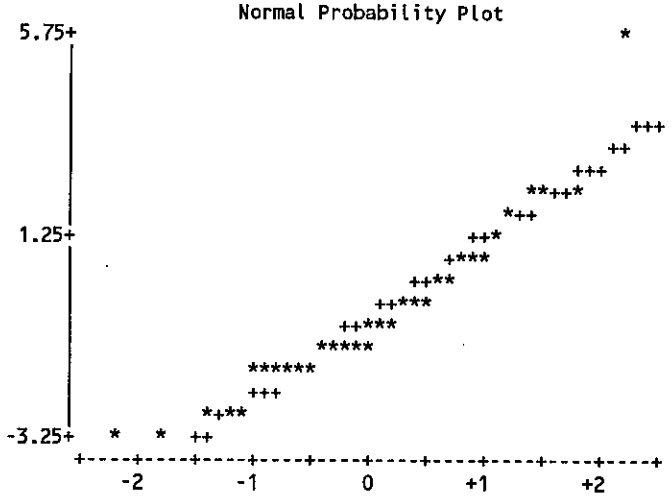
Lowest	Obs	Highest	Obs
-3.24419(	3)	1.568616(	26)
-3.14656(	21)	2.302585(	19)
-3.14656(	9)	2.442347(	28)
-2.97593(	40)	2.484907(	32)
-2.81341(	8)	5.886104(	41)

```
Stem Leaf                 #
   5 9                    1
   5
   4
   4
   3
   3
   2 5                    1
   2 34                   2
   1 6                    1
   1 03                   2
   0 68                   2
   0 234                  3
  -0 430                  3
  -0 998665               6
  -1 4433211              7
  -1 98777765             8
  -2
  -2 87                   2
  -3 2110                 4
     ----+----+----+----+
```

Boxplot



Normal Probability Plot



STD_NAME=Benzo(k)fluoranthene

Univariate Procedure

Variable=RESULT

Moments

N	42	Sum Wgts	42
Mean	3.603929	Sum	151.365
Std Dev	18.43448	Variance	339.8302
Skewness	6.441257	Kurtosis	41.64691
USS	14478.55	CSS	13933.04
CV	511.5108	Std Mean	2.844503
T:Mean=0	1.26698	Pr>|T|	0.2123
Num ^= 0	42	Num > 0	42
M(Sign)	21	Pr>=|M|	0.0001
Sgn Rank	451.5	Pr>=|S|	0.0001
W:Normal	0.192528	Pr<W	0.0001

Quantiles(Def=5)

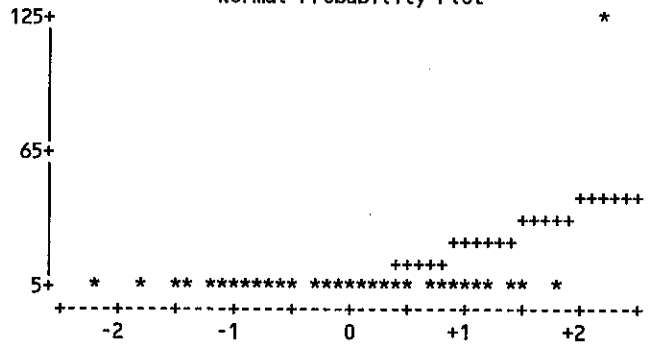
100% Max	120	99%	120
75% Q3	0.47	95%	3.7
50% Med	0.2025	90%	3.6
25% Q1	0.15	10%	0.076
0% Min	0.041	5%	0.057
		1%	0.041
Range	119.959		
Q3-Q1	0.32		
Mode	0.18		

Extremes

Lowest	Obs	Highest	Obs
0.041(	6)	3.6(	33)
0.042(	29)	3.65(	28)
0.057(	23)	3.7(	19)
0.061(	14)	3.8(	32)
0.076(	12)	120(	41)

```
Stem Leaf                     #             Boxplot
  12 0                        1                *
  11
  10
   9
   8
   7
   6
   5
   4
   3
   2
   1
   0 00000000000000000000000000000000222234444   41          +--*--+
     ----+----+----+----+----+----+----+----+-
Multiply Stem.Leaf by 10**+1
```

Normal Probability Plot



```
125+                                                                  *
   |
   |
   |
   |
65+
   |                                                          ++++++
   |                                                     +++++
   |                                                +++++++
   |                                          +++++
5+   *   *  ** ******** ********* ****** **  *
     +----+----+----+----+----+----+----+----+----+----+
         -2        -1         0        +1        +2
```

STD_NAME=Benzo(k)fluoranthene

Univariate Procedure

Variable=LNRESULT

Moments

N	42	Sum Wgts	42
Mean	-1.06635	Sum	-44.7866
Std Dev	1.590729	Variance	2.530419
Skewness	1.512081	Kurtosis	3.088267
USS	151.5052	CSS	103.7472
CV	-149.175	Std Mean	0.245455
T:Mean=0	-4.34437	Pr>|T|	0.0001
Num ^= 0	42	Num > 0	10
M(Sign)	-11	Pr>=|M|	0.0009
Sgn Rank	-339.5	Pr>=|S|	0.0001
W:Normal	0.852169	Pr<W	0.0001

Quantiles(Def=5)

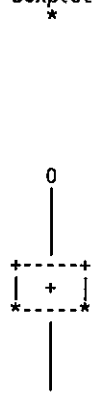
100% Max	4.787492	99%	4.787492
75% Q3	-0.75502	95%	1.308333
50% Med	-1.59709	90%	1.280934
25% Q1	-1.89712	10%	-2.57702
0% Min	-3.19418	5%	-2.8647
		1%	-3.19418
Range	7.981675		
Q3-Q1	1.142097		
Mode	-1.7148		

Extremes

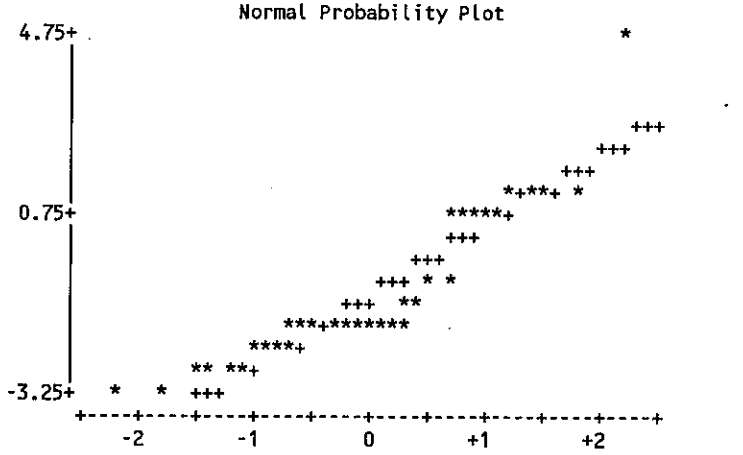
Lowest	Obs	Highest	Obs
-3.19418(	6)	1.280934(	33)
-3.17009(	29)	1.294727(	28)
-2.8647(	23)	1.308333(	19)
-2.79688(	14)	1.335001(	32)
-2.57702(	12)	4.787492(	41)

```
Stem Leaf                     #
   4 8                        1
   4
   3
   3
   2
   2
   1
   1 03333                    5
   0 6678                     4
   0
  -0
  -0 9998                     4
  -1 2                        1
  -1 98777776666666555       17
  -2 4210                     4
  -2 9865                     4
  -3 22                       2
     ----+----+----+----+
```

Boxplot



Normal Probability Plot



STD_NAME=Benzo[a]pyrene

Univariate Procedure

Variable=RESULT

Moments

N	41	Sum Wgts	41
Mean	8.43761	Sum	345.942
Std Dev	46.71519	Variance	2182.309
Skewness	6.384997	Kurtosis	40.83967
USS	90211.29	CSS	87292.37
CV	553.6543	Std Mean	7.295687
T:Mean=0	1.15652	Pr>|T|	0.2543
Num ^= 0	41	Num > 0	41
M(Sign)	20.5	Pr>=|M|	0.0001
Sgn Rank	430.5	Pr>=|S|	0.0001
W:Normal	0.181257	Pr<W	0.0001

Quantiles(Def=5)

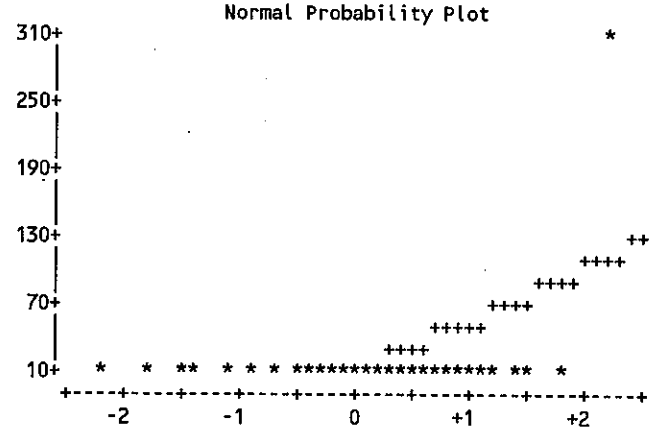
100% Max	300	99%	300
75% Q3	0.89	95%	7
50% Med	0.35	90%	3.6
25% Q1	0.19	10%	0.17
0% Min	0.077	5%	0.16
		1%	0.077
Range	299.923		
Q3-Q1	0.7		
Mode	0.18		

Extremes

Lowest	Obs	Highest	Obs
0.077(	28)	3.6(	32)
0.11(	22)	6.9(	18)
0.16(	13)	7(	27)
0.17(	12)	8.4(	31)
0.17(	11)	300(	40)

```
Stem Leaf                          #          Boxplot
  30 0                             1             *
  28
  26
  24
  22
  20
  18
  16
  14
  12
  10
   8
   6
   4
   2
   0 0000000000000000000000000000111122334778   40          +--0--+
     ----+----+----+----+----+----+----+----+
Multiply Stem.Leaf by 10**+1
```

Normal Probability Plot



STD_NAME=Benzo[a]pyrene

Univariate Procedure

Variable=LNRESULT

Moments

N	41	Sum Wgts	41
Mean	-0.64929	Sum	-26.6207
Std Dev	1.591707	Variance	2.533531
Skewness	1.993365	Kurtosis	5.166695
USS	118.6257	CSS	101.3412
CV	-245.147	Std Mean	0.248583
T:Mean=0	-2.61195	Pr>|T|	0.0126
Num ^= 0	41	Num > 0	10
M(Sign)	-10.5	Pr>=|M|	0.0015
Sgn Rank	-222.5	Pr>=|S|	0.0028
W:Normal	0.792141	Pr<W	0.0001

Quantiles(Def=5)

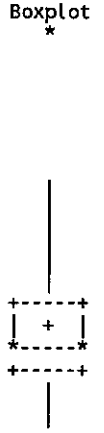
100% Max	5.703782	99%	5.703782
75% Q3	-0.11653	95%	1.94591
50% Med	-1.04982	90%	1.280934
25% Q1	-1.66073	10%	-1.77196
0% Min	-2.56395	5%	-1.83258
		1%	-2.56395
Range	8.267732		
Q3-Q1	1.544197		
Mode	-1.7148		

Extremes

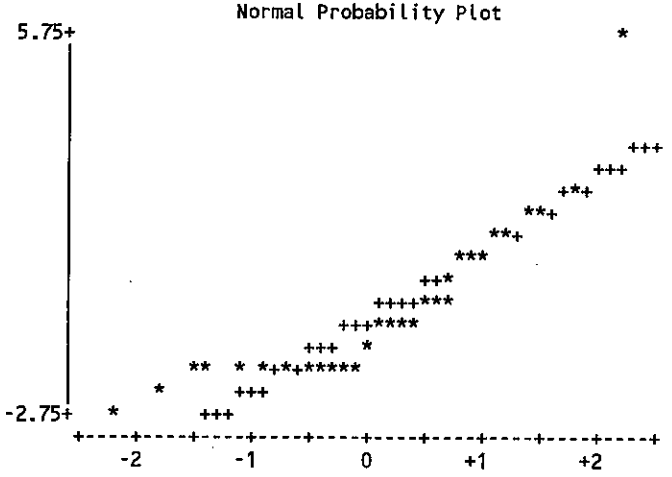
Lowest	Obs	Highest	Obs
-2.56395(	28)	1.280934(	32)
-2.20727(	22)	1.931521(	18)
-1.83258(	13)	1.94591(	27)
-1.77196(	12)	2.128232(	31)
-1.77196(	11)	5.703782(	40)

```
Stem Leaf                  #
   5 7                     1
   5
   4
   4
   3
   3
   2
   2 1                     1
   1 99                    2
   1 023                   3
   0 68                    2
   0 1                     1
  -0 41                    2
  -0 99995                 5
  -1 0000                  4
  -1 888777777766666655   18
  -2 2                     1
  -2 6                     1
     ----+----+----+----+
```

Boxplot



Normal Probability Plot



Surface Soils
Univariate Output

STD_NAME=Carbazole

Univariate Procedure

Variable=RESULT

Moments

N	44	Sum Wgts	44
Mean	3.303136	Sum	145.338
Std Dev	18.02537	Variance	324.914
Skewness	6.606393	Kurtosis	43.75424
USS	14451.37	CSS	13971.3
CV	545.7047	Std Mean	2.717427
T:Mean=0	1.215538	Pr>|T|	0.2308
Num ^= 0	44	Num > 0	44
M(Sign)	22	Pr>=|M|	0.0001
Sgn Rank	495	Pr>=|S|	0.0001
W:Normal	0.1794	Pr<W	0.0001

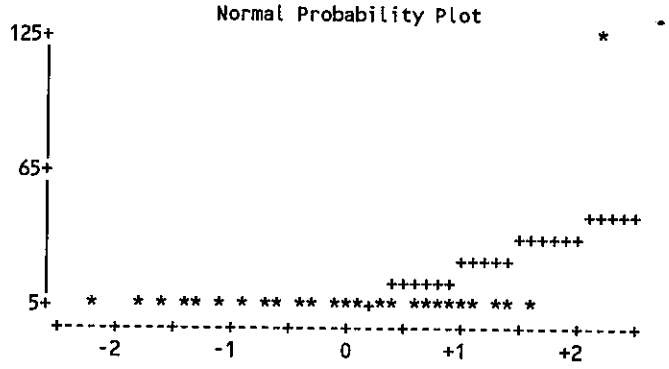
Quantiles(Def=5)

100% Max	120	99%	120
75% Q3	0.355	95%	3.6
50% Med	0.205	90%	2.5
25% Q1	0.185	10%	0.175
0% Min	0.05	5%	0.068
		1%	0.05
Range	119.95		
Q3-Q1	0.17		
Mode	0.18		

Extremes

Lowest	Obs	Highest	Obs
0.05(	1)	2.5(	21)
0.065(	5)	2.7(	40)
0.068(	20)	3.6(	30)
0.1(	8)	3.6(	35)
0.175(	32)	120(	43)

```
Stem Leaf                     #          Boxplot
  12 0                        1             *
  11
  10
   9
   8
   7
   6
   5
   4
   3
   2
   1
   0 00000000000000000000000000000000000011222344    43          +--0--+
     ----+----+----+----+----+----+----+----+---
Multiply Stem.Leaf by 10**+1
```



Surface Soils
Univariate Output

STD_NAME=Carbazole

Univariate Procedure

Variable=LNRESULT

Moments

N	44	Sum Wgts	44
Mean	-1.10531	Sum	-48.6338
Std Dev	1.375181	Variance	1.891123
Skewness	2.278628	Kurtosis	6.965627
USS	135.0739	CSS	81.31831
CV	-124.416	Std Mean	0.207316
T:Mean=0	-5.33153	Pr>|T|	0.0001
Num ^= 0	44	Num > 0	8
M(Sign)	-14	Pr>=|M|	0.0001
Sgn Rank	-407	Pr>=|S|	0.0001
W:Normal	0.725464	Pr<W	0.0001

Quantiles(Def=5)

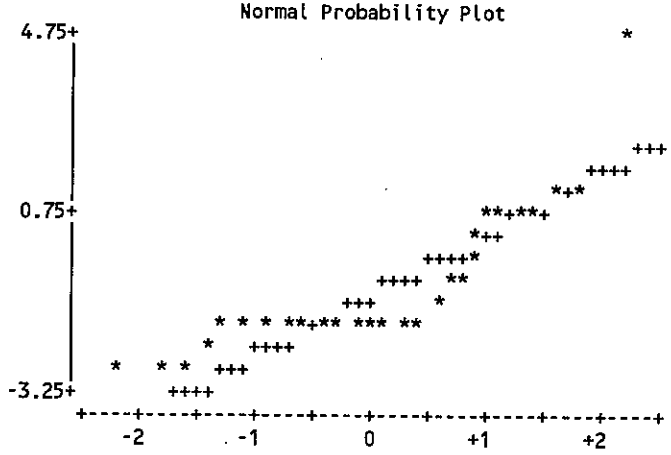
100% Max	4.787492	99%	4.787492
75% Q3	-1.04566	95%	1.280934
50% Med	-1.58475	90%	0.916291
25% Q1	-1.6874	10%	-1.74297
0% Min	-2.99573	5%	-2.68825
		1%	-2.99573
Range	7.783224		
Q3-Q1	0.641744		
Mode	-1.7148		

Extremes

Lowest	Obs	Highest	Obs
-2.99573(	1)	0.916291(	21)
-2.73337(	5)	0.993252(	40)
-2.68825(	20)	1.280934(	30)
-2.30259(	8)	1.280934(	35)
-1.74297(	32)	4.787492(	43)

Stem	Leaf	#	Boxplot
4	8	1	*
4			
3			
3			
2			
2			
1			
1	033	3	*
0	689	3	0
0	3	1	0
-0	4	1	|
-0	99	2	|
-1	2	1	+--+--+
-1	7777777777666666666666655555	28	*-----*
-2	3	1	|
-2	77	2	0
-3	0	1	0

Normal Probability Plot



STD_NAME=Chromium

Univariate Procedure

Variable=RESULT

Moments

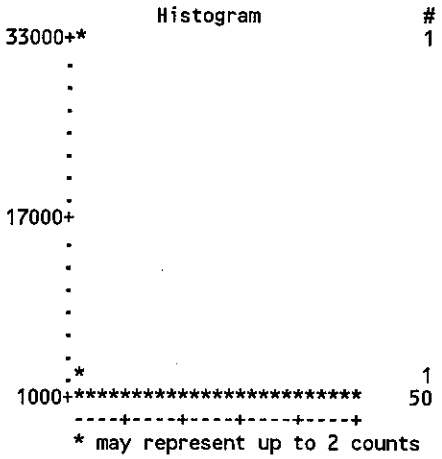
N	52	Sum Wgts	52
Mean	788.9615	Sum	41026
Std Dev	4442.366	Variance	19734617
Skewness	7.070924	Kurtosis	50.56036
USS	1.0388E9	CSS	1.0065E9
CV	563.065	Std Mean	616.0453
T:Mean=0	1.280687	Pr>|T|	0.2061
Num ^= 0	52	Num > 0	52
M(Sign)	26	Pr>=|M|	0.0001
Sgn Rank	689	Pr>=|S|	0.0001
W:Normal	0.183418	Pr<W	0.0001

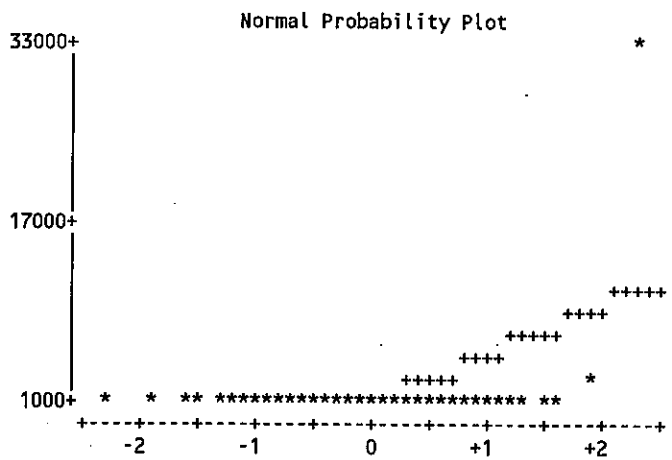
Quantiles(Def=5)

100% Max	32000	99%	32000
75% Q3	68.1	95%	1770
50% Med	30.85	90%	409
25% Q1	20.9	10%	14.3
0% Min	9.2	5%	12
		1%	9.2
Range	31990.8		
Q3-Q1	47.2		
Mode	21.6		

Extremes

Lowest	Obs	Highest	Obs
9.2(	10)	778(	47)
10.9(	14)	794(	48)
12(	1)	1770(	21)
12.2(	13)	3170(	51)
14.2(	27)	32000(	41)





STD_NAME=Chromium

Univariate Procedure

Variable=LNRESULT

Moments

N	52	Sum Wgts	52
Mean	3.923275	Sum	204.0103
Std Dev	1.581428	Variance	2.500915
Skewness	2.131189	Kurtosis	5.196128
USS	927.9351	CSS	127.5467
CV	40.30888	Std Mean	0.219305
T:Mean=0	17.88961	Pr>|T|	0.0001
Num ^= 0	52	Num > 0	52
M(Sign)	26	Pr>=|M|	0.0001
Sgn Rank	689	Pr>=|S|	0.0001
W:Normal	0.776616	Pr<W	0.0001

Quantiles(Def=5)

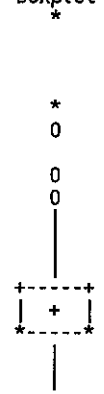
100% Max	10.37349	99%	10.37349
75% Q3	4.215818	95%	7.478735
50% Med	3.429125	90%	6.013715
25% Q1	3.039738	10%	2.66026
0% Min	2.219203	5%	2.484907
		1%	2.219203
Range	8.154288		
Q3-Q1	1.17608		
Mode	3.072693		

Extremes

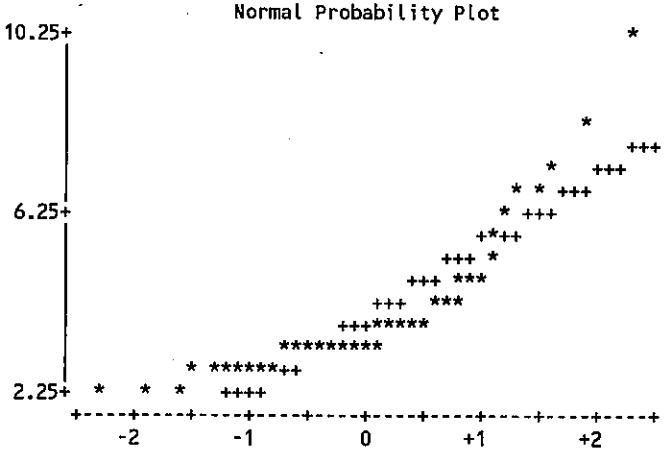
Lowest	Obs	Highest	Obs
2.219203(	10)	6.656727(	47)
2.388763(	14)	6.677083(	48)
2.484907(	1)	7.478735(	21)
2.501436(	13)	8.061487(	51)
2.653242(	27)	10.37349(	41)

```
Stem Leaf                 #
  10 4                    1
   9
   9
   8
   8 1                    1
   7 5                    1
   7
   6 77                   2
   6 0                    1
   5 9                    1
   5 2                    1
   4 789                  3
   4 1133                 4
   3 556677789            9
   3 00011111133333444   17
   2 557777999            9
   2 24                   2
     ----+----+----+----+
```

Boxplot



Normal Probability Plot



Surface Soils
Univariate Output

STD_NAME=Chrysene

Univariate Procedure

Variable=RESULT

Moments

N	42	Sum Wgts	42
Mean	10.32614	Sum	433.698
Std Dev	58.52226	Variance	3424.855
Skewness	6.450409	Kurtosis	41.72546
USS	144897.5	CSS	140419
CV	566.7388	Std Mean	9.030181
T:Mean=0	1.143515	Pr>|T|	0.2595
Num ^= 0	42	Num > 0	42
M(Sign)	21	Pr>=|M|	0.0001
Sgn Rank	451.5	Pr>=|S|	0.0001
W:Normal	0.180388	Pr<W	0.0001

Quantiles(Def=5)

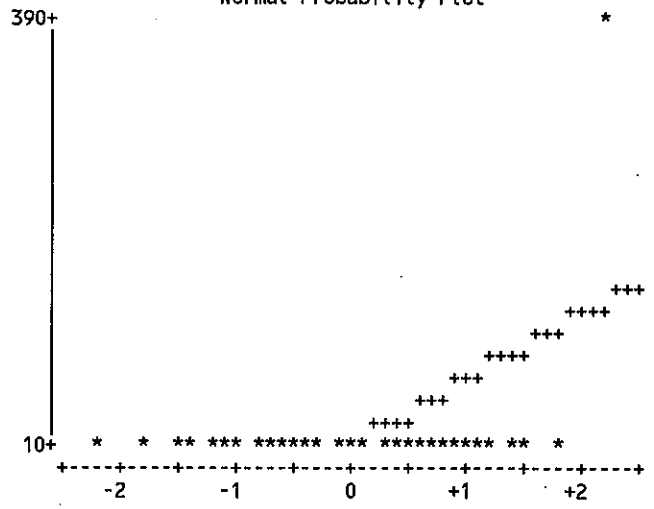
100% Max	380	99%	380
75% Q3	0.88	95%	8.9
50% Med	0.265	90%	2.7
25% Q1	0.16	10%	0.062
0% Min	0.042	5%	0.051
		1%	0.042
Range	379.958		
Q3-Q1	0.72		
Mode	0.18		

Extremes

Lowest	Obs	Highest	Obs
0.042(	10)	2.7(	38)
0.043(	40)	8.5(	32)
0.051(	9)	8.9(	20)
0.058(	11)	18(	28)
0.062(	7)	380(	41)

```
Stem Leaf                          #          Boxplot
  38 0                             1             *
  36
  34
  32
  30
  28
  26
  24
  22
  20
  18
  16
  14
  12
  10
   8
   6
   4
   2
   0 00000000000000000000000000000111111223898   41          +--0--+
     ----+----+----+----+----+----+----+----+-
Multiply Stem.Leaf by 10**+1
```

Normal Probability Plot



Surface Soils
Univariate Output

STD_NAME=Chrysene

Univariate Procedure

Variable=LNRESULT

Moments

N	42	Sum Wgts	42
Mean	-0.84935	Sum	-35.6725
Std Dev	1.759796	Variance	3.096882
Skewness	1.74046	Kurtosis	4.53389
USS	157.2705	CSS	126.9721
CV	-207.194	Std Mean	0.271542
T:Mean=0	-3.12786	Pr>|T|	0.0032
Num ^= 0	41	Num > 0	7
M(Sign)	-13.5	Pr>=|M|	0.0001
Sgn Rank	-258.5	Pr>=|S|	0.0004
W:Normal	0.865722	Pr<W	0.0001

Quantiles(Def=5)

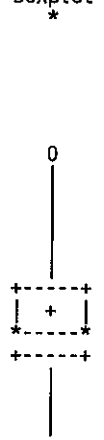
100% Max	5.940171	99%	5.940171
75% Q3	-0.12783	95%	2.186051
50% Med	-1.3282	90%	0.993252
25% Q1	-1.83258	10%	-2.78062
0% Min	-3.17009	5%	-2.97593
		1%	-3.17009
Range	9.110257		
Q3-Q1	1.704748		
Mode	-1.7148		

Extremes

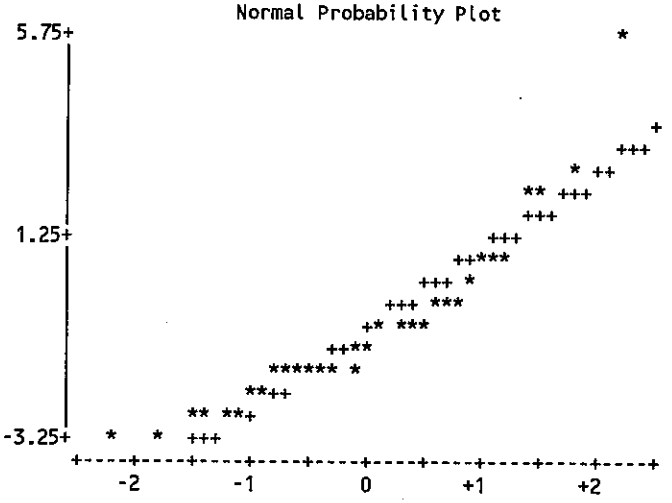
Lowest	Obs	Highest	Obs
-3.17009(	10)	0.993252(	38)
-3.14656(	40)	2.140066(	32)
-2.97593(	9)	2.186051(	20)
-2.84731(	11)	2.890372(	28)
-2.78062(	7)	5.940171(	41)

```
Stem Leaf                 #
   5 9                    1
   5
   4
   4
   3
   3
   2 9                    1
   2 12                   2
   1
   1 0                    1
   0 68                   2
   0 0                    1
  -0 2110                 4
  -0 99998887             8
  -1 433                  3
  -1 98877766665          11
  -2 00                   2
  -2 886                  3
  -3 210                  3
     ----+----+----+----+
```

Boxplot



Normal Probability Plot



Surface Soils
Univariate Output

---------- STD_NAME=Cobalt ----------

Univariate Procedure

Variable=RESULT

Moments

N	7	Sum Wgts	7
Mean	7.414286	Sum	51.9
Std Dev	2.033411	Variance	4.134762
Skewness	0.803093	Kurtosis	-0.8399
USS	409.61	CSS	24.80857
CV	27.42559	Std Mean	0.768557
T:Mean=0	9.647018	Pr>|T|	0.0001
Num ^= 0	7	Num > 0	7
M(Sign)	3.5	Pr>=|M|	0.0156
Sgn Rank	14	Pr>=|S|	0.0156
W:Normal	0.867058	Pr<W	0.1806

Quantiles(Def=5)

100% Max	10.8	99%	10.8
75% Q3	9.1	95%	10.8
50% Med	6.2	90%	10.8
25% Q1	6	10%	5.4
0% Min	5.4	5%	5.4
		1%	5.4
Range	5.4		
Q3-Q1	3.1		
Mode	6		

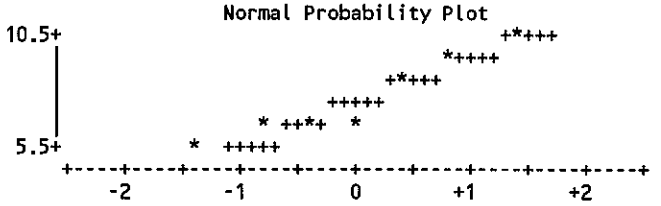
Extremes

Lowest	Obs	Highest	Obs
5.4(	1)	6(	7)
6(	7)	6.2(	3)
6(	4)	8.4(	6)
6.2(	3)	9.1(	2)
8.4(	6)	10.8(	5)

```
Stem Leaf                     #          Boxplot
  10 8                        1             |
   9 1                        1          +-----+
   8 4                        1          |     |
   7                                     |  +  |
   6 002                      3          *-----*
   5 4                        1             |
     ----+----+----+----+
```

Normal Probability Plot

```
10.5+                                                  +*+++
    |                                              *++++
    |                                        +*+++
    |                                  +++++
    |                            * ++*+  *
5.5+                      *  +++++
     +----+----+----+----+----+----+----+----+----+----+
         -2        -1         0        +1        +2
```



STD_NAME=Cobalt

Univariate Procedure

Variable=LNRESULT

Moments

N	7	Sum Wgts	7
Mean	1.972931	Sum	13.81052
Std Dev	0.26287	Variance	0.069101
Skewness	0.582204	Kurtosis	-1.45499
USS	27.66181	CSS	0.414605
CV	13.32384	Std Mean	0.099356
T:Mean=0	19.85727	Pr>|T|	0.0001
Num ^= 0	7	Num > 0	7
M(Sign)	3.5	Pr>=|M|	0.0156
Sgn Rank	14	Pr>=|S|	0.0156
W:Normal	0.882317	Pr<W	0.2459

Quantiles(Def=5)

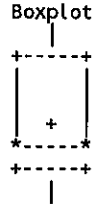
100% Max	2.379546	99%	2.379546
75% Q3	2.208274	95%	2.379546
50% Med	1.824549	90%	2.379546
25% Q1	1.791759	10%	1.686399
0% Min	1.686399	5%	1.686399
		1%	1.686399
Range	0.693147		
Q3-Q1	0.416515		
Mode	1.791759		

Extremes

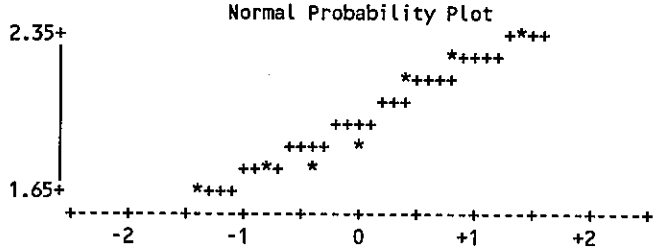
Lowest	Obs	Highest	Obs
1.686399(	1)	1.791759(	7)
1.791759(	7)	1.824549(	3)
1.791759(	4)	2.128232(	6)
1.824549(	3)	2.208274(	2)
2.128232(	6)	2.379546(	5)

```
Stem Leaf                     #
  23 8                        1
  22 1                        1
  21 3                        1
  20                          
  19                          
  18 2                        1
  17 99                       2
  16 9                        1
     ----+----+----+----+
Multiply Stem.Leaf by 10**-1
```

Boxplot



Normal Probability Plot



Surface Soils
Univariate Output

STD_NAME=Copper

Univariate Procedure

Variable=RESULT

Moments

N	52	Sum Wgts	52
Mean	489.4692	Sum	25452.4
Std Dev	1356.081	Variance	1838955
Skewness	2.934242	Kurtosis	7.361876
USS	1.0624E8	CSS	93786712
CV	277.0513	Std Mean	188.0546
T:Mean=0	2.602804	Pr>|T|	0.0121
Num ^= 0	52	Num > 0	52
M(Sign)	26	Pr>=|M|	0.0001
Sgn Rank	689	Pr>=|S|	0.0001
W:Normal	0.392582	Pr<W	0.0001

Quantiles(Def=5)

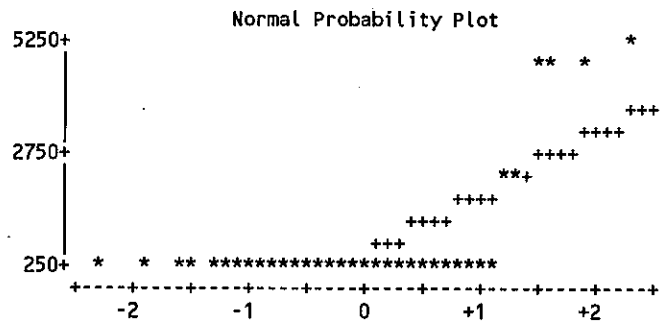
100% Max	5410	99%	5410
75% Q3	42.25	95%	4790
50% Med	29.1	90%	2010
25% Q1	19.85	10%	12.6
0% Min	6.9	5%	8.5
		1%	6.9
Range	5403.1		
Q3-Q1	22.4		
Mode	19.9		

Extremes

Lowest	Obs	Highest	Obs
6.9(	13)	2130(	49)
8(	1)	4520(	48)
8.5(	12)	4790(	41)
11.8(	27)	4990(	51)
12.5(	14)	5410(	47)

```
Stem Leaf                                  #          Boxplot
   5 04                                    2             *
   4 58                                    2             *
   4
   3
   3
   2
   2 01                                    2             *
   1
   1
   0
   0 00000000000000000000000000000000000000000111113   46          +--0--+
     ----+----+----+----+----+----+----+----+----+-
Multiply Stem.Leaf by 10**+3
```

Normal Probability Plot



STD_NAME=Copper

Univariate Procedure

Variable=LNRESULT

Moments

N	52	Sum Wgts	52
Mean	3.85195	Sum	200.3014
Std Dev	1.71364	Variance	2.936561
Skewness	1.935506	Kurtosis	2.809127
USS	921.3158	CSS	149.7646
CV	44.48759	Std Mean	0.237639
T:Mean=0	16.20925	Pr>|T|	0.0001
Num ^= 0	52	Num > 0	52
M(Sign)	26	Pr>=|M|	0.0001
Sgn Rank	689	Pr>=|S|	0.0001
W:Normal	0.703629	Pr<W	0.0001

Quantiles(Def=5)

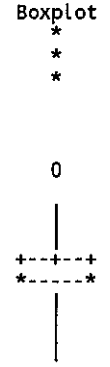
100% Max	8.596004	99%	8.596004
75% Q3	3.743447	95%	8.474286
50% Med	3.37026	90%	7.60589
25% Q1	2.988201	10%	2.533697
0% Min	1.931521	5%	2.140066
		1%	1.931521
Range	6.664483		
Q3-Q1	0.755246		
Mode	2.99072		

Extremes

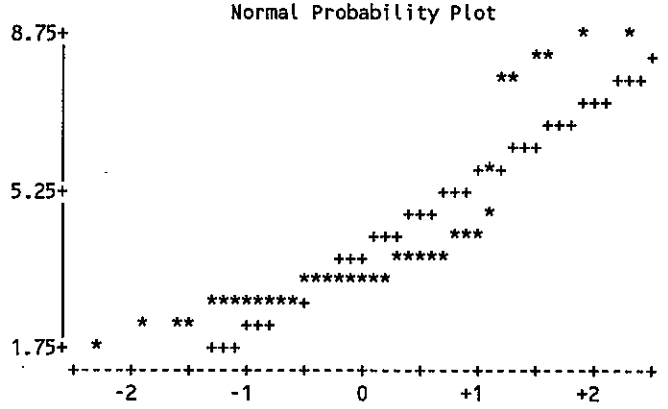
Lowest	Obs	Highest	Obs
1.931521(	13)	7.663877(	49)
2.079442(	1)	8.416267(	48)
2.140066(	12)	8.474286(	41)
2.4681(	27)	8.515191(	51)
2.525729(	14)	8.596004(	47)

```
Stem Leaf                    #
   8 556                     3
   8 4                       1
   7 67                      2
   7
   6
   6
   5 6                       1
   5
   4 6                       1
   4 1123                    4
   3 55666666778            11
   3 00000111123333444      17
   2 555678999               9
   2 11                      2
   1 9                       1
     ----+----+----+----+
```

Boxplot



Normal Probability Plot



Surface Soils
Univariate Output

STD_NAME=Dibenzo(a,h)anthracene

Univariate Procedure

Variable=RESULT

Moments

N	37	Sum Wgts	37
Mean	1.809054	Sum	66.935
Std Dev	6.381492	Variance	40.72344
Skewness	5.802271	Kurtosis	34.59848
USS	1587.133	CSS	1466.044
CV	352.753	Std Mean	1.049111
T:Mean=0	1.724369	Pr>|T|	0.0932
Num ^= 0	37	Num > 0	37
M(Sign)	18.5	Pr>=|M|	0.0001
Sgn Rank	351.5	Pr>=|S|	0.0001
W:Normal	0.269885	Pr<W	0.0001

Quantiles(Def=5)

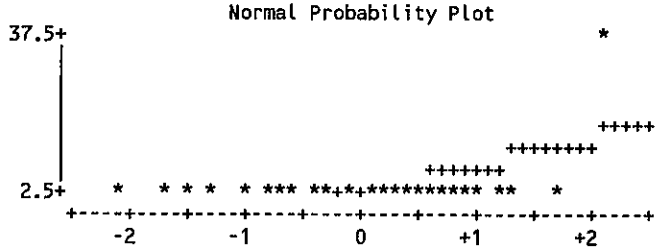
100% Max	39	99%	39
75% Q3	0.41	95%	3.9
50% Med	0.205	90%	3.6
25% Q1	0.185	10%	0.18
0% Min	0.14	5%	0.17
		1%	0.14
Range	38.86		
Q3-Q1	0.225		
Mode	0.18		

Extremes

Lowest	Obs	Highest	Obs
0.14(	19)	2.7(	33)
0.17(	13)	3.6(	27)
0.175(	25)	3.6(	28)
0.18(	37)	3.9(	23)
0.18(	26)	39(	36)

```
Stem Leaf                                #  Boxplot
   3 9                                   1     *
   3
   2
   2
   1
   1
   0
   0 00000000000000000000000000022223444 36    +--*--+
     ----+----+----+----+----+----+----+-
Multiply Stem.Leaf by 10**+1
```

Normal Probability Plot



STD_NAME=Dibenzo(a,h)anthracene

Univariate Procedure

Variable=LNRESULT

Moments

N	37	Sum Wgts	37
Mean	-0.87465	Sum	-32.3622
Std Dev	1.325387	Variance	1.75665
Skewness	1.700422	Kurtosis	2.465213
USS	91.54505	CSS	63.2394
CV	-151.533	Std Mean	0.217892
T:Mean=0	-4.01415	Pr>|T|	0.0003
Num ^= 0	37	Num > 0	9
M(Sign)	-9.5	Pr>=|M|	0.0026
Sgn Rank	-264.5	Pr>=|S|	0.0001
W:Normal	0.69932	Pr<W	0.0001

Quantiles(Def=5)

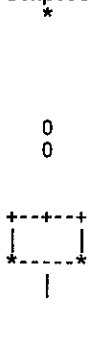
100% Max	3.663562	99%	3.663562
75% Q3	-0.8916	95%	1.360977
50% Med	-1.58475	90%	1.280934
25% Q1	-1.6874	10%	-1.7148
0% Min	-1.96611	5%	-1.77196
		1%	-1.96611
Range	5.629675		
Q3-Q1	0.795801		
Mode	-1.7148		

Extremes

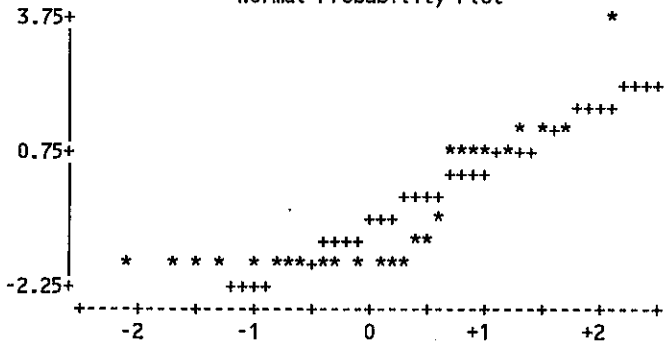
Lowest	Obs	Highest	Obs
-1.96611(	19)	0.993252(	33)
-1.77196(	13)	1.280934(	27)
-1.74297(	25)	1.280934(	28)
-1.7148(	37)	1.360977(	23)
-1.7148(	26)	3.663562(	36)

```
Stem Leaf                    #
   3 7                       1
   3
   2
   2
   1
   1 0334                    4
   0 6778                    4
   0
   -0
   -0 99                     2
   -1 20                     2
   -1 87777777777666666666555  23
   -2 0                      1
      ----+----+----+----+---
```

Boxplot



Normal Probability Plot



Surface Soils
Univariate Output

STD_NAME=Fluoranthene

Univariate Procedure

Variable=RESULT

Moments

N	44	Sum Wgts	44
Mean	28.99218	Sum	1275.656
Std Dev	180.6982	Variance	32651.85
Skewness	6.626768	Kurtosis	43.94085
USS	1441014	CSS	1404030
CV	623.2654	Std Mean	27.24129
T:Mean=0	1.064274	Pr>|T|	0.2931
Num ^= 0	44	Num > 0	44
M(Sign)	22	Pr>=|M|	0.0001
Sgn Rank	495	Pr>=|S|	0.0001
W:Normal	0.163897	Pr<W	0.0001

Quantiles(Def=5)

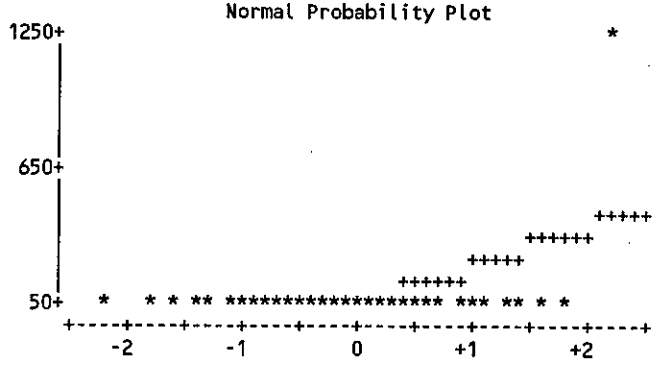
100% Max	1200	99%	1200
75% Q3	0.99	95%	19
50% Med	0.29	90%	4.4
25% Q1	0.11	10%	0.048
0% Min	0.04	5%	0.046
		1%	0.04
Range	1199.96		
Q3-Q1	0.88		
Mode	0.11		

Extremes

Lowest	Obs	Highest	Obs
0.04(	7)	4.4(	28)
0.043(	39)	13(	34)
0.046(	23)	19(	21)
0.047(	3)	21(	30)
0.048(	11)	1200(	43)

```
Stem Leaf                          #          Boxplot
  12 0                             1             *
  11
  10
   9
   8
   7
   6
   5
   4
   3
   2
   1
   0 0000000000000000000000000000000000000000122   43          +--0--+
     ----+----+----+----+----+----+----+----+---
Multiply Stem.Leaf by 10**+2
```

Normal Probability Plot



```
1250+                                                  *
    |
    |
    |
    |
 650+
    |
    |                                                 +++++
    |                                            ++++++
    |                                        +++++
    |                                    ++++++
   50+   *   * * ** ******************** *** ** * *
     +----+----+----+----+----+----+----+----+----+----+
         -2        -1         0        +1        +2
```

Surface Soils
Univariate Output

STD_NAME=Fluoranthene

Univariate Procedure

Variable=LNRESULT

Moments

N	44	Sum Wgts	44
Mean	-0.87412	Sum	-38.4615
Std Dev	2.008403	Variance	4.033683
Skewness	1.80674	Kurtosis	4.764654
USS	207.0685	CSS	173.4484
CV	-229.762	Std Mean	0.302778
T:Mean=0	-2.88701	Pr>|T|	0.0061
Num ^= 0	44	Num > 0	11
M(Sign)	-11	Pr>=|M|	0.0013
Sgn Rank	-289	Pr>=|S|	0.0004
W:Normal	0.854644	Pr<W	0.0001

Quantiles(Def=5)

100% Max	7.090077	99%	7.090077
75% Q3	-0.01626	95%	2.944439
50% Med	-1.23847	90%	1.481605
25% Q1	-2.20727	10%	-3.03655
0% Min	-3.21888	5%	-3.07911
		1%	-3.21888
Range	10.30895		
Q3-Q1	2.191013		
Mode	-2.20727		

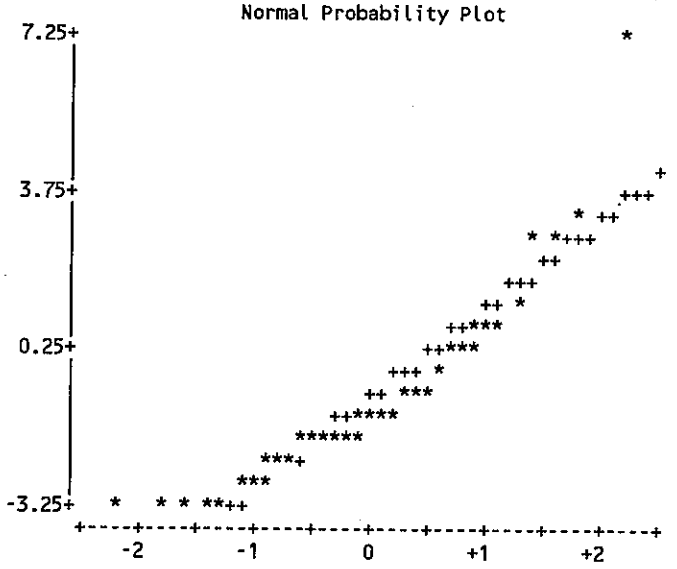
Extremes

Lowest	Obs	Highest	Obs
-3.21888(	7)	1.481605(	28)
-3.14656(	39)	2.564949(	34)
-3.07911(	23)	2.944439(	21)
-3.05761(	3)	3.044522(	30)
-3.03655(	11)	7.090077(	43)

```
Stem Leaf                 #
   7 1                    1
   6
   6
   5
   5
   4
   4
   3
   3 0                    1
   2 69                   2
   2
   1 5                    1
   1 0                    1
   0 568                  3
   0 11                   2
  -0 41                   2
  -0 998                  3
  -1 43211000             8
  -1 87776666             8
  -2 4322                 4
  -2 987                  3
  -3 21110                5
     ----+----+----+----+
```

Boxplot

Normal Probability Plot



Surface Soils
Univariate Output

---------- STD_NAME=Indeno(1,2,3-cd)pyrene ----------

Univariate Procedure

Variable=RESULT

Moments

N	39	Sum Wgts	39
Mean	5.802564	Sum	226.3
Std Dev	30.33985	Variance	920.5066
Skewness	6.201908	Kurtosis	38.62027
USS	36292.37	CSS	34979.25
CV	522.8697	Std Mean	4.858264
T:Mean=0	1.19437	Pr>|T|	0.2397
Num ^= 0	39	Num > 0	39
M(Sign)	19.5	Pr>=|M|	0.0001
Sgn Rank	390	Pr>=|S|	0.0001
W:Normal	0.193038	Pr<W	0.0001

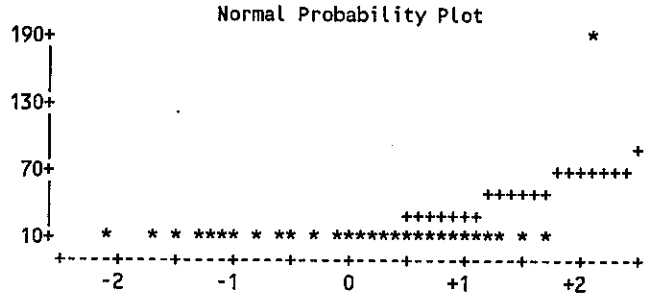
Quantiles(Def=5)

100% Max	190	99%	190
75% Q3	0.65	95%	12
50% Med	0.215	90%	3.5
25% Q1	0.18	10%	0.12
0% Min	0.067	5%	0.098
		1%	0.067
Range	189.933		
Q3-Q1	0.47		
Mode	0.18		

Extremes

Lowest	Obs	Highest	Obs
0.067(	11)	2.7(	35)
0.098(	2)	3.5(	29)
0.1(	27)	3.6(	30)
0.12(	39)	12(	25)
0.14(	12)	190(	38)

```
Stem Leaf                                  #          Boxplot
  18 0                                     1             *
  16
  14
  12
  10
   8
   6
   4
   2
   0 00000000000000000000000000001112223442   38          +--0--+
     ----+----+----+----+----+----+----+---
Multiply Stem.Leaf by 10**+1
```



Normal Probability Plot

```
190+                                                    *
   |
130+
   |
   |                                                        +
 70+                                                  +++++++
   |                                            ++++++
   |                                      +++++++
 10+    *   * * **** * ** * *************** * *
    +----+----+----+----+----+----+----+----+----+----+
        -2        -1         0        +1        +2
```

STD_NAME=Indeno(1,2,3-cd)pyrene

Univariate Procedure

Variable=LNRESULT

Moments

N	39	Sum Wgts	39
Mean	-0.82829	Sum	-32.3031
Std Dev	1.535185	Variance	2.356793
Skewness	2.079409	Kurtosis	5.534637
USS	116.3144	CSS	89.55815
CV	-185.345	Std Mean	0.245826
T:Mean=0	-3.36939	Pr>|T|	0.0017
Num ^= 0	39	Num > 0	8
M(Sign)	-11.5	Pr>=|M|	0.0003
Sgn Rank	-256	Pr>=|S|	0.0001
W:Normal	0.792491	Pr<W	0.0001

Quantiles(Def=5)

100% Max	5.247024	99%	5.247024
75% Q3	-0.43078	95%	2.484907
50% Med	-1.53712	90%	1.252763
25% Q1	-1.7148	10%	-2.12026
0% Min	-2.70306	5%	-2.32279
		1%	-2.70306
Range	7.950087		
Q3-Q1	1.284016		
Mode	-1.7148		

Extremes

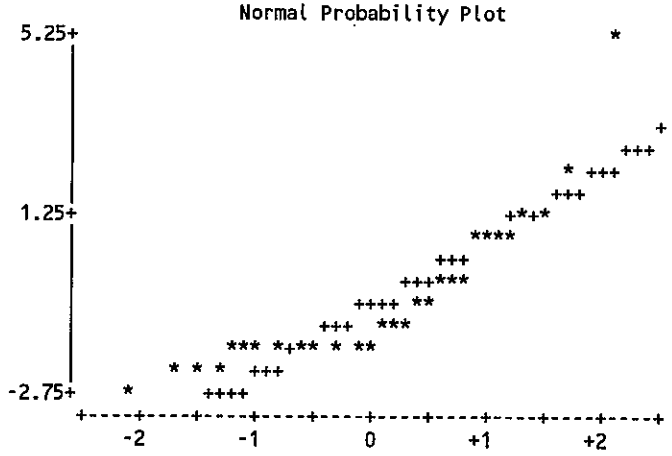
Lowest	Obs	Highest	Obs
-2.70306(	11)	0.993252(	35)
-2.32279(	2)	1.252763(	29)
-2.30259(	27)	1.280934(	30)
-2.12026(	39)	2.484907(	25)
-1.96611(	12)	5.247024(	38)

Stem Leaf #

```
  5 2                1
  4
  4
  3
  3
  2 5                1
  2
  1
  1 033              3
  0 678              3
  0
 -0 41               2
 -0 995              3
 -1 222100           6
 -1 877777766666665 15
 -2 3310             4
 -2 7                1
    ----+----+----+----+
```

Boxplot

Normal Probability Plot



Surface Soils
Univariate Output

---------- STD_NAME=Lead ----------

Univariate Procedure

Variable=RESULT

Moments

N	47	Sum Wgts	47
Mean	51.39149	Sum	2415.4
Std Dev	107.4136	Variance	11537.69
Skewness	5.473155	Kurtosis	33.44827
USS	654864.6	CSS	530733.6
CV	209.0105	Std Mean	15.66789
T:Mean=0	3.280052	Pr>|T|	0.0020
Num ^= 0	47	Num > 0	47
M(Sign)	23.5	Pr>=|M|	0.0001
Sgn Rank	564	Pr>=|S|	0.0001
W:Normal	0.404772	Pr<W	0.0001

Quantiles(Def=5)

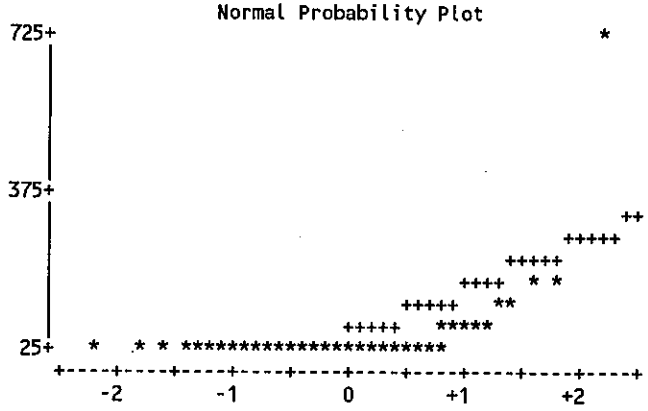
100% Max	717	99%	717
75% Q3	46.5	95%	174
50% Med	25.2	90%	115
25% Q1	12.3	10%	7.8
0% Min	3.7	5%	4.8
		1%	3.7
Range	713.3		
Q3-Q1	34.2		
Mode	33.2		

Extremes

Lowest	Obs	Highest	Obs
3.7(	9)	115(	11)
3.8(	5)	148(	14)
4.8(	8)	174(	47)
7(	35)	185(	46)
7.8(	22)	717(	36)

```
Stem Leaf                          #          Boxplot
   7 2                             1             *
   6
   6
   5
   5
   4
   4
   3
   3
   2
   2
   1 578                           3             0
   1 2                             1             0
   0 555555668                     9          +--+--+
   0 000111111111111122222223333333334   33   *-----*
     ----+----+----+----+----+----+---
Multiply Stem.Leaf by 10**+2
```

Normal Probability Plot



```
725+                                                  *
   |
   |
   |
   |
   |
375+
   |                                                     ++
   |                                                  +++++
   |                                              +++++
   |                                          ++++  * *
   |                                      +++++   **
   |                                  +++++   *****
25+   *   * * ***********************
   +----+----+----+----+----+----+----+----+----+----+
       -2        -1         0        +1        +2
```

STD_NAME=Lead

Univariate Procedure

Variable=LNRESULT

Moments

N	47	Sum Wgts	47
Mean	3.224298	Sum	151.542
Std Dev	1.067879	Variance	1.140366
Skewness	0.676622	Kurtosis	1.012965
USS	541.0735	CSS	52.45681
CV	33.11973	Std Mean	0.155766
T:Mean=0	20.69961	Pr>|T|	0.0001
Num ^= 0	47	Num > 0	47
M(Sign)	23.5	Pr>=|M|	0.0001
Sgn Rank	564	Pr>=|S|	0.0001
W:Normal	0.967813	Pr<W	0.3405

Quantiles(Def=5)

100% Max	6.575076	99%	6.575076
75% Q3	3.839452	95%	5.159055
50% Med	3.226844	90%	4.744932
25% Q1	2.509599	10%	2.054124
0% Min	1.308333	5%	1.568616
		1%	1.308333
Range	5.266743		
Q3-Q1	1.329853		
Mode	3.50255		

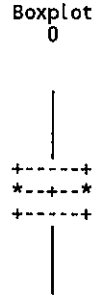
Extremes

Lowest	Obs	Highest	Obs
1.308333(	9)	4.744932(	11)
1.335001(	5)	4.997212(	14)
1.568616(	8)	5.159055(	47)
1.94591(	35)	5.220356(	46)
2.054124(	22)	6.575076(	36)

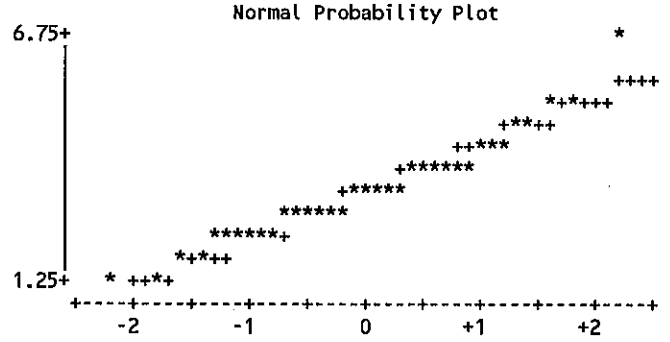
Stem Leaf #

```
6 6                1
6
5
5 022              3
4 7                1
4 114              3
3 55557888999     11
3 01223344         8
2 556667899        9
2 1111244          7
1 69               2
1 33               2
  ----+----+----+----+
```

Boxplot



Normal Probability Plot



Surface Soils
Univariate Output

STD_NAME=Nickel

Univariate Procedure

Variable=RESULT

Moments

N	52	Sum Wgts	52
Mean	386.5558	Sum	20100.9
Std Dev	1173.376	Variance	1376811
Skewness	4.161438	Kurtosis	18.10856
USS	77987492	CSS	70217373
CV	303.5464	Std Mean	162.718
T:Mean=0	2.375618	Pr>|T|	0.0213
Num ^= 0	52	Num > 0	52
M(Sign)	26	Pr>=|M|	0.0001
Sgn Rank	689	Pr>=|S|	0.0001
W:Normal	0.369743	Pr<W	0.0001

Quantiles(Def=5)

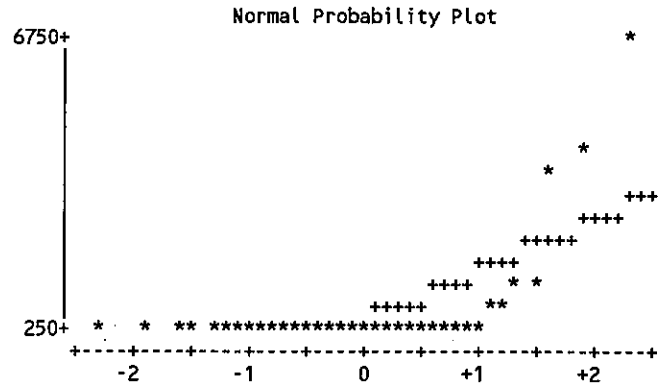
100% Max	6630	99%	6630
75% Q3	63.4	95%	3820
50% Med	31.3	90%	635
25% Q1	18.8	10%	13.1
0% Min	8.3	5%	9.9
		1%	8.3
Range	6621.7		
Q3-Q1	44.6		
Mode	13.1		

Extremes

Lowest	Obs	Highest	Obs
8.3(	1)	1040(	47)
9.8(	14)	1040(	48)
9.9(	13)	3820(	51)
10.3(	10)	4000(	5)
11.8(	27)	6630(	41)

```
Stem Leaf                          #          Boxplot
   6 6                             1             *
   6
   5
   5
   4
   4 0                             1             *
   3 8                             1             *
   3
   2
   2
   1
   1 00                            2             *
   0 566                           3             *
   0 00000000000000000000000000000000000001111114  44          +--*--+
     ----+----+----+----+----+----+----+----+----
Multiply Stem.Leaf by 10**+3
```

Normal Probability Plot



Surface Soils
Univariate Output

STD_NAME=Pyrene

Univariate Procedure

Variable=RESULT

Moments

N	43	Sum Wgts	43
Mean	25.6954	Sum	1104.902
Std Dev	152.2244	Variance	23172.28
Skewness	6.543167	Kurtosis	42.87058
USS	1001627	CSS	973235.8
CV	592.4191	Std Mean	23.21401
T:Mean=0	1.106892	Pr>|T|	0.2746
Num ^= 0	43	Num > 0	43
M(Sign)	21.5	Pr>=|M|	0.0001
Sgn Rank	473	Pr>=|S|	0.0001
W:Normal	0.172031	Pr<W	0.0001

Quantiles(Def=5)

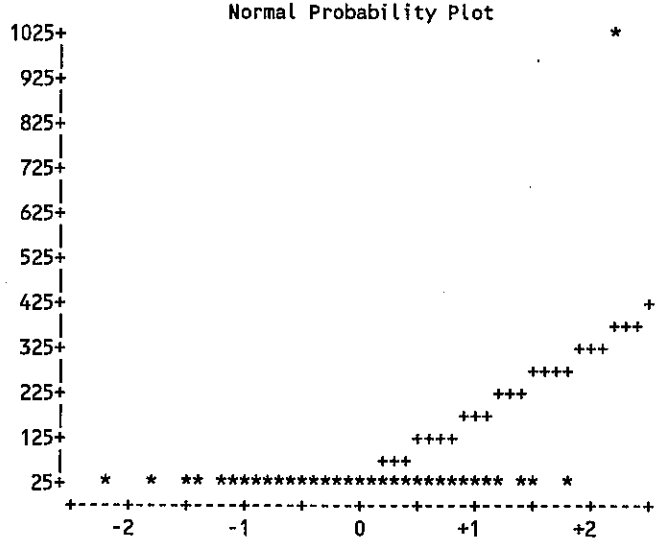
100% Max	1000	99%	1000
75% Q3	2.2	95%	21
50% Med	0.46	90%	9.7
25% Q1	0.215	10%	0.087
0% Min	0.041	5%	0.052
		1%	0.041
Range	999.959		
Q3-Q1	1.985		
Mode	0.18		

Extremes

Lowest	Obs	Highest	Obs
0.041(	22)	9.7(	27)
0.044(	3)	14(	33)
0.052(	41)	21(	20)
0.068(	10)	29(	29)
0.087(	9)	1000(	42)

```
Stem Leaf                                  #          Boxplot
  10 0                                     1             *
   9
   9
   8
   8
   7
   7
   6
   6
   5
   5
   4
   4
   3
   3
   2
   2
   1
   1
   0
   0 00000000000000000000000000000000000001123   42          +--*--+
     ----+----+----+----+----+----+----+----+--
Multiply Stem.Leaf by 10**+2
```

Normal Probability Plot



STD_NAME=Pyrene

Univariate Procedure

Variable=LNRESULT

Moments

N	43	Sum Wgts	43
Mean	-0.30888	Sum	-13.2817
Std Dev	1.940171	Variance	3.764263
Skewness	1.380214	Kurtosis	3.42655
USS	162.2015	CSS	158.0991
CV	-628.138	Std Mean	0.295873
T:Mean=0	-1.04395	Pr>|T|	0.3025
Num ^= 0	42	Num > 0	15
M(Sign)	-6	Pr>=|M|	0.0884
Sgn Rank	-143.5	Pr>=|S|	0.0723
W:Normal	0.914061	Pr<W	0.0034

Quantiles(Def=5)

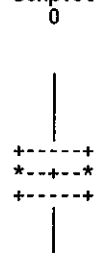
100% Max	6.907755	99%	6.907755
75% Q3	0.788457	95%	3.044522
50% Med	-0.77653	90%	2.272126
25% Q1	-1.53712	10%	-2.44185
0% Min	-3.19418	5%	-2.95651
		1%	-3.19418
Range	10.10194		
Q3-Q1	2.325575		
Mode	-1.7148		

Extremes

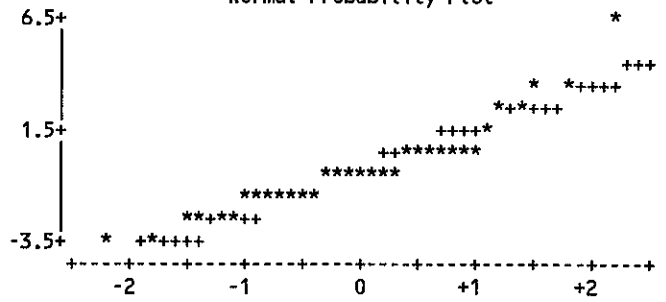
Lowest	Obs	Highest	Obs
-3.19418(	22)	2.272126(	27)
-3.12357(	3)	2.639057(	33)
-2.95651(	41)	3.044522(	20)
-2.68825(	10)	3.367296(	29)
-2.44185(	9)	6.907755(	42)

```
Stem Leaf                 #
   6 9                    1
   5
   4
   3 04                   2
   2 36                   2
   1 001                  3
   0 02266889             8
  -0 9999866211           10
  -1 8775532110           10
  -2 7420                 4
  -3 210                  3
     ----+----+----+----+
```

Boxplot



Normal Probability Plot



STD_NAME=Total PCBs

Univariate Procedure

Variable=RESULT

Moments

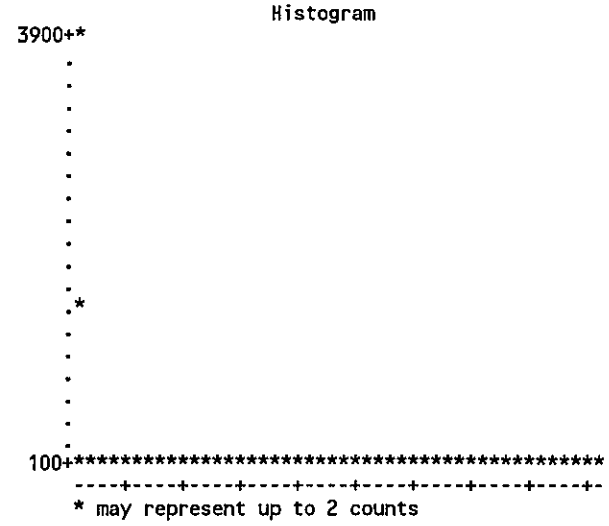
N	93	Sum Wgts	93
Mean	69.48106	Sum	6461.739
Std Dev	425.7833	Variance	181291.4
Skewness	8.181416	Kurtosis	70.33513
USS	17127778	CSS	16678810
CV	612.8048	Std Mean	44.15167
T:Mean=0	1.573691	Pr>|T|	0.1190
Num ^= 0	84	Num > 0	84
M(Sign)	42	Pr>=|M|	0.0001
Sgn Rank	1785	Pr>=|S|	0.0001
W:Normal	0.173124	Pr<W	0.0001

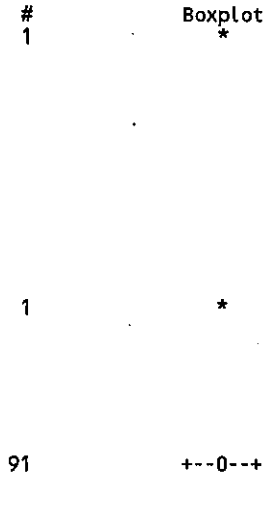
Quantiles(Def=5)

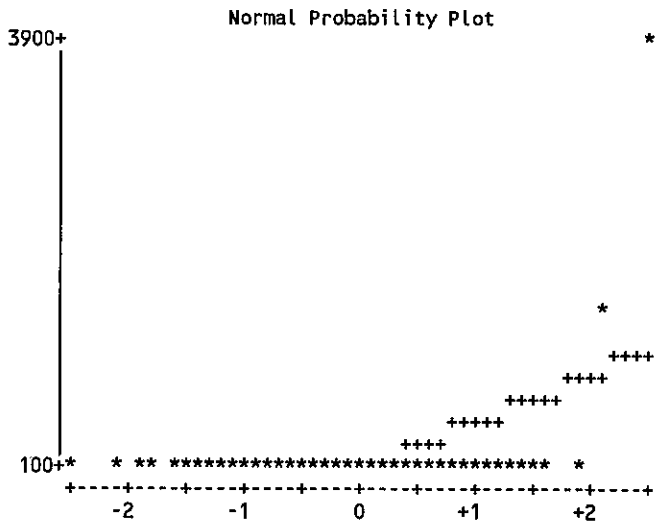
100% Max	3848	99%	3848
75% Q3	11	95%	100
50% Med	2.7	90%	58
25% Q1	0.5	10%	0.027
0% Min	0	5%	0
		1%	0
Range	3848		
Q3-Q1	10.5		
Mode	0		

Extremes

Lowest	Obs	Highest	Obs
0(	93)	100(	15)
0(	92)	100(	68)
0(	90)	130(	14)
0(	33)	1500(	37)
0(	32)	3848(	43)







Surface Soils
Univariate Output

STD_NAME=Total PCBs

Univariate Procedure

Variable=LNRESULT

Moments

N	84	Sum Wgts	84
Mean	1.311935	Sum	110.2025
Std Dev	2.088404	Variance	4.361432
Skewness	0.512046	Kurtosis	1.155685
USS	506.5774	CSS	361.9989
CV	159.1851	Std Mean	0.227864
T:Mean=0	5.757545	Pr>|T|	0.0001
Num ^= 0	81	Num > 0	62
M(Sign)	21.5	Pr>=|M|	0.0001
Sgn Rank	1053.5	Pr>=|S|	0.0001
W:Normal	0.968509	Pr<W	0.1537

Quantiles(Def=5)

100% Max	8.255309	99%	8.255309
75% Q3	2.493171	95%	4.60517
50% Med	1.045932	90%	4.110874
25% Q1	0	10%	-1.38629
0% Min	-3.61192	5%	-1.38629
		1%	-3.61192
Range	11.86723		
Q3-Q1	2.493171		
Mode	-1.38629		

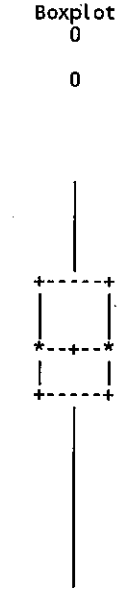
Extremes

Lowest	Obs	Highest	Obs
-3.61192(	89)	4.60517(	15)
-3.44202(	88)	4.60517(	68)
-1.38629(	76)	4.867534(	14)
-1.38629(	75)	7.31322(	37)
-1.38629(	74)	8.255309(	43)

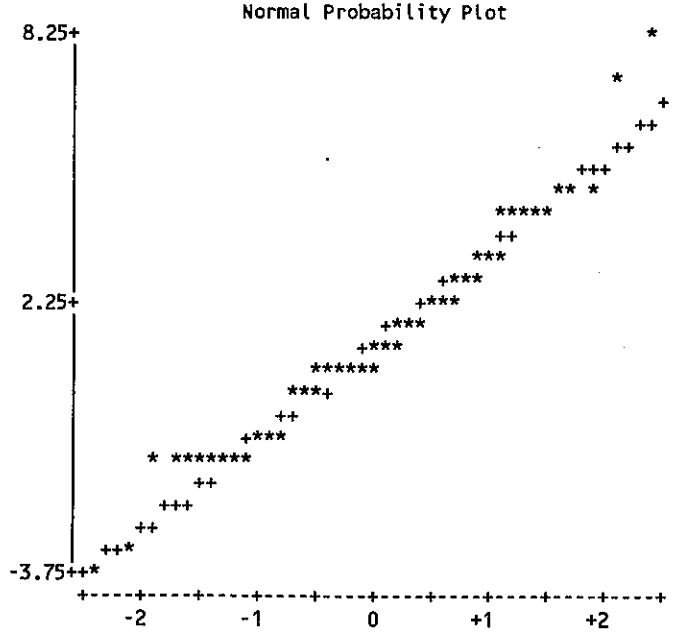
Missing Value	.
Count	9
% Count/Nobs	9.68

```
Stem Leaf                #
   8 3                   1
   7
   7 3                   1
   6
   6
   5
   5
   4 669                 3
   4 011344              6
   3
   3 00123               5
   2 556678              6
   2 13344               5
   1 66677889            8
   1 00000000001133444  17
   0 6667779             7
   0 000133              6
   -0
   -0 777777             6
   -1 44444444200       11
   -1
   -2
   -2
   -3 4                  1
   -3 6                  1
      ----+----+----+----+
```

Boxplot



Normal Probability Plot



STD_NAME=Trichloroethene

Univariate Procedure

Variable=RESULT

Moments

N	49	Sum Wgts	49
Mean	21.56915	Sum	1056.889
Std Dev	110.926	Variance	12304.58
Skewness	5.925381	Kurtosis	36.7759
USS	613416.2	CSS	590620
CV	514.2809	Std Mean	15.84658
T:Mean=0	1.361124	Pr>|T|	0.1798
Num ^= 0	49	Num > 0	49
M(Sign)	24.5	Pr>=|M|	0.0001
Sgn Rank	612.5	Pr>=|S|	0.0001
W:Normal	0.217366	Pr<W	0.0001

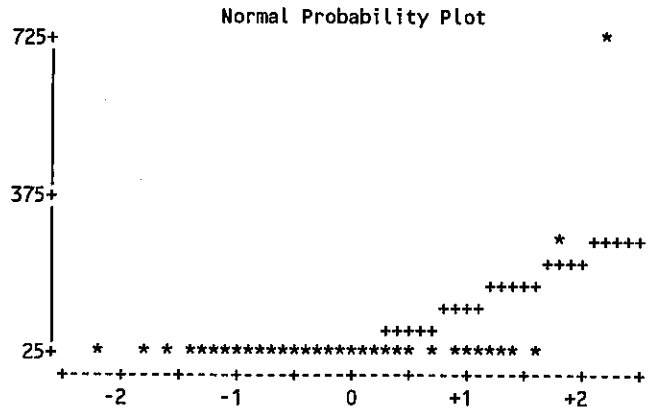
Quantiles(Def=5)

100% Max	730	99%	730
75% Q3	0.0055	95%	46
50% Med	0.0005	90%	0.165
25% Q1	0.0005	10%	0.0005
0% Min	0.0005	5%	0.0005
		1%	0.0005
Range	729.9995		
Q3-Q1	0.005		
Mode	0.0005		

Extremes

Lowest	Obs	Highest	Obs
0.0005(	47)	0.165(	46)
0.0005(	43)	0.405(	48)
0.0005(	42)	46(	5)
0.0005(	41)	280(	1)
0.0005(	40)	730(	2)

```
Stem Leaf                 #          Boxplot
   7 3                    1             *
   6                      0
   6                      0
   5                      0
   5                      0
   4                      0
   4                      0
   3                      0
   3                      0
   2 8                    1             *
   2                      0
   1                      0
   1                      0
   0 5                    1             *
   0 00000000000000000000000000000000000000000000000000    46          +--0--+
     ----+----+----+----+----+----+----+----+----+----+-
Multiply Stem.Leaf by 10**+2
```



Surface Soils
Univariate Output

---------- STD_NAME=Trichloroethene ----------

Univariate Procedure

Variable=LNRESULT

Moments

N	49	Sum Wgts	49
Mean	-5.76897	Sum	-282.679
Std Dev	3.391172	Variance	11.50005
Skewness	2.421887	Kurtosis	5.770919
USS	2182.769	CSS	552.0023
CV	-58.783	Std Mean	0.484453
T:Mean=0	-11.9082	Pr>|T|	0.0001
Num ^= 0	49	Num > 0	3
M(Sign)	-21.5	Pr>=|M|	0.0001
Sgn Rank	-573.5	Pr>=|S|	0.0001
W:Normal	0.608673	Pr<W	0.0001

Quantiles(Def=5)

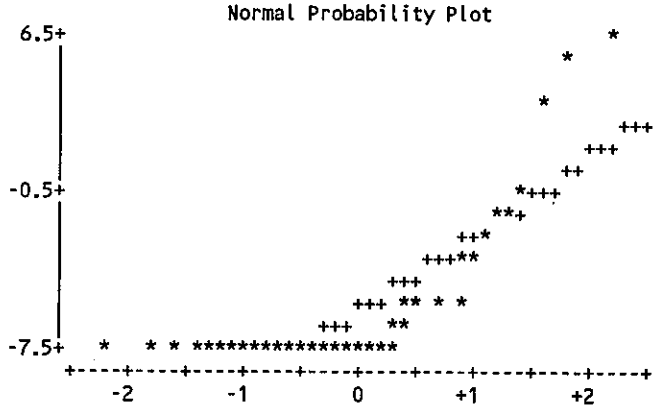
100% Max	6.593045	99%	6.593045
75% Q3	-5.20301	95%	3.828641
50% Med	-7.6009	90%	-1.80181
25% Q1	-7.6009	10%	-7.6009
0% Min	-7.6009	5%	-7.6009
		1%	-7.6009
Range	14.19395		
Q3-Q1	2.397895		
Mode	-7.6009		

Extremes

Lowest	Obs	Highest	Obs
-7.6009(	47)	-1.80181(	46)
-7.6009(	43)	-0.90387(	48)
-7.6009(	42)	3.828641(	5)
-7.6009(	41)	5.63479(	1)
-7.6009(	40)	6.593045(	2)

```
Stem Leaf                          #          Boxplot
   6 6                             1             *
   5 6                             1             *
   4
   3 8                             1             *
   2
   1
   0
  -0 9                             1             0
  -1 98                            2             |
  -2 9                             1             |
  -3 95                            2             |
  -4                                             |
  -5 55222111                      8          +--+--+
  -6 99                            2          |     |
  -7 66666666666666666666666666666 30         *-----*
     ----+----+----+----+----+----+
```

Normal Probability Plot



Surface Soils
Univariate Output

STD_NAME=Zinc

Univariate Procedure

Variable=RESULT

Moments

N	47	Sum Wgts	47
Mean	824.3191	Sum	38743
Std Dev	1912.799	Variance	3658799
Skewness	3.104778	Kurtosis	9.342207
USS	2.0024E8	CSS	1.683E8
CV	232.0459	Std Mean	279.0104
T:Mean=0	2.954439	Pr>|T|	0.0049
Num ^= 0	47	Num > 0	47
M(Sign)	23.5	Pr>=|M|	0.0001
Sgn Rank	564	Pr>=|S|	0.0001
W:Normal	0.471294	Pr<W	0.0001

Quantiles(Def=5)

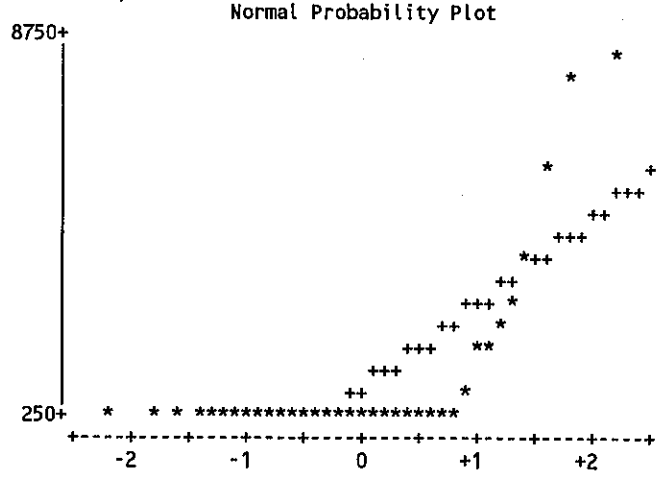
100% Max	8470	99%	8470
75% Q3	307	95%	5880
50% Med	95.7	90%	2520
25% Q1	52.7	10%	39.6
0% Min	25	5%	29.2
		1%	25
Range	8445		
Q3-Q1	254.3		
Mode	25		

Extremes

Lowest	Obs	Highest	Obs
25(	22)	2520(	46)
26.6(	9)	3510(	47)
29.2(	5)	5880(	36)
35.7(	21)	7990(	43)
39.6(	8)	8470(	42)

```
Stem Leaf                          #          Boxplot
   8 5                             1             *
   8 0                             1             *
   7
   7
   6
   6
   5 9                             1             *
   5
   4
   4
   3 5                             1             *
   3
   2 5                             1             *
   2 1                             1             *
   1 58                            2             *
   1
   0 9                             1             0
   0 00000000111111111111111111111112222344   38        +-----+
     ----+----+----+----+----+----+----+---
Multiply Stem.Leaf by 10**+3
```

Normal Probability Plot



STD_NAME=Zinc

Univariate Procedure

Variable=LNRESULT

Moments

N	47	Sum Wgts	47
Mean	5.104315	Sum	239.9028
Std Dev	1.586939	Variance	2.518375
Skewness	1.231697	Kurtosis	0.494853
USS	1340.385	CSS	115.8452
CV	31.09015	Std Mean	0.231479
T:Mean=0	22.05089	Pr>|T|	0.0001
Num ^= 0	47	Num > 0	47
M(Sign)	23.5	Pr>=|M|	0.0001
Sgn Rank	564	Pr>=|S|	0.0001
W:Normal	0.834932	Pr<W	0.0001

Quantiles(Def=5)

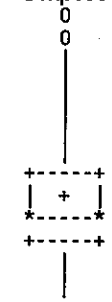
100% Max	9.044286	99%	9.044286
75% Q3	5.726848	95%	8.679312
50% Med	4.561218	90%	7.832014
25% Q1	3.964615	10%	3.678829
0% Min	3.218876	5%	3.374169
		1%	3.218876
Range	5.82541		
Q3-Q1	1.762232		
Mode	3.218876		

Extremes

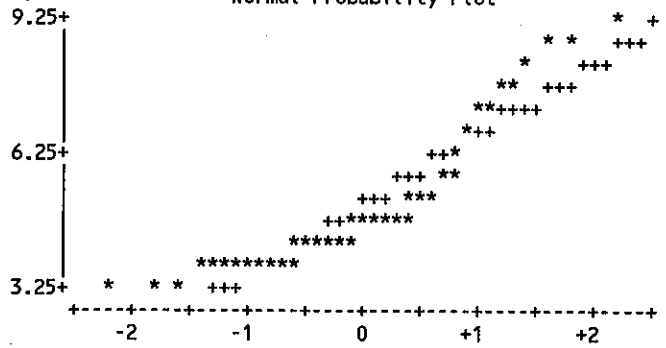
Lowest	Obs	Highest	Obs
3.218876(	22)	7.832014(	46)
3.280911(	9)	8.163371(	47)
3.374169(	5)	8.679312(	36)
3.575151(	21)	8.985946(	43)
3.678829(	8)	9.044286(	42)

Stem	Leaf	#
9	00	2
8	7	1
8	2	1
7	568	3
7	3	1
6	8	1
6	01	2
5	7	1
5	00113	5
4	566778899	9
4	00002223344	11
3	6778999	7
3	234	3

Boxplot



Normal Probability Plot



STD_NAME=cis-1,2-Dichloroethene

Univariate Procedure

Variable=RESULT

Moments

N	47	Sum Wgts	47
Mean	0.033383	Sum	1.569
Std Dev	0.10228	Variance	0.010461
Skewness	3.29207	Kurtosis	10.05755
USS	0.53359	CSS	0.481212
CV	306.3827	Std Mean	0.014919
T:Mean=0	2.237611	Pr>|T|	0.0301
Num ^= 0	47	Num > 0	47
M(Sign)	23.5	Pr>=|M|	0.0001
Sgn Rank	564	Pr>=|S|	0.0001
W:Normal	0.369943	Pr<W	0.0001

Quantiles(Def=5)

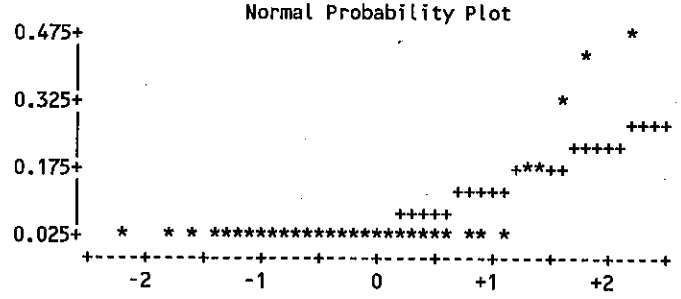
100% Max	0.45	99%	0.45
75% Q3	0.001	95%	0.34
50% Med	0.0005	90%	0.155
25% Q1	0.0005	10%	0.0005
0% Min	0.0005	5%	0.0005
		1%	0.0005
Range	0.4495		
Q3-Q1	0.0005		
Mode	0.0005		

Extremes

Lowest	Obs	Highest	Obs
0.0005(	47)	0.155(	42)
0.0005(	45)	0.165(	44)
0.0005(	41)	0.34(	3)
0.0005(	40)	0.405(	46)
0.0005(	39)	0.45(	43)

```
Stem Leaf                          #          Boxplot
   4 5                             1             *
   4 0                             1             *
   3
   3 4                             1             *
   2
   2
   1 66                            2             *
   1
   0
   0 00000000000000000000000000000000000000111111   42          +--*--+
     ----+----+----+----+----+----+----+----+--
Multiply Stem.Leaf by 10**-1
```

Normal Probability Plot



---------- STD_NAME=cis-1,2-Dichloroethene ----------

Univariate Procedure

Variable=LNRESULT

Moments

N	47	Sum Wgts	47
Mean	-6.58646	Sum	-309.564
Std Dev	2.02694	Variance	4.108487
Skewness	2.022385	Kurtosis	2.910938
USS	2227.917	CSS	188.9904
CV	-30.7744	Std Mean	0.29566
T:Mean=0	-22.2772	Pr>|T|	0.0001
Num ^= 0	47	Num > 0	0
M(Sign)	-23.5	Pr>=|M|	0.0001
Sgn Rank	-564	Pr>=|S|	0.0001
W:Normal	0.556211	Pr<W	0.0001

Quantiles(Def=5)

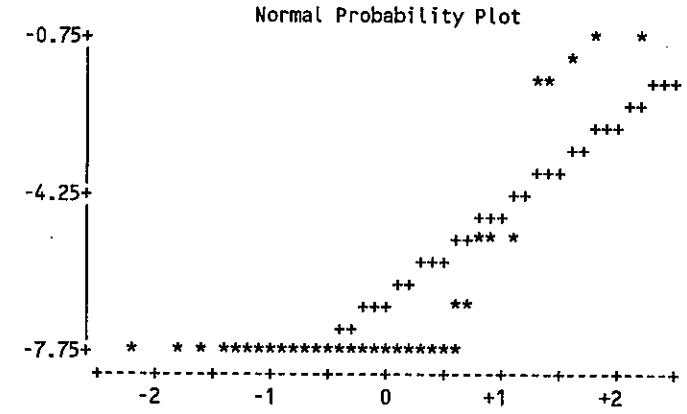
100% Max	-0.79851	99%	-0.79851
75% Q3	-6.90776	95%	-1.07881
50% Med	-7.6009	90%	-1.86433
25% Q1	-7.6009	10%	-7.6009
0% Min	-7.6009	5%	-7.6009
		1%	-7.6009
Range	6.802395		
Q3-Q1	0.693147		
Mode	-7.6009		

Extremes

Lowest	Obs	Highest	Obs
-7.6009(	47)	-1.86433(	42)
-7.6009(	45)	-1.80181(	44)
-7.6009(	41)	-1.07881(	3)
-7.6009(	40)	-0.90387(	46)
-7.6009(	39)	-0.79851(	43)

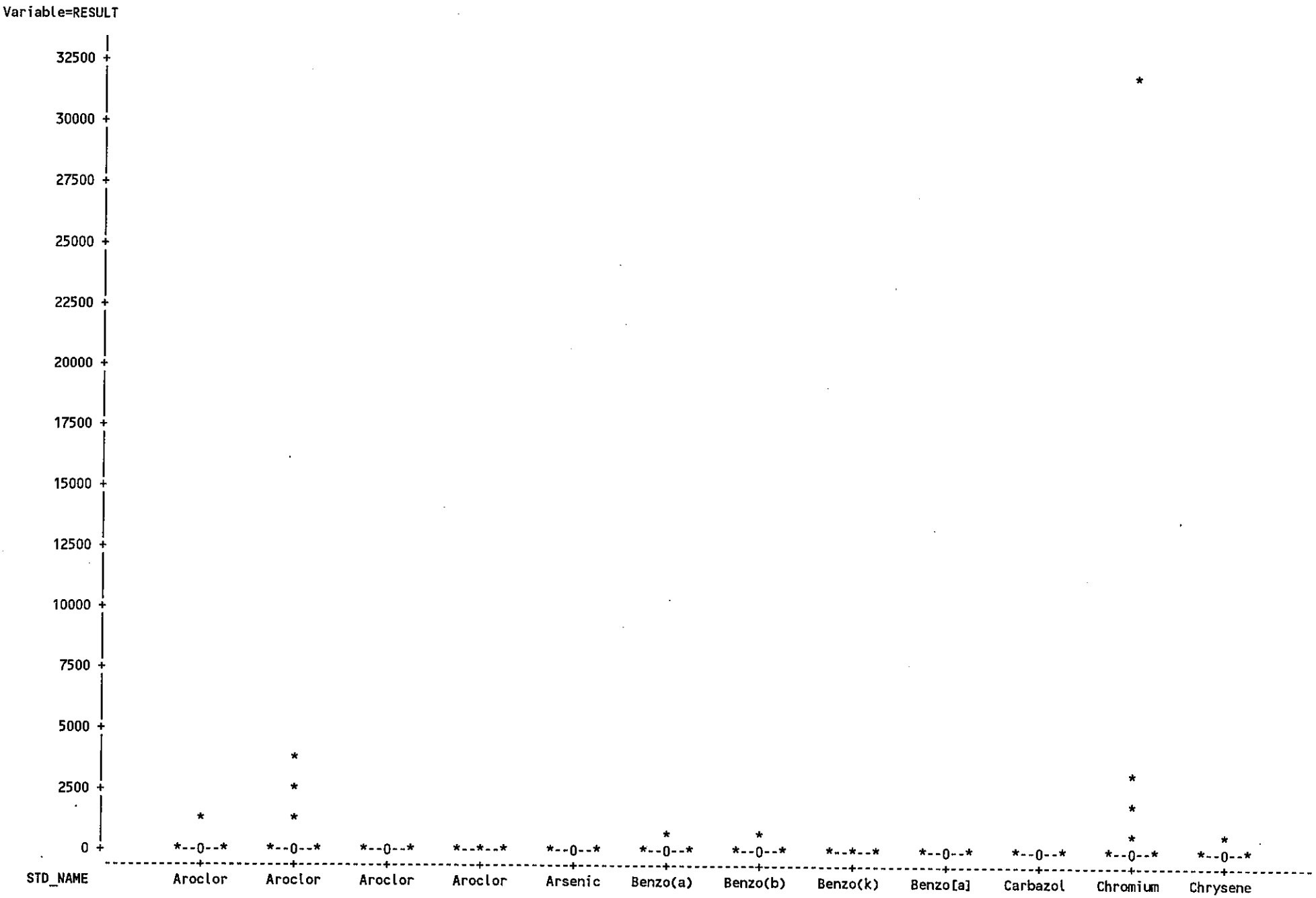
```
Stem Leaf                          #          Boxplot
  -0 98                            2             *
  -1 1                             1             *
  -1 98                            2             *
  -2
  -2
  -3
  -3
  -4
  -4
  -5 221111                        6             0
  -5
  -6
  -6 99                            2          +--+--+
  -7                                          |     |
  -7 666666666666666666666666666666666 34      *-----*
     ----+----+----+----+----+----+----
```

Normal Probability Plot



Univariate Output

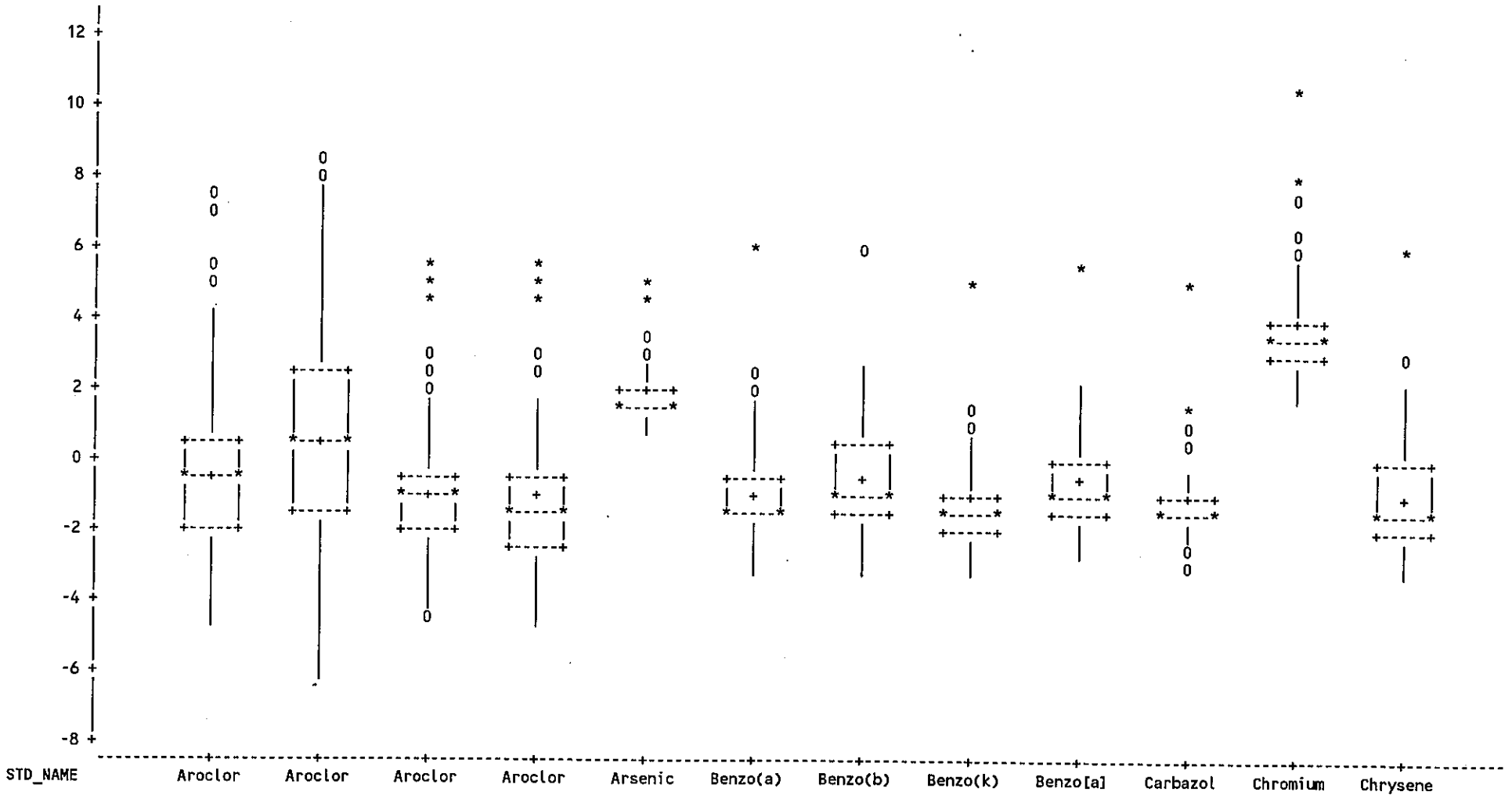
Univariate Procedure
Schematic Plots



Surface Soils
Univariate Output

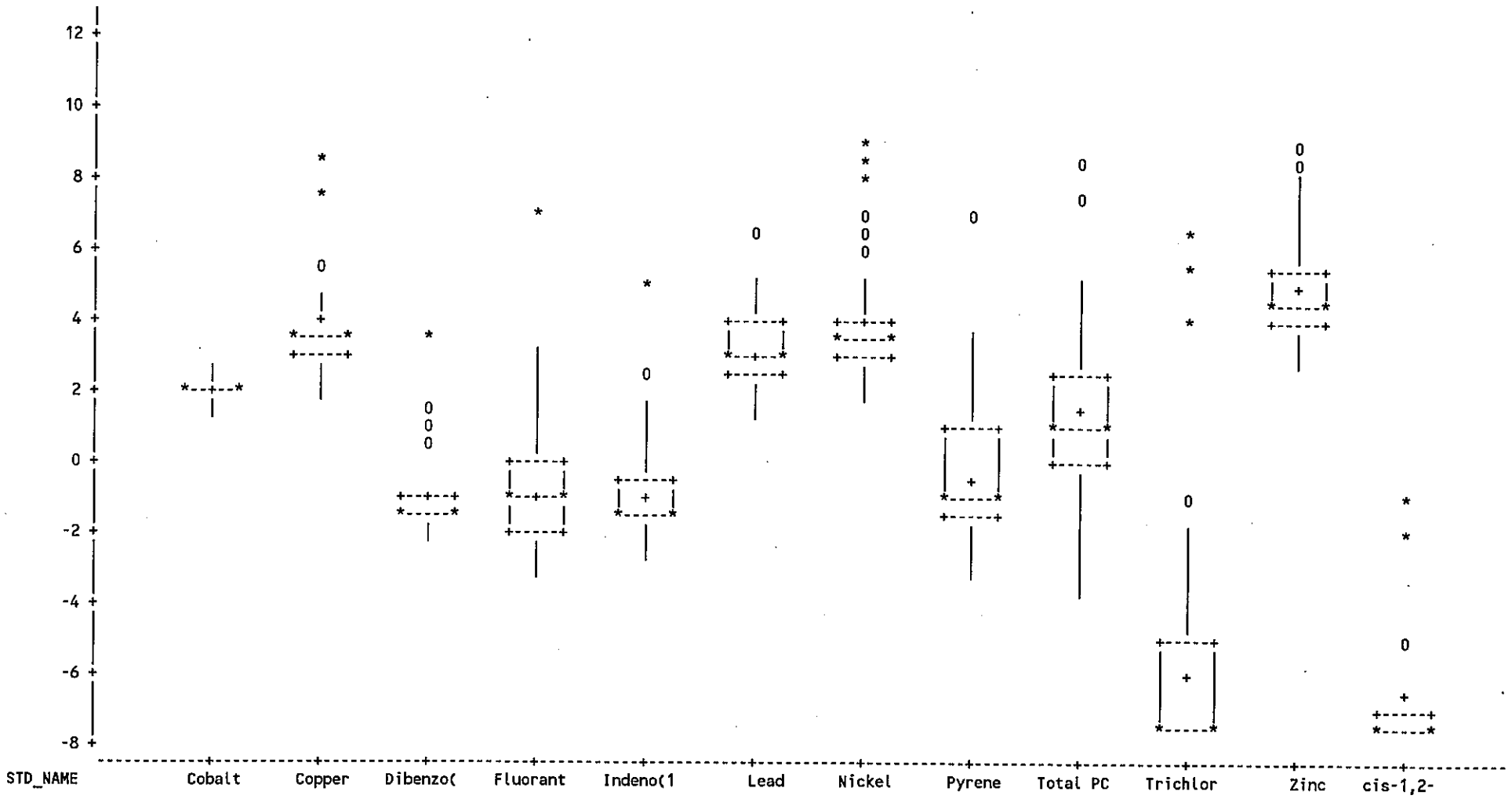
Univariate Procedure
Schematic Plots

Variable=LNRESULT



Univariate Procedure
Schematic Plots

Variable=LNRESULT



Sub-Surface Soils
Summary Statistics

OBS	STD_NAME	MINDET	MAXDET	MEANDET	MEAN	STD	MAXND	LNMAXDET	LNMEANDT	LNMEAN	LNSTD	LNCV	CAS_NUM	UNITS	SAMP_ID	ER_Q	FREQ	DETRANGE
1	Aroclor 1016	0.0000	0.0	0.00	10.89	54.44	600.00	.	.	-1.73670	2.73135	-157.27			B-16		0/204	0.006-600
2	Aroclor 1242	0.0000	9600.0	669.28	281.85	1154.05	255.00	9.1695	4.46937	-0.13565	4.06276	-2994.96		mg/kg	B-3		51/204	0.006-255
3	Aroclor 1248	0.0000	4300.0	164.69	112.85	581.13	600.00	8.3664	0.17701	-0.81523	3.40393	-417.54		mg/kg	BH-37		76/204	0.006-600
4	Arsenic	1.7000	65.7	7.66	7.44	10.92	0.50	4.1851	1.61152	1.51441	0.96774	63.90	7440-38-2	mg/kg	T02-1		65/67	0.075-0.5
5	Chromium	6.9000	34900.0	1238.24	1238.24	4897.83	.	10.4602	3.91210	3.91210	2.08260	53.23	7440-47-3	mg/kg	T08-2	J	70/70	.-.
6	Cobalt	2.2000	2.2	2.20	2.20	.	.	0.7885	0.78846	0.78846	.	.	7440-48-4	mg/kg	T03-2	J	1/1	.-.
7	Copper	7.1000	23200.0	941.72	941.72	3169.69	.	10.0519	4.09973	4.09973	2.13703	52.13	7440-50-8	mg/kg	T01-2		64/64	.-.
8	Cyanide	0.6800	166.0	26.27	6.70	26.83	0.42	5.1120	1.61233	-0.48294	1.52257	-315.27	57-12-5	mg/kg	T12-2		16/65	0.25-0.42
9	Ethylbenzene	0.0008	61000.0	10228.52	2544.29	9664.15	3000.00	11.0186	5.16782	-0.99640	5.87656	-589.78		mg/kg	T-23		30/122	0.0005-3000
10	Lead	0.4710	291.0	23.90	23.90	51.16	.	5.6733	2.34584	2.34584	1.11051	47.34	7439-92-1	mg/kg	T01-2		67/67	.-.
11	Nickel	6.9000	19700.0	813.35	813.35	3082.69	.	9.8884	3.92675	3.92675	1.97750	50.36	7440-02-0	mg/kg	T08-2		67/67	.-.
12	Toluene	0.0010	720000.0	19461.72	6090.64	65172.74	3000.00	13.4870	2.96789	-1.22415	5.42811	-443.42		mg/kg	HA-1		38/122	0.0005-3000
13	Total PCBs	0.0610	9600.0	555.52	315.77	1155.56	3.50	9.1695	2.94145	1.75749	3.09033	175.84			B-3		109/192	0-3.5
14	Trichloroethene	0.0010	150000.0	13949.63	3829.96	20350.27	3000.00	11.9184	-1.26080	-3.94795	4.97932	-126.12		mg/kg	BH-47		19/70	0.0005-3000
15	Xylene (total)	0.0000	330000.0	49364.06	13382.41	54200.14	3000.00	12.7068	6.14607	-0.05298	5.79230	-10933.14		mg/kg	T-21		32/122	0.0015-3000
16	Zinc	14.0000	53300.0	1644.34	1644.34	7542.59	.	10.8837	4.67257	4.67257	1.84211	39.42	7440-66-6	mg/kg	T03-2		59/59	.-.

Sub-Surface Soils
Univariate Output

STD_NAME=Aroclor 1016

Univariate Procedure

Variable=RESULT

Moments

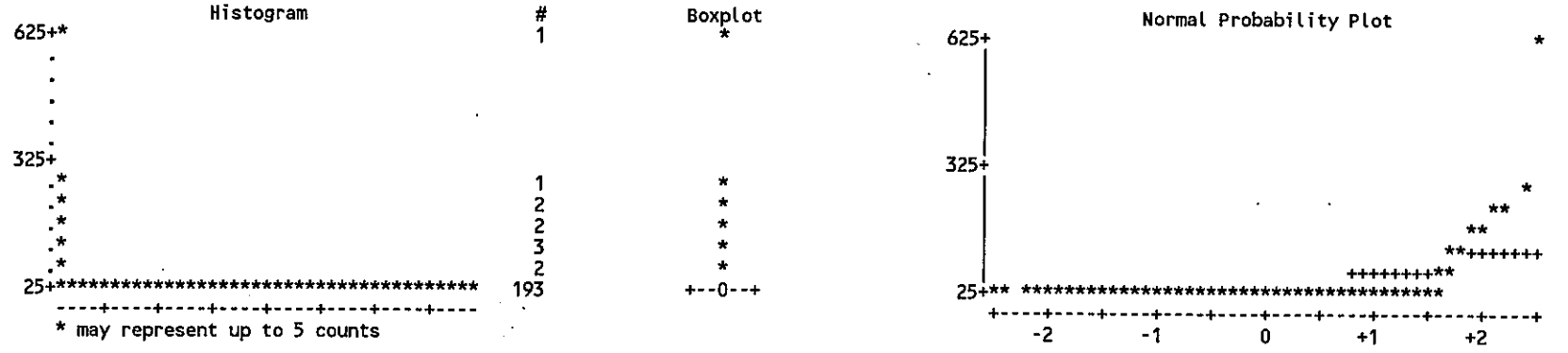
N	204	Sum Wgts	204
Mean	10.89168	Sum	2221.903
Std Dev	54.44129	Variance	2963.854
Skewness	7.641688	Kurtosis	71.60993
USS	625862.6	CSS	601662.4
CV	499.8428	Std Mean	3.811653
T:Mean=0	2.85747	Pr>|T|	0.0047
Num ^= 0	145	Num > 0	145
M(Sign)	72.5	Pr>=|M|	0.0001
Sgn Rank	5292.5	Pr>=|S|	0.0001
W:Normal	0.236958	Pr<W	0.0001

Quantiles(Def=5)

100% Max	600	99%	220
75% Q3	0.25	95%	60
50% Med	0.0135	90%	1.45
25% Q1	0	10%	0
0% Min	0	5%	0
		1%	0
Range	600		
Q3-Q1	0.25		
Mode	0		

Extremes

Lowest	Obs	Highest	Obs
0(	186)	165(	93)
0(	185)	220(	53)
0(	184)	220(	58)
0(	183)	255(	59)
0(	182)	600(	50)



Sub-Surface Soils
Univariate Output

STD_NAME=Aroclor 1016

Univariate Procedure

Variable=LNRESULT

Moments

N	145	Sum Wgts	145
Mean	-1.7367	Sum	-251.821
Std Dev	2.731352	Variance	7.460282
Skewness	1.049313	Kurtosis	0.826034
USS	1511.618	CSS	1074.281
CV	-157.273	Std Mean	0.226826
T:Mean=0	-7.65651	Pr>|T|	0.0001
Num ^= 0	144	Num > 0	24
M(Sign)	-48	Pr>=|M|	0.0001
Sgn Rank	-3298.5	Pr>=|S|	0.0001
W:Normal	0.846968	Pr<W	0.0001

Quantiles(Def=5)

100% Max	6.39693	99%	5.541264
75% Q3	-0.69315	95%	4.787492
50% Med	-1.38629	90%	2.351375
25% Q1	-4.46541	10%	-4.60517
0% Min	-5.116	5%	-4.60517
		1%	-4.60517
Range	11.51293		
Q3-Q1	3.772261		
Mode	-4.60517		

Extremes

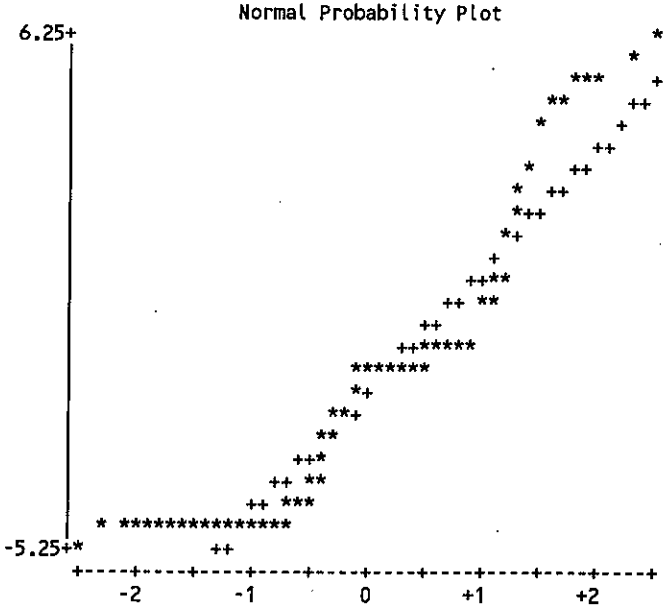
Lowest	Obs	Highest	Obs
-5.116(	88)	5.105945(	93)
-4.60517(	65)	5.393628(	53)
-4.60517(	64)	5.393628(	58)
-4.60517(	63)	5.541264(	59)
-4.60517(	61)	6.39693(	50)

Missing Value	.
Count	59
% Count/Nobs	28.92

```
Stem Leaf                                #
   6 4                                   1
   5 5                                   1
   5 0144                                4
   4 689                                 3
   4 14                                  2
   3
   3 01                                  2
   2 9                                   1
   2 4                                   1
   1 79                                  2
   1
   0 777                                 3
   0 01234                               5
  -0
  -0 7777777777777777765                 18
  -1 44444444444444444444444444444432    34
  -1 966                                 3
  -2 33311000                            8
  -2 877                                 3
  -3 11100                               5
  -3 987                                 3
  -4 433333331                           9
  -4 66666666666666666666666666666666655 36
  -5 1                                   1
     ----+----+----+----+----+----+----+-
```

Boxplot

Normal Probability Plot



Sub-Surface Soils
Univariate Output

STD_NAME=Aroclor 1242

Univariate Procedure

Variable=RESULT

Moments

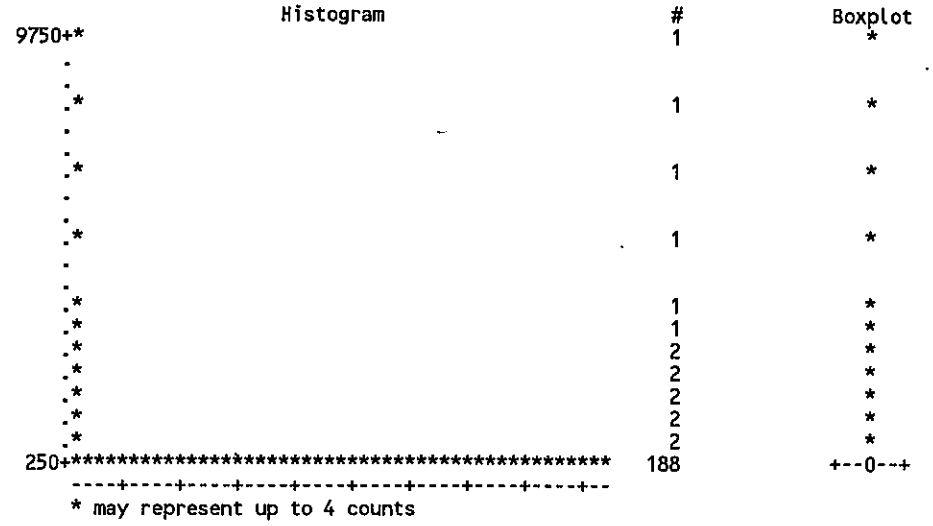
N	204	Sum Wgts	204
Mean	281.8478	Sum	57496.94
Std Dev	1154.053	Variance	1331839
Skewness	5.728205	Kurtosis	36.34059
USS	2.8657E8	CSS	2.7036E8
CV	409.4598	Std Mean	80.79989
T:Mean=0	3.48822	Pr>|T|	0.0006
Num ^= 0	171	Num > 0	171
M(Sign)	85.5	Pr>=|M|	0.0001
Sgn Rank	7353	Pr>=|S|	0.0001
W:Normal	0.286368	Pr<W	0.0001

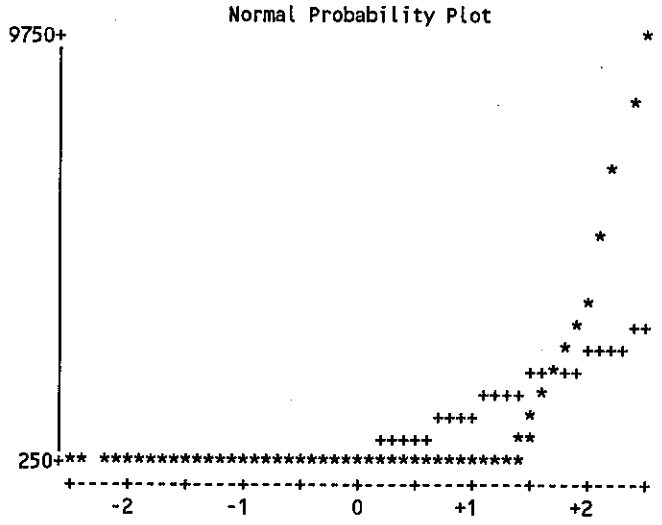
Quantiles(Def=5)

100% Max	9600	99%	6800
75% Q3	7	95%	1600
50% Med	0.24	90%	330
25% Q1	0.01	10%	0
0% Min	0	5%	0
		1%	0
Range	9600		
Q3-Q1	6.99		
Mode	0		

Extremes

Lowest	Obs	Highest	Obs
0(	186)	3500(	143)
0(	185)	5200(	139)
0(	183)	6800(	50)
0(	182)	8000(	135)
0(	180)	9600(	146)





Sub-Surface Soils
Univariate Output

STD_NAME=Aroclor 1242

Univariate Procedure

Variable=LNRESULT

Moments

N	171	Sum Wgts	171
Mean	-0.13565	Sum	-23.1967
Std Dev	4.062764	Variance	16.50605
Skewness	0.660648	Kurtosis	-0.71911
USS	2809.176	CSS	2806.029
CV	-2994.96	Std Mean	0.310687
T:Mean=0	-0.43662	Pr>|T|	0.6629
Num ^= 0	170	Num > 0	64
M(Sign)	-21	Pr>=|M|	0.0016
Sgn Rank	-585.5	Pr>=|S|	0.3632
W:Normal	0.873829	Pr<W	0.0001

Quantiles(Def=5)

100% Max	9.169518	99%	8.987197
75% Q3	3.044522	95%	7.783224
50% Med	-1.27297	90%	6.016157
25% Q1	-4.30507	10%	-4.60517
0% Min	-5.116	5%	-4.60517
		1%	-4.60517
Range	14.28551		
Q3-Q1	7.349588		
Mode	-4.60517		

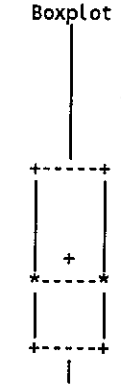
Extremes

Lowest	Obs	Highest	Obs
-5.116(	88)	8.160518(	143)
-4.60517(	65)	8.556414(	139)
-4.60517(	64)	8.824678(	50)
-4.60517(	63)	8.987197(	135)
-4.60517(	61)	9.169518(	146)

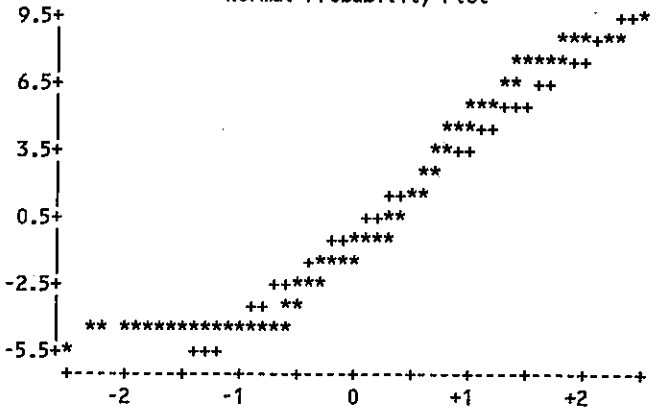
Missing Value	.
Count	33
% Count/Nobs	16.18

```
Stem Leaf                                                    #
   9 02                                                      2
   8 1268                                                    4
   7 01348889                                                8
   6 0136                                                    4
   5 0112445889                                             10
   4 044566899                                               9
   3 002566                                                  6
   2 0012459                                                 7
   1 44899                                                   5
   0 0122346777                                             10
  -0 7777777777777777665                                    19
  -1 9664444444444444444432                                 22
  -2 87733311000                                            11
  -3 987211100                                               9
  -4 666666666666666666666666666666655433333331            44
  -5 1                                                       1
     ----+----+----+----+----+----+----+----+----+----
```

Boxplot



Normal Probability Plot



Sub-Surface Soils
Univariate Output

STD_NAME=Aroclor 1248

Univariate Procedure

Variable=RESULT

Moments

N	204	Sum Wgts	204
Mean	112.8466	Sum	23020.71
Std Dev	581.1251	Variance	337706.4
Skewness	5.984772	Kurtosis	36.77338
USS	71152203	CSS	68554394
CV	514.969	Std Mean	40.68689
T:Mean=0	2.773537	Pr>|T|	0.0061
Num ^= 0	146	Num > 0	146
M(Sign)	73	Pr>=|M|	0.0001
Sgn Rank	5365.5	Pr>=|S|	0.0001
W:Normal	0.211752	Pr<W	0.0001

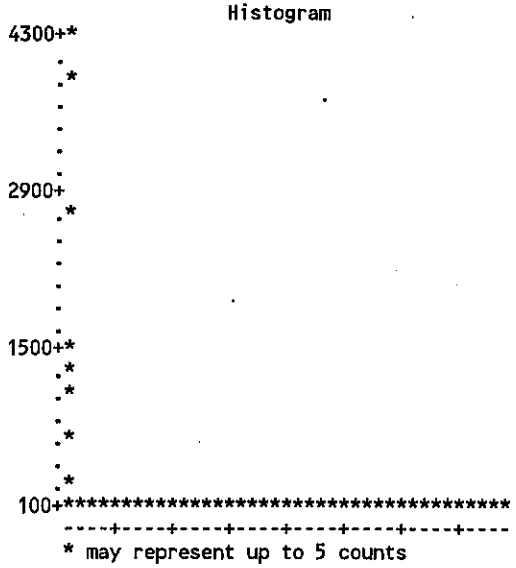
Quantiles(Def=5)

100% Max	4300	99%	3800
75% Q3	0.5	95%	190
50% Med	0.0805	90%	17
25% Q1	0	10%	0
0% Min	0	5%	0
		1%	0
Range	4300		
Q3-Q1	0.5		
Mode	0		

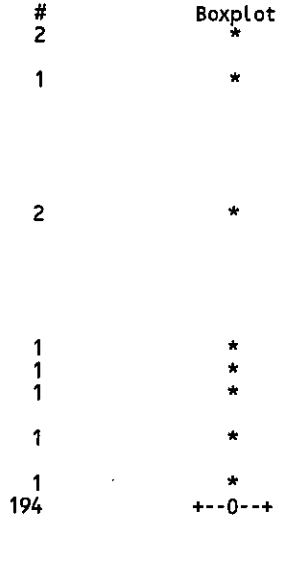
Extremes

Lowest	Obs	Highest	Obs
0(	186)	2700(	43)
0(	185)	2700(	92)
0(	184)	3800(	58)
0(	183)	4300(	59)
0(	182)	4300(	93)

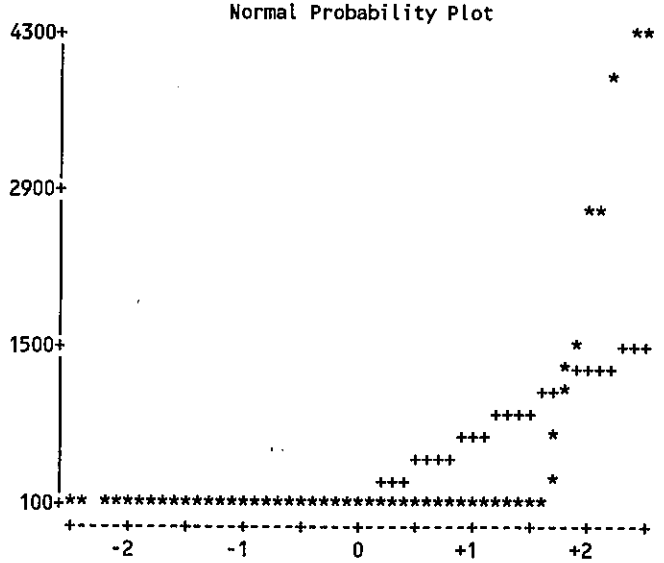
Histogram



\# Boxplot



Normal Probability Plot



y Cr[ ] Plar[ ]e [ ] [ ] [ ]

Sub-Surface Soils
Univariate Output

---------- STD_NAME=Arsenic ----------

Univariate Procedure

Variable=RESULT

Moments

N	67	Sum Wgts	67
Mean	7.444403	Sum	498.775
Std Dev	10.91571	Variance	119.1526
Skewness	3.846735	Kurtosis	16.02061
USS	11577.16	CSS	7864.074
CV	146.6297	Std Mean	1.333566
T:Mean=0	5.582329	Pr>|T|	0.0001
Num ^= 0	67	Num > 0	67
M(Sign)	33.5	Pr>=|M|	0.0001
Sgn Rank	1139	Pr>=|S|	0.0001
W:Normal	0.513875	Pr<W	0.0001

Quantiles(Def=5)

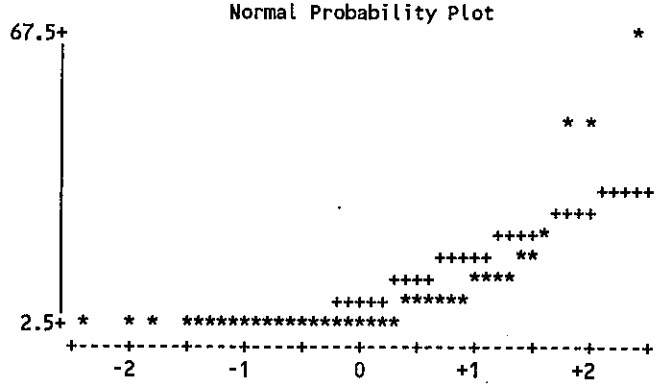
100% Max	65.7	99%	65.7
75% Q3	6.2	95%	21.1
50% Med	4.2	90%	14.5
25% Q1	2.8	10%	2.1
0% Min	0.075	5%	1.7
		1%	0.075
Range	65.625		
Q3-Q1	3.4		
Mode	2.4		

Extremes

Lowest	Obs	Highest	Obs
0.075(	65)	16.9(	59)
0.5(	67)	21.1(	42)
1.7(	30)	45.5(	45)
1.7(	13)	48(	66)
1.8(	64)	65.7(	41)

```
Stem Leaf                          #          Boxplot
   6 6                             1             *
   6
   5
   5
   4 68                            2             *
   4
   3
   3
   2
   2 1                             1             *
   1 67                            2             0
   1 012344                        6             0
   0 55555666666789               14          +--+--+
   0 00222222222222333333333444444444444444444  41          *-----*
     ----+----+----+----+----+----+----+----+-
Multiply Stem.Leaf by 10**+1
```

Normal Probability Plot



```
67.5+                                                                  *
    |
    |
    |
    |                                                                 * *
    |
    |
    |                                                                    +++++
    |                                                                 ++++
    |                                                              +++++*
    |                                                           +++++  **
    |                                                        ++++   ****
    |                                                   +++++ ******
2.5+ *   * *  ******************
     +----+----+----+----+----+----+----+----+----+----+
         -2        -1         0        +1        +2
```

Sub-Surface Soils
Univariate Output

---------- STD_NAME=Arsenic ----------

Univariate Procedure

Variable=LNRESULT

Moments

N	67	Sum Wgts	67
Mean	1.514413	Sum	101.4657
Std Dev	0.96774	Variance	0.93652
Skewness	-0.47136	Kurtosis	5.190953
USS	215.4712	CSS	61.81031
CV	63.90196	Std Mean	0.118228
T:Mean=0	12.80924	Pr>|T|	0.0001
Num ^= 0	67	Num > 0	65
M(Sign)	31.5	Pr>=|M|	0.0001
Sgn Rank	1075.5	Pr>=|S|	0.0001
W:Normal	0.900009	Pr<W	0.0001

Quantiles(Def=5)

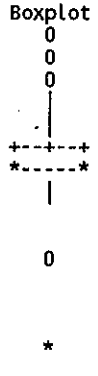
100% Max	4.185099	99%	4.185099
75% Q3	1.824549	95%	3.049273
50% Med	1.435085	90%	2.674149
25% Q1	1.029619	10%	0.741937
0% Min	-2.59027	5%	0.530628
		1%	-2.59027
Range	6.775366		
Q3-Q1	0.79493		
Mode	0.875469		

Extremes

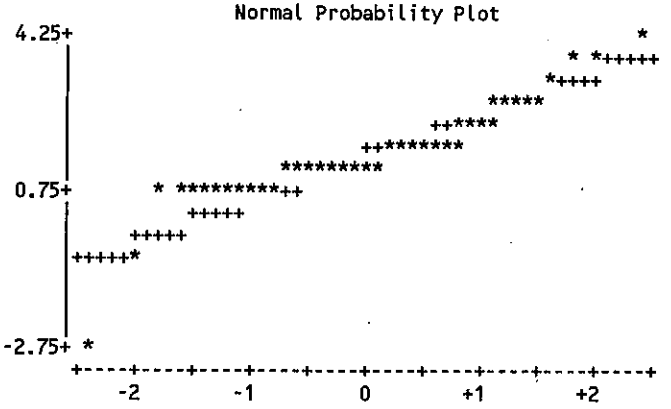
Lowest	Obs	Highest	Obs
-2.59027(	65)	2.827314(	59)
-0.69315(	67)	3.049273(	42)
0.530628(	30)	3.817712(	45)
0.530628(	13)	3.871201(	66)
0.587787(	64)	4.185099(	41)

```
Stem Leaf                 #
   4 2                    1
   3 89                   2
   3 0                    1
   2 566788               6
   2 1234                 4
   1 5555555566667778899  19
   1 00011222233333444444 20
   0 556778889999         12
   0
   -0
   -0 7                   1
   -1
   -1
   -2
   -2 6                   1
      ----+----+----+----+
```

Boxplot



Normal Probability Plot



Sub-Surface Soils
Univariate Output

STD_NAME=Chromium

Univariate Procedure

Variable=RESULT

Moments

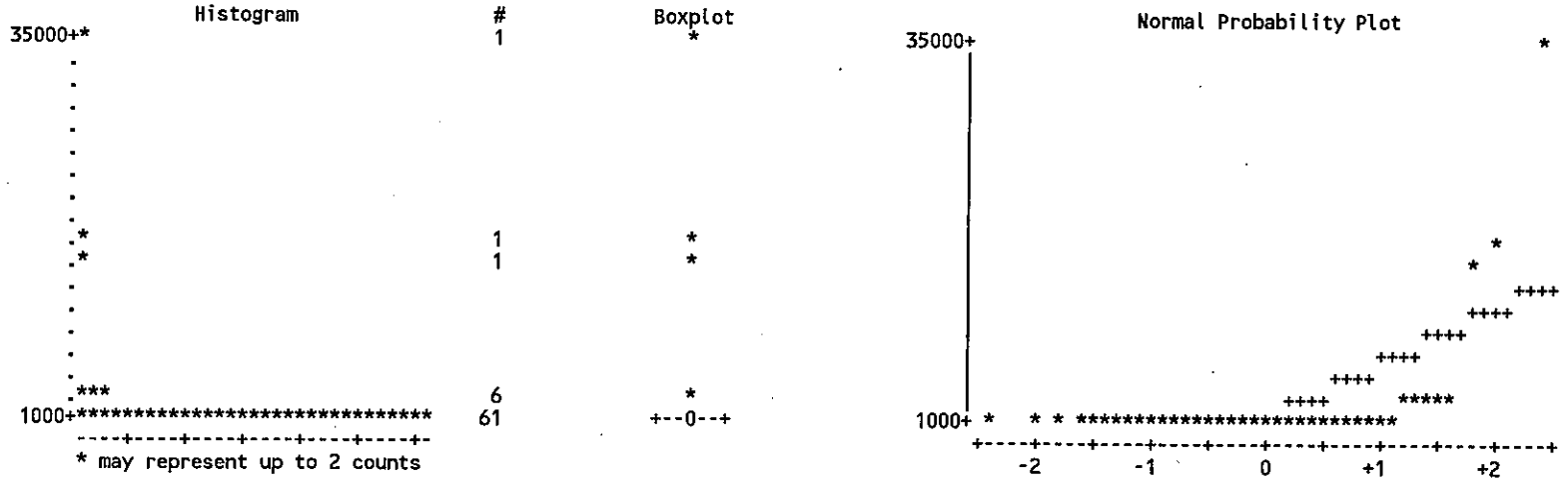
N	70	Sum Wgts	70
Mean	1238.245	Sum	86677.12
Std Dev	4897.833	Variance	23988771
Skewness	5.625978	Kurtosis	34.70227
USS	1.7626E9	CSS	1.6552E9
CV	395.5465	Std Mean	585.403
T:Mean=0	2.1152	Pr>|T|	0.0380
Num ^= 0	70	Num > 0	70
M(Sign)	35	Pr>=|M|	0.0001
Sgn Rank	1242.5	Pr>=|S|	0.0001
W:Normal	0.292699	Pr<W	0.0001

Quantiles(Def=5)

100% Max	34900	99%	34900
75% Q3	44	95%	3250
50% Med	22.5	90%	2520
25% Q1	15	10%	9.95
0% Min	6.9	5%	7.9
		1%	6.9
Range	34893.1		
Q3-Q1	29		
Mode	20		

Extremes

Lowest	Obs	Highest	Obs
6.9(	66)	2910(	52)
7.3(	21)	3250(	50)
7.4(	1)	14200(	59)
7.9(	2)	17200(	43)
8.2(	19)	34900(	53)



Sub-Surface Soils
Univariate Output

STD_NAME=Chromium

Univariate Procedure

Variable=LNRESULT

Moments

N	70	Sum Wgts	70
Mean	3.9121	Sum	273.847
Std Dev	2.0826	Variance	4.337222
Skewness	1.682976	Kurtosis	1.794542
USS	1370.585	CSS	299.2683
CV	53.23482	Std Mean	0.248918
T:Mean=0	15.7164	Pr>|T|	0.0001
Num ^= 0	70	Num > 0	70
M(Sign)	35	Pr>=|M|	0.0001
Sgn Rank	1242.5	Pr>=|S|	0.0001
W:Normal	0.7312	Pr<W	0.0001

Quantiles(Def=5)

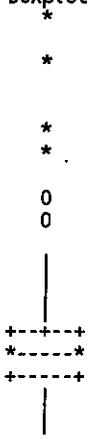
100% Max	10.46024	99%	10.46024
75% Q3	3.78419	95%	8.08641
50% Med	3.113505	90%	7.831888
25% Q1	2.70805	10%	2.29756
0% Min	1.931521	5%	2.066863
		1%	1.931521
Range	8.528721		
Q3-Q1	1.076139		
Mode	2.995732		

Extremes

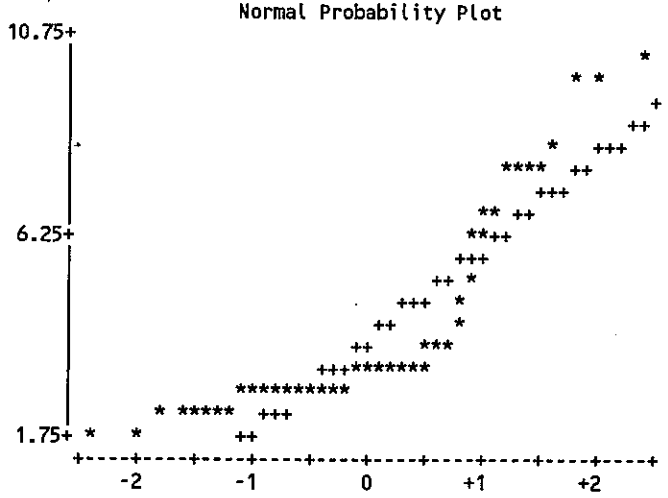
Lowest	Obs	Highest	Obs
1.931521(	66)	7.975908(	52)
1.987874(	21)	8.08641(	50)
2.00148(	1)	9.560997(	59)
2.066863(	2)	9.752665(	43)
2.104134(	19)	10.46024(	53)

```
Stem Leaf                    #
  10 5                       1
  10
   9 68                      2
   9
   8
   8 001                     3
   7 788                     3
   7
   6 77                      2
   6 12                      2
   5
   5 2                       1
   4 6                       1
   4 04                      2
   3 5678                    4
   3 00000111233333333444    21
   2 5666667777778889999     19
   2 00111334                8
   1 9                       1
     ----+----+----+----+-
```

Boxplot



Normal Probability Plot



Sub-Surface Soils
Univariate Output

STD_NAME=Cobalt

Univariate Procedure

Variable=RESULT

Moments

N	1	Sum Wgts	1
Mean	2.2	Sum	2.2
Std Dev	.	Variance	.
Skewness	.	Kurtosis	.
USS	4.84	CSS	0
CV	.	Std Mean	.
T:Mean=0	.	Pr>|T|	.
Num ^= 0	1	Num > 0	1
M(Sign)	0.5	Pr>=|M|	1.0000
Sgn Rank	0.5	Pr>=|S|	1.0000
W:Normal	.	Pr<W	.

Quantiles(Def=5)

100% Max	2.2	99%	2.2
75% Q3	2.2	95%	2.2
50% Med	2.2	90%	2.2
25% Q1	2.2	10%	2.2
0% Min	2.2	5%	2.2
		1%	2.2
Range	0		
Q3-Q1	0		
Mode	2.2		

Extremes

Lowest	Obs	Highest	Obs
2.2(	1)	.(	)
.(	)	.(	)
.(	)	.(	)
.(	)	.(	)
.(	)	2.2(	1)

Sub-Surface Soils
Univariate Output

STD_NAME=Cobalt

Univariate Procedure

Variable=LNRESULT

Moments

N	1	Sum Wgts	1
Mean	0.788457	Sum	0.788457
Std Dev	.	Variance	.
Skewness	.	Kurtosis	.
USS	0.621665	CSS	0
CV	.	Std Mean	.
T:Mean=0	.	Pr>|T|	.
Num ^= 0	1	Num > 0	1
M(Sign)	0.5	Pr>=|M|	1.0000
Sgn Rank	0.5	Pr>=|S|	1.0000
W:Normal	.	Pr<W	.

Quantiles(Def=5)

100% Max	0.788457	99%	0.788457
75% Q3	0.788457	95%	0.788457
50% Med	0.788457	90%	0.788457
25% Q1	0.788457	10%	0.788457
0% Min	0.788457	5%	0.788457
		1%	0.788457
Range	0		
Q3-Q1	0		
Mode	0.788457		

Extremes

Lowest	Obs	Highest	Obs
0.788457(	1)	.(	)
.(	)	.(	)
.(	)	.(	)
.(	)	.(	)
.(	)	0.788457(	1)

Sub-Surface Soils
Univariate Output

---------- STD_NAME=Copper ----------

Univariate Procedure

Variable=RESULT

Moments

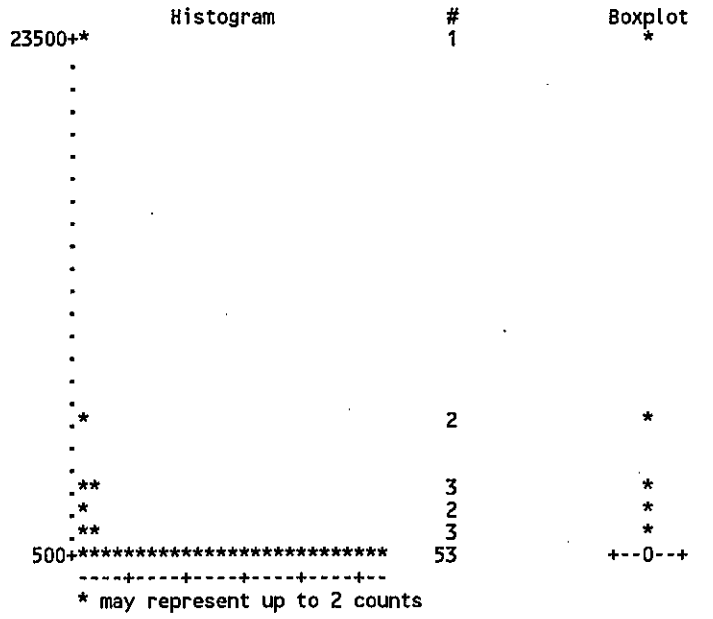
N	64	Sum Wgts	64
Mean	941.7234	Sum	60270.3
Std Dev	3169.687	Variance	10046915
Skewness	5.895297	Kurtosis	39.75071
USS	6.8971E8	CSS	6.3296E8
CV	336.5836	Std Mean	396.2109
T:Mean=0	2.376824	Pr>|T|	0.0205
Num ^= 0	64	Num > 0	64
M(Sign)	32	Pr>=|M|	0.0001
Sgn Rank	1040	Pr>=|S|	0.0001
W:Normal	0.343213	Pr<W	0.0001

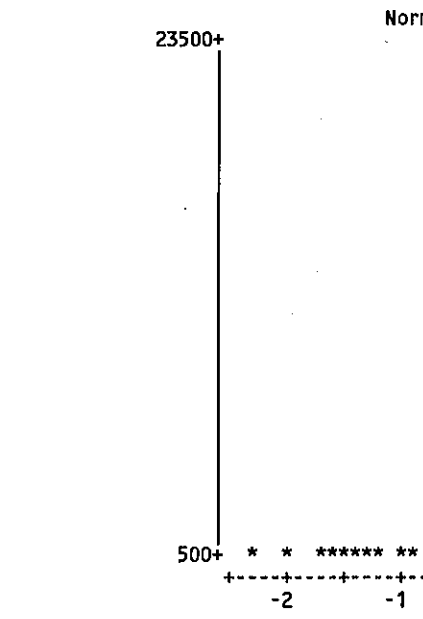
Quantiles(Def=5)

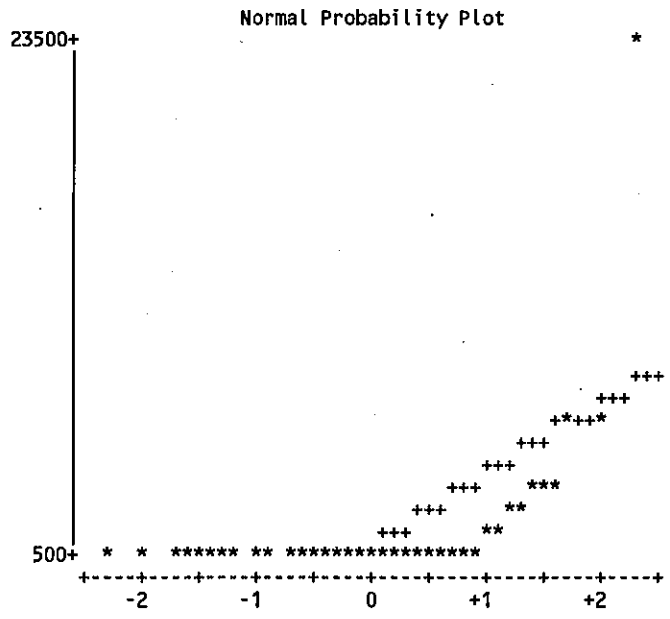
100% Max	23200	99%	23200
75% Q3	184	95%	3920
50% Med	22.1	90%	2920
25% Q1	13.8	10%	11.5
0% Min	7.1	5%	9.1
		1%	7.1
Range	23192.9		
Q3-Q1	170.2		
Mode	7.1		

Extremes

Lowest	Obs	Highest	Obs
7.1(	17)	3530(	43)
7.1(	16)	3920(	47)
8.5(	13)	6600(	64)
9.1(	28)	6990(	53)
10.5(	29)	23200(	38)







STD_NAME=Copper

Univariate Procedure

Variable=LNRESULT

Moments

N	64	Sum Wgts	64
Mean	4.099729	Sum	262.3827
Std Dev	2.137033	Variance	4.566909
Skewness	1.243709	Kurtosis	0.246657
USS	1363.413	CSS	287.7153
CV	52.12619	Std Mean	0.267129
T:Mean=0	15.34737	Pr>|T|	0.0001
Num ^= 0	64	Num > 0	64
M(Sign)	32	Pr>=|M|	0.0001
Sgn Rank	1040	Pr>=|S|	0.0001
W:Normal	0.784058	Pr<W	0.0001

Quantiles(Def=5)

100% Max	10.05191	99%	10.05191
75% Q3	5.211141	95%	8.273847
50% Med	3.095578	90%	7.979339
25% Q1	2.624432	10%	2.442347
0% Min	1.960095	5%	2.208274
		1%	1.960095
Range	8.091813		
Q3-Q1	2.586708		
Mode	1.960095		

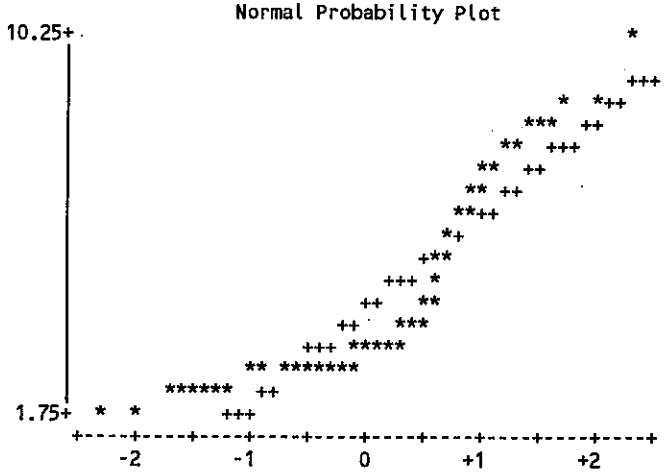
Extremes

Lowest	Obs	Highest	Obs
1.960095(	17)	8.169053(	43)
1.960095(	16)	8.273847(	47)
2.140066(	13)	8.794825(	64)
2.208274(	28)	8.852236(	53)
2.351375(	29)	10.05191(	38)

```
Stem Leaf                     #
  10 1                        1
   9
   9
   8 89                       2
   8 0123                     4
   7 8                        1
   7 33                       2
   6 79                       2
   6 13                       2
   5 6                        1
   5 13                       2
   4 7                        1
   4 13                       2
   3 556689                   6
   3 000001112223            12
   2 5555566666777778888     19
   2 0012444                  7
   1
     ----+----+----+----+
```

Boxplot

Normal Probability Plot



Sub-Surface Soils
Univariate Output

STD_NAME=Cyanide

Univariate Procedure

Variable=RESULT

Moments

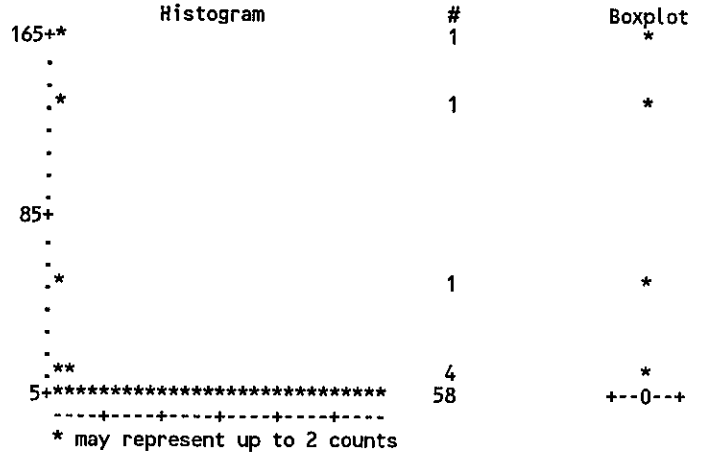
N	65	Sum Wgts	65
Mean	6.703077	Sum	435.7
Std Dev	26.83036	Variance	719.868
Skewness	5.115265	Kurtosis	26.5673
USS	48992.08	CSS	46071.55
CV	400.2693	Std Mean	3.327896
T:Mean=0	2.014209	Pr>|T|	0.0482
Num ^= 0	65	Num > 0	65
M(Sign)	32.5	Pr>=|M|	0.0001
Sgn Rank	1072.5	Pr>=|S|	0.0001
W:Normal	0.272243	Pr<W	0.0001

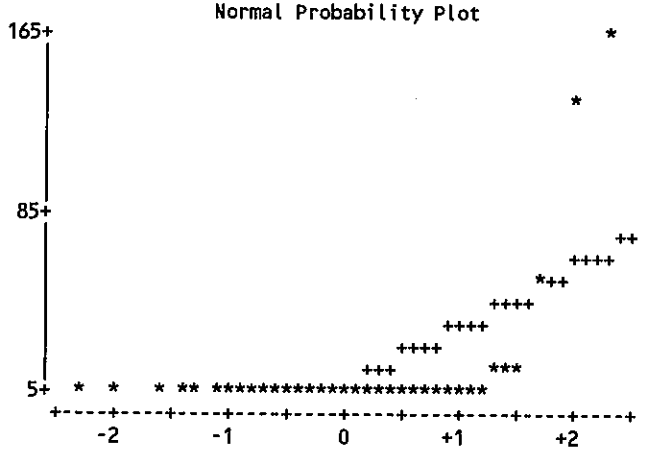
Quantiles(Def=5)

100% Max	166	99%	166
75% Q3	0.42	95%	13.2
50% Med	0.315	90%	11.8
25% Q1	0.305	10%	0.29
0% Min	0.25	5%	0.27
		1%	0.25
Range	165.75		
Q3-Q1	0.115		
Mode	0.31		

Extremes

Lowest	Obs	Highest	Obs
0.25(	60)	13.2(	53)
0.265(	17)	13.2(	57)
0.265(	16)	57.7(	42)
0.27(	35)	132(	43)
0.27(	28)	166(	59)





STD_NAME=Cyanide

Univariate Procedure

Variable=LNRESULT

Moments

N	65	Sum Wgts	65
Mean	-0.48294	Sum	-31.3914
Std Dev	1.522572	Variance	2.318227
Skewness	2.421962	Kurtosis	5.170667
USS	163.5268	CSS	148.3665
CV	-315.268	Std Mean	0.188852
T:Mean=0	-2.55727	Pr>|T|	0.0129
Num ^= 0	65	Num > 0	11
M(Sign)	-21.5	Pr>=|M|	0.0001
Sgn Rank	-565.5	Pr>=|S|	0.0001
W:Normal	0.568027	Pr<W	0.0001

Quantiles(Def=5)

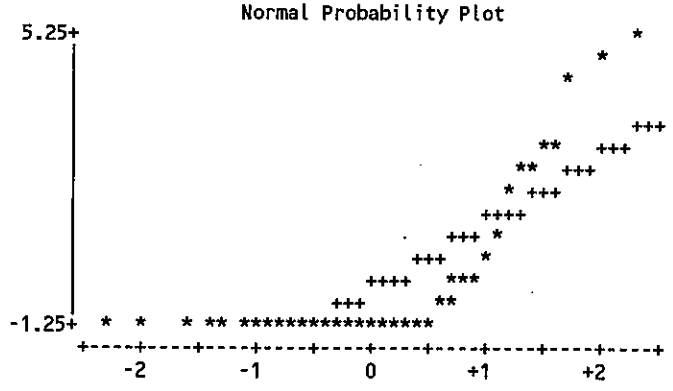
100% Max	5.111988	99%	5.111988
75% Q3	-0.8675	95%	2.580217
50% Med	-1.15518	90%	2.4681
25% Q1	-1.18744	10%	-1.23787
0% Min	-1.38629	5%	-1.30933
		1%	-1.38629
Range	6.498282		
Q3-Q1	0.319943		
Mode	-1.17118		

Extremes

Lowest	Obs	Highest	Obs
-1.38629(	60)	2.580217(	53)
-1.32803(	17)	2.580217(	57)
-1.32803(	16)	4.055257(	42)
-1.30933(	35)	4.882802(	43)
-1.30933(	28)	5.111988(	59)

```
Stem Leaf                                  #          Boxplot
   5 1                                     1             *
   4 9                                     1             *
   4 1                                     1             *
   3
   3
   2 5566                                  4             *
   2
   1 8                                     1             *
   1
   0 7                                     1             *
   0 23                                    2             *
  -0 44321                                 5             0
  -0 999                                   3          +--+--+
  -1 43333322222222222222222222222222222222221110000  46          *-----*
     ----+----+----+----+----+----+----+----+----+-
```

Normal Probability Plot



```
5.25+                                                  *
    |                                                *
    |                                             *
    |                                                  +++
    |                                           **   +++
    |                                         **  +++
    |                                        * +++
    |                                      ++++
    |                                   +++ *
    |                                +++   *
    |                             ++++   ***
    |                          +++      **
-1.25+  *  *   * ** *****************
       +----+----+----+----+----+----+----+----+----+----+
           -2        -1         0        +1        +2
```

Sub-Surface Soils
Univariate Output

STD_NAME=Ethylbenzene

Univariate Procedure

Variable=RESULT

Moments

N	122	Sum Wgts	122
Mean	2544.288	Sum	310403.1
Std Dev	9664.152	Variance	93395827
Skewness	4.579802	Kurtosis	21.71173
USS	1.209E10	CSS	1.13E10
CV	379.8372	Std Mean	874.9512
T:Mean=0	2.90792	Pr>|T|	0.0043
Num ^= 0	122	Num > 0	122
M(Sign)	61	Pr>=|M|	0.0001
Sgn Rank	3751.5	Pr>=|S|	0.0001
W:Normal	0.307647	Pr<W	0.0001

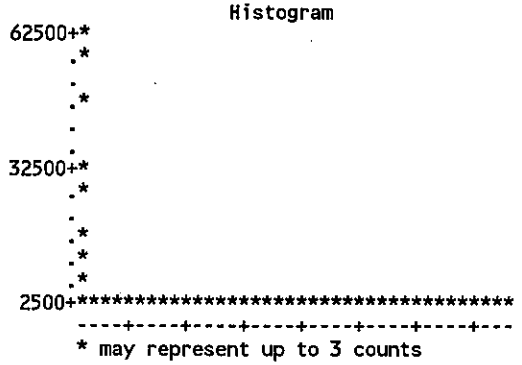
Quantiles(Def=5)

100% Max	61000	99%	55000
75% Q3	5	95%	18400
50% Med	3	90%	3000
25% Q1	0.0005	10%	0.0005
0% Min	0.0005	5%	0.0005
		1%	0.0005
Range	61000		
Q3-Q1	4.9995		
Mode	0.0005		

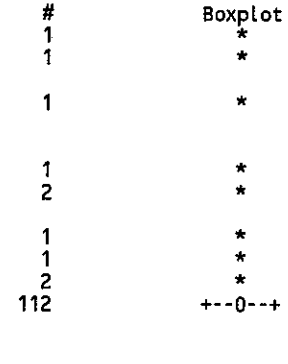
Extremes

Lowest	Obs	Highest	Obs
0.0005(	57)	27000(	80)
0.0005(	56)	30200(	76)
0.0005(	55)	48000(	85)
0.0005(	54)	55000(	89)
0.0005(	48)	61000(	93)

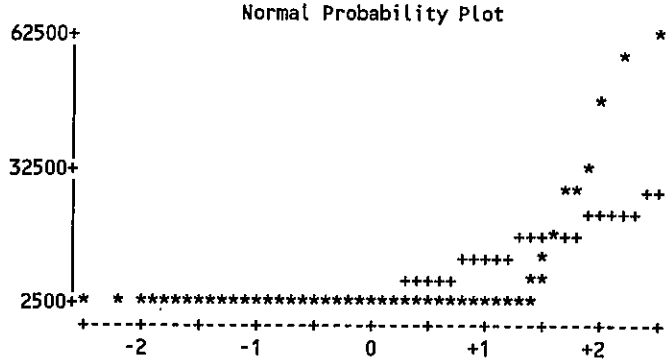
Histogram



\# Boxplot



Normal Probability Plot



Sub-Surface Soils
Univariate Output

STD_NAME=Ethylbenzene

Univariate Procedure

Variable=LNRESULT

Moments

N	122	Sum Wgts	122
Mean	-0.9964	Sum	-121.56
Std Dev	5.87656	Variance	34.53396
Skewness	0.263833	Kurtosis	-1.03738
USS	4299.732	CSS	4178.609
CV	-589.781	Std Mean	0.532039
T:Mean=0	-1.87279	Pr>|T|	0.0635
Num ^= 0	122	Num > 0	66
M(Sign)	5	Pr>=|M|	0.4153
Sgn Rank	-453.5	Pr>=|S|	0.2449
W:Normal	0.831527	Pr<W	0.0001

Quantiles(Def=5)

100% Max	11.01863	99%	10.91509
75% Q3	1.609438	95%	9.820106
50% Med	1.098612	90%	8.006368
25% Q1	-7.6009	10%	-7.6009
0% Min	-7.6009	5%	-7.6009
		1%	-7.6009
Range	18.61953		
Q3-Q1	9.21034		
Mode	-7.6009		

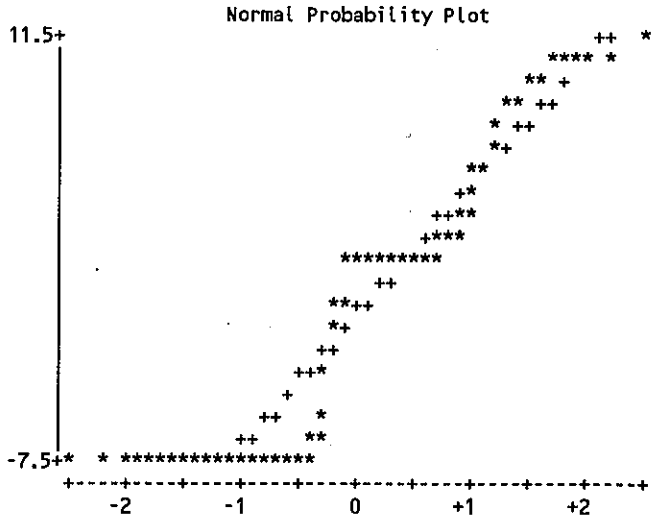
Extremes

Lowest	Obs	Highest	Obs
-7.6009(	57)	10.20359(	80)
-7.6009(	56)	10.3156(	76)
-7.6009(	55)	10.77896(	85)
-7.6009(	54)	10.91509(	89)
-7.6009(	48)	11.01863(	93)

```
Stem Leaf                                                    #
  11 0                                                       1
  10 22389                                                   5
   9 0048                                                    4
   8 013                                                     3
   7 9                                                       1
   6 4                                                       1
   5 1469                                                    4
   4 3                                                       1
   3 09                                                      2
   2 3333349                                                 7
   1 11111116666666666666666666666666666666                 37
   0                                                         0
  -0 8321                                                    4
  -1 980                                                     3
  -2                                                         0
  -3 9                                                       1
  -4                                                         0
  -5 888                                                     3
  -6 92                                                      2
  -7 66666666666666666666666666666666666666666661           43
     ----+----+----+----+----+----+----+----+---
```

Boxplot

Normal Probability Plot



Sub-Surface Soils
Univariate Output

---------- STD_NAME=Lead ----------

Univariate Procedure

Variable=RESULT

Moments

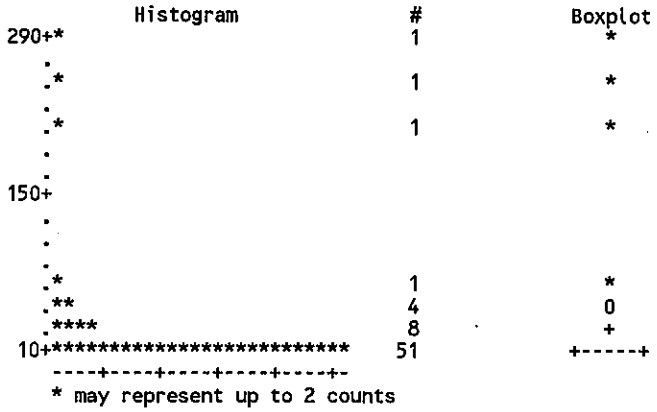
N	67	Sum Wgts	67
Mean	23.90404	Sum	1601.571
Std Dev	51.15851	Variance	2617.193
Skewness	4.166015	Kurtosis	17.57819
USS	211018.8	CSS	172734.7
CV	214.0161	Std Mean	6.250007
T:Mean=0	3.824643	Pr>|T|	0.0003
Num ^= 0	67	Num > 0	67
M(Sign)	33.5	Pr>=|M|	0.0001
Sgn Rank	1139	Pr>=|S|	0.0001
W:Normal	0.418777	Pr<W	0.0001

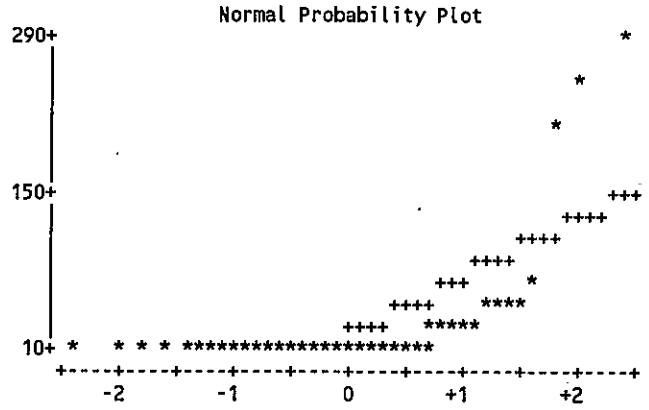
Quantiles(Def=5)

100% Max	291	99%	291
75% Q3	19.1	95%	61.2
50% Med	8.5	90%	52
25% Q1	5.1	10%	3.5
0% Min	0.471	5%	3
		1%	0.471
Range	290.529		
Q3-Q1	14		
Mode	3		

Extremes

Lowest	Obs	Highest	Obs
0.471(	65)	59.5(	37)
2.8(	1)	61.2(	51)
2.9(	21)	208(	59)
3(	30)	243(	47)
3(	19)	291(	38)





Sub-Surface Soils
Univariate Output

---------- STD_NAME=Lead ----------

Univariate Procedure

Variable=LNRESULT

Moments

N	67	Sum Wgts	67
Mean	2.345842	Sum	157.1714
Std Dev	1.11051	Variance	1.233231
Skewness	0.835634	Kurtosis	1.860701
USS	450.0925	CSS	81.39327
CV	47.33949	Std Mean	0.13567
T:Mean=0	17.29075	Pr>|T|	0.0001
Num ^= 0	67	Num > 0	66
M(Sign)	32.5	Pr>=|M|	0.0001
Sgn Rank	1138	Pr>=|S|	0.0001
W:Normal	0.931175	Pr<W	0.0013

Quantiles(Def=5)

100% Max	5.673323	99%	5.673323
75% Q3	2.949688	95%	4.114147
50% Med	2.140066	90%	3.951244
25% Q1	1.629241	10%	1.252763
0% Min	-0.7529	5%	1.098612
		1%	-0.7529
Range	6.42622		
Q3-Q1	1.320448		
Mode	1.098612		

Extremes

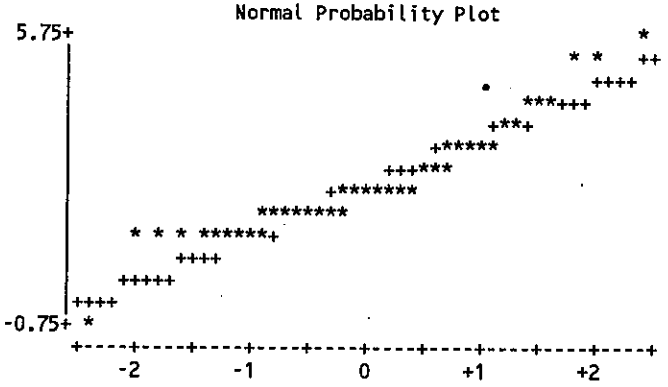
Lowest	Obs	Highest	Obs
-0.7529(	65)	4.085976(	37)
1.029619(	1)	4.114147(	51)
1.064711(	21)	5.337538(	59)
1.098612(	30)	5.493061(	47)
1.098612(	19)	5.673323(	38)

```
Stem Leaf                 #
   5 57                   2
   5 3                    1
   4
   4 0011                 4
   3 8                    1
   3 11122244             8
   2 55568999             8
   2 0011111122233444    16
   1 5556666777777999    16
   1 0111133344          10
   0
   0
  -0
  -0 8                    1
     ----+----+----+----+
```

Boxplot

```
  0
  0
  |
  |
  |
+-----+
*--+--*
+-----+
  |
  |
  |
  |
  |
  0
```

Normal Probability Plot



Sub-Surface Soils
Univariate Output

STD_NAME=Nickel

Univariate Procedure

Variable=RESULT

Moments

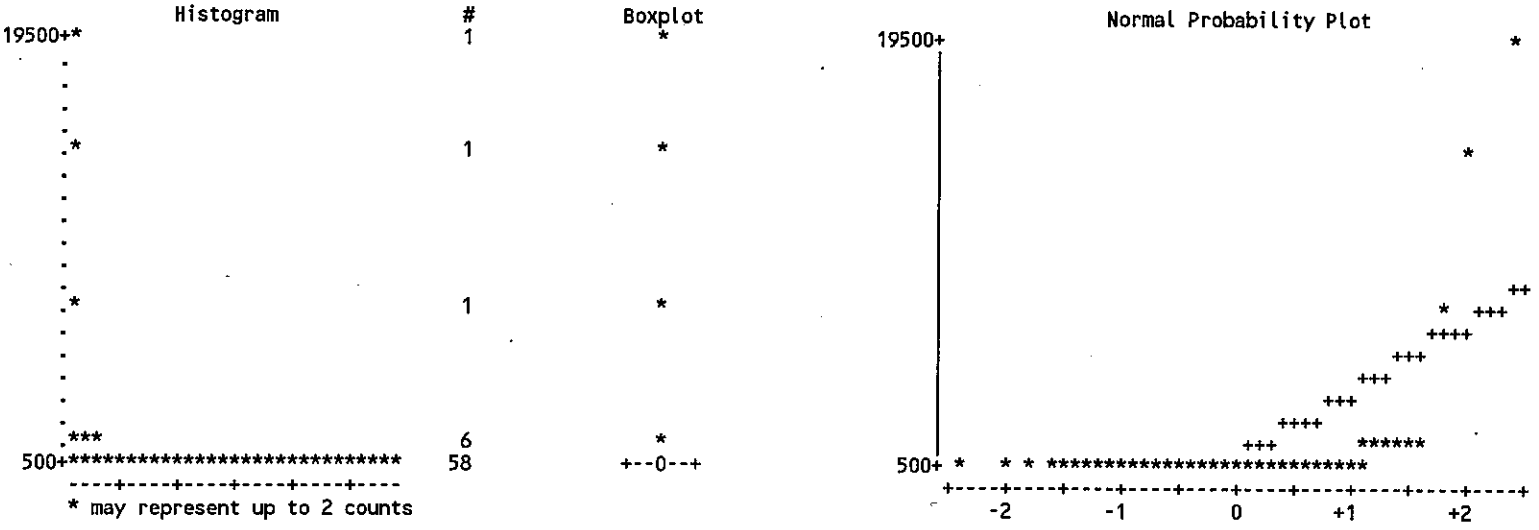
N	67	Sum Wgts	67
Mean	813.3481	Sum	54494.32
Std Dev	3082.689	Variance	9502974
Skewness	5.108775	Kurtosis	26.97821
USS	6.7152E8	CSS	6.272E8
CV	379.0123	Std Mean	376.6104
T:Mean=0	2.159654	Pr>|T|	0.0344
Num ^= 0	67	Num > 0	67
M(Sign)	33.5	Pr>=|M|	0.0001
Sgn Rank	1139	Pr>=|S|	0.0001
W:Normal	0.296586	Pr<W	0.0001

Quantiles(Def=5)

100% Max	19700	99%	19700
75% Q3	140	95%	1720
50% Med	21.3	90%	1240
25% Q1	14.1	10%	9.8
0% Min	6.9	5%	8.4
		1%	6.9
Range	19693.1		
Q3-Q1	125.9		
Mode	6.9		

Extremes

Lowest	Obs	Highest	Obs
6.9(	13)	1580(	50)
7.2(	21)	1720(	57)
7.5(	19)	7940(	43)
8.4(	30)	14400(	59)
9.1(	17)	19700(	53)



Sub-Surface Soils
Univariate Output

STD_NAME=Nickel

Univariate Procedure

Variable=LNRESULT

Moments

N	67	Sum Wgts	67
Mean	3.926754	Sum	263.0925
Std Dev	1.977501	Variance	3.91051
Skewness	1.435296	Kurtosis	1.135166
USS	1291.193	CSS	258.0936
CV	50.35968	Std Mean	0.24159
T:Mean=0	16.25378	Pr>|T|	0.0001
Num ^= 0	67	Num > 0	67
M(Sign)	33.5	Pr>=|M|	0.0001
Sgn Rank	1139	Pr>=|S|	0.0001
W:Normal	0.780568	Pr<W	0.0001

Quantiles(Def=5)

100% Max	9.888374	99%	9.888374
75% Q3	4.941642	95%	7.45008
50% Med	3.058707	90%	7.122867
25% Q1	2.646175	10%	2.282382
0% Min	1.931521	5%	2.128232
		1%	1.931521
Range	7.956853		
Q3-Q1	2.295468		
Mode	1.931521		

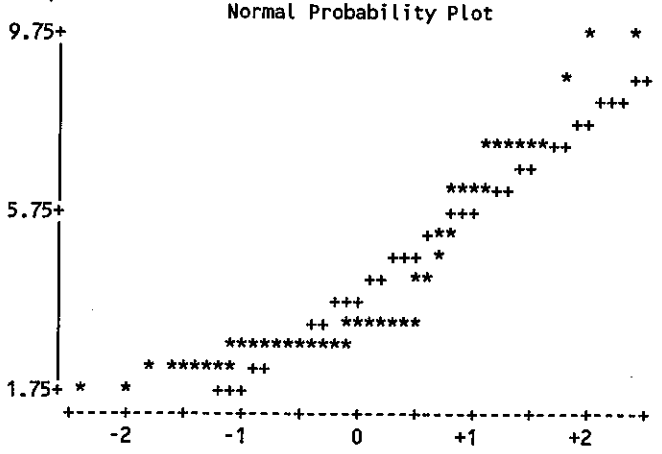
Extremes

Lowest	Obs	Highest	Obs
1.931521(	13)	7.36518(	50)
1.974081(	21)	7.45008(	57)
2.014903(	19)	8.979669(	43)
2.128232(	30)	9.574983(	59)
2.208274(	17)	9.888374(	53)

```
Stem Leaf                 #
   9 69                   2
   9 0                    1
   8
   8
   7 5                    1
   7 11124                5
   6
   6 22234                5
   5 5                    1
   5 1                    1
   4 9                    1
   4 0024                 4
   3 5                    1
   3 00000112222233334   17
   2 5566666677777788899 19
   2 00123334             8
   1 9                    1
     ----+----+----+----+
```

Boxplot

Normal Probability Plot



Sub-Surface Soils
Univariate Output

STD_NAME=Toluene

Univariate Procedure

Variable=RESULT

Moments

N	122	Sum Wgts	122
Mean	6090.64	Sum	743058.1
Std Dev	65172.74	Variance	4.2475E9
Skewness	11.04317	Kurtosis	121.9673
USS	5.185E11	CSS	5.139E11
CV	1070.048	Std Mean	5900.463
T:Mean=0	1.032231	Pr>|T|	0.3040
Num ^= 0	122	Num > 0	122
M(Sign)	61	Pr>=|M|	0.0001
Sgn Rank	3751.5	Pr>=|S|	0.0001
W:Normal	0.094293	Pr<W	0.0001

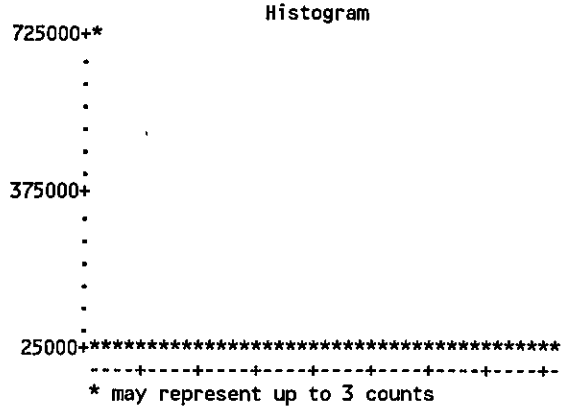
Quantiles(Def=5)

100% Max	720000	99%	5800
75% Q3	10	95%	1030
50% Med	3	90%	270
25% Q1	0.0005	10%	0.0005
0% Min	0.0005	5%	0.0005
		1%	0.0005
Range	720000		
Q3-Q1	9.9995		
Mode	0.0005		

Extremes

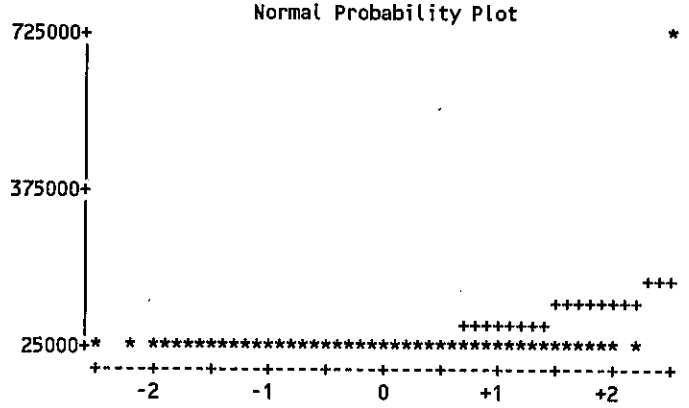
Lowest	Obs	Highest	Obs
0.0005(	57)	2800(	93)
0.0005(	56)	3000(	122)
0.0005(	55)	3500(	85)
0.0005(	54)	5800(	95)
0.0005(	48)	720000(	119)

Histogram



#	Boxplot
1	*
121	+--0--+

Normal Probability Plot



Sub-Surface Soils
Univariate Output

STD_NAME=Toluene

Univariate Procedure

Variable=LNRESULT

Moments

N	122	Sum Wgts	122
Mean	-1.22415	Sum	-149.346
Std Dev	5.428105	Variance	29.46433
Skewness	0.103848	Kurtosis	-1.14742
USS	3748.006	CSS	3565.183
CV	-443.418	Std Mean	0.491438
T:Mean=0	-2.49096	Pr>|T|	0.0141
Num ^= 0	122	Num > 0	66
M(Sign)	5	Pr>=|M|	0.4153
Sgn Rank	-810.5	Pr>=|S|	0.0368
W:Normal	0.842604	Pr<W	0.0001

Quantiles(Def=5)

100% Max	13.48701	99%	8.665613
75% Q3	2.302585	95%	6.937314
50% Med	1.098612	90%	5.598422
25% Q1	-7.6009	10%	-7.6009
0% Min	-7.6009	5%	-7.6009
		1%	-7.6009
Range	21.08791		
Q3-Q1	9.903488		
Mode	-7.6009		

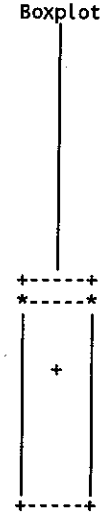
Extremes

Lowest	Obs	Highest	Obs
-7.6009(	57)	7.937375(	93)
-7.6009(	56)	8.006368(	122)
-7.6009(	55)	8.160518(	85)
-7.6009(	54)	8.665613(	95)
-7.6009(	48)	13.48701(	119)

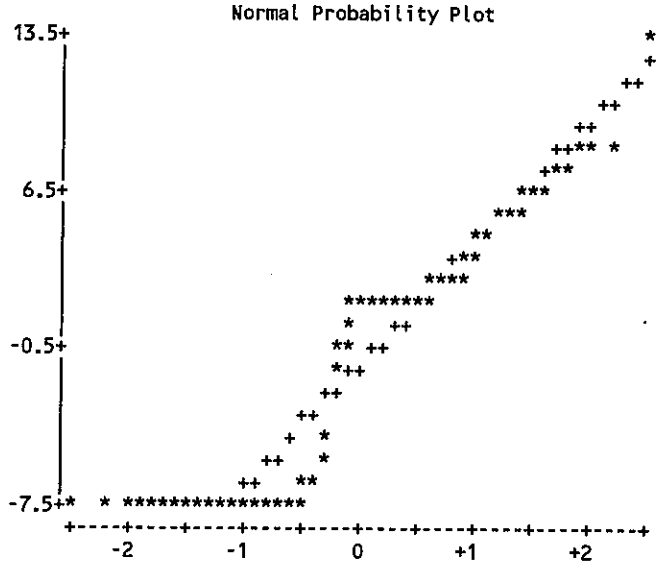
Stem	Leaf	#
13	5	1
12		
11		
10		
9		
8	027	3
7	79	2
6	5799	4
5	24689	5
4	12799	5
3	0245	4
2	23333333	8
1	11111666666666666666666666666666	33
0	7	1
-0	821	3
-1	9800	4
-2		
-3		
-4	7	1
-5	8888	4
-6	99222	5
-7	666666666666666666666666666666666666	39

----+----+----+----+----+----+----+----

Boxplot



Normal Probability Plot



Sub-Surface Soils
Univariate Output

---------- STD_NAME=Total PCBs ----------

Univariate Procedure

Variable=RESULT

Moments

N	192	Sum Wgts	192
Mean	315.7659	Sum	60627.05
Std Dev	1155.556	Variance	1335310
Skewness	5.351847	Kurtosis	33.54631
USS	2.7419E8	CSS	2.5504E8
CV	365.9535	Std Mean	83.39509
T:Mean=0	3.786385	Pr>|T|	0.0002
Num ^= 0	163	Num > 0	163
M(Sign)	81.5	Pr>=|M|	0.0001
Sgn Rank	6683	Pr>=|S|	0.0001
W:Normal	0.326266	Pr<W	0.0001

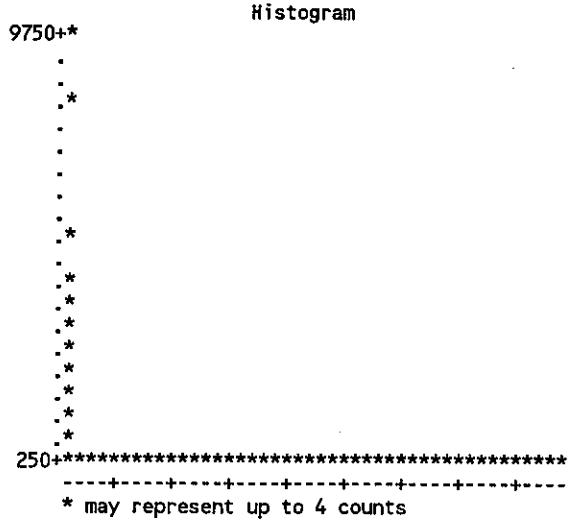
Quantiles(Def=5)

100% Max	9600	99%	8000
75% Q3	17	95%	2500
50% Med	2.85	90%	460
25% Q1	0.25	10%	0
0% Min	0	5%	0
		1%	0
Range	9600		
Q3-Q1	16.75		
Mode	0		

Extremes

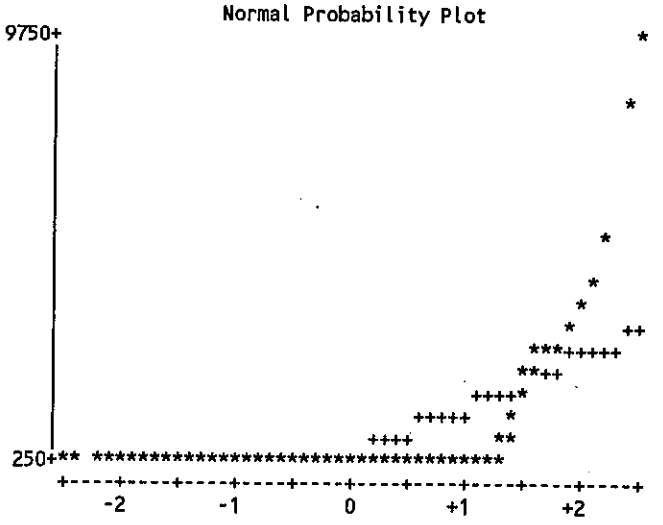
Lowest	Obs	Highest	Obs
0(	156)	3500(	98)
0(	155)	4300(	28)
0(	154)	5200(	94)
0(	153)	8000(	90)
0(	152)	9600(	101)

Histogram



#	Boxplot
1	*
1	*
1	*
1	*
1	*
1	*
1	*
4	*
3	*
1	*
2	*
2	*
174	+--0--+

Normal Probability Plot



STD_NAME=Total PCBs

Univariate Procedure

Variable=LNRESULT

Moments

N	163	Sum Wgts	163
Mean	1.757492	Sum	286.4712
Std Dev	3.090333	Variance	9.550156
Skewness	0.524834	Kurtosis	-0.2707
USS	2050.596	CSS	1547.125
CV	175.8376	Std Mean	0.242054
T:Mean=0	7.260758	Pr>|T|	0.0001
Num ^= 0	161	Num > 0	114
M(Sign)	33.5	Pr>=|M|	0.0001
Sgn Rank	3548	Pr>=|S|	0.0001
W:Normal	0.935279	Pr<W	0.0001

Quantiles(Def=5)

100% Max	9.169518	99%	8.987197
75% Q3	3.465736	95%	7.824046
50% Med	1.147402	90%	6.620073
25% Q1	-0.69315	10%	-1.38629
0% Min	-3.68888	5%	-2.99573
		1%	-3.68888
Range	12.8584		
Q3-Q1	4.158883		
Mode	-1.38629		

Extremes

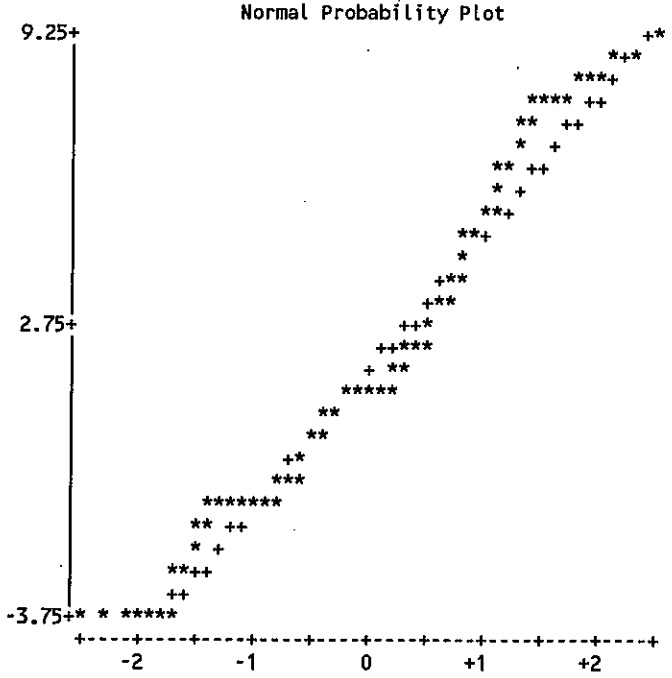
Lowest	Obs	Highest	Obs
-3.68888(	70)	8.160518(	98)
-3.68888(	66)	8.36637(	28)
-3.68888(	65)	8.556414(	94)
-3.68888(	64)	8.987197(	90)
-3.68888(	63)	9.169518(	101)

Missing Value	.
Count	29
% Count/Nobs	15.10

```
Stem Leaf                                #
   9 02                                  2
   8 6                                   1
   8 124                                 3
   7 6888899                             7
   7 013                                 3
   6 6                                   1
   6 0113                                4
   5 578                                 3
   5 1224                                4
   4 556799                              6
   4 0                                   1
   3 556669                              6
   3 000224                              6
   2 567889                              6
   2 0000011123444                      13
   1 55889                               5
   1 00000011111111111111112222233444   32
   0 5566899                             7
   0 001224                              6
  -0 3322                                4
  -0 9997776                             7
  -1 44444444444444444432100            23
  -1
  -2 100                                 3
  -2 8                                   1
  -3 00                                  2
  -3 7777777                             7
     ----+----+----+----+----+----+--
```

Boxplot

Normal Probability Plot



Sub-Surface Soils
Univariate Output

STD_NAME=Trichloroethene

Univariate Procedure

Variable=RESULT

Moments

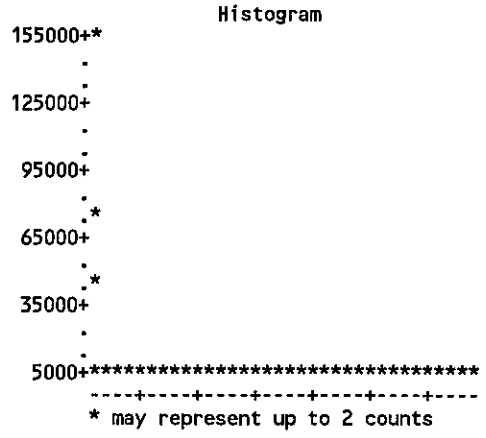
N	70	Sum Wgts	70
Mean	3829.96	Sum	268097.2
Std Dev	20350.27	Variance	4.1413E8
Skewness	6.206204	Kurtosis	41.25224
USS	2.96E10	CSS	2.858E10
CV	531.3441	Std Mean	2432.322
T:Mean=0	1.574611	Pr>|T|	0.1199
Num ^= 0	70	Num > 0	70
M(Sign)	35	Pr>=|M|	0.0001
Sgn Rank	1242.5	Pr>=|S|	0.0001
W:Normal	0.213679	Pr<W	0.0001

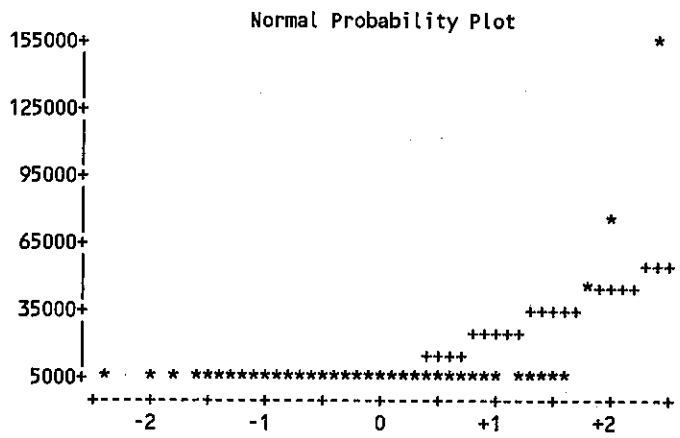
Quantiles(Def=5)

100% Max	150000	99%	150000
75% Q3	0.37	95%	3000
50% Med	0.002	90%	9.725
25% Q1	0.0005	10%	0.0005
0% Min	0.0005	5%	0.0005
		1%	0.0005
Range	150000		
Q3-Q1	0.3695		
Mode	0.0005		

Extremes

Lowest	Obs	Highest	Obs
0.0005(	57)	39(	60)
0.0005(	56)	3000(	70)
0.0005(	55)	42000(	63)
0.0005(	54)	73000(	59)
0.0005(	48)	150000(	62)





Sub-Surface Soils
Univariate Output

STD_NAME=Trichloroethene

Univariate Procedure

Variable=LNRESULT

Moments

N	70	Sum Wgts	70
Mean	-3.94795	Sum	-276.356
Std Dev	4.979323	Variance	24.79365
Skewness	1.545422	Kurtosis	2.020553
USS	2801.803	CSS	1710.762
CV	-126.124	Std Mean	0.595143
T:Mean=0	-6.63361	Pr>|T|	0.0001
Num ^= 0	70	Num > 0	13
M(Sign)	-22	Pr>=|M|	0.0001
Sgn Rank	-856.5	Pr>=|S|	0.0001
W:Normal	0.749248	Pr<W	0.0001

Quantiles(Def=5)

100% Max	11.91839	99%	11.91839
75% Q3	-0.99425	95%	8.006368
50% Med	-6.21461	90%	2.057278
25% Q1	-7.6009	10%	-7.6009
0% Min	-7.6009	5%	-7.6009
		1%	-7.6009
Range	19.51929		
Q3-Q1	6.60665		
Mode	-7.6009		

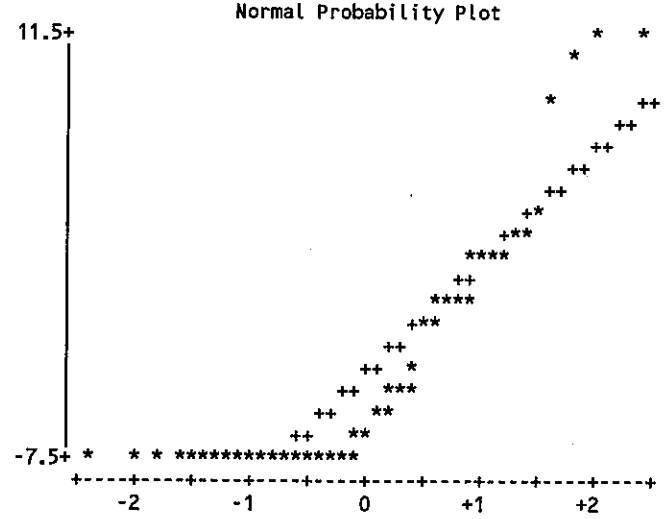
Extremes

Lowest	Obs	Highest	Obs
-7.6009(	57)	3.663562(	60)
-7.6009(	56)	8.006368(	70)
-7.6009(	55)	10.64542(	63)
-7.6009(	54)	11.19821(	59)
-7.6009(	48)	11.91839(	62)

```
Stem Leaf                 #
  11 29                   2
  10 6                    1
   9
   8 0                    1
   7
   6
   5
   4
   3 7                    1
   2 79                   2
   1 111134               6
   0
  -0 8211                 4
  -1 885500               6
  -2
  -3 4                    1
  -4 8772                 4
  -5 87710                5
  -6 99222                5
  -7 66666666666666666666666666666666   32
     ----+----+----+----+----+----+--
```

Boxplot

Normal Probability Plot



Sub-Surface Soils
Univariate Output

STD_NAME=Xylene (total)

Univariate Procedure

Variable=RESULT

Moments

N	122	Sum Wgts	122
Mean	13382.41	Sum	1632654
Std Dev	54200.14	Variance	2.9377E9
Skewness	4.789109	Kurtosis	23.42222
USS	3.773E11	CSS	3.555E11
CV	405.0103	Std Mean	4907.051
T:Mean=0	2.72718	Pr>|T|	0.0073
Num ^= 0	121	Num > 0	121
M(Sign)	60.5	Pr>=|M|	0.0001
Sgn Rank	3690.5	Pr>=|S|	0.0001
W:Normal	0.282073	Pr<W	0.0001

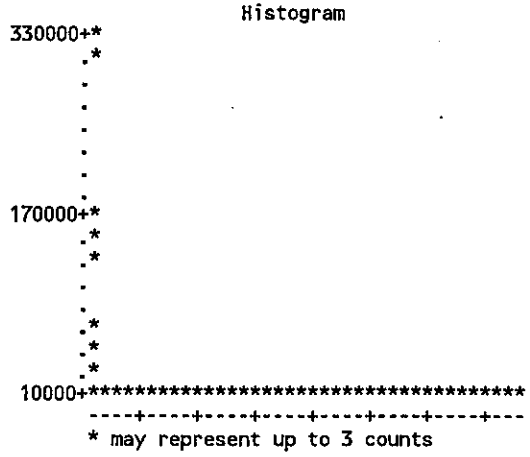
Quantiles(Def=5)

100% Max	330000	99%	317000
75% Q3	15	95%	79000
50% Med	3	90%	3400
25% Q1	0.002	10%	0.002
0% Min	0	5%	0.0015
		1%	0.0015
Range	330000		
Q3-Q1	14.998		
Mode	0.002		

Extremes

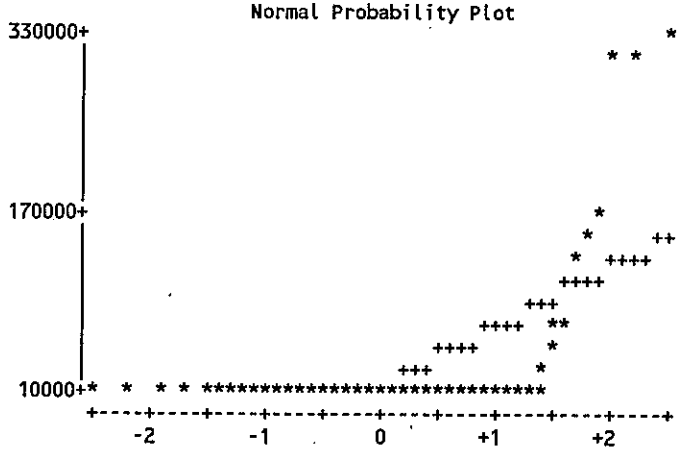
Lowest	Obs	Highest	Obs
0(	80)	149000(	77)
0.0015(	35)	163000(	76)
0.0015(	31)	300000(	85)
0.0015(	28)	317000(	93)
0.0015(	17)	330000(	89)

Histogram



#	Boxplot
1	*
2	*
1	*
1	*
1	*
2	*
1	*
1	*
112	+--*--+

Normal Probability Plot



Sub-Surface Soils
Univariate Output

STD_NAME=Xylene (total)

Univariate Procedure

Variable=LNRESULT

Moments

N	121	Sum Wgts	121
Mean	-0.05298	Sum	-6.41049
Std Dev	5.7923	Variance	33.55074
Skewness	0.467037	Kurtosis	-0.72737
USS	4026.428	CSS	4026.089
CV	-10933.1	Std Mean	0.526573
T:Mean=0	-0.10061	Pr>|T|	0.9200
Num ^= 0	121	Num > 0	70
M(Sign)	9.5	Pr>=|M|	0.1014
Sgn Rank	-207.5	Pr>=|S|	0.5922
W:Normal	0.846975	Pr<W	0.0001

Quantiles(Def=5)

100% Max	12.70685	99%	12.66666
75% Q3	2.70805	95%	11.2772
50% Med	1.098612	90%	8.131531
25% Q1	-6.21461	10%	-6.21461
0% Min	-6.50229	5%	-6.50229
		1%	-6.50229
Range	19.20914		
Q3-Q1	8.922658		
Mode	-6.21461		

Extremes

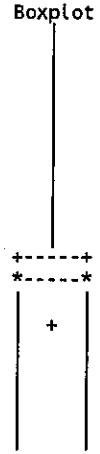
Lowest	Obs	Highest	Obs
-6.50229(	35)	11.9117(	77)
-6.50229(	31)	12.00151(	76)
-6.50229(	28)	12.61154(	85)
-6.50229(	17)	12.66666(	93)
-6.50229(	16)	12.70685(	89)

Missing Value	.
Count	1
% Count/Nobs	0.82

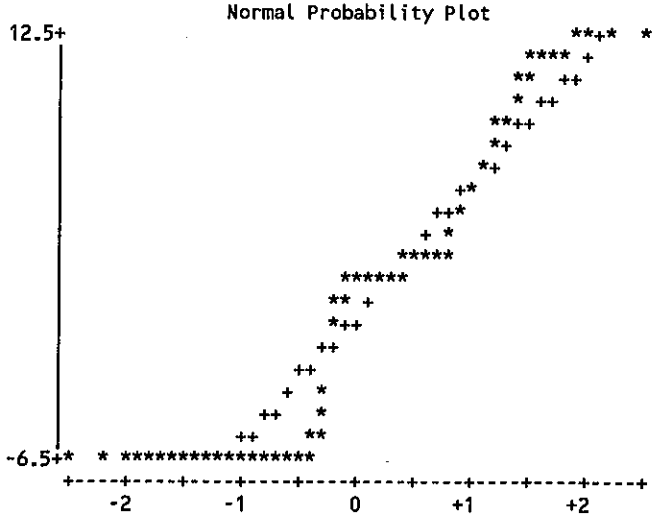
Stem	Leaf	#
12	0677	4
11	0389	4
10	17	2
9	9	1
8	017	3
7	5	1
6	188	3
5	449	3
4	477	3
3	05	2
2	33377777777779	14
1	011111114666666666666666666	27
0	139	3
-0	87	2
-1		
-2		
-3	4	1
-4	777	3
-5	1	1
-6	55555555222222222222222222222222222222220	44

----+----+----+----+----+----+----+----+----

Boxplot



Normal Probability Plot



Sub-Surface Soils
Univariate Output

STD_NAME=Zinc

Univariate Procedure

Variable=RESULT

Moments

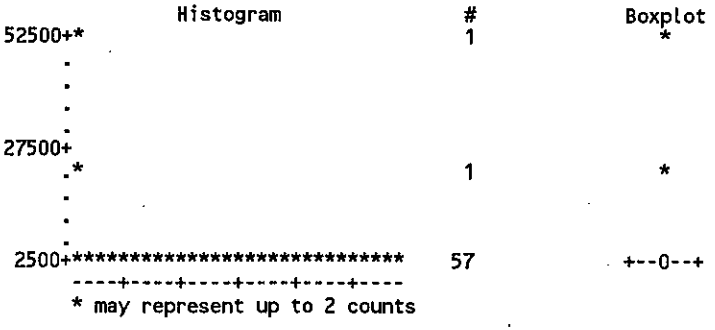
N	59	Sum Wgts	59
Mean	1644.344	Sum	97016.3
Std Dev	7542.587	Variance	56890622
Skewness	6.190687	Kurtosis	40.37948
USS	3.4592E9	CSS	3.2997E9
CV	458.6988	Std Mean	981.9612
T:Mean=0	1.674551	Pr>|T|	0.0994
Num ^= 0	59	Num > 0	59
M(Sign)	29.5	Pr>=|M|	0.0001
Sgn Rank	885	Pr>=|S|	0.0001
W:Normal	0.238832	Pr<W	0.0001

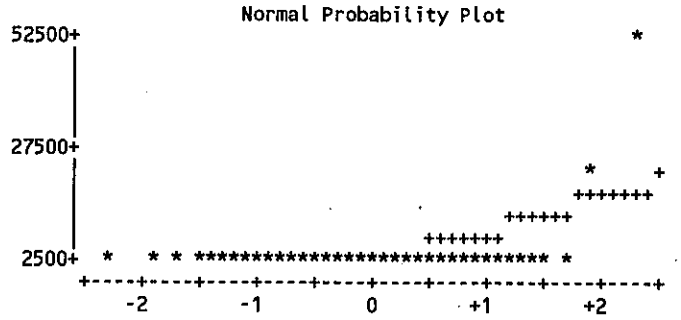
Quantiles(Def=5)

100% Max	53300	99%	53300
75% Q3	447	95%	4730
50% Med	53.1	90%	1440
25% Q1	31.9	10%	18.4
0% Min	14	5%	15.1
		1%	14
Range	53286		
Q3-Q1	415.1		
Mode	14		

Extremes

Lowest	Obs	Highest	Obs
14(	13)	2410(	45)
14(	1)	2720(	59)
15.1(	16)	4730(	53)
15.9(	21)	24000(	38)
16.6(	2)	53300(	46)





Sub-Surface Soils
Univariate Output

---------- STD_NAME=Zinc ----------

Univariate Procedure

Variable=LNRESULT

Moments

N	59	Sum Wgts	59
Mean	4.672568	Sum	275.6815
Std Dev	1.84211	Variance	3.393368
Skewness	1.443751	Kurtosis	1.885863
USS	1484.956	CSS	196.8154
CV	39.42392	Std Mean	0.239822
T:Mean=0	19.48346	Pr>|T|	0.0001
Num ^= 0	59	Num > 0	59
M(Sign)	29.5	Pr>=|M|	0.0001
Sgn Rank	885	Pr>=|S|	0.0001
W:Normal	0.835629	Pr<W	0.0001

Quantiles(Def=5)

100% Max	10.88369	99%	10.88369
75% Q3	6.102559	95%	8.46168
50% Med	3.972177	90%	7.272398
25% Q1	3.462606	10%	2.912351
0% Min	2.639057	5%	2.714695
		1%	2.639057
Range	8.244634		
Q3-Q1	2.639953		
Mode	2.639057		

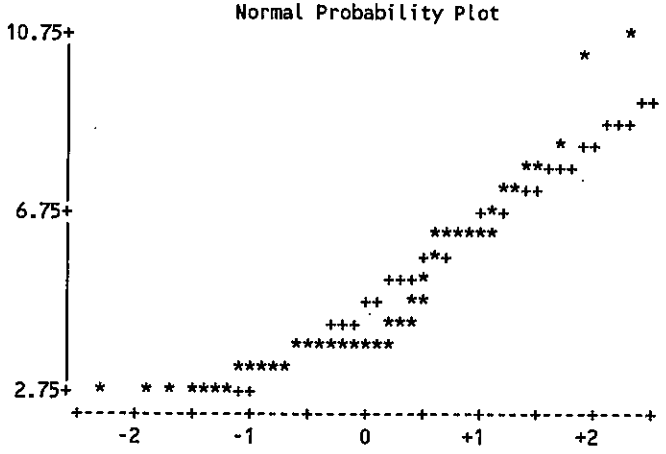
Extremes

Lowest	Obs	Highest	Obs
2.639057(	13)	7.787382(	45)
2.639057(	1)	7.908387(	59)
2.714695(	16)	8.46168(	53)
2.766319(	21)	10.08581(	38)
2.809403(	2)	10.88369(	46)

```
Stem Leaf                     #
  10 9                        1
  10 1                        1
   9
   9
   8 5                        1
   8
   7 89                       2
   7 23                       2
   6 7                        1
   6 01112333                 8
   5 9                        1
   5 04                       2
   4 7                        1
   4 00000001224             11
   3 555555567789999         15
   3 0133334                  7
   2 667889                   6
     ----+----+----+----+
```

Boxplot

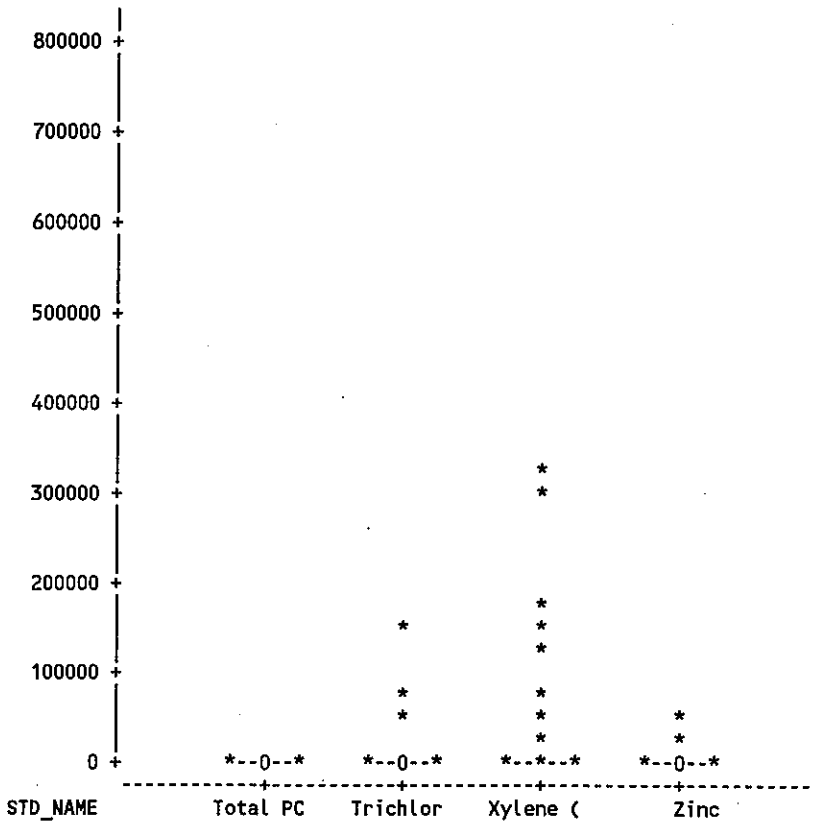
Normal Probability Plot



Sub-Surface Soils
Univariate Output

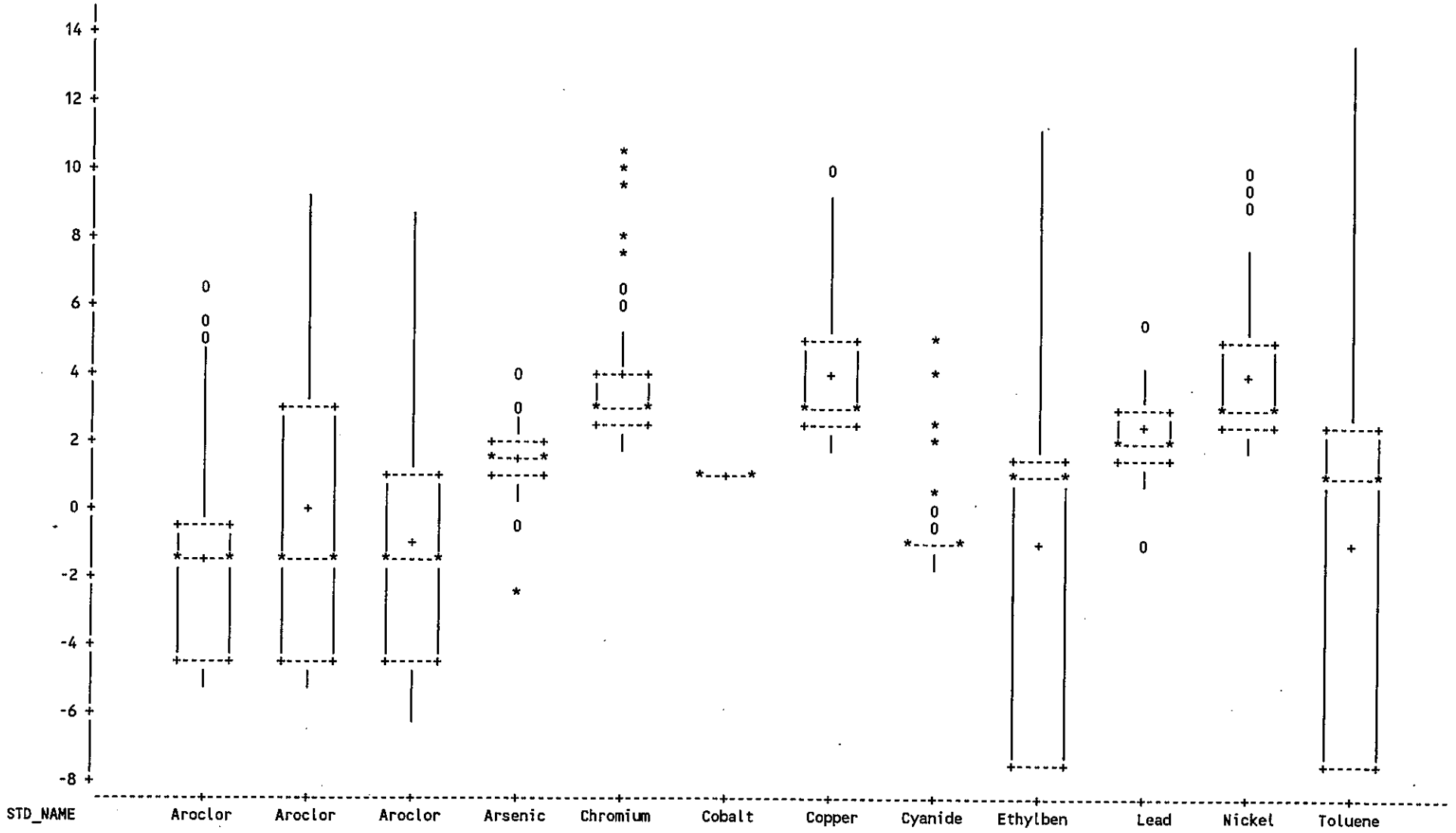
Univariate Procedure
Schematic Plots

Variable=RESULT



Sub-Surface Soils
Univariate Output

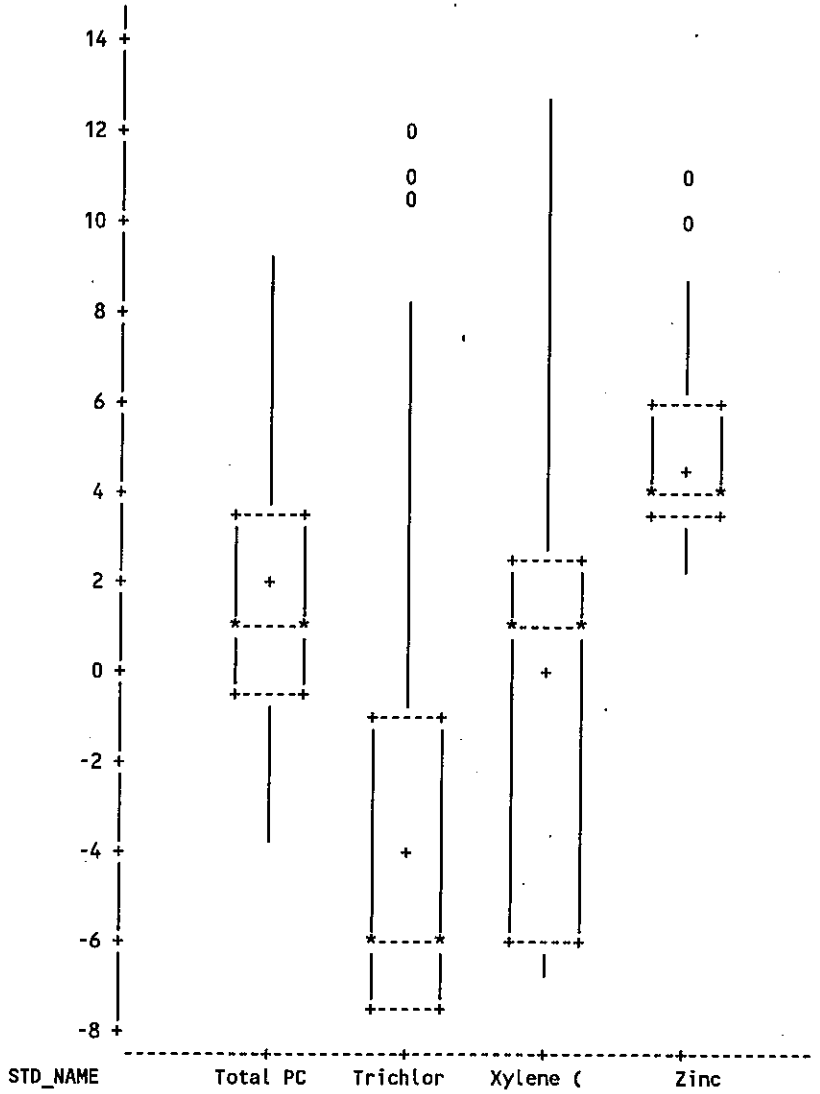
Univariate Procedure
Schematic Plots



Sub-Surface Soils
Univariate Output

Univariate Procedure
Schematic Plots

Variable=LNRESULT



Sediment
Summary Statistics

OBS	STD_NAME	MINDET	MAXDET	MEANDET	MEAN	STD	MAXND	LNMAXDET	LNMEANDT	LNMEAN	LNSTD	LNCV	CAS_NUM	UNITS	SAMP_ID	ER_Q	FREQ	DETRANGE
1	Aroclor 1016	-3.27017	5.81	1.0060	0.5222	1.1710	2.950	1.75958	-2.29259	-1.97260	1.54189	-78.17	12674-11-2	mg/Kg	L7	X	6/30	0.0115-2.95
2	Aroclor 1242	-3.96332	36.30	6.3683	1.5947	6.5831	2.950	3.59182	-0.94653	-1.70339	1.77737	-104.34	53469-21-9	mg/Kg	L7	D	6/30	0.0115-2.95
3	Aroclor 1248	-1.89712	25.00	4.0279	3.3229	5.8126	2.905	3.21888	0.43546	-0.24878	2.03538	-818.14	12672-29-6	mg/Kg	GM98-SED08-C		24/30	0.019-2.905
4	Aroclor 1260	-3.35241	1.13	0.2900	0.4554	0.5986	2.950	0.12222	-1.57172	-1.40449	1.16443	-82.91	11096-82-5	mg/Kg	L7	JD	18/30	0.0205-2.95
5	Arsenic	0.78846	14.10	5.1036	5.1036	2.2239	.	2.64617	1.55827	1.55827	0.37447	24.03	7440-38-2	mg/Kg	L10A		28/28	.-.
6	Barium	4.01458	55.40	55.4000	55.4000	.	.	4.01458	4.01458	4.01458	.	.	7440-39-3	mg/Kg	GM98-SED01-C		1/1	.-.
7	Benzo(a)anthracene	-2.83022	30.00	5.3200	5.3200	6.5721	.	3.40120	1.08278	1.08278	1.24159	114.67	56-55-3	mg/Kg	GM98-SED04-C		24/24	.-.
8	Benzo(b)fluoranthene	-0.65393	27.00	6.3539	6.0979	6.2302	0.210	3.29584	1.46269	1.33672	1.08789	81.38	205-99-2	mg/Kg	GM98-SED04-C		23/24	0.21-0.21
9	Benzo(k)fluoranthene	-2.90042	13.00	2.5369	2.5369	2.7490	.	2.56495	0.47951	0.47951	1.06800	222.73	207-08-9	mg/Kg	GM98-SED04-C		24/24	.-.
10	Benzo[a]pyrene	-3.10109	27.00	5.0098	5.0098	5.7972	.	3.29584	1.06036	1.06036	1.25014	117.90	50-32-8	mg/Kg	GM98-SED04-C	J	24/24	.-.
11	Dibenzo(a,h)anthracene	-2.37516	5.90	1.5545	1.7208	1.9465	7.000	1.77495	-0.03182	-0.07398	1.17824	-1592.68	53-70-3	mg/Kg	GM98-SED04-C		14/24	0.21-7
12	Indeno(1,2,3-cd)pyrene	-0.91629	17.00	3.9561	3.8000	4.0177	0.210	2.83321	0.96783	0.86248	1.04342	120.98	193-39-5	mg/Kg	GM98-SED04-C		23/24	0.21-0.21
13	Lead	1.93152	172.00	54.0857	54.0857	39.0981	.	5.14749	3.71769	3.71769	0.80945	21.77	7439-92-1	mg/Kg	GM98-SED08-C		28/28	.-.

Sediment
Univariate Output

STD_NAME=Aroclor 1016

Univariate Procedure

Variable=RESULT

Moments

N	30	Sum Wgts	30
Mean	0.5222	Sum	15.666
Std Dev	1.171006	Variance	1.371256
Skewness	3.717931	Kurtosis	15.13007
USS	47.94721	CSS	39.76642
CV	224.2448	Std Mean	0.213796
T:Mean=0	2.442521	Pr>|T|	0.0209
Num ^= 0	30	Num > 0	30
M(Sign)	15	Pr>=|M|	0.0001
Sgn Rank	232.5	Pr>=|S|	0.0001
W:Normal	0.471832	Pr<W	0.0001

Quantiles(Def=5)

100% Max	5.81	99%	5.81
75% Q3	0.285	95%	2.95
50% Med	0.1275	90%	1.4
25% Q1	0.05	10%	0.023
0% Min	0.0115	5%	0.0125
		1%	0.0115
Range	5.7985		
Q3-Q1	0.235		
Mode	0.65		

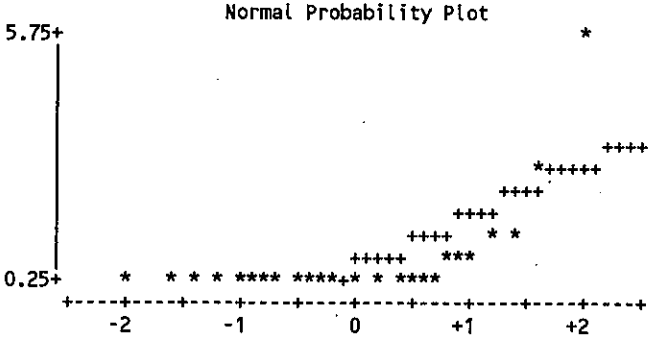
Extremes

Lowest	Obs	Highest	Obs
0.0115(	29)	0.65(	22)
0.0125(	30)	1.4(	4)
0.02(	3)	1.4(	6)
0.026(	21)	2.95(	14)
0.038(	28)	5.81(	23)

```
Stem Leaf                     #
   5 8                        1
   5
   4
   4
   3
   3 0                        1
   2
   2
   1
   1 44                       2
   0 666                      3
   0 00000000011111111112223 23
     ----+----+----+----+---
```

Boxplot

Normal Probability Plot



y Cr[ ] Plar[ ]e [ ] [ ] [ ]

Sediment
Univariate Output

STD_NAME=Aroclor 1242

Univariate Procedure

Variable=RESULT

Moments

N	30	Sum Wgts	30
Mean	1.594667	Sum	47.84
Std Dev	6.583072	Variance	43.33684
Skewness	5.404272	Kurtosis	29.43195
USS	1333.057	CSS	1256.768
CV	412.8181	Std Mean	1.201899
T:Mean=0	1.326789	Pr>|T|	0.1949
Num ^= 0	30	Num > 0	30
M(Sign)	15	Pr>=|M|	0.0001
Sgn Rank	232.5	Pr>=|S|	0.0001
W:Normal	0.242096	Pr<W	0.0001

Quantiles(Def=5)

100% Max	36.3	99%	36.3
75% Q3	0.65	95%	2.95
50% Med	0.14	90%	1.4
25% Q1	0.055	10%	0.0195
0% Min	0.0115	5%	0.0125
		1%	0.0115
Range	36.2885		
Q3-Q1	0.595		
Mode	0.65		

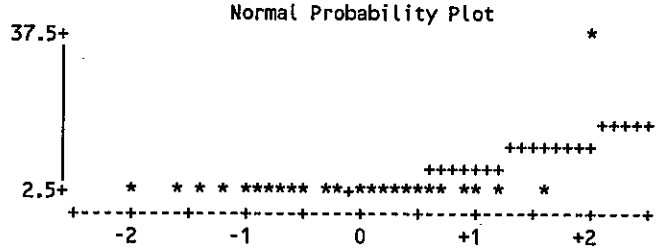
Extremes

Lowest	Obs	Highest	Obs
0.0115(	29)	0.72(	26)
0.0125(	30)	1.4(	4)
0.019(	24)	1.4(	6)
0.02(	3)	2.95(	8)
0.021(	27)	36.3(	23)

```
Stem Leaf                     #
   3 6                        1
   3
   2
   2
   1
   1
   0
   0 00000000000000000000111111113   29
     ----+----+----+----+----+----
Multiply Stem.Leaf by 10**+1
```

Boxplot

Normal Probability Plot



y Cr[ ] Plar[ ]e [ ] [ ] [ ]

Sediment

Univariate Output

STD_NAME=Aroclor 1248

Univariate Procedure

Variable=RESULT

Moments

N	30	Sum Wgts	30
Mean	3.322933	Sum	99.688
Std Dev	5.81258	Variance	33.78609
Skewness	2.578939	Kurtosis	6.734762
USS	1311.053	CSS	979.7965
CV	174.9232	Std Mean	1.061227
T:Mean=0	3.131218	Pr>|T|	0.0040
Num ^= 0	30	Num > 0	30
M(Sign)	15	Pr>=|M|	0.0001
Sgn Rank	232.5	Pr>=|S|	0.0001
W:Normal	0.608806	Pr<W	0.0001

Quantiles(Def=5)

100% Max	25	99%	25
75% Q3	2.905	95%	17
50% Med	0.84	90%	10.95
25% Q1	0.32	10%	0.024
0% Min	0.019	5%	0.0205
		1%	0.019
Range	24.981		
Q3-Q1	2.585		
Mode	0.79		

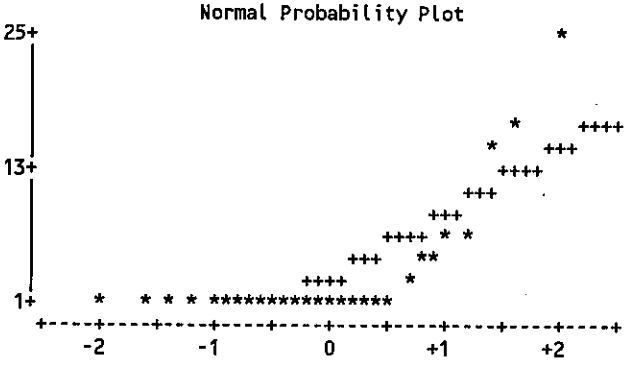
Extremes

Lowest	Obs	Highest	Obs
0.019(	28)	7.9(	7)
0.0205(	27)	7.9(	15)
0.023(	26)	14(	6)
0.025(	25)	17(	4)
0.0255(	24)	25(	8)

```
Stem Leaf                     #
  24 0                        1
  22
  20
  18
  16 0                        1
  14 0                        1
  12
  10
   8
   6 99                       2
   4 46                       2
   2 9                        1
   0 00000223466788890235 8   22
     ----+----+----+----+--
```

Boxplot

Normal Probability Plot



Sediment
Univariate Output

STD_NAME=Aroclor 1260

Univariate Procedure

Variable=RESULT

Moments

N	30	Sum Wgts	30
Mean	0.45535	Sum	13.6605
Std Dev	0.598636	Variance	0.358366
Skewness	2.911633	Kurtosis	10.12786
USS	16.61291	CSS	10.3926
CV	131.4673	Std Mean	0.109296
T:Mean=0	4.166226	Pr>|T|	0.0003
Num ^= 0	30	Num > 0	30
M(Sign)	15	Pr>=|M|	0.0001
Sgn Rank	232.5	Pr>=|S|	0.0001
W:Normal	0.660229	Pr<W	0.0001

Quantiles(Def=5)

100% Max	2.95	99%	2.95
75% Q3	0.51	95%	1.4
50% Med	0.2825	90%	1.265
25% Q1	0.13	10%	0.0455
0% Min	0.0205	5%	0.035
		1%	0.0205
Range	2.9295		
Q3-Q1	0.38		
Mode	0.65		

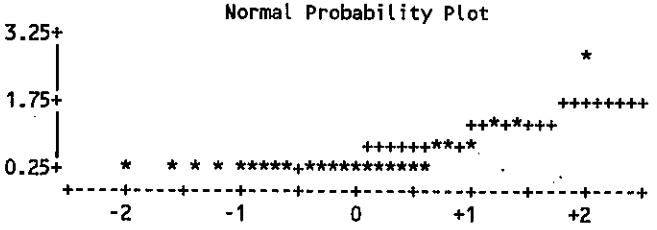
Extremes

Lowest	Obs	Highest	Obs
0.0205(	27)	0.65(	17)
0.035(	24)	1.13(	23)
0.041(	1)	1.4(	3)
0.05(	5)	1.4(	6)
0.069(	30)	2.95(	15)

```
Stem Leaf                     #
   3 0                        1
   2
   2
   1
   1 144                      3
   0 5666                     4
   0 000011111112233333444   22
     ----+----+----+----+--
```

Boxplot

Normal Probability Plot



Univariate Output

STD_NAME=Aroclor 1260

Univariate Procedure

Variable=LNRESULT

Moments

N	30	Sum Wgts	30
Mean	-1.40449	Sum	-42.1347
Std Dev	1.164429	Variance	1.355896
Skewness	-0.08764	Kurtosis	-0.13993
USS	98.4988	CSS	39.32098
CV	-82.9076	Std Mean	0.212595
T:Mean=0	-6.60642	Pr>|T|	0.0001
Num ^= 0	30	Num > 0	4
M(Sign)	-11	Pr>=|M|	0.0001
Sgn Rank	-215.5	Pr>=|S|	0.0001
W:Normal	0.984308	Pr<W	0.9319

Quantiles(Def=5)

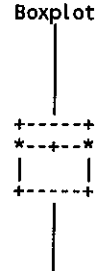
100% Max	1.081805	99%	1.081805
75% Q3	-0.67334	95%	0.336472
50% Med	-1.26412	90%	0.229345
25% Q1	-2.04022	10%	-3.09496
0% Min	-3.88733	5%	-3.35241
		1%	-3.88733
Range	4.969136		
Q3-Q1	1.366876		
Mode	-0.43078		

Extremes

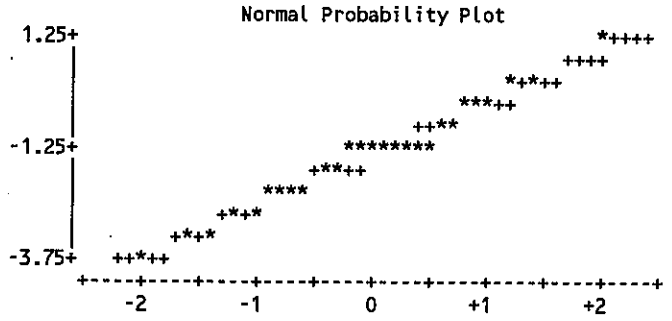
Lowest	Obs	Highest	Obs
-3.88733(	27)	-0.43078(	17)
-3.35241(	24)	0.122218(	23)
-3.19418(	1)	0.336472(	3)
-2.99573(	5)	0.336472(	6)
-2.67365(	30)	1.081805(	15)

```
Stem Leaf                 #
   1 1                    1
   0
   0 133                  3
  -0 444                  3
  -0 87                   2
  -1 433321100            9
  -1 9                    1
  -2 420000               6
  -2 7                    1
  -3 420                  3
  -3 9                    1
     ----+----+----+----+
```

Boxplot



Normal Probability Plot



Sediment
Univariate Output

STD_NAME=Arsenic

Univariate Procedure

Variable=RESULT

Moments

N	28	Sum Wgts	28
Mean	5.103571	Sum	142.9
Std Dev	2.223858	Variance	4.945542
Skewness	2.472148	Kurtosis	9.497158
USS	862.83	CSS	133.5296
CV	43.57454	Std Mean	0.42027
T:Mean=0	12.14357	Pr>|T|	0.0001
Num ^= 0	28	Num > 0	28
M(Sign)	14	Pr>=|M|	0.0001
Sgn Rank	203	Pr>=|S|	0.0001
W:Normal	0.79446	Pr<W	0.0001

Quantiles(Def=5)

100% Max	14.1	99%	14.1
75% Q3	5.85	95%	7.6
50% Med	4.9	90%	7
25% Q1	3.85	10%	2.8
0% Min	2.2	5%	2.4
		1%	2.2
Range	11.9		
Q3-Q1	2		
Mode	4.9		

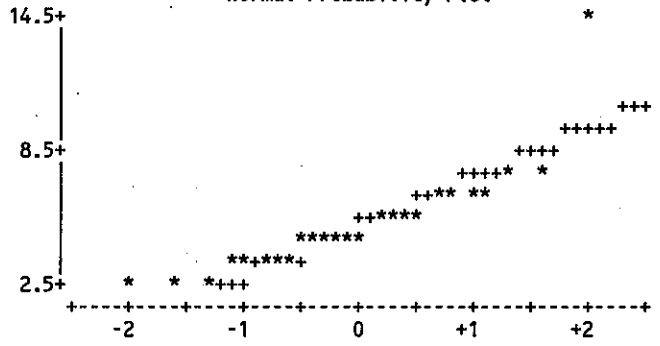
Extremes

Lowest	Obs	Highest	Obs
2.2(	6)	6.4(	4)
2.4(	23)	6.7(	3)
2.8(	15)	7(	8)
3.3(	24)	7.6(	21)
3.4(	5)	14.1(	20)

```
Stem Leaf                 #
  14 1                    1
  13
  12
  11
  10
   9
   8
   7 06                   2
   6 0247                 4
   5 22277                5
   4 22456999             8
   3 34589                5
   2 248                  3
     ----+----+----+----+
```

Boxplot

Normal Probability Plot



Univariate Output

STD_NAME=Arsenic

Univariate Procedure

Variable=LNRESULT

Moments

N	28	Sum Wgts	28
Mean	1.558266	Sum	43.63145
Std Dev	0.374466	Variance	0.140225
Skewness	0.382051	Kurtosis	1.798811
USS	71.77549	CSS	3.786078
CV	24.03097	Std Mean	0.070768
T:Mean=0	22.01952	Pr>|T|	0.0001
Num ^= 0	28	Num > 0	28
M(Sign)	14	Pr>=|M|	0.0001
Sgn Rank	203	Pr>=|S|	0.0001
W:Normal	0.964364	Pr<W	0.4729

Quantiles(Def=5)

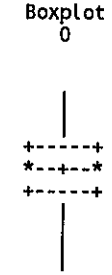
100% Max	2.646175	99%	2.646175
75% Q3	1.766113	95%	2.028148
50% Med	1.589235	90%	1.94591
25% Q1	1.347989	10%	1.029619
0% Min	0.788457	5%	0.875469
		1%	0.788457
Range	1.857717		
Q3-Q1	0.418124		
Mode	1.589235		

Extremes

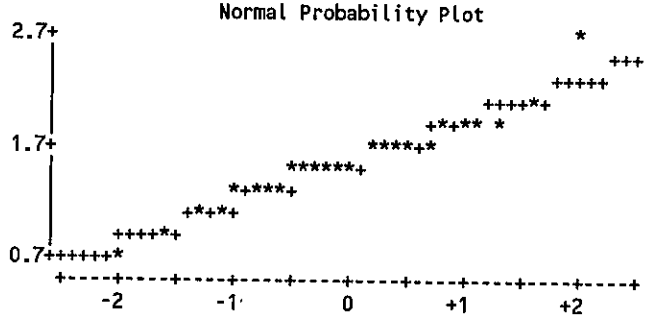
Lowest	Obs	Highest	Obs
0.788457(	6)	1.856298(	4)
0.875469(	23)	1.902108(	3)
1.029619(	15)	1.94591(	8)
1.193922(	24)	2.028148(	21)
1.223775(	5)	2.646175(	20)

```
Stem Leaf                 #
  26 5                    1
  24
  22
  20 3                    1
  18 2605                 4
  16 555449               6
  14 44803999             8
  12 2546                 4
  10 39                   2
   8 8                    1
   6 9                    1
     ----+----+----+----+
Multiply Stem.Leaf by 10**-1
```

Boxplot



Normal Probability Plot



Sediment

Univariate Output

---------- STD_NAME=Barium ----------

Univariate Procedure

Variable=RESULT

Moments

N	1	Sum Wgts	1
Mean	55.4	Sum	55.4
Std Dev	.	Variance	.
Skewness	.	Kurtosis	.
USS	3069.16	CSS	0
CV	.	Std Mean	.
T:Mean=0	.	Pr>|T|	.
Num ^= 0	1	Num > 0	1
M(Sign)	0.5	Pr>=|M|	1.0000
Sgn Rank	0.5	Pr>=|S|	1.0000
W:Normal	.	Pr<W	.

Quantiles(Def=5)

100% Max	55.4	99%	55.4
75% Q3	55.4	95%	55.4
50% Med	55.4	90%	55.4
25% Q1	55.4	10%	55.4
0% Min	55.4	5%	55.4
		1%	55.4
Range	0		
Q3-Q1	0		
Mode	55.4		

Extremes

Lowest	Obs	Highest	Obs
55.4(	1)	.(	)
.(	)	.(	)
.(	)	.(	)
.(	)	.(	)
.(	)	55.4(	1)

Sediment
Univariate Output

STD_NAME=Barium

Univariate Procedure

Variable=LNRESULT

Moments

N	1	Sum Wgts	1
Mean	4.01458	Sum	4.01458
Std Dev	.	Variance	.
Skewness	.	Kurtosis	.
USS	16.11685	CSS	0
CV	.	Std Mean	.
T:Mean=0	.	Pr>|T|	.
Num ^= 0	1	Num > 0	1
M(Sign)	0.5	Pr>=|M|	1.0000
Sgn Rank	0.5	Pr>=|S|	1.0000
W:Normal	.	Pr<W	.

Quantiles(Def=5)

100% Max	4.01458	99%	4.01458
75% Q3	4.01458	95%	4.01458
50% Med	4.01458	90%	4.01458
25% Q1	4.01458	10%	4.01458
0% Min	4.01458	5%	4.01458
		1%	4.01458
Range	0		
Q3-Q1	0		
Mode	4.01458		

Extremes

Lowest	Obs	Highest	Obs
4.01458(	1)	.(	)
.(	)	.(	)
.(	)	.(	)
.(	)	.(	)
.(	)	4.01458(	1)

Sediment
Univariate Output

STD_NAME=Benzo(a)anthracene

Univariate Procedure

Variable=RESULT

Moments

N	24	Sum Wgts	24
Mean	5.319958	Sum	127.679
Std Dev	6.572099	Variance	43.19248
Skewness	2.676586	Kurtosis	8.3131
USS	1672.674	CSS	993.4271
CV	123.5367	Std Mean	1.341524
T:Mean=0	*3.965608	Pr>|T|	0.0006
Num ^= 0	24	Num > 0	24
M(Sign)	12	Pr>=|M|	0.0001
Sgn Rank	150	Pr>=|S|	0.0001
W:Normal	0.676836	Pr<W	0.0001

Quantiles(Def=5)

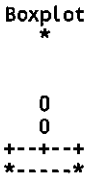
100% Max	30	99%	30
75% Q3	5.3	95%	15
50% Med	3.05	90%	13
25% Q1	1.795	10%	0.92
0% Min	0.059	5%	0.61
		1%	0.059
Range	29.941		
Q3-Q1	3.505		
Mode	0.059		

Extremes

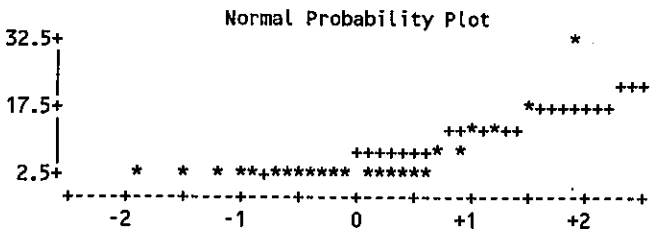
Lowest	Obs	Highest	Obs
0.059(	23)	8(	10)
0.61(	21)	12(	13)
0.92(	2)	13(	12)
1.2(	22)	15(	9)
1.4(	3)	30(	1)

```
Stem Leaf                     #
   3 0                        1
   2
   2
   1 5                        1
   1 23                       2
   0 568                      3
   0 01111222233333444       17
     ----+----+----+----+
Multiply Stem.Leaf by 10**+1
```

Boxplot



Normal Probability Plot



Sediment
Univariate Output

---------- STD_NAME=Benzo(a)anthracene ----------

Univariate Procedure

Variable=LNRESULT

Moments

N	24	Sum Wgts	24
Mean	1.082776	Sum	25.98662
Std Dev	1.241592	Variance	1.54155
Skewness	-1.05664	Kurtosis	3.442699
USS	63.59333	CSS	35.45565
CV	114.6675	Std Mean	0.253439
T:Mean=0	4.272335	Pr>|T|	0.0003
Num ^= 0	24	Num > 0	21
M(Sign)	9	Pr>=|M|	0.0003
Sgn Rank	122	Pr>=|S|	0.0001
W:Normal	0.924131	Pr<W	0.0731

Quantiles(Def=5)

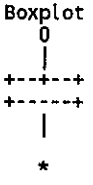
100% Max	3.401197	99%	3.401197
75% Q3	1.664851	95%	2.70805
50% Med	1.113931	90%	2.564949
25% Q1	0.583603	10%	-0.08338
0% Min	-2.83022	5%	-0.4943
		1%	-2.83022
Range	6.231415		
Q3-Q1	1.081248		
Mode	-2.83022		

Extremes

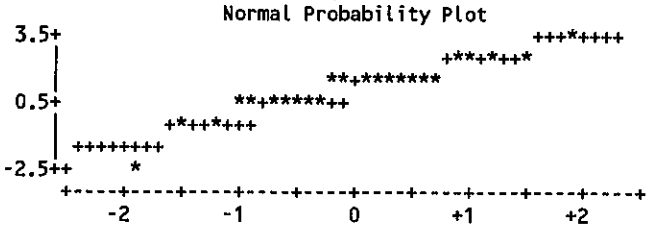
Lowest	Obs	Highest	Obs
-2.83022(	23)	2.079442(	10)
-0.4943(	21)	2.484907(	13)
-0.08338(	2)	2.564949(	12)
0.182322(	22)	2.70805(	9)
0.336472(	3)	3.401197(	1)

```
Stem Leaf                 #
   3 4                    1
   2 1567                 4
   1 0012234567          10
   0 235669               6
  -0 51                   2
  -1
  -2 8                    1
     ----+----+----+----+
```

Boxplot



Normal Probability Plot



Sediment
Univariate Output

STD_NAME=Benzo(b)fluoranthene

Univariate Procedure

Variable=RESULT

Moments

N	24	Sum Wgts	24
Mean	6.097917	Sum	146.35
Std Dev	6.23021	Variance	38.81551
Skewness	2.060154	Kurtosis	4.704307
USS	1785.187	CSS	892.7568
CV	102.1695	Std Mean	1.271736
T:Mean=0	4.794954	Pr>|T|	0.0001
Num ^= 0	24	Num > 0	24
M(Sign)	12	Pr>=|M|	0.0001
Sgn Rank	150	Pr>=|S|	0.0001
W:Normal	0.771775	Pr<W	0.0001

Quantiles(Def=5)

100% Max	27	99%	27
75% Q3	6.95	95%	17
50% Med	4.2	90%	14
25% Q1	2.31	10%	1.2
0% Min	0.21	5%	0.52
		1%	0.21
Range	26.79		
Q3-Q1	4.64		
Mode	4.5		

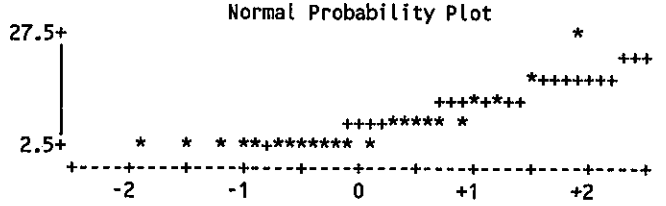
Extremes

Lowest	Obs	Highest	Obs
0.21(	23)	8(	15)
0.52(	21)	14(	12)
1.2(	22)	14(	13)
1.5(	1)	17(	8)
2(	4)	27(	2)

```
Stem Leaf                     #
   2 7                        1
   2
   1 7                        1
   1 44                       2
   0 666678                   6
   0 01122222334444          14
     ----+----+----+----+
Multiply Stem.Leaf by 10**+1
```

Boxplot

Normal Probability Plot



Sediment
Univariate Output

STD_NAME=Benzo(b)fluoranthene

Univariate Procedure

Variable=LNRESULT

Moments

N	24	Sum Wgts	24
Mean	1.33672	Sum	32.08127
Std Dev	1.087888	Variance	1.183501
Skewness	-0.69331	Kurtosis	1.210947
USS	70.10419	CSS	27.22053
CV	81.38494	Std Mean	0.222064
T:Mean=0	6.019516	Pr>|T|	0.0001
Num ^= 0	24	Num > 0	22
M(Sign)	10	Pr>=|M|	0.0001
Sgn Rank	133	Pr>=|S|	0.0001
W:Normal	0.961838	Pr<W	0.4823

Quantiles(Def=5)

100% Max	3.295837	99%	3.295837
75% Q3	1.936641	95%	2.833213
50% Med	1.432527	90%	2.639057
25% Q1	0.837238	10%	0.182322
0% Min	-1.56065	5%	-0.65393
		1%	-1.56065
Range	4.856485		
Q3-Q1	1.099403		
Mode	1.504077		

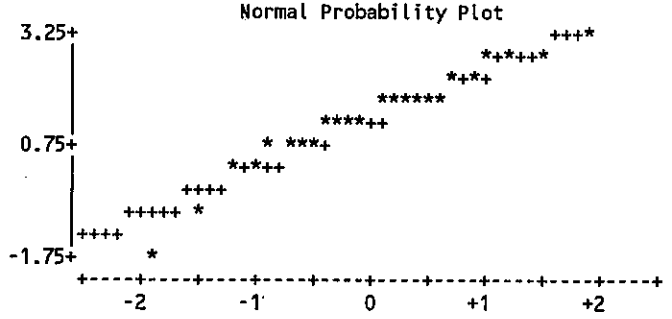
Extremes

Lowest	Obs	Highest	Obs
-1.56065(	23)	2.079442(	15)
-0.65393(	21)	2.639057(	12)
0.182322(	22)	2.639057(	13)
0.405465(	1)	2.833213(	8)
0.693147(	4)	3.295837(	2)

```
Stem Leaf                 #
   3 3                    1
   2 668                  3
   2 01                   2
   1 557889               6
   1 0134                 4
   0 7889                 4
   0 24                   2
  -0
  -0 7                    1
  -1
  -1 6                    1
     ----+----+----+----+
```

Boxplot

Normal Probability Plot



y Cr[ ]Plan[ ]e [ ][ ][ ][

y Cr[ ]Plar[ ]e [ ] [ ] [ ]

Sediment
Univariate Output

STD_NAME=Benzo[a]pyrene

Univariate Procedure

Variable=RESULT

Moments

N	24	Sum Wgts	24
Mean	5.009792	Sum	120.235
Std Dev	5.797195	Variance	33.60747
Skewness	2.690912	Kurtosis	8.692852
USS	1375.324	CSS	772.9718
CV	115.7173	Std Mean	1.183347
T:Mean=0	4.233576	Pr>|T|	0.0003
Num ^= 0	24	Num > 0	24
M(Sign)	12	Pr>=|M|	0.0001
Sgn Rank	150	Pr>=|S|	0.0001
W:Normal	0.696755	Pr<W	0.0001

Quantiles(Def=5)

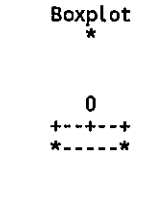
100% Max	27	99%	27
75% Q3	5.35	95%	13
50% Med	2.95	90%	11
25% Q1	1.745	10%	1
0% Min	0.045	5%	0.6
		1%	0.045
Range	26.955		
Q3-Q1	3.605		
Mode	1.6		

Extremes

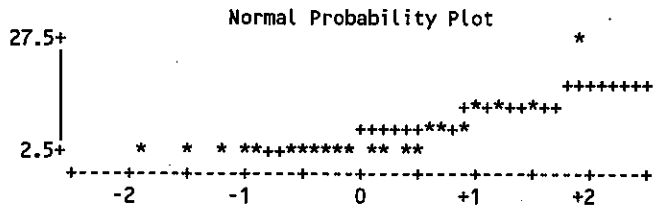
Lowest	Obs	Highest	Obs
0.045(	23)	7.4(	9)
0.6(	21)	11(	12)
1(	1)	11(	13)
1.1(	22)	13(	8)
1.6(	16)	27(	2)

```
Stem Leaf                     #
   2 7                        1
   2
   1
   1 113                      3
   0 55567                    5
   0 011122222333344         15
     ----+----+----+----+
Multiply Stem.Leaf by 10**+1
```

Boxplot



Normal Probability Plot



Sediment
Univariate Output

STD_NAME=Benzo[a]pyrene

Univariate Procedure

Variable=LNRESULT

Moments

N	24	Sum Wgts	24
Mean	1.060365	Sum	25.44875
Std Dev	1.25014	Variance	1.562849
Skewness	-1.39938	Kurtosis	4.566761
USS	62.93049	CSS	35.94553
CV	117.8972	Std Mean	0.255184
T:Mean=0	4.155299	Pr>|T|	0.0004
Num ^= 0	23	Num > 0	21
M(Sign)	9.5	Pr>=|M|	0.0001
Sgn Rank	112	Pr>=|S|	0.0001
W:Normal	0.898565	Pr<W	0.0191

Quantiles(Def=5)

100% Max	3.295837	99%	3.295837
75% Q3	1.676004	95%	2.564949
50% Med	1.081662	90%	2.397895
25% Q1	0.55329	10%	0
0% Min	-3.10109	5%	-0.51083
		1%	-3.10109
Range	6.39693		
Q3-Q1	1.122713		
Mode	0.470004		

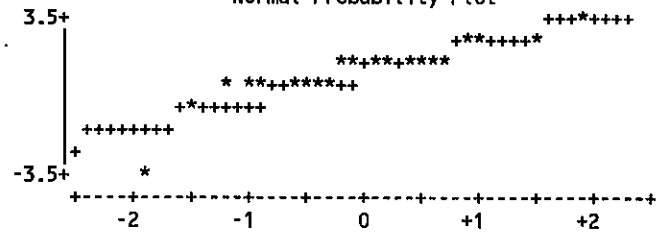
Extremes

Lowest	Obs	Highest	Obs
-3.10109(	23)	2.00148(	9)
-0.51083(	21)	2.397895(	12)
0(	1)	2.397895(	13)
0.09531(	22)	2.564949(	8)
0.470004(	16)	3.295837(	2)

```
Stem Leaf                     #
   3 3                        1
   2 0446                     4
   1 0011335667              10
   0 0155679                  7
  -0 5                        1
  -1
  -2
  -3 1                        1
     ----+----+----+----+
```

Boxplot

Normal Probability Plot



Sediment
Univariate Output

---------- STD_NAME=Dibenzo(a,h)anthracene ----------

Univariate Procedure

Variable=RESULT

Moments

N	24	Sum Wgts	24
Mean	1.72075	Sum	41.298
Std Dev	1.946549	Variance	3.789054
Skewness	1.534619	Kurtosis	1.491525
USS	158.2118	CSS	87.14824
CV	113.1221	Std Mean	0.397338
T:Mean=0	4.330699	Pr>|T|	0.0002
Num ^= 0	24	Num > 0	24
M(Sign)	12	Pr>=|M|	0.0001
Sgn Rank	150	Pr>=|S|	0.0001
W:Normal	0.774879	Pr<W	0.0001

Quantiles(Def=5)

100% Max	7	99%	7
75% Q3	2.65	95%	5.9
50% Med	0.84	90%	4.65
25% Q1	0.355	10%	0.23
0% Min	0.093	5%	0.21
		1%	0.093
Range	6.907		
Q3-Q1	2.295		
Mode	1.3		

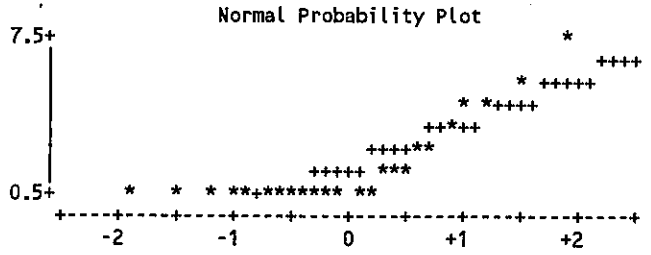
Extremes

Lowest	Obs	Highest	Obs
0.093(	21)	3.05(	6)
0.21(	23)	4.4(	8)
0.23(	22)	4.65(	9)
0.275(	2)	5.9(	1)
0.28(	3)	7(	13)

```
Stem Leaf                     #
   7 0                        1
   6
   5 9                        1
   4 46                       2
   3 0                        1
   2 67                       2
   1 0335                     4
   0 1223334458888           13
     ----+----+----+----+
```

Boxplot

Normal Probability Plot



Sediment
Univariate Output

STD_NAME=Dibenzo(a,h)anthracene

Univariate Procedure

Variable=LNRESULT

Moments

N	24	Sum Wgts	24
Mean	-0.07398	Sum	-1.77548
Std Dev	1.178239	Variance	1.388248
Skewness	0.065879	Kurtosis	-0.82629
USS	32.06105	CSS	31.9297
CV	-1592.68	Std Mean	0.240507
T:Mean=0	-0.30759	Pr>|T|	0.7612
Num ^= 0	24	Num > 0	10
M(Sign)	-2	Pr>=|M|	0.5413
Sgn Rank	-10	Pr>=|S|	0.7818
W:Normal	0.968906	Pr<W	0.6407

Quantiles(Def=5)

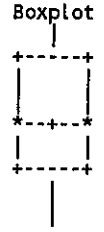
100% Max	1.94591	99%	1.94591
75% Q3	0.974382	95%	1.774952
50% Med	-0.17442	90%	1.536867
25% Q1	-1.05269	10%	-1.46968
0% Min	-2.37516	5%	-1.56065
		1%	-2.37516
Range	4.321066		
Q3-Q1	2.027069		
Mode	0.262364		

Extremes

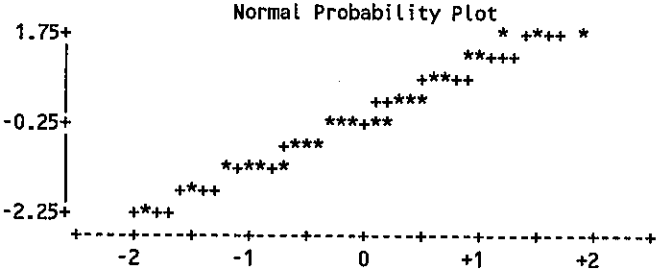
Lowest	Obs	Highest	Obs
-2.37516(	21)	1.115142(	6)
-1.56065(	23)	1.481605(	8)
-1.46968(	22)	1.536867(	9)
-1.29098(	2)	1.774952(	1)
-1.27297(	3)	1.94591(	13)

```
Stem Leaf                     #
   1 5589                     4
   1 001                      3
   0
   0 334                      3
  -0 33221                    5
  -0 987                      3
  -1 332                      3
  -1 65                       2
  -2 4                        1
     ----+----+----+----+
```

Boxplot



Normal Probability Plot



Sediment
Univariate Output

STD_NAME=Indeno(1,2,3-cd)pyrene

Univariate Procedure

Variable=RESULT

Moments

N	24	Sum Wgts	24
Mean	3.8	Sum	91.2
Std Dev	4.017717	Variance	16.14205
Skewness	2.064314	Kurtosis	4.468092
USS	717.8272	CSS	371.2672
CV	105.7294	Std Mean	0.820113
T:Mean=0	4.633507	Pr>|T|	0.0001
Num ^= 0	24	Num > 0	24
M(Sign)	12	Pr>=|M|	0.0001
Sgn Rank	150	Pr>=|S|	0.0001
W:Normal	0.760309	Pr<W	0.0001

Quantiles(Def=5)

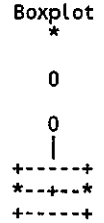
100% Max	17	99%	17
75% Q3	4.15	95%	12
50% Med	2.45	90%	8.6
25% Q1	1.37	10%	0.65
0% Min	0.21	5%	0.4
		1%	0.21
Range	16.79		
Q3-Q1	2.78		
Mode	3.9		

Extremes

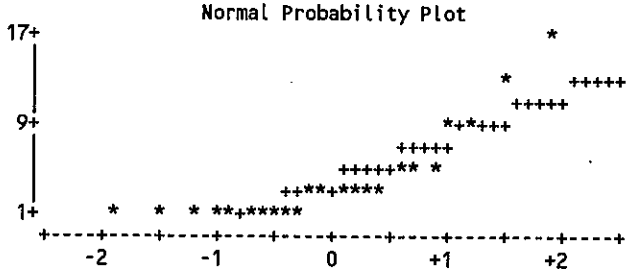
Lowest	Obs	Highest	Obs
0.21(	23)	5.6(	9)
0.4(	21)	8.2(	12)
0.65(	1)	8.6(	13)
0.75(	22)	12(	8)
1.3(	16)	17(	2)

```
Stem Leaf                     #
  16 0                        1
  14
  12 0                        1
  10
   8 26                       2
   6
   4 036                      3
   2 0458899                  7
   0 2468334579              10
     ----+----+----+----+
```

Boxplot



Normal Probability Plot



Sediment
Univariate Output

STD_NAME=Indeno(1,2,3-cd)pyrene

Univariate Procedure

Variable=LNRESULT

Moments

N	24	Sum Wgts	24
Mean	0.862481	Sum	20.69954
Std Dev	1.043423	Variance	1.088732
Skewness	-0.29232	Kurtosis	0.253494
USS	42.8938	CSS	25.04085
CV	120.9793	Std Mean	0.212988
T:Mean=0	4.049436	Pr>|T|	0.0005
Num ^= 0	24	Num > 0	20
M(Sign)	8	Pr>=|M|	0.0015
Sgn Rank	111.5	Pr>=|S|	0.0004
W:Normal	0.983856	Pr<W	0.9463

Quantiles(Def=5)

100% Max	2.833213	99%	2.833213
75% Q3	1.422455	95%	2.484907
50% Med	0.89588	90%	2.151762
25% Q1	0.314571	10%	-0.43078
0% Min	-1.56065	5%	-0.91629
		1%	-1.56065
Range	4.393861		
Q3-Q1	1.107884		
Mode	1.360977		

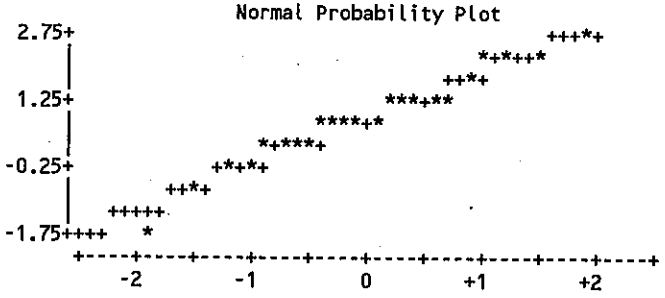
Extremes

Lowest	Obs	Highest	Obs
-1.56065(	23)	1.722767(	9)
-0.91629(	21)	2.104134(	12)
-0.43078(	1)	2.151762(	13)
-0.28768(	22)	2.484907(	8)
0.262364(	16)	2.833213(	2)

```
Stem Leaf                 #
   2 58                   2
   2 12                   2
   1 57                   2
   1 00444                5
   0 56799                5
   0 3334                 4
  -0 43                   2
  -0 9                    1
  -1
  -1 6                    1
     ----+----+----+----+
```

Boxplot

Normal Probability Plot



Sediment
Univariate Output

STD_NAME=Lead

Univariate Procedure

Variable=RESULT

Moments

N	28	Sum Wgts	28
Mean	54.08571	Sum	1514.4
Std Dev	39.09808	Variance	1528.66
Skewness	1.318127	Kurtosis	1.940126
USS	123181.2	CSS	41273.81
CV	72.28911	Std Mean	7.388842
T:Mean=0	7.319917	Pr>|T|	0.0001
Num ^= 0	28	Num > 0	28
M(Sign)	14	Pr>=|M|	0.0001
Sgn Rank	203	Pr>=|S|	0.0001
W:Normal	0.890987	Pr<W	0.0069

Quantiles(Def=5)

100% Max	172	99%	172
75% Q3	67.3	95%	126
50% Med	45	90%	122
25% Q1	26.05	10%	12.4
0% Min	6.9	5%	7
		1%	6.9
Range	165.1		
Q3-Q1	41.25		
Mode	6.9		

Extremes

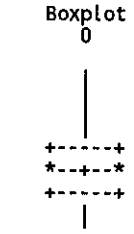
Lowest	Obs	Highest	Obs
6.9(	22)	78.4(	2)
7(	23)	104(	12)
12.4(	1)	122(	27)
16.7(	25)	126(	14)
17(	10)	172(	9)

Stem Leaf #

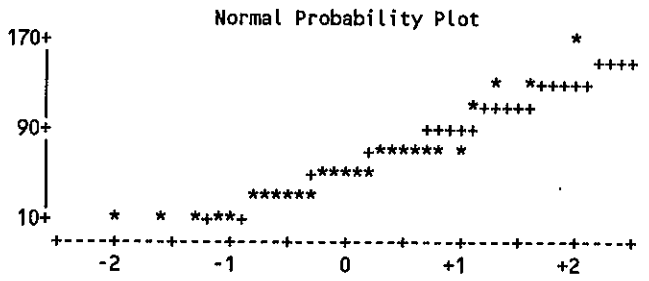
```
  16 2                  1
  14
  12 26                 2
  10 4                  1
   8
   6 0167828            7
   4 023769             6
   2 457897             6
   0 77277              5
     ----+----+----+----+
```

Multiply Stem.Leaf by 10**+1

Boxplot



Normal Probability Plot



STD_NAME=Lead

Univariate Procedure

Variable=LNRESULT

Moments

N	28	Sum Wgts	28
Mean	3.717693	Sum	104.0954
Std Dev	0.809448	Variance	0.655207
Skewness	-0.5626	Kurtosis	0.082397
USS	404.6854	CSS	17.69058
CV	21.77287	Std Mean	0.152971
T:Mean=0	24.3032	Pr>|T|	0.0001
Num ^= 0	28	Num > 0	28
M(Sign)	14	Pr>=|M|	0.0001
Sgn Rank	203	Pr>=|S|	0.0001
W:Normal	0.960049	Pr<W	0.3814

Quantiles(Def=5)

100% Max	5.147494	99%	5.147494
75% Q3	4.209156	95%	4.836282
50% Med	3.805572	90%	4.804021
25% Q1	3.259485	10%	2.517696
0% Min	1.931521	5%	1.94591
		1%	1.931521
Range	3.215973		
Q3-Q1	0.949671		
Mode	1.931521		

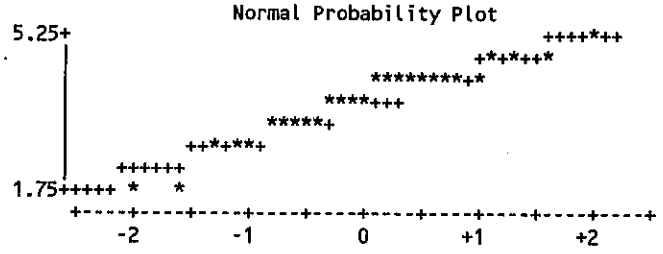
Extremes

Lowest	Obs	Highest	Obs
1.931521(	22)	4.361824(	2)
1.94591(	23)	4.644391(	12)
2.517696(	1)	4.804021(	27)
2.815409(	25)	4.836282(	14)
2.833213(	10)	5.147494(	9)

```
Stem Leaf                 #
   5 1                    1
   4 688                  3
   4 011122234            9
   3 67789                5
   3 22334                5
   2 588                  3
   2
   1 99                   2
     ----+----+----+----+
```

Boxplot

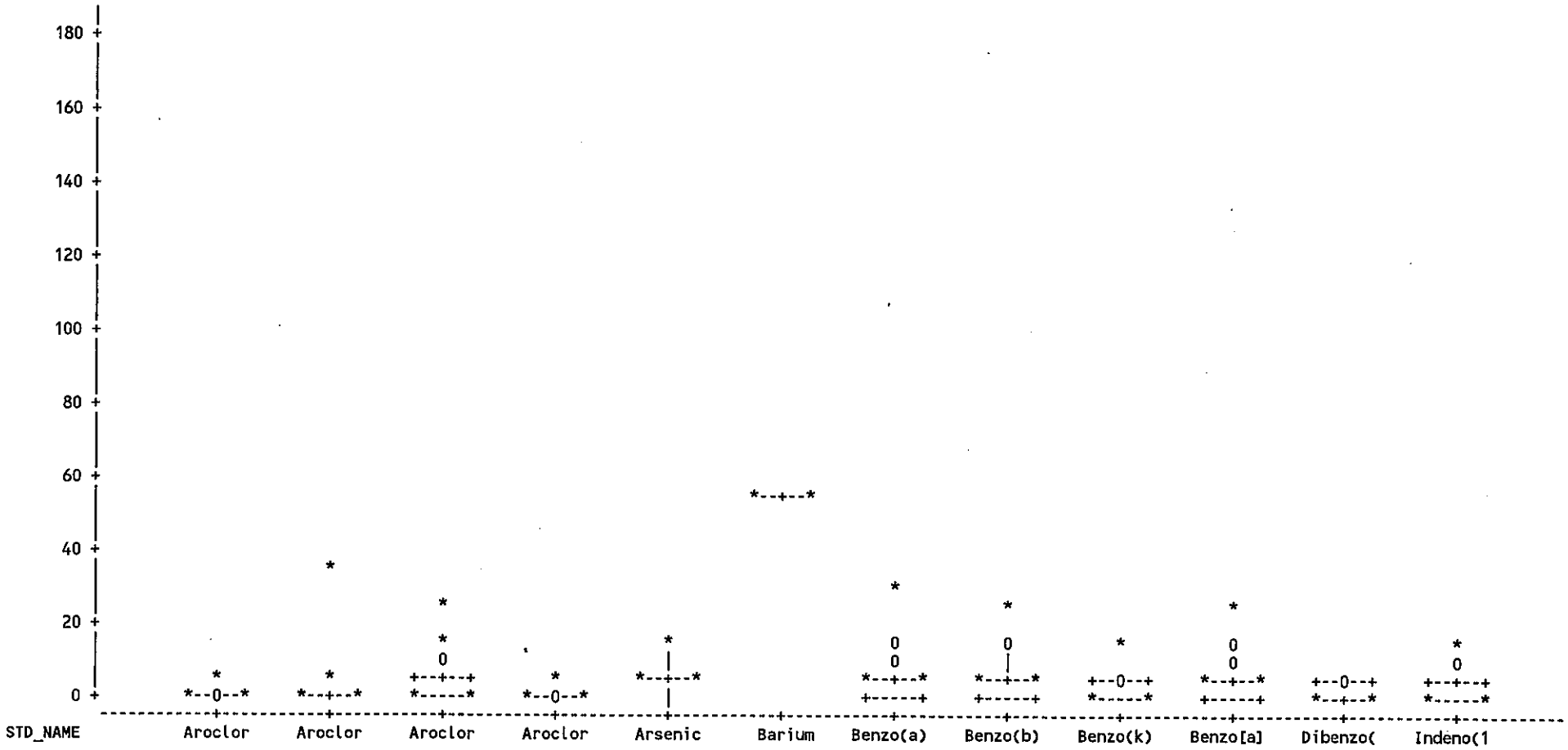
Normal Probability Plot



Sediment
Univariate Output

Univariate Procedure
Schematic Plots

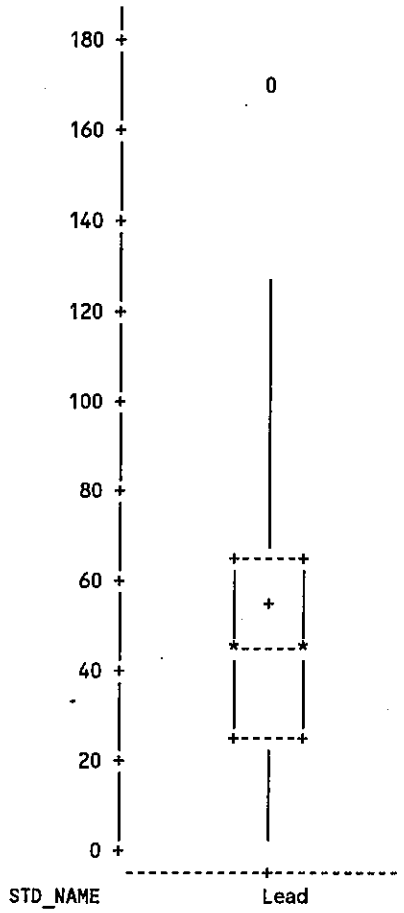
Variable=RESULT



Sediment
Univariate Output

Univariate Procedure
Schematic Plots

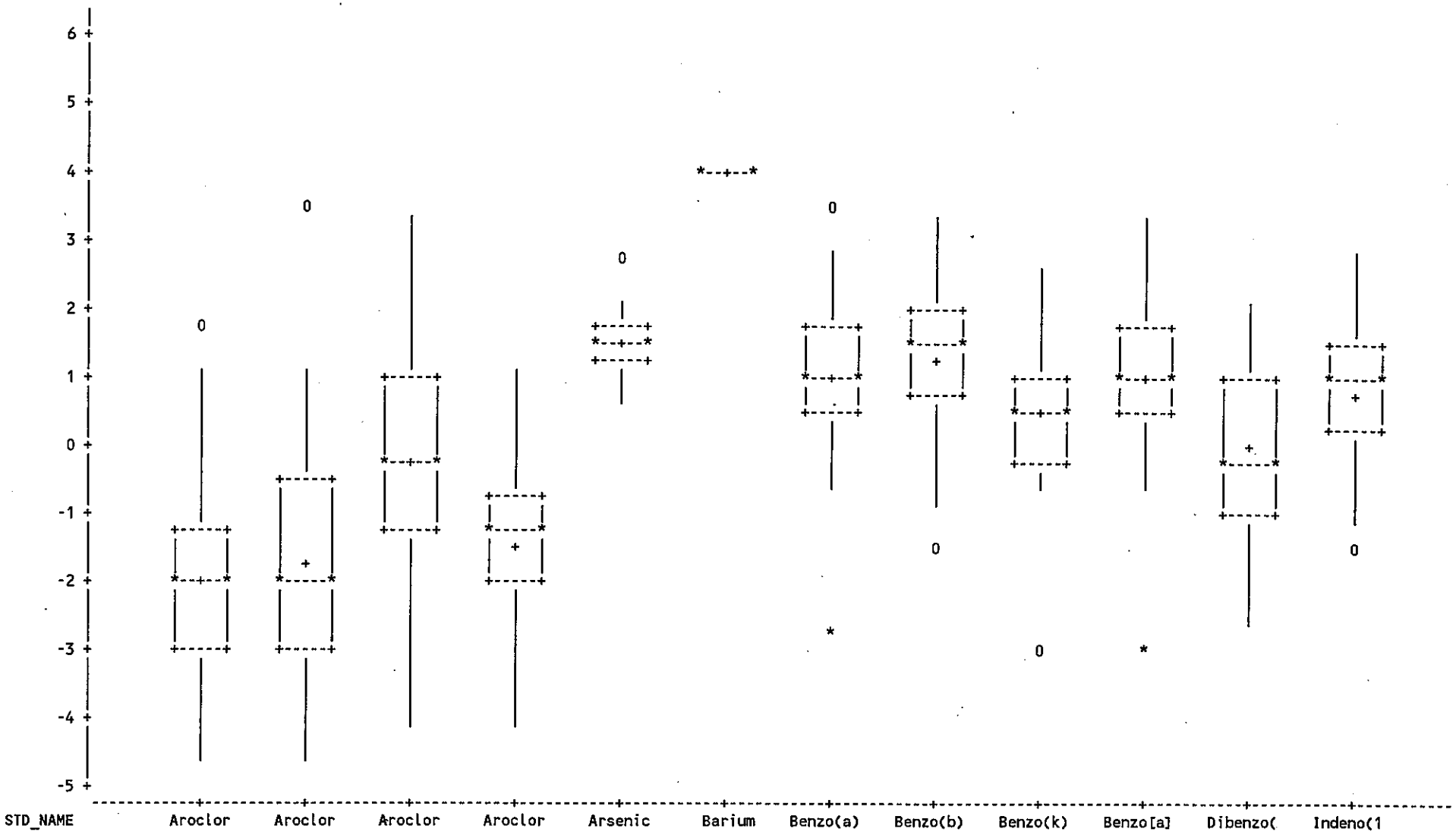
Variable=RESULT



Sediment
Univariate Output

Univariate Procedure
Schematic Plots

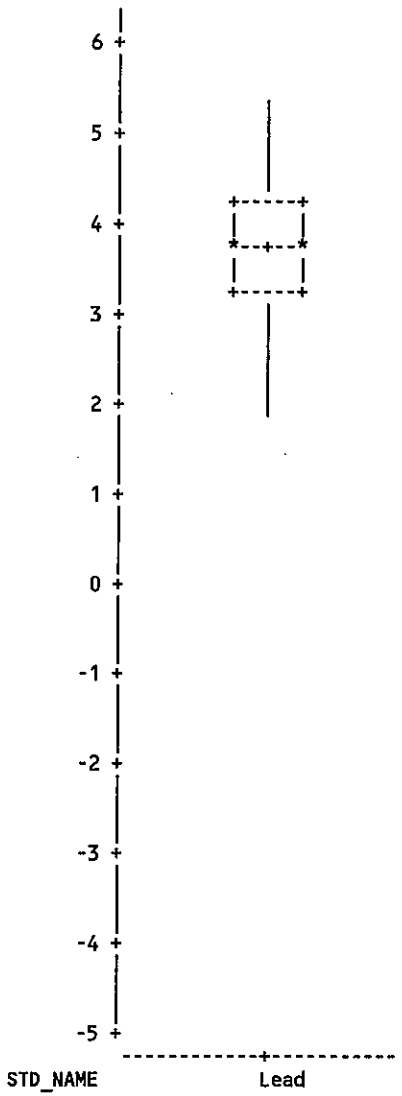
Variable=LNRESULT



Sediment
Univariate Output

Univariate Procedure
Schematic Plots

Variable=LNRESULT



ATTACHMENT B

Summary of Indoor Air Migration Calculations

GM - Ley Creek
Human Health Risk Assessment
Vapor Migration Exposure Point Concentration Evaluation

Table B-1a. ***Subsurface Soil Vapor Migration Data Set***

Chemical	Number Detected	Total Analyzed	Fraction Detected	Sample ID	Maximum Detection mg/kg	Mean mg/kg	Standard Deviation	Standard Error	95% UCL mg/kg	Indoor Air Screening Exp. Point Conc. ug/m3	Distance to Source (1) ft	Distance to Source (1) m	Soil Type (2)	Vertical Permeability (3) fraction
Ethylbenzene	30	122	0.25	T-23	61	2.5	10	0.9	3.7		9.0	2.7	fine sand & silt	1.0E-08
Toluene	38	122	0.31	HA-1	720	6.1	65	5.9	14		6.0	1.8	fine sand & silt	1.0E-08
Trichloroethene	19	70	0.27	BH-47	150	3.8	20	2.4	7.0		7.0	2.1	fine sand & silt	1.0E-08
Xylene (total)	32	122	0.26	T-21	330	13	54	4.9	20		10	3.1	fine sand & silt	1.0E-08

Notes:
Units - mg/kg
Conceptual Model is based on Figure 3-2A.
(1) - Taken from Figure 3-5 or 3-9 (O'Brien & Gere 2000)
(2) - Taken from O'Brien & Gere (2000)
(3) Taken from (O'Brien & Gere 2000)

GM - Ley Creek
Human Health Risk Assessment
Vapor Migration Exposure Point Concentration Evaluation

Table B-1b. *"Shallow Well" Vapor Migration Data Set*

Sample ID	Sample Date	Chemical	CAS Number	Maximum Concentration ug/L	ER_Q	Indoor Air Screening Exp. Point Conc. ug/m3
T-21	7/29/99	Ethylbenzene	100-41-4	39000		
OBG-15	11/11/99	Methylene chloride	75-09-2	11	NJ	
T-21	11/11/99	Toluene	108-88-3	2400		
MWI-3	8/18/99	Trichloroethene	79-01-6	25000		
MWI-3	8/18/99	Vinyl chloride	75-01-4	140	J	
T-21	7/29/99	Xylene (total)	1330-20-7	200000		
MWI-3	8/18/99	cis-1,2-Dichloroethene	156-59-2	4700		
W-11S	11/8/99	trans-1,2-Dichloroethene	156-60-5	57		

Table 1b. *"Shallow Well" Vapor Migration Model Source and Soil P*

Chemical	Distance to GW Source (1) ft	Distance to GW Source (1) m
Ethylbenzene	8.45	2.6
Methylene chloride	6	1.8
Toluene	8.45	2.6
Trichloroethene	4.75	1.4
Vinyl chloride	4.75	1.4
Xylene (total)	8.45	2.6
cis-1,2-Dichloroethene	4.75	1.4
trans-1,2-Dichloroethene	6.8	2.1

Notes:

Units - ug/L

Vapor Migration Data Set - Taken from RI VOC Data not including piezometer data.

Conceptual Model is based on Figure 3-2A.

Shallow well data represents shallow sources plus attenuated deep well sources.

(1) - Distance to top of well screen was, conservatively, selected as top of ground water source.

(2) - Taken from O'Brien & Gere (2000).

(3) Taken from (O'Brien & Gere 2000).

DATA ENTRY SHEET

CALCULATE RISK-BASED SOIL CONCENTRATION (enter "X" in "YES" box)

VERSION 1.2
September, 1998

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL SOIL CONCENTRATION (enter "X" in "YES" box and initial soil conc. below)

YES [ ]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial soil conc., C_R (µg/kg)	Chemical
100414	3700	Ethylbenzene

ENTER Average soil temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to top of contamination, L_t (cm)	ENTER Depth below grade to bottom of contamination, (enter value of 0 if value is unknown) L_b (cm)	ENTER Totals must add up to value of L_t (cell D28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
10	33	270	0	270	0	0			1.00E-08

ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm³)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum A soil organic carbon fraction, f_{oc}^A (unitless)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm³)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum B soil organic carbon fraction, f_{oc}^B (unitless)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm³)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)	ENTER Stratum C soil organic carbon fraction, f_{oc}^C (unitless)
1.5	0.35	0.15	0.006	1.5	0.43	0.25	0.003	1.7	0.34	0.26	0.002

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s²)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)
33	40	961	961	488	0.1	1

ENTER Averaging time for carcinogens, AT_c (yrs)	ENTER Averaging time for noncarcinogens, AT_{nc} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1

Used to calculate risk-based soil concentration.

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
7.50E-02	7.80E-06	7.88E-03	25	8,501	409.34	617.20	3.63E+02	1.69E+02	0.0E+00	1.0E+00

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Initial soil concentration used, C_R (µg/kg)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
9.46E+08	237	0.200	0.180	0.080	#N/A	#N/A	#N/A	1.00E-08	3,844	1	1.25E+05

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} ($atm\text{-}m^3/mol$)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)	Convection path length, L_p (cm)
9.24E+05	4.16E-04	33	10,155	3.18E-03	1.37E-01	1.75E-04	2.88E-03	0.00E+00	0.00E+00	2.88E-03	237	33

Soil-water partition coefficient, K_d (cm^3/g)	Source vapor conc., C_{source} (µg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (µg/m^3)	Finite source β term (unitless)	Finite source ψ term $(sec)^{-1}$	Time for source depletion, τ_D (sec)	Exposure duration > time for source depletion (YES/NO)
2.18E+00	5.96E+01	0.10	8.48E+00	2.88E-03	3.84E+02	6.30E+109	3.86E-05	2.30E-03	NA	NA	NA	NA

Finite source indoor attenuation coefficient, $<\alpha>$ (unitless)	Mass limit bldg. conc., $C_{building}$ (µg/m^3)	Finite source bldg. conc., $C_{building}$ (µg/m^3)	Final finite source bldg. conc., $C_{building}$ (µg/m^3)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
NA	NA	NA	NA	NA	1.0E+00

RESULTS SHEET

RISK-BASED SOIL CONCENTRATION CALCULATIONS:

Indoor exposure soil conc., carcinogen (µg/kg)	Indoor exposure soil conc., noncarcinogen (µg/kg)	Risk-based indoor exposure soil conc., (µg/kg)	Soil saturation conc., C_{sat} (µg/kg)	Final indoor exposure soil conc., (µg/kg)
NA	4.54E+05	4.54E+05	3.88E+05	3.88E+05

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

VLOOKUP TABLES

Soil Properties Lookup Table

SCS Soil Type	K_s (cm/h)	α (1/cm)	N (unitless)	M (unitless)	θ_s (cm^3/cm^3)	θ_r (cm^3/cm^3)	Mean Grain Diameter (cm)
C	0.20	0.008	1.09	0.083	0.38	0.068	0.0092
CL	0.26	0.019	1.31	0.237	0.41	0.095	0.016
L	1.04	0.036	1.56	0.359	0.43	0.078	0.020
LS	14.59	0.124	2.28	0.561	0.41	0.057	0.040
S	29.70	0.145	2.68	0.627	0.43	0.045	0.044
SC	0.12	0.027	1.23	0.187	0.38	0.100	0.025
SCL	1.31	0.059	1.48	0.324	0.39	0.100	0.029
SI	0.25	0.016	1.37	0.270	0.46	0.034	0.0046
SIC	0.02	0.005	1.09	0.083	0.26	0.070	0.0039
SICL	0.07	0.010	1.23	0.187	0.43	0.089	0.0056
SIL	0.45	0.020	1.41	0.291	0.45	0.067	0.011
SL	4.42	0.075	1.89	0.471	0.41	0.065	0.030

Chemical Properties Lookup Table

CAS No.	Chemical	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Pure component water solubility, S (mg/L)	Henry's law constant H' (unitless)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
50293	DDT	2.63E+06	1.37E-02	4.95E-06	2.50E-02	3.32E-04	8.10E-06	25	533.15	720.75	11,000	9.7E-05	0.0E+00
50328	Benzo(a)pyrene	1.02E+06	4.30E-02	9.00E-06	1.62E-03	4.63E-05	1.13E-06	25	715.90	969.27	15,000	2.1E-03	0.0E+00
51285	2,4-Dinitrophenol	1.00E-02	2.73E-02	9.06E-06	2.79E+03	1.82E-05	4.44E-07	25	605.28	827.85	15,000	0.0E+00	7.0E-03
53703	Dibenz(a,h)anthracene	3.80E+06	2.02E-02	5.18E-06	2.49E-03	6.03E-07	1.47E-08	25	743.24	990.41	16,000	2.1E-03	0.0E+00
56235	Carbon tetrachloride	1.74E+02	7.80E-02	8.80E-06	7.93E+02	1.25E+00	3.05E-02	25	349.90	556.60	7,127	1.5E-05	0.0E+00
56553	Benz(a)anthracene	3.98E+05	5.10E-02	9.00E-06	9.40E-03	1.37E-04	3.34E-06	25	708.15	1004.79	15,000	2.1E-04	0.0E+00
57749	Chlordane	1.20E+05	1.18E-02	4.37E-06	5.60E-02	1.99E-03	4.85E-05	25	624.24	885.73	13,000	3.7E-04	0.0E+00
58899	gamma-HCH (Lindane)	1.07E+03	1.42E-02	7.34E-06	6.80E+00	5.74E-04	1.40E-05	25	596.55	839.36	13,000	3.7E-04	0.0E+00
60571	Dieldrin	2.14E+04	1.25E-02	4.74E-06	1.95E-01	6.19E-04	1.51E-05	25	613.32	842.25	13,000	4.6E-03	0.0E+00
65850	Benzoic Acid	6.00E-01	5.36E-02	7.97E-06	3.50E+03	6.31E-05	1.54E-06	25	720.00	751.00	10,000	0.0E+00	1.4E+01
67641	Acetone	5.75E-01	1.24E-01	1.14E-05	1.00E+06	1.59E-03	3.88E-05	25	329.20	508.10	6,955	0.0E+00	3.5E-01
67663	Chloroform	3.98E+01	1.04E-01	1.00E-05	7.92E+03	1.50E-01	3.66E-03	25	334.32	536.40	6,988	2.3E-05	0.0E+00
67721	Hexachloroethane	1.78E+03	2.50E-03	6.80E-06	5.00E+01	1.59E-01	3.88E-03	25	458.00	695.00	9,510	4.0E-06	0.0E+00
71363	Butanol	6.92E+00	8.00E-02	9.30E-06	7.40E+04	3.61E-04	8.80E-06	25	390.88	563.05	10,346	0.0E+00	3.5E-01
71432	Benzene	5.89E+01	8.80E-02	9.80E-06	1.75E+03	2.28E-01	5.56E-03	25	353.24	562.16	7,342	8.3E-06	0.0E+00
71556	1,1,1-Trichloroethane	1.10E+02	7.80E-02	8.80E-06	1.33E+03	7.05E-01	1.72E-02	25	347.24	545.00	7,136	0.0E+00	1.0E+00
72208	Endrin	1.23E+04	1.25E-02	4.74E-06	2.50E-01	3.08E-04	7.51E-06	25	718.15	986.20	12,000	0.0E+00	1.1E-03
72435	Methoxychlor	9.77E+04	1.56E-02	4.46E-06	4.50E-02	6.48E-04	1.58E-05	25	651.02	848.49	14,000	0.0E+00	1.8E-02
72548	DDD	1.00E+06	1.69E-02	4.76E-06	9.00E-02	1.64E-04	4.00E-06	25	639.90	863.77	14,000	6.9E-05	0.0E+00
72559	DDE	4.47E+06	1.44E-02	5.87E-06	1.20E-01	8.61E-04	2.10E-05	25	636.44	860.38	13,000	9.7E-05	0.0E+00
74839	Methyl bromide	1.05E+01	7.28E-02	1.21E-05	1.52E+04	2.56E-01	6.24E-03	25	276.71	467.00	5,714	0.0E+00	5.0E-03
75014	Vinyl chloride (chloroethene)	1.86E+01	1.06E-01	1.23E-06	2.76E+03	1.11E+00	2.71E-02	25	259.25	432.00	5,250	8.4E-05	0.0E+00
75092	Methylene chloride	1.17E+01	1.01E-01	1.17E-05	1.30E+04	8.98E-02	2.19E-03	25	313.00	510.00	6,706	4.7E-07	3.0E+00
75150	Carbon disulfide	4.57E+01	1.04E-01	1.00E-05	1.19E+03	1.24E+00	3.02E-02	25	319.00	552.00	6,391	0.0E+00	7.0E-01
75252	Bromoform	8.71E+01	1.49E-02	1.03E-05	3.10E+03	2.19E-02	5.34E-04	25	422.35	696.00	9,479	1.1E-06	0.0E+00
75274	Bromodichloromethane	5.50E+01	2.98E-02	1.06E-05	6.74E+03	6.56E-02	1.60E-03	25	363.15	585.85	7,000	1.8E-05	0.0E+00
75343	1,1-Dichloroethane	3.16E+01	7.42E-02	1.05E-05	5.06E+03	2.30E-01	5.61E-03	25	330.55	523.00	6,895	0.0E+00	5.0E-01
75354	1,1-Dichloroethylene	5.89E+01	9.00E-02	1.04E-05	2.25E+03	1.07E+00	2.61E-02	25	304.75	576.05	6,247	5.0E-05	0.0E+00
76448	Heptachlor	1.41E+06	1.12E-02	5.69E-06	1.80E-01	4.47E-02	1.09E-03	25	603.69	846.31	13,000	1.3E-03	0.0E+00
77474	Hexachlorocyclopentadiene	2.00E+05	1.61E-02	7.21E-06	1.80E+00	1.11E+00	2.71E-02	25	512.15	746.00	10,931	0.0E+00	7.0E-05
78591	Isophorone	4.68E+01	6.23E-02	6.76E-06	1.20E+04	2.72E-04	6.63E-06	25	488.35	715.00	10,271	2.7E-07	0.0E+00
78875	1,2-Dichloropropane	4.37E+01	7.82E-02	8.73E-06	2.80E+03	1.15E-01	2.80E-03	25	369.52	572.00	7,590	0.0E+00	4.0E-03
79005	1,1,2-Trichloroethane	5.01E+01	7.80E-02	8.80E-06	4.42E+03	3.74E-02	9.12E-04	25	386.15	602.00	8,322	1.6E-05	0.0E+00
79016	Trichloroethylene	1.66E+02	7.90E-02	9.10E-06	1.10E+03	4.22E-01	1.03E-02	25	360.36	544.20	7,505	1.7E-06	0.0E+00
79345	1,1,2,2-Tetrachloroethane	9.33E+01	7.10E-02	7.90E-06	2.97E+03	1.41E-02	3.44E-04	25	419.60	661.15	8,996	5.8E-05	0.0E+00
83329	Acenaphthene	7.08E+03	4.21E-02	7.69E-06	4.24E+00	6.36E-03	1.55E-04	25	550.54	803.15	12,155	0.0E+00	2.1E-01
84662	Diethylphthalate	2.88E+02	2.56E-02	6.35E-06	1.08E+03	1.85E-05	4.51E-07	25	567.15	757.00	13,733	0.0E+00	2.8E+00
84742	Di-n-butyl phthalate	3.39E+04	4.38E-02	7.86E-06	1.12E+01	3.85E-08	9.39E-10	25	613.15	798.67	14,751	0.0E+00	3.5E-01

85687	Butyl benzyl phthalate	5.75E+04	1.74E-02	4.83E-06	2.69E+00	5.17E-05	1.26E-06	25	660.60	839.68	13,000	0.0E+00	7.0E-01
86306	N-Nitrosodiphenylamine	1.29E+03	3.12E-02	6.35E-06	3.51E+01	2.05E-04	5.00E-06	25	632.28	890.45	13,000	1.4E-06	0.0E+00
86737	Fluorene	1.38E+04	3.63E-02	7.88E-06	1.98E+00	2.61E-03	6.37E-05	25	570.44	870.00	12,666	0.0E+00	1.4E-01
86748	Carbazole	3.39E+03	3.90E-02	7.03E-06	7.48E+00	6.26E-07	1.53E-08	25	627.87	899.00	13,977	5.7E-06	0.0E+00
87683	Hexachloro-1,3-butadiene	5.37E+04	5.61E-02	6.16E-06	3.23E+00	3.34E-01	8.15E-03	25	486.15	738.00	10,206	2.2E-05	0.0E+00
87865	Pentachlorophenol	5.92E+02	5.60E-02	6.10E-06	1.95E+03	1.00E-06	2.44E-08	25	582.15	813.20	14,000	3.4E-05	0.0E+00
88062	2,4,6-Trichlorophenol	3.81E+02	3.18E-02	6.25E-06	8.00E+02	3.19E-04	7.78E-06	25	519.15	749.03	12,000	3.1E-06	0.0E+00
91203	Naphthalene	2.00E+03	5.90E-02	7.50E-06	3.10E+01	1.98E-02	4.83E-04	25	491.14	748.40	10,373	0.0E+00	1.4E-01
91941	3,3-Dichlorobenzidine	7.24E+02	1.94E-02	6.74E-06	3.11E+00	1.64E-07	4.00E-09	25	560.26	754.03	13,000	1.3E-04	0.0E+00
95476	o-Xylene	3.63E+02	8.70E-02	1.00E-05	1.78E+02	2.13E-01	5.20E-03	25	417.60	630.30	8,661	0.0E+00	7.0E+00
95487	2-Methylphenol (o-cresol)	9.12E+01	7.40E-02	8.30E-06	2.60E+04	4.92E-05	1.20E-06	25	464.19	697.60	10,800	0.0E+00	1.8E-01
95501	1,2-Dichlorobenzene	6.17E+02	6.90E-02	7.90E-06	1.56E+02	7.79E-02	1.90E-03	25	453.57	705.00	9,700	0.0E+00	2.0E-01
95578	2-Chlorophenol	3.88E+02	5.01E-02	9.46E-06	2.20E+04	1.60E-02	3.90E-04	25	447.53	675.00	9,572	0.0E+00	1.8E-02
95954	2,4,5-Trichlorophenol	1.60E+03	2.91E-02	7.03E-06	1.20E+03	1.78E-04	4.34E-06	25	526.15	759.13	13,000	0.0E+00	3.5E-01
98953	Nitrobenzene	6.46E+01	7.60E-02	8.60E-06	2.09E+03	9.84E-04	2.40E-05	25	483.95	719.00	10,566	0.0E+00	2.0E-03
100414	Ethylbenzene	3.63E+02	7.50E-02	7.80E-06	1.69E+02	3.23E-01	7.88E-03	25	409.34	617.20	8,501	0.0E+00	1.0E+00
100425	Styrene	7.76E+02	7.10E-02	8.00E-06	3.10E+02	1.13E-01	2.76E-03	25	418.31	636.00	8,737	0.0E+00	1.0E+00
105679	2,4-Dimethylphenol	2.09E+02	5.84E-02	8.69E-06	7.87E+03	8.20E-05	2.00E-06	25	484.13	707.60	11,329	0.0E+00	7.0E-02
106423	p-Xylene	3.89E+02	7.69E-02	8.44E-06	1.85E+02	3.14E-01	7.66E-03	26	411.52	616.20	8,525	0.0E+00	7.0E+00
106467	1,4-Dichlorobenzene	6.17E+02	6.90E-02	7.90E-06	7.38E+01	9.96E-02	2.43E-03	25	447.21	684.75	9,271	0.0E+00	8.0E-01
106478	p-Chloroaniline	6.61E+01	4.83E-02	1.01E-05	5.30E+03	1.36E-05	3.32E-07	25	503.65	754.00	11,689	0.0E+00	1.4E-02
107062	1,2-Dichloroethane	1.74E+01	1.04E-01	9.90E-06	8.52E+03	4.01E-02	9.78E-04	25	356.65	561.00	7,643	2.6E-05	0.0E+00
108054	Vinyl acetate	5.25E+00	8.50E-02	9.20E-06	2.00E+04	2.10E-02	5.12E-04	25	345.65	519.13	7,800	0.0E+00	2.0E-01
108383	m-Xylene	4.07E+02	7.00E-02	7.80E-06	1.61E+02	3.01E-01	7.34E-03	25	412.27	617.05	8,523	0.0E+00	7.0E+00
108883	Toluene	1.82E+02	8.70E-02	8.60E-06	5.26E+02	2.72E-01	6.63E-03	25	383.78	591.79	7,930	0.0E+00	4.0E-01
108907	Chlorobenzene	2.19E+02	7.30E-02	8.70E-06	4.72E+02	1.52E-01	3.71E-03	25	404.87	632.40	8,410	0.0E+00	2.0E-02
108952	Phenol	2.88E+01	8.20E-02	9.10E-06	8.28E+04	1.63E-05	3.98E-07	25	455.02	694.20	10,920	0.0E+00	2.1E+00
111444	Bis(2-chloroethyl)ether	1.55E+01	6.92E-02	7.53E-06	1.72E+04	7.38E-04	1.80E-05	25	451.15	659.79	9,000	3.3E-04	0.0E+00
115297	Endosulfan	2.14E+03	1.15E-02	4.55E-06	5.10E-01	4.59E-04	1.12E-05	25	674.43	942.94	14,000	0.0E+00	2.1E-02
117817	Bis(2-ethylhexyl)phthalate	1.51E+07	3.51E-02	3.66E-06	3.40E-01	4.18E-06	1.02E-07	25	657.15	806.00	15,999	4.0E-06	0.0E+00
117840	Di-n-octyl phthalate	8.32E+07	1.51E-02	3.58E-06	2.00E-02	2.74E-03	6.68E-05	25	704.09	862.22	15,000	0.0E+00	7.0E-02
118741	Hexachlorobenzene	5.50E+04	5.42E-02	5.91E-06	6.20E+00	5.41E-02	1.32E-03	25	582.55	825.00	14,447	4.6E-04	0.0E+00
120127	Anthracene	2.95E+04	3.24E-02	7.74E-06	4.34E-02	2.67E-03	6.51E-05	25	615.18	873.00	13,121	0.0E+00	1.1E+00
120821	1,2,4-Trichlorobenzene	1.78E+03	3.00E-02	8.23E-06	3.00E+02	5.82E-02	1.42E-03	25	486.15	725.00	10,471	0.0E+00	2.0E-01
120832	2,4-Dichlorophenol	1.47E+02	3.46E-02	8.77E-06	4.50E+03	1.30E-04	3.17E-06	25	482.15	708.17	11,000	0.0E+00	1.1E-02
121142	2,4-Dinitrotoluene	9.55E+01	2.03E-01	7.06E-06	2.70E+02	3.80E-06	9.27E-08	25	590.00	814.00	13,467	1.9E-04	0.0E+00
124481	Chlorodibromomethane	6.31E+01	1.96E-02	1.05E-05	2.60E+03	3.21E-02	7.83E-04	25	416.14	678.20	8,000	2.4E-05	0.0E+00
127184	Tetrachloroethylene	1.55E+02	7.20E-02	8.20E-06	2.00E+02	7.54E-01	1.84E-02	25	394.40	620.20	8,288	5.8E-07	0.0E+00
129000	Pyrene	1.05E+05	2.72E-02	7.24E-06	1.35E-01	4.51E-04	1.10E-05	25	667.95	936.00	14,370	0.0E+00	1.1E-01
156592	cis-1,2-Dichloroethylene	3.55E+01	7.36E-02	1.13E-05	3.50E+03	1.67E-01	4.07E-03	25	333.65	544.00	7,192	0.0E+00	3.5E-02
156605	trans-1,2-Dichloroethylene	5.25E+01	7.07E-02	1.19E-05	6.30E+03	3.85E-01	9.39E-03	25	320.85	516.50	6,717	0.0E+00	7.0E-02
193395	Indeno(1,2,3-cd)pyrene	3.47E+06	1.90E-02	5.66E-06	2.20E-05	6.56E-05	1.60E-06	25	809.15	1078.24	17,000	2.1E-04	0.0E+00
205992	Benzo(b)fluoranthene	1.23E+06	2.26E-02	5.56E-06	1.50E-03	4.55E-03	1.11E-04	25	715.90	969.27	15,000	2.1E-04	0.0E+00
206440	Fluoranthene	1.07E+05	3.02E-02	6.35E-06	2.06E-01	6.60E-04	1.61E-05	25	655.95	905.00	13,815	0.0E+00	1.4E-01
207089	Benzo(k)fluoranthene	1.23E+06	2.26E-02	5.56E-06	8.00E-04	3.40E-05	8.29E-07	25	753.15	1019.70	16,000	2.1E-05	0.0E+00
218019	Chrysene	3.98E+05	2.48E-02	6.21E-06	1.60E-03	3.88E-03	9.46E-05	25	714.15	979.00	16,455	2.1E-06	0.0E+00
309002	Aldrin	2.45E+06	1.32E-02	4.86E-06	1.80E-01	6.97E-03	1.70E-04	25	603.01	839.37	13,000	4.9E-03	0.0E+00
319846	alpha-HCH (alpha-BHC)	1.23E+03	1.42E-02	7.34E-06	2.00E+00	4.35E-04	1.06E-05	25	596.55	839.36	13,000	1.8E-03	0.0E+00
319857	beta-HCH (beta-BHC)	1.26E+03	1.42E-02	7.34E-06	2.40E-01	3.05E-05	7.44E-07	25	596.55	839.36	13,000	5.3E-04	0.0E+00
542756	1,3-Dichloropropene	4.57E+01	6.26E-02	1.00E-05	2.80E+03	7.26E-01	1.77E-02	25	381.15	587.38	7,000	3.7E-05	2.0E-02
606202	2,6-Dinitrotoluene	6.92E+01	3.27E-02	7.26E-06	1.82E+02	3.06E-05	7.46E-07	25	558.00	770.00	12,938	1.9E-04	0.0E+00
621647	N-Nitrosodi-n-propylamine	2.40E+01	5.45E-02	8.17E-06	9.89E+03	9.23E-05	2.25E-06	25	509.60	746.87	11,000	2.0E-03	0.0E+00
1024573	Heptachlor epoxide	8.32E+04	1.32E-02	4.23E-06	2.00E-01	3.90E-04	9.51E-06	25	613.96	848.76	13,000	2.6E-03	0.0E+00
7439976	Mercury (elemental)	5.20E+01	3.07E-02	6.30E-06	5.62E-02	4.67E-01	1.14E-02	25	629.88	1750.00	14,127	0.0E+00	3.0E-04
8001352	Toxaphene	2.57E+05	1.16E-02	4.34E-06	7.40E-01	2.46E-04	6.00E-06	25	657.15	873.31	14,000	3.2E-04	0.0E+00
11096825	Aroclor 1260 (PCB-1260)	2.90E+05	1.38E-02	4.32E-06	8.00E-02	1.89E-01	4.60E-03	25	402.50	539.37	19,000	1.0E-04	0.0E+00
11097691	Aroclor 1254 (PCB-1254)	2.00E+05	1.56E-02	5.00E-06	5.70E-02	8.20E-02	2.00E-03	25	377.50	512.27	19,000	1.0E-04	0.0E+00
12674112	Aroclor 1016 (PCB-1016)	3.30E+04	2.22E-02	5.42E-06	4.20E-01	1.19E-02	2.90E-04	25	340.50	475.22	18,000	1.0E-04	0.0E+00
53469219	Aroclor 1242 (PCB-1242)	3.30E+04	2.14E-02	5.31E-06	3.40E-01	2.13E-02	5.20E-04	25	345.50	482.20	18,000	1.0E-04	0.0E+00

DATA ENTRY SHEET

CALCULATE RISK-BASED SOIL CONCENTRATION (enter "X" in "YES" box)

VERSION 1.2
September, 1998

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL SOIL CONCENTRATION (enter "X" in "YES" box and initial soil conc. below)

YES [ ]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial soil conc., C_R (µg/kg)	Chemical
108883	14000	Toluene

ENTER Average soil temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to top of contamination, L_t (cm)	ENTER Depth below grade to bottom of contamination, (enter value of 0 if value is unknown) L_b (cm)	ENTER Totals must add up to value of L_t (cell D28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
10	33	180	0	180	0	0			1.00E-08

ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum A soil organic carbon fraction, f_{oc}^A (unitless)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum B soil organic carbon fraction, f_{oc}^B (unitless)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)	ENTER Stratum C soil organic carbon fraction, f_{oc}^C (unitless)
1.5	0.35	0.15	0.006	1.5	0.43	0.25	0.003	1.7	0.34	0.26	0.002

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm-s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)
33	40	961	961	488	0.1	1

ENTER Averaging time for carcinogens, AT_c (yrs)	ENTER Averaging time for noncarcinogens, AT_{nc} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based soil concentration.	

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
8.70E-02	8.60E-06	6.63E-03	25	7,930	383.78	591.79	1.82E+02	5.26E+02	0.0E+00	4.0E-01

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Initial soil concentration used, C_R (µg/kg)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
9.46E+08	147	0.200	0.180	0.080	#N/A	#N/A	#N/A	1.00E-08	3,844	1	1.25E+05

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)	Convection path length, L_p (cm)
9.24E+05	4.16E-04	33	9,154	2.92E-03	1.26E-01	1.75E-04	3.34E-03	0.00E+00	0.00E+00	3.34E-03	147	33

Soil-water partition coefficient, K_d (cm^3/g)	Source vapor conc., C_{source} (µg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (µg/m^3)	Finite source β term (unitless)	Finite source ψ term $(sec)^{-1}$	Time for source depletion, τ_D (sec)	Exposure duration > time for source depletion (YES/NO)
1.09E+00	1.04E+02	0.10	8.48E+00	3.34E-03	3.84E+02	4.50E+94	4.83E-05	5.03E-03	NA	NA	NA	NA

Finite source indoor attenuation coefficient, <α> (unitless)	Mass limit bldg. conc., $C_{building}$ (µg/m^3)	Finite source bldg. conc., $C_{building}$ (µg/m^3)	Final finite source bldg. conc., $C_{building}$ (µg/m^3)	Unit risk factor, URF $(µg/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
NA	NA	NA	NA	NA	4.0E-01

RESULTS SHEET

RISK-BASED SOIL CONCENTRATION CALCULATIONS:

Indoor exposure soil conc., carcinogen (µg/kg)	Indoor exposure soil conc., noncarcinogen (µg/kg)	Risk-based indoor exposure soil conc., (µg/kg)	Soil saturation conc., C_{sat} (µg/kg)	Final indoor exposure soil conc., (µg/kg)
NA	8.30E+04	8.30E+04	6.36E+05	8.30E+04

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

VLOOKUP TABLES

Soil Properties Lookup Table

SCS Soil Type	K_s (cm/h)	α (1/cm)	N (unitless)	M (unitless)	θ_s (cm^3/cm^3)	θ_r (cm^3/cm^3)	Mean Grain Diameter (cm)
C	0.20	0.008	1.09	0.083	0.38	0.068	0.0092
CL	0.26	0.019	1.31	0.237	0.41	0.095	0.016
L	1.04	0.036	1.56	0.359	0.43	0.078	0.020
LS	14.59	0.124	2.28	0.561	0.41	0.057	0.040
S	29.70	0.145	2.68	0.627	0.43	0.045	0.044
SC	0.12	0.027	1.23	0.187	0.38	0.100	0.025
SCL	1.31	0.059	1.48	0.324	0.39	0.100	0.029
SI	0.25	0.016	1.37	0.270	0.46	0.034	0.0046
SIC	0.02	0.005	1.09	0.083	0.26	0.070	0.0039
SICL	0.07	0.010	1.23	0.187	0.43	0.089	0.0056
SIL	0.45	0.020	1.41	0.291	0.45	0.067	0.011
SL	4.42	0.075	1.89	0.471	0.41	0.065	0.030

Chemical Properties Lookup Table

CAS No.	Chemical	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Pure component water solubility, S (mg/L)	Henry's law constant H' (unitless)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
50293	DDT	2.63E+06	1.37E-02	4.95E-06	2.50E-02	3.32E-04	8.10E-06	25	533.15	720.75	11,000	9.7E-05	0.0E+00
50328	Benzo(a)pyrene	1.02E+06	4.30E-02	9.00E-06	1.62E-03	4.63E-05	1.13E-06	25	715.90	969.27	15,000	2.1E-03	0.0E+00
51285	2,4-Dinitrophenol	1.00E-02	2.73E-02	9.06E-06	2.79E+03	1.82E-05	4.44E-07	25	605.28	827.85	15,000	0.0E+00	7.0E-03
53703	Dibenz(a,h)anthracene	3.80E+06	2.02E-02	5.18E-06	2.49E-03	6.03E-07	1.47E-08	25	743.24	990.41	16,000	2.1E-03	0.0E+00
56235	Carbon tetrachloride	1.74E+02	7.80E-02	8.80E-06	7.93E+02	1.25E+00	3.05E-02	25	349.90	556.60	7,127	1.5E-05	0.0E+00
56553	Benz(a)anthracene	3.98E+05	5.10E-02	9.00E-06	9.40E-03	1.37E-04	3.34E-06	25	708.15	1004.79	15,000	2.1E-04	0.0E+00
57749	Chlordane	1.20E+05	1.18E-02	4.37E-06	5.60E-02	1.99E-03	4.85E-05	25	624.24	885.73	13,000	3.7E-04	0.0E+00
58899	gamma-HCH (Lindane)	1.07E+03	1.42E-02	7.34E-06	6.80E+00	5.74E-04	1.40E-05	25	596.55	839.36	13,000	3.7E-04	0.0E+00
60571	Dieldrin	2.14E+04	1.25E-02	4.74E-06	1.95E-01	6.19E-04	1.51E-05	25	613.32	842.25	13,000	4.6E-03	0.0E+00
65850	Benzoic Acid	6.00E-01	5.36E-02	7.97E-06	3.50E+03	6.31E-05	1.54E-06	25	720.00	751.00	10,000	0.0E+00	1.4E+01
67641	Acetone	5.75E-01	1.24E-01	1.14E-05	1.00E+06	1.59E-03	3.88E-05	25	329.20	508.10	6,955	0.0E+00	3.5E-01
67663	Chloroform	3.98E+01	1.04E-01	1.00E-05	7.92E+03	1.50E-01	3.66E-03	25	334.32	536.40	6,988	2.3E-05	0.0E+00
67721	Hexachloroethane	1.78E+03	2.50E-03	6.80E-06	5.00E+01	1.59E-01	3.88E-03	25	458.00	695.00	9,510	4.0E-06	0.0E+00
71363	Butanol	6.92E+00	8.00E-02	9.30E-06	7.40E+04	3.61E-04	8.80E-06	25	390.88	563.05	10,346	0.0E+00	3.5E-01
71432	Benzene	5.89E+01	8.80E-02	9.80E-06	1.75E+03	2.28E-01	5.56E-03	25	353.24	562.16	7,342	8.3E-06	0.0E+00
71556	1,1,1-Trichloroethane	1.10E+02	7.80E-02	8.80E-06	1.33E+03	7.05E-01	1.72E-02	25	347.24	545.00	7,136	0.0E+00	1.0E+00
72208	Endrin	1.23E+04	1.25E-02	4.74E-06	2.50E-01	3.08E-04	7.51E-06	25	718.15	986.20	12,000	0.0E+00	1.1E-03
72435	Methoxychlor	9.77E+04	1.56E-02	4.46E-06	4.50E-02	6.48E-04	1.58E-05	25	651.02	848.49	14,000	0.0E+00	1.8E-02
72548	DDD	1.00E+06	1.69E-02	4.76E-06	9.00E-02	1.64E-04	4.00E-06	25	639.90	863.77	14,000	6.9E-05	0.0E+00
72559	DDE	4.47E+06	1.44E-02	5.87E-06	1.20E-01	8.61E-04	2.10E-05	25	636.44	860.38	13,000	9.7E-05	0.0E+00
74839	Methyl bromide	1.05E+01	7.28E-02	1.21E-05	1.52E+04	2.56E-01	6.24E-03	25	276.71	467.00	5,714	0.0E+00	5.0E-03
75014	Vinyl chloride (chloroethene)	1.86E+01	1.06E-01	1.23E-06	2.76E+03	1.11E+00	2.71E-02	25	259.25	432.00	5,250	8.4E-05	0.0E+00
75092	Methylene chloride	1.17E+01	1.01E-01	1.17E-05	1.30E+04	8.98E-02	2.19E-03	25	313.00	510.00	6,706	4.7E-07	3.0E+00
75150	Carbon disulfide	4.57E+01	1.04E-01	1.00E-05	1.19E+03	1.24E+00	3.02E-02	25	319.00	552.00	6,391	0.0E+00	7.0E-01
75252	Bromoform	8.71E+01	1.49E-02	1.03E-05	3.10E+03	2.19E-02	5.34E-04	25	422.35	696.00	9,479	1.1E-06	0.0E+00
75274	Bromodichloromethane	5.50E+01	2.98E-02	1.06E-05	6.74E+03	6.56E-02	1.60E-03	25	363.15	585.85	7,000	1.8E-05	0.0E+00
75343	1,1-Dichloroethane	3.16E+01	7.42E-02	1.05E-05	5.06E+03	2.30E-01	5.61E-03	25	330.55	523.00	6,895	0.0E+00	5.0E-01
75354	1,1-Dichloroethylene	5.89E+01	9.00E-02	1.04E-05	2.25E+03	1.07E+00	2.61E-02	25	304.75	576.05	6,247	5.0E-05	0.0E+00
76448	Heptachlor	1.41E+06	1.12E-02	5.69E-06	1.80E-01	4.47E-02	1.09E-03	25	603.69	846.31	13,000	1.3E-03	0.0E+00
77474	Hexachlorocyclopentadiene	2.00E+05	1.61E-02	7.21E-06	1.80E+00	1.11E+00	2.71E-02	25	512.15	746.00	10,931	0.0E+00	7.0E-05
78591	Isophorone	4.68E+01	6.23E-02	6.76E-06	1.20E+04	2.72E-04	6.63E-06	25	488.35	715.00	10,271	2.7E-07	0.0E+00
78875	1,2-Dichloropropane	4.37E+01	7.82E-02	8.73E-06	2.80E+03	1.15E-01	2.80E-03	25	369.52	572.00	7,590	0.0E+00	4.0E-03
79005	1,1,2-Trichloroethane	5.01E+01	7.80E-02	8.80E-06	4.42E+03	3.74E-02	9.12E-04	25	386.15	602.00	8,322	1.6E-05	0.0E+00
79016	Trichloroethylene	1.66E+02	7.90E-02	9.10E-06	1.10E+03	4.22E-01	1.03E-02	25	360.36	544.20	7,505	1.7E-06	0.0E+00
79345	1,1,2,2-Tetrachloroethane	9.33E+01	7.10E-02	7.90E-06	2.97E+03	1.41E-02	3.44E-04	25	419.60	661.15	8,996	5.8E-05	0.0E+00
83329	Acenaphthene	7.08E+03	4.21E-02	7.69E-06	4.24E+00	6.36E-03	1.55E-04	25	550.54	803.15	12,155	0.0E+00	2.1E-01
84662	Diethylphthalate	2.88E+02	2.56E-02	6.35E-06	1.08E+03	1.85E-05	4.51E-07	25	567.15	757.00	13,733	0.0E+00	2.8E+00
84742	Di-n-butyl phthalate	3.39E+04	4.38E-02	7.86E-06	1.12E+01	3.85E-08	9.39E-10	25	613.15	798.67	14,751	0.0E+00	3.5E-01

85687	Butyl benzyl phthalate	5.75E+04	1.74E-02	4.83E-06	2.69E+00	5.17E-05	1.26E-06	25	660.60	839.68	13,000	0.0E+00	7.0E-01
86306	N-Nitrosodiphenylamine	1.29E+03	3.12E-02	6.35E-06	3.51E+01	2.05E-04	5.00E-06	25	632.28	890.45	13,000	1.4E-06	0.0E+00
86737	Fluorene	1.38E+04	3.63E-02	7.88E-06	1.98E+00	2.61E-03	6.37E-05	25	570.44	870.00	12,666	0.0E+00	1.4E-01
86748	Carbazole	3.39E+03	3.90E-02	7.03E-06	7.48E+00	6.26E-07	1.53E-08	25	627.87	899.00	13,977	5.7E-06	0.0E+00
87683	Hexachloro-1,3-butadiene	5.37E+04	5.61E-02	6.16E-06	3.23E+00	3.34E-01	8.15E-03	25	486.15	738.00	10,206	2.2E-05	0.0E+00
87865	Pentachlorophenol	5.92E+02	5.60E-02	6.10E-06	1.95E+03	1.00E-06	2.44E-08	25	582.15	813.20	14,000	3.4E-05	0.0E+00
88062	2,4,6-Trichlorophenol	3.81E+02	3.18E-02	6.25E-06	8.00E+02	3.19E-04	7.78E-06	25	519.15	749.03	12,000	3.1E-06	0.0E+00
91203	Naphthalene	2.00E+03	5.90E-02	7.50E-06	3.10E+01	1.98E-02	4.83E-04	25	491.14	748.40	10,373	0.0E+00	1.4E-01
91941	3,3-Dichlorobenzidine	7.24E+02	1.94E-02	6.74E-06	3.11E+00	1.64E-07	4.00E-09	25	560.26	754.03	13,000	1.3E-04	0.0E+00
95476	o-Xylene	3.63E+02	8.70E-02	1.00E-05	1.78E+02	2.13E-01	5.20E-03	25	417.60	630.30	8,661	0.0E+00	7.0E+00
95487	2-Methylphenol (o-cresol)	9.12E+01	7.40E-02	8.30E-06	2.60E+04	4.92E-05	1.20E-06	25	464.19	697.60	10,800	0.0E+00	1.8E-01
95501	1,2-Dichlorobenzene	6.17E+02	6.90E-02	7.90E-06	1.56E+02	7.79E-02	1.90E-03	25	453.57	705.00	9,700	0.0E+00	2.0E-01
95578	2-Chlorophenol	3.88E+02	5.01E-02	9.46E-06	2.20E+04	1.60E-02	3.90E-04	25	447.53	675.00	9,572	0.0E+00	1.8E-02
95954	2,4,5-Trichlorophenol	1.60E+03	2.91E-02	7.03E-06	1.20E+03	1.78E-04	4.34E-06	25	526.15	759.13	13,000	0.0E+00	3.5E-01
98953	Nitrobenzene	6.46E+01	7.60E-02	8.60E-06	2.09E+03	9.84E-04	2.40E-05	25	483.95	719.00	10,566	0.0E+00	2.0E-03
100414	Ethylbenzene	3.63E+02	7.50E-02	7.80E-06	1.69E+02	3.23E-01	7.88E-03	25	409.34	617.20	8,501	0.0E+00	1.0E+00
100425	Styrene	7.76E+02	7.10E-02	8.00E-06	3.10E+02	1.13E-01	2.76E-03	25	418.31	636.00	8,737	0.0E+00	1.0E+00
105679	2,4-Dimethylphenol	2.09E+02	5.84E-02	8.69E-06	7.87E+03	8.20E-05	2.00E-06	25	484.13	707.60	11,329	0.0E+00	7.0E-02
106423	p-Xylene	3.89E+02	7.69E-02	8.44E-06	1.85E+02	3.14E-01	7.66E-03	26	411.52	616.20	8,525	0.0E+00	7.0E+00
106467	1,4-Dichlorobenzene	6.17E+02	6.90E-02	7.90E-06	7.38E+01	9.96E-02	2.43E-03	25	447.21	684.75	9,271	0.0E+00	8.0E-01
106478	p-Chloroaniline	6.61E+01	4.83E-02	1.01E-05	5.30E+03	1.36E-05	3.32E-07	25	503.65	754.00	11,689	0.0E+00	1.4E-02
107062	1,2-Dichloroethane	1.74E+01	1.04E-01	9.90E-06	8.52E+03	4.01E-02	9.78E-04	25	356.65	561.00	7,643	2.6E-05	0.0E+00
108054	Vinyl acetate	5.25E+00	8.50E-02	9.20E-06	2.00E+04	2.10E-02	5.12E-04	25	345.65	519.13	7,800	0.0E+00	2.0E-01
108383	m-Xylene	4.07E+02	7.00E-02	7.80E-06	1.61E+02	3.01E-01	7.34E-03	25	412.27	617.05	8,523	0.0E+00	7.0E+00
108883	Toluene	1.82E+02	8.70E-02	8.60E-06	5.26E+02	2.72E-01	6.63E-03	25	383.78	591.79	7,930	0.0E+00	4.0E-01
108907	Chlorobenzene	2.19E+02	7.30E-02	8.70E-06	4.72E+02	1.52E-01	3.71E-03	25	404.87	632.40	8,410	0.0E+00	2.0E-02
108952	Phenol	2.88E+01	8.20E-02	9.10E-06	8.28E+04	1.63E-05	3.98E-07	25	455.02	694.20	10,920	0.0E+00	2.1E+00
111444	Bis(2-chloroethyl)ether	1.55E+01	6.92E-02	7.53E-06	1.72E+04	7.38E-04	1.80E-05	25	451.15	659.79	9,000	3.3E-04	0.0E+00
115297	Endosulfan	2.14E+03	1.15E-02	4.55E-06	5.10E-01	4.59E-04	1.12E-05	25	674.43	942.94	14,000	0.0E+00	2.1E-02
117817	Bis(2-ethylhexyl)phthalate	1.51E+07	3.51E-02	3.66E-06	3.40E-01	4.18E-06	1.02E-07	25	657.15	806.00	15,999	4.0E-06	0.0E+00
117840	Di-n-octyl phthalate	8.32E+07	1.51E-02	3.58E-06	2.00E-02	2.74E-03	6.68E-05	25	704.09	862.22	15,000	0.0E+00	7.0E-02
118741	Hexachlorobenzene	5.50E+04	5.42E-02	5.91E-06	6.20E+00	5.41E-02	1.32E-03	25	582.55	825.00	14,447	4.6E-04	0.0E+00
120127	Anthracene	2.95E+04	3.24E-02	7.74E-06	4.34E-02	2.67E-03	6.51E-05	25	615.18	873.00	13,121	0.0E+00	1.1E+00
120821	1,2,4-Trichlorobenzene	1.78E+03	3.00E-02	8.23E-06	3.00E+02	5.82E-02	1.42E-03	25	486.15	725.00	10,471	0.0E+00	2.0E-01
120832	2,4-Dichlorophenol	1.47E+02	3.46E-02	8.77E-06	4.50E+03	1.30E-04	3.17E-06	25	482.15	708.17	11,000	0.0E+00	1.1E-02
121142	2,4-Dinitrotoluene	9.55E+01	2.03E-01	7.06E-06	2.70E+02	3.80E-06	9.27E-08	25	590.00	814.00	13,467	1.9E-04	0.0E+00
124481	Chlorodibromomethane	6.31E+01	1.96E-02	1.05E-05	2.60E+03	3.21E-02	7.83E-04	25	416.14	676.20	8,000	2.4E-05	0.0E+00
127184	Tetrachloroethylene	1.55E+02	7.20E-02	8.20E-06	2.00E+02	7.54E-01	1.84E-02	25	394.40	620.20	8,288	5.8E-07	0.0E+00
129000	Pyrene	1.05E+05	2.72E-02	7.24E-06	1.35E-01	4.51E-04	1.10E-05	25	667.95	936.00	14,370	0.0E+00	1.1E-01
156592	cis-1,2-Dichloroethylene	3.55E+01	7.36E-02	1.13E-05	3.50E+03	1.67E-01	4.07E-03	25	333.65	544.00	7,192	0.0E+00	3.5E-02
156605	trans-1,2-Dichloroethylene	5.25E+01	7.07E-02	1.19E-05	6.30E+03	3.85E-01	9.39E-03	25	320.85	516.50	6,717	0.0E+00	7.0E-02
193395	Indeno(1,2,3-cd)pyrene	3.47E+06	1.90E-02	5.66E-06	2.20E-05	6.56E-05	1.60E-06	25	809.15	1078.24	17,000	2.1E-04	0.0E+00
205992	Benzo(b)fluoranthene	1.23E+06	2.26E-02	5.56E-06	1.50E-03	4.55E-03	1.11E-04	25	715.90	969.27	15,000	2.1E-04	0.0E+00
206440	Fluoranthene	1.07E+05	3.02E-02	6.35E-06	2.06E-01	6.60E-04	1.61E-05	25	655.95	905.00	13,815	0.0E+00	1.4E-01
207089	Benzo(k)fluoranthene	1.23E+06	2.26E-02	5.56E-06	8.00E-04	3.40E-05	8.29E-07	25	753.15	1019.70	16,000	2.1E-05	0.0E+00
218019	Chrysene	3.98E+05	2.48E-02	6.21E-06	1.60E-03	3.88E-03	9.46E-05	25	714.15	979.00	16,455	2.1E-06	0.0E+00
309002	Aldrin	2.45E+06	1.32E-02	4.86E-06	1.80E-01	6.97E-03	1.70E-04	25	603.01	839.37	13,000	4.9E-03	0.0E+00
319846	alpha-HCH (alpha-BHC)	1.23E+03	1.42E-02	7.34E-06	2.00E+00	4.35E-04	1.06E-05	25	596.55	839.36	13,000	1.8E-03	0.0E+00
319857	beta-HCH (beta-BHC)	1.26E+03	1.42E-02	7.34E-06	2.40E-01	3.05E-05	7.44E-07	25	596.55	839.36	13,000	5.3E-04	0.0E+00
542756	1,3-Dichloropropene	4.57E+01	6.26E-02	1.00E-05	2.80E+03	7.26E-01	1.77E-02	25	381.15	587.38	7,000	3.7E-05	2.0E-02
606202	2,6-Dinitrotoluene	6.92E+01	3.27E-02	7.26E-06	1.82E+02	3.06E-05	7.46E-07	25	558.00	770.00	12,938	1.9E-04	0.0E+00
621647	N-Nitrosodi-n-propylamine	2.40E+01	5.45E-02	8.17E-06	9.89E+03	9.23E-05	2.25E-06	25	509.60	746.87	11,000	2.0E-03	0.0E+00
1024573	Heptachlor epoxide	8.32E+04	1.32E-02	4.23E-06	2.00E-01	3.90E-04	9.51E-06	25	613.96	848.76	13,000	2.6E-03	0.0E+00
7439976	Mercury (elemental)	5.20E+01	3.07E-02	6.30E-06	5.62E-02	4.67E-01	1.14E-02	25	629.88	1750.00	14,127	0.0E+00	3.0E-04
8001352	Toxaphene	2.57E+05	1.16E-02	4.34E-06	7.40E-01	2.46E-04	6.00E-06	25	657.15	873.31	14,000	3.2E-04	0.0E+00
11096825	Aroclor 1260 (PCB-1260)	2.90E+05	1.38E-02	4.32E-06	8.00E-02	1.89E-01	4.60E-03	25	402.50	539.37	19,000	1.0E-04	0.0E+00
11097691	Aroclor 1254 (PCB-1254)	2.00E+05	1.56E-02	5.00E-06	5.70E-02	8.20E-02	2.00E-03	25	377.50	512.27	19,000	1.0E-04	0.0E+00
12674112	Aroclor 1016 (PCB-1016)	3.30E+04	2.22E-02	5.42E-06	4.20E-01	1.19E-02	2.90E-04	25	340.50	475.22	18,000	1.0E-04	0.0E+00
53469219	Aroclor 1242 (PCB-1242)	3.30E+04	2.14E-02	5.31E-06	3.40E-01	2.13E-02	5.20E-04	25	345.50	482.20	18,000	1.0E-04	0.0E+00

DATA ENTRY SHEET

CALCULATE RISK-BASED SOIL CONCENTRATION (enter "X" in "YES" box)

VERSION 1.2
September, 1998

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL SOIL CONCENTRATION (enter "X" in "YES" box and initial soil conc. below)

YES [ ]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial soil conc., C_R (µg/kg)	Chemical
79016	7000	Trichloroethylene

ENTER Average soil temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to top of contamination, L_t (cm)	ENTER Depth below grade to bottom of contamination, (enter value of 0 if value is unknown) L_b (cm)	ENTER Totals must add up to value of L_t (cell D28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
10	33	210	0	210	0	0			1.00E-08

ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm³)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum A soil organic carbon fraction, f_{oc}^A (unitless)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm³)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum B soil organic carbon fraction, f_{oc}^B (unitless)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm³)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)	ENTER Stratum C soil organic carbon fraction, f_{oc}^C (unitless)
1.5	0.35	0.15	0.006	1.5	0.43	0.25	0.003	1.7	0.34	0.26	0.002

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s²)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)
33	40	961	961	488	0.1	1

ENTER Averaging time for carcinogens, AT_c (yrs)	ENTER Averaging time for noncarcinogens, AT_{nc} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based soil concentration.	

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
7.90E-02	9.10E-06	1.03E-02	25	7,505	360.36	544.20	1.66E+02	1.10E+03	1.7E-06	0.0E+00

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Initial soil concentration used, C_R (µg/kg)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
9.46E+08	177	0.200	0.180	0.080	#N/A	#N/A	#N/A	1.00E-08	3,844	1	1.25E+05

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)	Convection path length, L_p (cm)
9.24E+05	4.16E-04	33	8,557	4.79E-03	2.06E-01	1.75E-04	3.03E-03	0.00E+00	0.00E+00	3.03E-03	177	33

Soil-water partition coefficient, K_d (cm^3/g)	Source vapor conc., C_{source} (µg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (µg/m^3)	Finite source β term (unitless)	Finite source ψ term $(sec)^{-1}$	Time for source depletion, τ_D (sec)	Exposure duration > time for source depletion (YES/NO)
9.96E-01	1.84E+02	0.10	8.48E+00	3.03E-03	3.84E+02	1.77E+104	4.41E-05	8.10E-03	NA	NA	NA	NA

Finite source indoor attenuation coefficient, <α> (unitless)	Mass limit bldg. conc., $C_{building}$ (µg/m^3)	Finite source bldg. conc., $C_{building}$ (µg/m^3)	Final finite source bldg. conc., $C_{building}$ (µg/m^3)	Unit risk factor, URF $(µg/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
NA	NA	NA	NA	1.7E-06	NA

RESULTS SHEET

RISK-BASED SOIL CONCENTRATION CALCULATIONS:

Indoor exposure soil conc., carcinogen (µg/kg)	Indoor exposure soil conc., noncarcinogen (µg/kg)	Risk-based indoor exposure soil conc., (µg/kg)	Soil saturation conc., C_{sat} (µg/kg)	Final indoor exposure soil conc., (µg/kg)
1.77E+02	NA	1.77E+02	1.24E+06	1.77E+02

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

Soil Properties Lookup Table

SCS Soil Type	K_s (cm/h)	α (1/cm)	N (unitless)	M (unitless)	θ_s (cm^3/cm^3)	θ_r (cm^3/cm^3)	Mean Grain Diameter (cm)
C	0.20	0.008	1.09	0.083	0.38	0.068	0.0092
CL	0.26	0.019	1.31	0.237	0.41	0.095	0.016
L	1.04	0.036	1.56	0.359	0.43	0.078	0.020
LS	14.59	0.124	2.28	0.561	0.41	0.057	0.040
S	29.70	0.145	2.68	0.627	0.43	0.045	0.044
SC	0.12	0.027	1.23	0.187	0.38	0.100	0.025
SCL	1.31	0.059	1.48	0.324	0.39	0.100	0.029
SI	0.25	0.016	1.37	0.270	0.46	0.034	0.0046
SIC	0.02	0.005	1.09	0.083	0.26	0.070	0.0039
SICL	0.07	0.010	1.23	0.187	0.43	0.089	0.0056
SIL	0.45	0.020	1.41	0.291	0.45	0.067	0.011
SL	4.42	0.075	1.89	0.471	0.41	0.065	0.030

Chemical Properties Lookup Table

CAS No.	Chemical	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Pure component water solubility, S (mg/L)	Henry's law constant H' (unitless)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
50293	DDT	2.63E+06	1.37E-02	4.95E-06	2.50E-02	3.32E-04	8.10E-06	25	533.15	720.75	11,000	9.7E-05	0.0E+00
50328	Benzo(a)pyrene	1.02E+06	4.30E-02	9.00E-06	1.62E-03	4.63E-05	1.13E-06	25	715.90	969.27	15,000	2.1E-03	0.0E+00
51285	2,4-Dinitrophenol	1.00E-02	2.73E-02	9.06E-06	2.79E+03	1.82E-05	4.44E-07	25	605.28	827.85	15,000	0.0E+00	7.0E-03
53703	Dibenz(a,h)anthracene	3.80E+06	2.02E-02	5.18E-06	2.49E-03	6.03E-07	1.47E-08	25	743.24	990.41	16,000	2.1E-03	0.0E+00
56235	Carbon tetrachloride	1.74E+02	7.80E-02	8.80E-06	7.93E+02	1.25E+00	3.05E-02	25	349.90	556.60	7,127	1.5E-05	0.0E+00
56553	Benz(a)anthracene	3.98E+05	5.10E-02	9.00E-06	9.40E-03	1.37E-04	3.34E-06	25	708.15	1004.79	15,000	2.1E-04	0.0E+00
57749	Chlordane	1.20E+05	1.18E-02	4.37E-06	5.60E-02	1.99E-03	4.85E-05	25	624.24	885.73	13,000	3.7E-04	0.0E+00
58899	gamma-HCH (Lindane)	1.07E+03	1.42E-02	7.34E-06	6.80E+00	5.74E-04	1.40E-05	25	596.55	839.36	13,000	3.7E-04	0.0E+00
60571	Dieldrin	2.14E+04	1.25E-02	4.74E-06	1.95E-01	6.19E-04	1.51E-05	25	613.32	842.25	13,000	4.6E-03	0.0E+00
65850	Benzoic Acid	6.00E-01	5.36E-02	7.97E-06	3.50E+03	6.31E-05	1.54E-06	25	720.00	751.00	10,000	0.0E+00	1.4E+01
67641	Acetone	5.75E-01	1.24E-01	1.14E-05	1.00E+06	1.59E-03	3.88E-05	25	329.20	508.10	6,955	0.0E+00	3.5E-01
67663	Chloroform	3.98E+01	1.04E-01	1.00E-05	7.92E+03	1.50E-01	3.66E-03	25	334.32	536.40	6,988	2.3E-05	0.0E+00
67721	Hexachloroethane	1.78E+03	2.50E-03	6.80E-06	5.00E+01	1.59E-01	3.88E-03	25	458.00	695.00	9,510	4.0E-06	0.0E+00
71363	Butanol	6.92E+00	8.00E-02	9.30E-06	7.40E+04	3.61E-04	8.80E-06	25	390.88	563.05	10,346	0.0E+00	3.5E-01
71432	Benzene	5.89E+01	8.80E-02	9.80E-06	1.75E+03	2.28E-01	5.56E-03	25	353.24	562.16	7,342	8.3E-06	0.0E+00
71556	1,1,1-Trichloroethane	1.10E+02	7.80E-02	8.80E-06	1.33E+03	7.05E-01	1.72E-02	25	347.24	545.00	7,136	0.0E+00	1.0E+00
72208	Endrin	1.23E+04	1.25E-02	4.74E-06	2.50E-01	3.08E-04	7.51E-06	25	718.15	986.20	12,000	0.0E+00	1.1E-03
72435	Methoxychlor	9.77E+04	1.56E-02	4.46E-06	4.50E-02	6.48E-04	1.58E-05	25	651.02	848.49	14,000	0.0E+00	1.8E-02
72548	DDD	1.00E+06	1.69E-02	4.76E-06	9.00E-02	1.64E-04	4.00E-06	25	639.90	863.77	14,000	6.9E-05	0.0E+00
72559	DDE	4.47E+06	1.44E-02	5.87E-06	1.20E-01	8.61E-04	2.10E-05	25	636.44	860.38	13,000	9.7E-05	0.0E+00
74839	Methyl bromide	1.05E+01	7.28E-02	1.21E-05	1.52E+04	2.56E-01	6.24E-03	25	276.71	467.00	5,714	0.0E+00	5.0E-03
75014	Vinyl chloride (chloroethene)	1.86E+01	1.06E-01	1.23E-06	2.76E+03	1.11E+00	2.71E-02	25	259.25	432.00	5,250	8.4E-05	0.0E+00
75092	Methylene chloride	1.17E+01	1.01E-01	1.17E-05	1.30E+04	8.98E-02	2.19E-03	25	313.00	510.00	6,706	4.7E-07	3.0E+00
75150	Carbon disulfide	4.57E+01	1.04E-01	1.00E-05	1.19E+03	1.24E+00	3.02E-02	25	319.00	552.00	6,391	0.0E+00	7.0E-01
75252	Bromoform	8.71E+01	1.49E-02	1.03E-05	3.10E+03	2.19E-02	5.34E-04	25	422.35	696.00	9,479	1.1E-06	0.0E+00
75274	Bromodichloromethane	5.50E+01	2.98E-02	1.06E-05	6.74E+03	6.56E-02	1.60E-03	25	363.15	585.85	7,000	1.8E-05	0.0E+00
75343	1,1-Dichloroethane	3.16E+01	7.42E-02	1.05E-05	5.06E+03	2.30E-01	5.61E-03	25	330.55	523.00	6,895	0.0E+00	5.0E-01
75354	1,1-Dichloroethylene	5.89E+01	9.00E-02	1.04E-05	2.25E+03	1.07E+00	2.61E-02	25	304.75	576.05	6,247	5.0E-05	0.0E+00
76448	Heptachlor	1.41E+06	1.12E-02	5.69E-06	1.80E-01	4.47E-02	1.09E-03	25	603.69	846.31	13,000	1.3E-03	0.0E+00
77474	Hexachlorocyclopentadiene	2.00E+05	1.61E-02	7.21E-06	1.80E+00	1.11E+00	2.71E-02	25	512.15	746.00	10,931	0.0E+00	7.0E-05
78591	Isophorone	4.68E+01	6.23E-02	6.76E-06	1.20E+04	2.72E-04	6.63E-06	25	488.35	715.00	10,271	2.7E-07	0.0E+00
78875	1,2-Dichloropropane	4.37E+01	7.82E-02	8.73E-06	2.80E+03	1.15E-01	2.80E-03	25	369.52	572.00	7,590	0.0E+00	4.0E-03
79005	1,1,2-Trichloroethane	5.01E+01	7.80E-02	8.80E-06	4.42E+03	3.74E-02	9.12E-04	25	386.15	602.00	8,322	1.6E-05	0.0E+00
79016	Trichloroethylene	1.66E+02	7.90E-02	9.10E-06	1.10E+03	4.22E-01	1.03E-02	25	360.36	544.20	7,505	1.7E-06	0.0E+00
79345	1,1,2,2-Tetrachloroethane	9.33E+01	7.10E-02	7.90E-06	2.97E+03	1.41E-02	3.44E-04	25	419.60	661.15	8,996	5.8E-05	0.0E+00
83329	Acenaphthene	7.08E+03	4.21E-02	7.69E-06	4.24E+00	6.36E-03	1.55E-04	25	550.54	803.15	12,155	0.0E+00	2.1E-01
84662	Diethylphthalate	2.88E+02	2.56E-02	6.35E-06	1.08E+03	1.85E-05	4.51E-07	25	567.15	757.00	13,733	0.0E+00	2.8E+00
84742	Di-n-butyl phthalate	3.39E+04	4.38E-02	7.86E-06	1.12E+01	3.85E-08	9.39E-10	25	613.15	798.67	14,751	0.0E+00	3.5E-01

85687	Butyl benzyl phthalate	5.75E+04	1.74E-02	4.83E-06	2.69E+00	5.17E-05	1.26E-06	25	660.60	839.68	13,000	0.0E+00	7.0E-01
86306	N-Nitrosodiphenylamine	1.29E+03	3.12E-02	6.35E-06	3.51E+01	2.05E-04	5.00E-06	25	632.28	890.45	13,000	1.4E-06	0.0E+00
86737	Fluorene	1.38E+04	3.63E-02	7.88E-06	1.98E+00	2.61E-03	6.37E-05	25	570.44	870.00	12,666	0.0E+00	1.4E-01
86748	Carbazole	3.39E+03	3.90E-02	7.03E-06	7.48E+00	6.26E-07	1.53E-08	25	627.87	899.00	13,977	5.7E-06	0.0E+00
87683	Hexachloro-1,3-butadiene	5.37E+04	5.61E-02	6.16E-06	3.23E+00	3.34E-01	8.15E-03	25	486.15	738.00	10,206	2.2E-05	0.0E+00
87865	Pentachlorophenol	5.92E+02	5.60E-02	6.10E-06	1.95E+03	1.00E-06	2.44E-08	25	582.15	813.20	14,000	3.4E-05	0.0E+00
88062	2,4,6-Trichlorophenol	3.81E+02	3.18E-02	6.25E-06	8.00E+02	3.19E-04	7.78E-06	25	519.15	749.03	12,000	3.1E-06	0.0E+00
91203	Naphthalene	2.00E+03	5.90E-02	7.50E-06	3.10E+01	1.98E-02	4.83E-04	25	491.14	748.40	10,373	0.0E+00	1.4E-01
91941	3,3-Dichlorobenzidine	7.24E+02	1.94E-02	6.74E-06	3.11E+00	1.64E-07	4.00E-09	25	560.26	754.03	13,000	1.3E-04	0.0E+00
95476	o-Xylene	3.63E+02	8.70E-02	1.00E-05	1.78E+02	2.13E-01	5.20E-03	25	417.60	630.30	8,661	0.0E+00	7.0E+00
95487	2-Methylphenol (o-cresol)	9.12E+01	7.40E-02	8.30E-06	2.60E+04	4.92E-05	1.20E-06	25	464.19	697.60	10,800	0.0E+00	1.8E-01
95501	1,2-Dichlorobenzene	6.17E+02	6.90E-02	7.90E-06	1.56E+02	7.79E-02	1.90E-03	25	453.57	705.00	9,700	0.0E+00	2.0E-01
95578	2-Chlorophenol	3.88E+02	5.01E-02	9.46E-06	2.20E+04	1.60E-02	3.90E-04	25	447.53	675.00	9,572	0.0E+00	1.8E-02
95954	2,4,5-Trichlorophenol	1.60E+03	2.91E-02	7.03E-06	1.20E+03	1.78E-04	4.34E-06	25	526.15	759.13	13,000	0.0E+00	3.5E-01
98953	Nitrobenzene	6.46E+01	7.60E-02	8.60E-06	2.09E+03	9.84E-04	2.40E-05	25	483.95	719.00	10,566	0.0E+00	2.0E-03
100414	Ethylbenzene	3.63E+02	7.50E-02	7.80E-06	1.69E+02	3.23E-01	7.88E-03	25	409.34	617.20	8,501	0.0E+00	1.0E+00
100425	Styrene	7.76E+02	7.10E-02	8.00E-06	3.10E+02	1.13E-01	2.76E-03	25	418.31	636.00	8,737	0.0E+00	1.0E+00
105679	2,4-Dimethylphenol	2.09E+02	5.84E-02	8.69E-06	7.87E+03	8.20E-05	2.00E-06	25	484.13	707.60	11,329	0.0E+00	7.0E-02
106423	p-Xylene	3.89E+02	7.69E-02	8.44E-06	1.85E+02	3.14E-01	7.66E-03	26	411.52	616.20	8,525	0.0E+00	7.0E+00
106467	1,4-Dichlorobenzene	6.17E+02	6.90E-02	7.90E-06	7.38E+01	9.96E-02	2.43E-03	25	447.21	684.75	9,271	0.0E+00	8.0E-01
106478	p-Chloroaniline	6.61E+01	4.83E-02	1.01E-05	5.30E+03	1.36E-05	3.32E-07	25	503.65	754.00	11,689	0.0E+00	1.4E-02
107062	1,2-Dichloroethane	1.74E+01	1.04E-01	9.90E-06	8.52E+03	4.01E-02	9.78E-04	25	356.65	561.00	7,643	2.6E-05	0.0E+00
108054	Vinyl acetate	5.25E+00	8.50E-02	9.20E-06	2.00E+04	2.10E-02	5.12E-04	25	345.65	519.13	7,800	0.0E+00	2.0E-01
108383	m-Xylene	4.07E+02	7.00E-02	7.80E-06	1.61E+02	3.01E-01	7.34E-03	25	412.27	617.05	8,523	0.0E+00	7.0E+00
108883	Toluene	1.82E+02	8.70E-02	8.60E-06	5.26E+02	2.72E-01	6.63E-03	25	383.78	591.79	7,930	0.0E+00	4.0E-01
108907	Chlorobenzene	2.19E+02	7.30E-02	8.70E-06	4.72E+02	1.52E-01	3.71E-03	25	404.87	632.40	8,410	0.0E+00	2.0E-02
108952	Phenol	2.88E+01	8.20E-02	9.10E-06	8.28E+04	1.63E-05	3.98E-07	25	455.02	694.20	10,920	0.0E+00	2.1E+00
111444	Bis(2-chloroethyl)ether	1.55E+01	6.92E-02	7.53E-06	1.72E+04	7.38E-04	1.80E-05	25	451.15	659.79	9,000	3.3E-04	0.0E+00
115297	Endosulfan	2.14E+03	1.15E-02	4.55E-06	5.10E-01	4.59E-04	1.12E-05	25	674.43	942.94	14,000	0.0E+00	2.1E-02
117817	Bis(2-ethylhexyl)phthalate	1.51E+07	3.51E-02	3.66E-06	3.40E-01	4.18E-06	1.02E-07	25	657.15	806.00	15,999	4.0E-06	0.0E+00
117840	Di-n-octyl phthalate	8.32E+07	1.51E-02	3.58E-06	2.00E-02	2.74E-03	6.68E-05	25	704.09	862.22	15,000	0.0E+00	7.0E-02
118741	Hexachlorobenzene	5.50E+04	5.42E-02	5.91E-06	6.20E+00	5.41E-02	1.32E-03	25	582.55	825.00	14,447	4.6E-04	0.0E+00
120127	Anthracene	2.95E+04	3.24E-02	7.74E-06	4.34E-02	2.67E-03	6.51E-05	25	615.18	873.00	13,121	0.0E+00	1.1E+00
120821	1,2,4-Trichlorobenzene	1.78E+03	3.00E-02	8.23E-06	3.00E+02	5.82E-02	1.42E-03	25	486.15	725.00	10,471	0.0E+00	2.0E-01
120832	2,4-Dichlorophenol	1.47E+02	3.46E-02	8.77E-06	4.50E+03	1.30E-04	3.17E-06	25	482.15	708.17	11,000	0.0E+00	1.1E-02
121142	2,4-Dinitrotoluene	9.55E+01	2.03E-01	7.06E-06	2.70E+02	3.80E-06	9.27E-08	25	590.00	814.00	13,467	1.9E-04	0.0E+00
124481	Chlorodibromomethane	6.31E+01	1.96E-02	1.05E-05	2.60E+03	3.21E-02	7.83E-04	25	416.14	678.20	8,000	2.4E-05	0.0E+00
127184	Tetrachloroethylene	1.55E+02	7.20E-02	8.20E-06	2.00E+02	7.54E-01	1.84E-02	25	394.40	620.20	8,288	5.8E-07	0.0E+00
129000	Pyrene	1.05E+05	2.72E-02	7.24E-06	1.35E-01	4.51E-04	1.10E-05	25	667.95	936.00	14,370	0.0E+00	1.1E-01
156592	cis-1,2-Dichloroethylene	3.55E+01	7.36E-02	1.13E-05	3.50E+03	1.67E-01	4.07E-03	25	333.65	544.00	7,192	0.0E+00	3.5E-02
156605	trans-1,2-Dichloroethylene	5.25E+01	7.07E-02	1.19E-05	6.30E+03	3.85E-01	9.39E-03	25	320.85	516.50	6,717	0.0E+00	7.0E-02
193395	Indeno(1,2,3-cd)pyrene	3.47E+06	1.90E-02	5.66E-06	2.20E-05	6.56E-05	1.60E-06	25	809.15	1078.24	17,000	2.1E-04	0.0E+00
205992	Benzo(b)fluoranthene	1.23E+06	2.26E-02	5.56E-06	1.50E-03	4.55E-03	1.11E-04	25	715.90	969.27	15,000	2.1E-04	0.0E+00
206440	Fluoranthene	1.07E+05	3.02E-02	6.35E-06	2.06E-01	6.60E-04	1.61E-05	25	655.95	905.00	13,815	0.0E+00	1.4E-01
207089	Benzo(k)fluoranthene	1.23E+06	2.26E-02	5.56E-06	8.00E-04	3.40E-05	8.29E-07	25	753.15	1019.70	16,000	2.1E-05	0.0E+00
218019	Chrysene	3.98E+05	2.48E-02	6.21E-06	1.60E-03	3.88E-03	9.46E-05	25	714.15	979.00	16,455	2.1E-06	0.0E+00
309002	Aldrin	2.45E+06	1.32E-02	4.86E-06	1.80E-01	6.97E-03	1.70E-04	25	603.01	839.37	13,000	4.9E-03	0.0E+00
319846	alpha-HCH (alpha-BHC)	1.23E+03	1.42E-02	7.34E-06	2.00E+00	4.35E-04	1.06E-05	25	596.55	839.36	13,000	1.8E-03	0.0E+00
319857	beta-HCH (beta-BHC)	1.26E+03	1.42E-02	7.34E-06	2.40E-01	3.05E-05	7.44E-07	25	596.55	839.36	13,000	5.3E-04	0.0E+00
542756	1,3-Dichloropropene	4.57E+01	6.26E-02	1.00E-05	2.80E+03	7.26E-01	1.77E-02	25	381.15	587.38	7,000	3.7E-05	2.0E-02
606202	2,6-Dinitrotoluene	6.92E+01	3.27E-02	7.26E-06	1.82E+02	3.06E-05	7.46E-07	25	558.00	770.00	12,938	1.9E-04	0.0E+00
621647	N-Nitrosodi-n-propylamine	2.40E+01	5.45E-02	8.17E-06	9.89E+03	9.23E-05	2.25E-06	25	509.60	746.87	11,000	2.0E-03	0.0E+00
1024573	Heptachlor epoxide	8.32E+04	1.32E-02	4.23E-06	2.00E-01	3.90E-04	9.51E-06	25	613.96	848.76	13,000	2.6E-03	0.0E+00
7439976	Mercury (elemental)	5.20E+01	3.07E-02	6.30E-06	5.62E-02	4.67E-01	1.14E-02	25	629.88	1750.00	14,127	0.0E+00	3.0E-04
8001352	Toxaphene	2.57E+05	1.16E-02	4.34E-06	7.40E-01	2.46E-04	6.00E-06	25	657.15	873.31	14,000	3.2E-04	0.0E+00
11096825	Aroclor 1260 (PCB-1260)	2.90E+05	1.38E-02	4.32E-06	8.00E-02	1.89E-01	4.60E-03	25	402.50	539.37	19,000	1.0E-04	0.0E+00
11097691	Aroclor 1254 (PCB-1254)	2.00E+05	1.56E-02	5.00E-06	5.70E-02	8.20E-02	2.00E-03	25	377.50	512.27	19,000	1.0E-04	0.0E+00
12674112	Aroclor 1016 (PCB-1016)	3.30E+04	2.22E-02	5.42E-06	4.20E-01	1.19E-02	2.90E-04	25	340.50	475.22	18,000	1.0E-04	0.0E+00
53469219	Aroclor 1242 (PCB-1242)	3.30E+04	2.14E-02	5.31E-06	3.40E-01	2.13E-02	5.20E-04	25	345.50	482.20	18,000	1.0E-04	0.0E+00

DATA ENTRY SHEET

CALCULATE RISK-BASED SOIL CONCENTRATION (enter "X" in "YES" box)

VERSION 1.2
September, 1998

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL SOIL CONCENTRATION (enter "X" in "YES" box and initial soil conc. below)

YES [ ]

ENTER Chemical CAS No. (numbers only, no dashes)	**ENTER** Initial soil conc., C_R (µg/kg)	Chemical
95476	20000	o-Xylene

ENTER Average soil temperature, T_S (°C)	**ENTER** Depth below grade to bottom of enclosed space floor, L_F (cm)	**ENTER** Depth below grade to top of contamination, L_1 (cm)	**ENTER** Depth below grade to bottom of contamination, (enter value of 0 if value is unknown) L_b (cm)	**ENTER** Totals must add up to value of L_1 (cell D28) Thickness of soil stratum A, h_A (cm)	**ENTER** Thickness of soil stratum B, (Enter value or 0) h_B (cm)	**ENTER** Thickness of soil stratum C, (Enter value or 0) h_C (cm)	**ENTER** Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	**ENTER** User-defined stratum A soil vapor permeability, k_v (cm^2)
10	33	310	0	310	0	0			1.00E-08

ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	**ENTER** Stratum A soil total porosity, n^A (unitless)	**ENTER** Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	**ENTER** Stratum A soil organic carbon fraction, f_{oc}^A (unitless)	**ENTER** Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	**ENTER** Stratum B soil total porosity, n^B (unitless)	**ENTER** Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	**ENTER** Stratum B soil organic carbon fraction, f_{oc}^B (unitless)	**ENTER** Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	**ENTER** Stratum C soil total porosity, n^C (unitless)	**ENTER** Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)	**ENTER** Stratum C soil organic carbon fraction, f_{oc}^C (unitless)
1.5	0.35	0.15	0.006	1.5	0.43	0.25	0.003	1.7	0.34	0.26	0.002

ENTER Enclosed space floor thickness, L_{crack} (cm)	**ENTER** Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	**ENTER** Enclosed space floor length, L_B (cm)	**ENTER** Enclosed space floor width, W_B (cm)	**ENTER** Enclosed space height, H_B (cm)	**ENTER** Floor-wall seam crack width, w (cm)	**ENTER** Indoor air exchange rate, ER (1/h)
33	40	961	961	488	0.1	1

ENTER Averaging time for carcinogens, AT_c (yrs)	**ENTER** Averaging time for noncarcinogens, AT_{nc} (yrs)	**ENTER** Exposure duration, ED (yrs)	**ENTER** Exposure frequency, EF (days/yr)	**ENTER** Target risk for carcinogens, TR (unitless)	**ENTER** Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based soil concentration.	

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
8.70E-02	1.00E-05	5.20E-03	25	8,661	417.60	630.30	3.63E+02	1.78E+02	0.0E+00	7.0E+00

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Initial soil concentration used, C_R (µg/kg)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
9.46E+08	277	0.200	0.180	0.080	#N/A	#N/A	#N/A	1.00E-08	3,844	1	1.25E+05

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)	Convection path length, L_p (cm)
9.24E+05	4.16E-04	33	10,404	2.05E-03	8.83E-02	1.75E-04	3.34E-03	0.00E+00	0.00E+00	3.34E-03	277	33

Soil-water partition coefficient, K_d (cm^3/g)	Source vapor conc., C_{source} (µg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (µg/m^3)	Finite source β term (unitless)	Finite source ψ term $(sec)^{-1}$	Time for source depletion, τ_D (sec)	Exposure duration > time for source depletion (YES/NO)
2.18E+00	3.86E+01	0.10	8.48E+00	3.34E-03	3.84E+02	4.31E+94	3.85E-05	1.48E-03	NA	NA	NA	NA

Finite source indoor attenuation coefficient, $<\alpha>$ (unitless)	Mass limit bldg. conc., $C_{building}$ (µg/m^3)	Finite source bldg. conc., $C_{building}$ (µg/m^3)	Final finite source bldg. conc., $C_{building}$ (µg/m^3)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
NA	NA	NA	NA	NA	7.0E+00

RESULTS SHEET

RISK-BASED SOIL CONCENTRATION CALCULATIONS:

Indoor exposure soil conc., carcinogen (µg/kg)	Indoor exposure soil conc., noncarcinogen (µg/kg)	Risk-based indoor exposure soil conc., (µg/kg)	Soil saturation conc., C_{sat} (µg/kg)	Final indoor exposure soil conc., (µg/kg)
NA	4.92E+06	4.92E+06	4.08E+05	4.08E+05

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

VLOOKUP TABLES

Soil Properties Lookup Table

SCS Soil Type	K_s (cm/h)	α (1/cm)	N (unitless)	M (unitless)	θ_s (cm^3/cm^3)	θ_r (cm^3/cm^3)	Mean Grain Diameter (cm)
C	0.20	0.008	1.09	0.083	0.38	0.068	0.0092
CL	0.26	0.019	1.31	0.237	0.41	0.095	0.016
L	1.04	0.036	1.56	0.359	0.43	0.078	0.020
LS	14.59	0.124	2.28	0.561	0.41	0.057	0.040
S	29.70	0.145	2.68	0.627	0.43	0.045	0.044
SC	0.12	0.027	1.23	0.187	0.38	0.100	0.025
SCL	1.31	0.059	1.48	0.324	0.39	0.100	0.029
SI	0.25	0.016	1.37	0.270	0.46	0.034	0.0046
SIC	0.02	0.005	1.09	0.083	0.26	0.070	0.0039
SICL	0.07	0.010	1.23	0.187	0.43	0.089	0.0056
SIL	0.45	0.020	1.41	0.291	0.45	0.067	0.011
SL	4.42	0.075	1.89	0.471	0.41	0.065	0.030

Chemical Properties Lookup Table

CAS No.	Chemical	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Pure component water solubility, S (mg/L)	Henry's law constant H' (unitless)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
50293	DDT	2.63E+06	1.37E-02	4.95E-06	2.50E-02	3.32E-04	8.10E-06	25	533.15	720.75	11,000	9.7E-05	0.0E+00
50328	Benzo(a)pyrene	1.02E+06	4.30E-02	9.00E-06	1.62E-03	4.63E-05	1.13E-06	25	715.90	969.27	15,000	2.1E-03	0.0E+00
51285	2,4-Dinitrophenol	1.00E-02	2.73E-02	9.06E-06	2.79E+03	1.82E-05	4.44E-07	25	605.28	827.85	15,000	0.0E+00	7.0E-03
53703	Dibenz(a,h)anthracene	3.80E+06	2.02E-02	5.18E-06	2.49E-03	6.03E-07	1.47E-08	25	743.24	990.41	16,000	2.1E-03	0.0E+00
56235	Carbon tetrachloride	1.74E+02	7.80E-02	8.80E-06	7.93E+02	1.25E+00	3.05E-02	25	349.90	556.60	7,127	1.5E-05	0.0E+00
56553	Benz(a)anthracene	3.98E+05	5.10E-02	9.00E-06	9.40E-03	1.37E-04	3.34E-06	25	708.15	1004.79	15,000	2.1E-04	0.0E+00
57749	Chlordane	1.20E+05	1.18E-02	4.37E-06	5.60E-02	1.99E-03	4.85E-05	25	624.24	885.73	13,000	3.7E-04	0.0E+00
58899	gamma-HCH (Lindane)	1.07E+03	1.42E-02	7.34E-06	6.80E+00	5.74E-04	1.40E-05	25	596.55	839.36	13,000	3.7E-04	0.0E+00
60571	Dieldrin	2.14E+04	1.25E-02	4.74E-06	1.95E-01	6.19E-04	1.51E-05	25	613.32	842.25	13,000	4.6E-03	0.0E+00
65850	Benzoic Acid	6.00E-01	5.36E-02	7.97E-06	3.50E+03	6.31E-05	1.54E-06	25	720.00	751.00	10,000	0.0E+00	1.4E+01
67641	Acetone	5.75E-01	1.24E-01	1.14E-05	1.00E+06	1.59E-03	3.88E-05	25	329.20	508.10	6,955	0.0E+00	3.5E-01
67663	Chloroform	3.98E+01	1.04E-01	1.00E-05	7.92E+03	1.50E-01	3.66E-03	25	334.32	536.40	6,988	2.3E-05	0.0E+00
67721	Hexachloroethane	1.78E+03	2.50E-03	6.80E-06	5.00E+01	1.59E-01	3.88E-03	25	458.00	695.00	9,510	4.0E-06	0.0E+00
71363	Butanol	6.92E+00	8.00E-02	9.30E-06	7.40E+04	3.61E-04	8.80E-06	25	390.88	563.05	10,346	0.0E+00	3.5E-01
71432	Benzene	5.89E+01	8.80E-02	9.80E-06	1.75E+03	2.28E-01	5.56E-03	25	353.24	562.16	7,342	8.3E-06	0.0E+00
71556	1,1,1-Trichloroethane	1.10E+02	7.80E-02	8.80E-06	1.33E+03	7.05E-01	1.72E-02	25	347.24	545.00	7,136	0.0E+00	1.0E+00
72208	Endrin	1.23E+04	1.25E-02	4.74E-06	2.50E-01	3.08E-04	7.51E-06	25	718.15	986.20	12,000	0.0E+00	1.1E-03
72435	Methoxychlor	9.77E+04	1.56E-02	4.46E-06	4.50E-02	6.48E-04	1.58E-05	25	651.02	848.49	14,000	0.0E+00	1.8E-02
72548	DDD	1.00E+06	1.69E-02	4.76E-06	9.00E-02	1.64E-04	4.00E-06	25	639.90	863.77	14,000	6.9E-05	0.0E+00
72559	DDE	4.47E+06	1.44E-02	5.87E-06	1.20E-01	8.61E-04	2.10E-05	25	636.44	860.38	13,000	9.7E-05	0.0E+00
74839	Methyl bromide	1.05E+01	7.28E-02	1.21E-05	1.52E+04	2.56E-01	6.24E-03	25	276.71	467.00	5,714	0.0E+00	5.0E-03
75014	Vinyl chloride (chloroethene)	1.86E+01	1.06E-01	1.23E-06	2.76E+03	1.11E+00	2.71E-02	25	259.25	432.00	5,250	8.4E-05	0.0E+00
75092	Methylene chloride	1.17E+01	1.01E-01	1.17E-05	1.30E+04	8.98E-02	2.19E-03	25	313.00	510.00	6,706	4.7E-07	3.0E+00
75150	Carbon disulfide	4.57E+01	1.04E-01	1.00E-05	1.19E+03	1.24E+00	3.02E-02	25	319.00	552.00	6,391	0.0E+00	7.0E-01
75252	Bromoform	8.71E+01	1.49E-02	1.03E-05	3.10E+03	2.19E-02	5.34E-04	25	422.35	696.00	9,479	1.1E-06	0.0E+00
75274	Bromodichloromethane	5.50E+01	2.98E-02	1.06E-05	6.74E+03	6.56E-02	1.60E-03	25	363.15	585.85	7,000	1.8E-05	0.0E+00
75343	1,1-Dichloroethane	3.16E+01	7.42E-02	1.05E-05	5.06E+03	2.30E-01	5.61E-03	25	330.55	523.00	6,895	0.0E+00	5.0E-01
75354	1,1-Dichloroethylene	5.89E+01	9.00E-02	1.04E-05	2.25E+03	1.07E+00	2.61E-02	25	304.75	576.05	6,247	5.0E-05	0.0E+00
76448	Heptachlor	1.41E+06	1.12E-02	5.69E-06	1.80E-01	4.47E-02	1.09E-03	25	603.69	846.31	13,000	1.3E-03	0.0E+00
77474	Hexachlorocyclopentadiene	2.00E+05	1.61E-02	7.21E-06	1.80E+00	1.11E+00	2.71E-02	25	512.15	746.00	10,931	0.0E+00	7.0E-05
78591	Isophorone	4.68E+01	6.23E-02	6.76E-06	1.20E+04	2.72E-04	6.63E-06	25	488.35	715.00	10,271	2.7E-07	0.0E+00
78875	1,2-Dichloropropane	4.37E+01	7.82E-02	8.73E-06	2.80E+03	1.15E-01	2.80E-03	25	369.52	572.00	7,590	0.0E+00	4.0E-03
79005	1,1,2-Trichloroethane	5.01E+01	7.80E-02	8.80E-06	4.42E+03	3.74E-02	9.12E-04	25	386.15	602.00	8,322	1.6E-05	0.0E+00
79016	Trichloroethylene	1.66E+02	7.90E-02	9.10E-06	1.10E+03	4.22E-01	1.03E-02	25	360.36	544.20	7,505	1.7E-06	0.0E+00
79345	1,1,2,2-Tetrachloroethane	9.33E+01	7.10E-02	7.90E-06	2.97E+03	1.41E-02	3.44E-04	25	419.60	661.15	8,996	5.8E-05	0.0E+00
83329	Acenaphthene	7.08E+03	4.21E-02	7.69E-06	4.24E+00	6.36E-03	1.55E-04	25	550.54	803.15	12,155	0.0E+00	2.1E-01
84662	Diethylphthalate	2.68E+02	2.56E-02	6.35E-06	1.08E+03	1.85E-05	4.51E-07	25	567.15	757.00	13,733	0.0E+00	2.8E+00
84742	Di-n-butyl phthalate	3.39E+04	4.38E-02	7.86E-06	1.12E+01	3.85E-08	9.39E-10	25	613.15	798.67	14,751	0.0E+00	3.5E-01

85687	Butyl benzyl phthalate	5.75E+04	1.74E-02	4.83E-06	2.69E+00	5.17E-05	1.26E-06	25	660.60	839.68	13,000	0.0E+00	7.0E-01
86306	N-Nitrosodiphenylamine	1.29E+03	3.12E-02	6.35E-06	3.51E+01	2.05E-04	5.00E-06	25	632.28	890.45	13,000	1.4E-06	0.0E+00
86737	Fluorene	1.38E+04	3.63E-02	7.88E-06	1.98E+00	2.61E-03	6.37E-05	25	570.44	870.00	12,666	0.0E+00	1.4E-01
86748	Carbazole	3.39E+03	3.90E-02	7.03E-06	7.48E+00	6.26E-07	1.53E-08	25	627.87	899.00	13,977	5.7E-06	0.0E+00
87683	Hexachloro-1,3-butadiene	5.37E+04	5.61E-02	6.16E-06	3.23E+00	3.34E-01	8.15E-03	25	486.15	738.00	10,206	2.2E-05	0.0E+00
87865	Pentachlorophenol	5.92E+02	5.60E-02	6.10E-06	1.95E+03	1.00E-06	2.44E-08	25	582.15	813.20	14,000	3.4E-05	0.0E+00
88062	2,4,6-Trichlorophenol	3.81E+02	3.18E-02	6.25E-06	8.00E+02	3.19E-04	7.78E-06	25	519.15	749.03	12,000	3.1E-06	0.0E+00
91203	Naphthalene	2.00E+03	5.90E-02	7.50E-06	3.10E+01	1.98E-02	4.83E-04	25	491.14	748.40	10,373	0.0E+00	1.4E-01
91941	3,3-Dichlorobenzidine	7.24E+02	1.94E-02	6.74E-06	3.11E+00	1.64E-07	4.00E-09	25	560.26	754.03	13,000	1.3E-04	0.0E+00
95476	o-Xylene	3.63E+02	8.70E-02	1.00E-05	1.78E+02	2.13E-01	5.20E-03	25	417.60	630.30	8,661	0.0E+00	7.0E+00
95487	2-Methylphenol (o-cresol)	9.12E+01	7.40E-02	8.30E-06	2.60E+04	4.92E-05	1.20E-06	25	464.19	697.60	10,800	0.0E+00	1.8E-01
95501	1,2-Dichlorobenzene	6.17E+02	6.90E-02	7.90E-06	1.56E+02	7.79E-02	1.90E-03	25	453.57	705.00	9,700	0.0E+00	2.0E-01
95578	2-Chlorophenol	3.88E+02	5.01E-02	9.46E-06	2.20E+04	1.60E-02	3.90E-04	25	447.53	675.00	9,572	0.0E+00	1.8E-02
95954	2,4,5-Trichlorophenol	1.60E+03	2.91E-02	7.03E-06	1.20E+03	1.78E-04	4.34E-06	25	526.15	759.13	13,000	0.0E+00	3.5E-01
98953	Nitrobenzene	6.46E+01	7.60E-02	8.60E-06	2.09E+03	9.84E-04	2.40E-05	25	483.95	719.00	10,566	0.0E+00	2.0E-03
100414	Ethylbenzene	3.63E+02	7.50E-02	7.80E-06	1.69E+02	3.23E-01	7.88E-03	25	409.34	617.20	8,501	0.0E+00	1.0E+00
100425	Styrene	7.76E+02	7.10E-02	8.00E-06	3.10E+02	1.13E-01	2.76E-03	25	418.31	636.00	8,737	0.0E+00	1.0E+00
105679	2,4-Dimethylphenol	2.09E+02	5.84E-02	8.69E-06	7.87E+03	8.20E-05	2.00E-06	25	484.13	707.60	11,329	0.0E+00	7.0E-02
106423	p-Xylene	3.89E+02	7.69E-02	8.44E-06	1.85E+02	3.14E-01	7.66E-03	26	411.52	616.20	8,525	0.0E+00	7.0E+00
106467	1,4-Dichlorobenzene	6.17E+02	6.90E-02	7.90E-06	7.38E+01	9.96E-02	2.43E-03	25	447.21	684.75	9,271	0.0E+00	8.0E-01
106478	p-Chloroaniline	6.61E+01	4.83E-02	1.01E-05	5.30E+03	1.36E-05	3.32E-07	25	503.65	754.00	11,689	0.0E+00	1.4E-02
107062	1,2-Dichloroethane	1.74E+01	1.04E-01	9.90E-06	8.52E+03	4.01E-02	9.78E-04	25	356.65	561.00	7,643	2.6E-05	0.0E+00
108054	Vinyl acetate	5.25E+00	8.50E-02	9.20E-06	2.00E+04	2.10E-02	5.12E-04	25	345.65	519.13	7,800	0.0E+00	2.0E-01
108383	m-Xylene	4.07E+02	7.00E-02	7.80E-06	1.61E+02	3.01E-01	7.34E-03	25	412.27	617.05	8,523	0.0E+00	7.0E+00
108883	Toluene	1.82E+02	8.70E-02	8.60E-06	5.26E+02	2.72E-01	6.63E-03	25	383.78	591.79	7,930	0.0E+00	4.0E-01
108907	Chlorobenzene	2.19E+02	7.30E-02	8.70E-06	4.72E+02	1.52E-01	3.71E-03	25	404.87	632.40	8,410	0.0E+00	2.0E-02
108952	Phenol	2.88E+01	8.20E-02	9.10E-06	8.28E+04	1.63E-05	3.98E-07	25	455.02	694.20	10,920	0.0E+00	2.1E+00
111444	Bis(2-chloroethyl)ether	1.55E+01	6.92E-02	7.53E-06	1.72E+04	7.38E-04	1.80E-05	25	451.15	659.79	9,000	3.3E-04	0.0E+00
115297	Endosulfan	2.14E+03	1.15E-02	4.55E-06	5.10E-01	4.59E-04	1.12E-05	25	674.43	942.94	14,000	0.0E+00	2.1E-02
117817	Bis(2-ethylhexyl)phthalate	1.51E+07	3.51E-02	3.66E-06	3.40E-01	4.18E-06	1.02E-07	25	657.15	806.00	15,999	4.0E-06	0.0E+00
117840	Di-n-octyl phthalate	8.32E+07	1.51E-02	3.58E-06	2.00E-02	2.74E-03	6.68E-05	25	704.09	862.22	15,000	0.0E+00	7.0E-02
118741	Hexachlorobenzene	5.50E+04	5.42E-02	5.91E-06	6.20E+00	5.41E-02	1.32E-03	25	582.55	825.00	14,447	4.6E-04	0.0E+00
120127	Anthracene	2.95E+04	3.24E-02	7.74E-06	4.34E-02	2.67E-03	6.51E-05	25	615.18	873.00	13,121	0.0E+00	1.1E+00
120821	1,2,4-Trichlorobenzene	1.78E+03	3.00E-02	8.23E-06	3.00E+02	5.82E-02	1.42E-03	25	486.15	725.00	10,471	0.0E+00	2.0E-01
120832	2,4-Dichlorophenol	1.47E+02	3.46E-02	8.77E-06	4.50E+03	1.30E-04	3.17E-06	25	482.15	708.17	11,000	0.0E+00	1.1E-02
121142	2,4-Dinitrotoluene	9.55E+01	2.03E-01	7.06E-06	2.70E+02	3.80E-06	9.27E-08	25	590.00	814.00	13,467	1.9E-04	0.0E+00
124481	Chlorodibromomethane	6.31E+01	1.96E-02	1.05E-05	2.60E+03	3.21E-02	7.83E-04	25	416.14	678.20	8,000	2.4E-05	0.0E+00
127184	Tetrachloroethylene	1.55E+02	7.20E-02	8.20E-06	2.00E+02	7.54E-01	1.84E-02	25	394.40	620.20	8,288	5.8E-07	0.0E+00
129000	Pyrene	1.05E+05	2.72E-02	7.24E-06	1.35E-01	4.51E-04	1.10E-05	25	667.95	936.00	14,370	0.0E+00	1.1E-01
156592	cis-1,2-Dichloroethylene	3.55E+01	7.36E-02	1.13E-05	3.50E+03	1.67E-01	4.07E-03	25	333.65	544.00	7,192	0.0E+00	3.5E-02
156605	trans-1,2-Dichloroethylene	5.25E+01	7.07E-02	1.19E-05	6.30E+03	3.85E-01	9.39E-03	25	320.85	516.50	6,717	0.0E+00	7.0E-02
193395	Indeno(1,2,3-cd)pyrene	3.47E+06	1.90E-02	5.66E-06	2.20E-05	6.56E-05	1.60E-06	25	809.15	1078.24	17,000	2.1E-04	0.0E+00
205992	Benzo(b)fluoranthene	1.23E+06	2.26E-02	5.56E-06	1.50E-03	4.55E-03	1.11E-04	25	715.90	969.27	15,000	2.1E-04	0.0E+00
206440	Fluoranthene	1.07E+05	3.02E-02	6.35E-06	2.06E-01	6.60E-04	1.61E-05	25	655.95	905.00	13,815	0.0E+00	1.4E-01
207089	Benzo(k)fluoranthene	1.23E+06	2.26E-02	5.56E-06	8.00E-04	3.40E-05	8.29E-07	25	753.15	1019.70	16,000	2.1E-05	0.0E+00
218019	Chrysene	3.98E+05	2.48E-02	6.21E-06	1.60E-03	3.88E-03	9.46E-05	25	714.15	979.00	16,455	2.1E-06	0.0E+00
309002	Aldrin	2.45E+06	1.32E-02	4.86E-06	1.80E-01	6.97E-03	1.70E-04	25	603.01	839.37	13,000	4.9E-03	0.0E+00
319846	alpha-HCH (alpha-BHC)	1.23E+03	1.42E-02	7.34E-06	2.00E+00	4.35E-04	1.06E-05	25	596.55	839.36	13,000	1.8E-03	0.0E+00
319857	beta-HCH (beta-BHC)	1.26E+03	1.42E-02	7.34E-06	2.40E-01	3.05E-05	7.44E-07	25	596.55	839.36	13,000	5.3E-04	0.0E+00
542756	1,3-Dichloropropene	4.57E+01	6.26E-02	1.00E-05	2.80E+03	7.26E-01	1.77E-02	25	381.15	587.38	7,000	3.7E-05	2.0E-02
606202	2,6-Dinitrotoluene	6.92E+01	3.27E-02	7.26E-06	1.82E+02	3.06E-05	7.46E-07	25	558.00	770.00	12,938	1.9E-04	0.0E+00
621647	N-Nitrosodi-n-propylamine	2.40E+01	5.45E-02	8.17E-06	9.89E+03	9.23E-05	2.25E-06	25	509.60	746.87	11,000	2.0E-03	0.0E+00
1024573	Heptachlor epoxide	8.32E+04	1.32E-02	4.23E-06	2.00E-01	3.90E-04	9.51E-06	25	613.96	848.76	13,000	2.6E-03	0.0E+00
7439976	Mercury (elemental)	5.20E+01	3.07E-02	6.30E-06	5.62E-02	4.67E-01	1.14E-02	25	629.88	1750.00	14,127	0.0E+00	3.0E-04
8001352	Toxaphene	2.57E+05	1.16E-02	4.34E-06	7.40E-01	2.46E-04	6.00E-06	25	657.15	873.31	14,000	3.2E-04	0.0E+00
11096825	Aroclor 1260 (PCB-1260)	2.90E+05	1.38E-02	4.32E-06	8.00E-02	1.89E-01	4.60E-03	25	402.50	539.37	19,000	1.0E-04	0.0E+00
11097691	Aroclor 1254 (PCB-1254)	2.00E+05	1.56E-02	5.00E-06	5.70E-02	8.20E-02	2.00E-03	25	377.50	512.27	19,000	1.0E-04	0.0E+00
12674112	Aroclor 1016 (PCB-1016)	3.30E+04	2.22E-02	5.42E-06	4.20E-01	1.19E-02	2.90E-04	25	340.50	475.22	18,000	1.0E-04	0.0E+00
53469219	Aroclor 1242 (PCB-1242)	3.30E+04	2.14E-02	5.31E-06	3.40E-01	2.13E-02	5.20E-04	25	345.50	482.20	18,000	1.0E-04	0.0E+00

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

VERSION 1.2
September, 1998

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_w (µg/L)	Chemical
156592	4700	cis-1,2-Dichloroethylene

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell D28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
10	33	140	140	0	0	A	SC			1.00E-09

ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
1.5	0.35	0.15	1.5	0.45	1	1.5	0.35	1

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)
33	40	961	961	488	0.1	1

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1

Used to calculate risk-based groundwater concentration.

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
7.36E-02	1.13E-05	4.07E-03	25	7,192	333.65	544.00	3.55E+01	3.50E+03	0.0E+00	3.5E-02

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	107	0.200	-0.550	-0.650	#N/A	#N/A	#N/A	1.00E-09	30.00	0.35	0.004	0.346	3,844

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.25E+05	9.24E+05	4.16E-04	33	7,734	2.04E-03	8.77E-02	1.75E-04	2.83E-03	0.00E+00	0.00E+00	3.07E-05	1.06E-04	107

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
33	8.77E+01	0.10	8.48E-01	2.83E-03	3.84E+02	1.53E+11	3.52E-06	3.09E-04	NA	3.5E-02

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
NA	1.18E+05	1.18E+05	3.50E+06	1.18E+05

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

VLOOKUP TABLES

Soil Properties Lookup Table

SCS Soil Type	K_s (cm/h)	α (1/cm)	N (unitless)	M (unitless)	θ_s (cm^3/cm^3)	θ_r (cm^3/cm^3)	Mean Grain Diameter (cm)
C	0.20	0.008	1.09	0.083	0.38	0.068	0.0092
CL	0.26	0.019	1.31	0.237	0.41	0.095	0.016
L	1.04	0.036	1.56	0.359	0.43	0.078	0.020
LS	14.59	0.124	2.28	0.561	0.41	0.057	0.040
S	29.70	0.145	2.68	0.627	0.43	0.045	0.044
SC	0.12	0.027	1.23	0.187	0.38	0.100	0.025
SCL	1.31	0.059	1.48	0.324	0.39	0.100	0.029
SI	0.25	0.016	1.37	0.270	0.46	0.034	0.0046
SIC	0.02	0.005	1.09	0.083	0.26	0.070	0.0039
SICL	0.07	0.010	1.23	0.187	0.43	0.089	0.0056
SIL	0.45	0.020	1.41	0.291	0.45	0.067	0.011
SL	4.42	0.075	1.89	0.471	0.41	0.065	0.030

Chemical Properties Lookup Table

CAS No.	Chemical	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Pure component water solubility, S (mg/L)	Henry's law constant H' (unitless)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
50293	DDT	2.63E+06	1.37E-02	4.95E-06	2.50E-02	3.32E-04	8.10E-06	25	533.15	720.75	11,000	9.7E-05	0.0E+00
50328	Benzo(a)pyrene	1.02E+06	4.30E-02	9.00E-06	1.62E-03	4.63E-05	1.13E-06	25	715.90	969.27	15,000	2.1E-03	0.0E+00
51285	2,4-Dinitrophenol	1.00E-02	2.73E-02	9.06E-06	2.79E+03	1.82E-05	4.44E-07	25	605.28	827.85	15,000	0.0E+00	7.0E-03
53703	Dibenz(a,h)anthracene	3.80E+06	2.02E-02	5.18E-06	2.49E-03	6.03E-07	1.47E-08	25	743.24	990.41	16,000	2.1E-03	0.0E+00
56235	Carbon tetrachloride	1.74E+02	7.80E-02	8.80E-06	7.93E+02	1.25E+00	3.05E-02	25	349.90	556.60	7,127	1.5E-05	0.0E+00
56553	Benz(a)anthracene	3.98E+05	5.10E-02	9.00E-06	9.40E-03	1.37E-04	3.34E-06	25	708.15	1004.79	15,000	2.1E-04	0.0E+00
57749	Chlordane	1.20E+05	1.18E-02	4.37E-06	5.60E-02	1.99E-03	4.85E-05	25	624.24	885.73	13,000	3.7E-04	0.0E+00
58899	gamma-HCH (Lindane)	1.07E+03	1.42E-02	7.34E-06	6.80E+00	5.74E-04	1.40E-05	25	596.55	839.36	13,000	3.7E-04	0.0E+00
60571	Dieldrin	2.14E+04	1.25E-02	4.74E-06	1.95E-01	6.19E-04	1.51E-05	25	613.32	842.25	13,000	4.6E-03	0.0E+00
65850	Benzoic Acid	6.00E-01	5.36E-02	7.97E-06	3.50E+03	6.31E-05	1.54E-06	25	720.00	751.00	10,000	0.0E+00	1.4E+01
67641	Acetone	5.75E-01	1.24E-01	1.14E-05	1.00E+06	1.59E-03	3.88E-05	25	329.20	508.10	6,955	0.0E+00	3.5E-01
67663	Chloroform	3.98E+01	1.04E-01	1.00E-05	7.92E+03	1.50E-01	3.66E-03	25	334.32	536.40	6,988	2.3E-05	0.0E+00
67721	Hexachloroethane	1.78E+03	2.50E-03	6.80E-06	5.00E+01	1.59E-01	3.88E-03	25	458.00	695.00	9,510	4.0E-06	0.0E+00
71363	Butanol	6.92E+00	8.00E-02	9.30E-06	7.40E+04	3.61E-04	8.80E-06	25	390.88	563.05	10,346	0.0E+00	3.5E-01
71432	Benzene	5.89E+01	8.80E-02	9.80E-06	1.75E+03	2.28E-01	5.56E-03	25	353.24	562.16	7,342	8.3E-06	0.0E+00
71556	1,1,1-Trichloroethane	1.10E+02	7.80E-02	8.80E-06	1.33E+03	7.05E-01	1.72E-02	25	347.24	545.00	7,136	0.0E+00	1.0E+00
72208	Endrin	1.23E+04	1.25E-02	4.74E-06	2.50E-01	3.08E-04	7.51E-06	25	718.15	986.20	12,000	0.0E+00	1.1E-03
72435	Methoxychlor	9.77E+04	1.56E-02	4.46E-06	4.50E-02	6.48E-04	1.58E-05	25	651.02	848.49	14,000	0.0E+00	1.8E-02
72548	DDD	1.00E+06	1.69E-02	4.76E-06	9.00E-02	1.64E-04	4.00E-06	25	639.90	863.77	14,000	6.9E-05	0.0E+00
72559	DDE	4.47E+06	1.44E-02	5.87E-06	1.20E-01	8.61E-04	2.10E-05	25	636.44	860.38	13,000	9.7E-05	0.0E+00
74839	Methyl bromide	1.05E+01	7.28E-02	1.21E-05	1.52E+04	2.56E-01	6.24E-03	25	276.71	467.00	5,714	0.0E+00	5.0E-03
75014	Vinyl chloride (chloroethene)	1.86E+01	1.06E-01	1.23E-06	2.76E+03	1.11E+00	2.71E-02	25	259.25	432.00	5,250	8.4E-05	0.0E+00
75092	Methylene chloride	1.17E+01	1.01E-01	1.17E-05	1.30E+04	8.98E-02	2.19E-03	25	313.00	510.00	6,706	4.7E-07	3.0E+00
75150	Carbon disulfide	4.57E+01	1.04E-01	1.00E-05	1.19E+03	1.24E+00	3.02E-02	25	319.00	552.00	6,391	0.0E+00	7.0E-01
75252	Bromoform	8.71E+01	1.49E-02	1.03E-05	3.10E+03	2.19E-02	5.34E-04	25	422.35	696.00	9,479	1.1E-06	0.0E+00
75274	Bromodichloromethane	5.50E+01	2.98E-02	1.06E-05	6.74E+03	6.56E-02	1.60E-03	25	363.15	585.85	7,000	1.8E-05	0.0E+00
75343	1,1-Dichloroethane	3.16E+01	7.42E-02	1.05E-05	5.06E+03	2.30E-01	5.61E-03	25	330.55	523.00	6,895	0.0E+00	5.0E-01
75354	1,1-Dichloroethylene	5.89E+01	9.00E-02	1.04E-05	2.25E+03	1.07E+00	2.61E-02	25	304.75	576.05	6,247	5.0E-05	0.0E+00
76448	Heptachlor	1.41E+06	1.12E-02	5.69E-06	1.80E-01	4.47E-02	1.09E-03	25	603.69	846.31	13,000	1.3E-03	0.0E+00
77474	Hexachlorocyclopentadiene	2.00E+05	1.61E-02	7.21E-06	1.80E+00	1.11E+00	2.71E-02	25	512.15	746.00	10,931	0.0E+00	7.0E-05
78591	Isophorone	4.68E+01	6.23E-02	6.76E-06	1.20E+04	2.72E-04	6.63E-06	25	488.35	715.00	10,271	2.7E-07	0.0E+00
78875	1,2-Dichloropropane	4.37E+01	7.82E-02	8.73E-06	2.80E+03	1.15E-01	2.80E-03	25	369.52	572.00	7,590	0.0E+00	4.0E-03
79005	1,1,2-Trichloroethane	5.01E+01	7.80E-02	8.80E-06	4.42E+03	3.74E-02	9.12E-04	25	386.15	602.00	8,322	1.6E-05	0.0E+00
79016	Trichloroethylene	1.66E+02	7.90E-02	9.10E-06	1.10E+03	4.22E-01	1.03E-02	25	360.36	544.20	7,505	1.7E-06	0.0E+00
79345	1,1,2,2-Tetrachloroethane	9.33E+01	7.10E-02	7.90E-06	2.97E+03	1.41E-02	3.44E-04	25	419.60	661.15	8,996	5.8E-05	0.0E+00
83329	Acenaphthene	7.08E+03	4.21E-02	7.69E-06	4.24E+00	6.36E-03	1.55E-04	25	550.54	803.15	12,155	0.0E+00	2.1E-01
84662	Diethylphthalate	2.88E+02	2.56E-02	6.35E-06	1.08E+03	1.85E-05	4.51E-07	25	567.15	757.00	13,733	0.0E+00	2.8E+00
84742	Di-n-butyl phthalate	3.39E+04	4.38E-02	7.86E-06	1.12E+01	3.85E-08	9.39E-10	25	613.15	798.67	14,751	0.0E+00	3.5E-01

85687	Butyl benzyl phthalate	5.75E+04	1.74E-02	4.83E-06	2.69E+00	5.17E-05	1.26E-06	25	660.60	839.68	13,000	0.0E+00	7.0E-01
86306	N-Nitrosodiphenylamine	1.29E+03	3.12E-02	6.35E-06	3.51E+01	2.05E-04	5.00E-06	25	632.28	890.45	13,000	1.4E-06	0.0E+00
86737	Fluorene	1.38E+04	3.63E-02	7.88E-06	1.98E+00	2.61E-03	6.37E-05	25	570.44	870.00	12,666	0.0E+00	1.4E-01
86748	Carbazole	3.39E+03	3.90E-02	7.03E-06	7.48E+00	6.26E-07	1.53E-08	25	627.87	899.00	13,977	5.7E-06	0.0E+00
87683	Hexachloro-1,3-butadiene	5.37E+04	5.61E-02	6.16E-06	3.23E+00	3.34E-01	8.15E-03	25	486.15	738.00	10,206	2.2E-05	0.0E+00
87865	Pentachlorophenol	5.92E+02	5.60E-02	6.10E-06	1.95E+03	1.00E-06	2.44E-08	25	582.15	813.20	14,000	3.4E-05	0.0E+00
88062	2,4,6-Trichlorophenol	3.81E+02	3.18E-02	6.25E-06	8.00E+02	3.19E-04	7.78E-06	25	519.15	749.03	12,000	3.1E-06	0.0E+00
91203	Naphthalene	2.00E+03	5.90E-02	7.50E-06	3.10E+01	1.98E-02	4.83E-04	25	491.14	748.40	10,373	0.0E+00	1.4E-01
91941	3,3-Dichlorobenzidine	7.24E+02	1.94E-02	6.74E-06	3.11E+00	1.64E-07	4.00E-09	25	560.26	754.03	13,000	1.3E-04	0.0E+00
95476	o-Xylene	3.63E+02	8.70E-02	1.00E-05	1.78E+02	2.13E-01	5.20E-03	25	417.60	630.30	8,661	0.0E+00	7.0E+00
95487	2-Methylphenol (o-cresol)	9.12E+01	7.40E-02	8.30E-06	2.60E+04	4.92E-05	1.20E-06	25	464.19	697.60	10,800	0.0E+00	1.8E-01
95501	1,2-Dichlorobenzene	6.17E+02	6.90E-02	7.90E-06	1.56E+02	7.79E-02	1.90E-03	25	453.57	705.00	9,700	0.0E+00	2.0E-01
95578	2-Chlorophenol	3.88E+02	5.01E-02	9.46E-06	2.20E+04	1.60E-02	3.90E-04	25	447.53	675.00	9,572	0.0E+00	1.8E-02
95954	2,4,5-Trichlorophenol	1.60E+03	2.91E-02	7.03E-06	1.20E+03	1.78E-04	4.34E-06	25	526.15	759.13	13,000	0.0E+00	3.5E-01
98953	Nitrobenzene	6.46E+01	7.60E-02	8.60E-06	2.09E+03	9.84E-04	2.40E-05	25	483.95	719.00	10,566	0.0E+00	2.0E-03
100414	Ethylbenzene	3.63E+02	7.50E-02	7.80E-06	1.69E+02	3.23E-01	7.88E-03	25	409.34	617.20	8,501	0.0E+00	1.0E+00
100425	Styrene	7.76E+02	7.10E-02	8.00E-06	3.10E+02	1.13E-01	2.76E-03	25	418.31	636.00	8,737	0.0E+00	1.0E+00
105679	2,4-Dimethylphenol	2.09E+02	5.84E-02	8.69E-06	7.87E+03	8.20E-05	2.00E-06	25	484.13	707.60	11,329	0.0E+00	7.0E-02
106423	p-Xylene	3.89E+02	7.69E-02	8.44E-06	1.85E+02	3.14E-01	7.66E-03	26	411.52	616.20	8,525	0.0E+00	7.0E+00
106467	1,4-Dichlorobenzene	6.17E+02	6.90E-02	7.90E-06	7.38E+01	9.96E-02	2.43E-03	25	447.21	684.75	9,271	0.0E+00	8.0E-01
106478	p-Chloroaniline	6.61E+01	4.83E-02	1.01E-05	5.30E+03	1.36E-05	3.32E-07	25	503.65	754.00	11,689	0.0E+00	1.4E-02
107062	1,2-Dichloroethane	1.74E+01	1.04E-01	9.90E-06	8.52E+03	4.01E-02	9.78E-04	25	356.65	561.00	7,643	2.6E-05	0.0E+00
108054	Vinyl acetate	5.25E+00	8.50E-02	9.20E-06	2.00E+04	2.10E-02	5.12E-04	25	345.65	519.13	7,800	0.0E+00	2.0E-01
108383	m-Xylene	4.07E+02	7.00E-02	7.80E-06	1.61E+02	3.01E-01	7.34E-03	25	412.27	617.05	8,523	0.0E+00	7.0E+00
108883	Toluene	1.82E+02	8.70E-02	8.60E-06	5.26E+02	2.72E-01	6.63E-03	25	383.78	591.79	7,930	0.0E+00	4.0E-01
108907	Chlorobenzene	2.19E+02	7.30E-02	8.70E-06	4.72E+02	1.52E-01	3.71E-03	25	404.87	632.40	8,410	0.0E+00	2.0E-02
108952	Phenol	2.88E+01	8.20E-02	9.10E-06	8.28E+04	1.63E-05	3.98E-07	25	455.02	694.20	10,920	0.0E+00	2.1E+00
111444	Bis(2-chloroethyl)ether	1.55E+01	6.92E-02	7.53E-06	1.72E+04	7.38E-04	1.80E-05	25	451.15	659.79	9,000	3.3E-04	0.0E+00
115297	Endosulfan	2.14E+03	1.15E-02	4.55E-06	5.10E-01	4.59E-04	1.12E-05	25	674.43	942.94	14,000	0.0E+00	2.1E-02
117817	Bis(2-ethylhexyl)phthalate	1.51E+07	3.51E-02	3.66E-06	3.40E-01	4.18E-06	1.02E-07	25	657.15	806.00	15,999	4.0E-06	0.0E+00
117840	Di-n-octyl phthalate	8.32E+07	1.51E-02	3.58E-06	2.00E-02	2.74E-03	6.68E-05	25	704.09	862.22	15,000	0.0E+00	7.0E-02
118741	Hexachlorobenzene	5.50E+04	5.42E-02	5.91E-06	6.20E+00	5.41E-02	1.32E-03	25	582.55	825.00	14,447	4.6E-04	0.0E+00
120127	Anthracene	2.95E+04	3.24E-02	7.74E-06	4.34E-02	2.67E-03	6.51E-05	25	615.18	873.00	13,121	0.0E+00	1.1E+00
120821	1,2,4-Trichlorobenzene	1.78E+03	3.00E-02	8.23E-06	3.00E+02	5.82E-02	1.42E-03	25	486.15	725.00	10,471	0.0E+00	2.0E-01
120832	2,4-Dichlorophenol	1.47E+02	3.46E-02	8.77E-06	4.50E+03	1.30E-04	3.17E-06	25	482.15	708.17	11,000	0.0E+00	1.1E-02
121142	2,4-Dinitrotoluene	9.55E+01	2.03E-01	7.06E-06	2.70E+02	3.80E-06	9.27E-08	25	590.00	814.00	13,467	1.9E-04	0.0E+00
124481	Chlorodibromomethane	6.31E+01	1.96E-02	1.05E-05	2.60E+03	3.21E-02	7.83E-04	25	416.14	678.20	8,000	2.4E-05	0.0E+00
127184	Tetrachloroethylene	1.55E+02	7.20E-02	8.20E-06	2.00E+02	7.54E-01	1.84E-02	25	394.40	620.20	8,288	5.8E-07	0.0E+00
129000	Pyrene	1.05E+05	2.72E-02	7.24E-06	1.35E-01	4.51E-04	1.10E-05	25	667.95	936.00	14,370	0.0E+00	1.1E-01
156592	cis-1,2-Dichloroethylene	3.55E+01	7.36E-02	1.13E-05	3.50E+03	1.67E-01	4.07E-03	25	333.65	544.00	7,192	0.0E+00	3.5E-02
156605	trans-1,2-Dichloroethylene	5.25E+01	7.07E-02	1.19E-05	6.30E+03	3.85E-01	9.39E-03	25	320.85	516.50	6,717	0.0E+00	7.0E-02
193395	Indeno(1,2,3-cd)pyrene	3.47E+06	1.90E-02	5.66E-06	2.20E-05	6.56E-05	1.60E-06	25	809.15	1078.24	17,000	2.1E-04	0.0E+00
205992	Benzo(b)fluoranthene	1.23E+06	2.26E-02	5.56E-06	1.50E-03	4.55E-03	1.11E-04	25	715.90	969.27	15,000	2.1E-04	0.0E+00
206440	Fluoranthene	1.07E+05	3.02E-02	6.35E-06	2.06E-01	6.60E-04	1.61E-05	25	655.95	905.00	13,815	0.0E+00	1.4E-01
207089	Benzo(k)fluoranthene	1.23E+06	2.26E-02	5.56E-06	8.00E-04	3.40E-05	8.29E-07	25	753.15	1019.70	16,000	2.1E-05	0.0E+00
218019	Chrysene	3.98E+05	2.48E-02	6.21E-06	1.60E-03	3.88E-03	9.46E-05	25	714.15	979.00	16,455	2.1E-06	0.0E+00
309002	Aldrin	2.45E+06	1.32E-02	4.86E-06	1.80E-01	6.97E-03	1.70E-04	25	603.01	839.37	13,000	4.9E-03	0.0E+00
319846	alpha-HCH (alpha-BHC)	1.23E+03	1.42E-02	7.34E-06	2.00E+00	4.35E-04	1.06E-05	25	596.55	839.36	13,000	1.8E-03	0.0E+00
319857	beta-HCH (beta-BHC)	1.26E+03	1.42E-02	7.34E-06	2.40E-01	3.05E-05	7.44E-07	25	596.55	839.36	13,000	5.3E-04	0.0E+00
542756	1,3-Dichloropropene	4.57E+01	6.26E-02	1.00E-05	2.80E+03	7.26E-01	1.77E-02	25	381.15	587.38	7,000	3.7E-05	2.0E-02
606202	2,6-Dinitrotoluene	6.92E+01	3.27E-02	7.26E-06	1.82E+02	3.06E-05	7.46E-07	25	558.00	770.00	12,938	1.9E-04	0.0E+00
621647	N-Nitrosodi-n-propylamine	2.40E+01	5.45E-02	8.17E-06	9.89E+03	9.23E-05	2.25E-06	25	509.60	746.87	11,000	2.0E-03	0.0E+00
1024573	Heptachlor epoxide	8.32E+04	1.32E-02	4.23E-06	2.00E-01	3.90E-04	9.51E-06	25	613.96	848.76	13,000	2.6E-03	0.0E+00
7439976	Mercury (elemental)	5.20E+01	3.07E-02	6.30E-06	5.62E-02	4.67E-01	1.14E-02	25	629.88	1750.00	14,127	0.0E+00	3.0E-04
8001352	Toxaphene	2.57E+05	1.16E-02	4.34E-06	7.40E-01	2.46E-04	6.00E-06	25	657.15	873.31	14,000	3.2E-04	0.0E+00
11096825	Aroclor 1260 (PCB-1260)	2.90E+05	1.38E-02	4.32E-06	8.00E-02	1.89E-01	4.60E-03	25	402.50	539.37	19,000	1.0E-04	0.0E+00
11097691	Aroclor 1254 (PCB-1254)	2.00E+05	1.56E-02	5.00E-06	5.70E-02	8.20E-02	2.00E-03	25	377.50	512.27	19,000	1.0E-04	0.0E+00
12674112	Aroclor 1016 (PCB-1016)	3.30E+04	2.22E-02	5.42E-06	4.20E-01	1.19E-02	2.90E-04	25	340.50	475.22	18,000	1.0E-04	0.0E+00
53469219	Aroclor 1242 (PCB-1242)	3.30E+04	2.14E-02	5.31E-06	3.40E-01	2.13E-02	5.20E-04	25	345.50	482.20	18,000	1.0E-04	0.0E+00

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

VERSION 1.2
September, 1998

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
156605	57	trans-1,2-Dichloroethylene

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell D28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
10	33	140	140	0	0	A	SC			1.00E-09

ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm³)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm³/cm³)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm³)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm³/cm³)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm³)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm³/cm³)
1.5	0.35	0.15	1.5	0.45	1	1.5	0.35	1

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s²)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)
33	40	961	961	488	0.1	1

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1

Used to calculate risk-based groundwater concentration.

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
7.07E-02	1.19E-05	9.39E-03	25	6,717	320.85	516.50	5.25E+01	6.30E+03	0.0E+00	7.0E-02

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	107	0.200	-0.550	-0.650	#N/A	#N/A	#N/A	1.00E-09	30.00	0.35	0.004	0.346	3,844

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.25E+05	9.24E+05	4.16E-04	33	7,136	4.96E-03	2.14E-01	1.75E-04	2.72E-03	0.00E+00	0.00E+00	1.33E-05	4.68E-05	107

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
33	2.14E+02	0.10	8.48E-01	2.72E-03	3.84E+02	4.44E+11	2.19E-06	4.67E-04	NA	7.0E-02

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
NA	1.56E+05	1.56E+05	6.30E+06	1.56E+05

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

VLOOKUP TABLES

Soil Properties Lookup Table

SCS Soil Type	K_s (cm/h)	α (1/cm)	N (unitless)	M (unitless)	θ_s (cm^3/cm^3)	θ_r (cm^3/cm^3)	Mean Grain Diameter (cm)
C	0.20	0.008	1.09	0.083	0.38	0.068	0.0092
CL	0.26	0.019	1.31	0.237	0.41	0.095	0.016
L	1.04	0.036	1.56	0.359	0.43	0.078	0.020
LS	14.59	0.124	2.28	0.561	0.41	0.057	0.040
S	29.70	0.145	2.68	0.627	0.43	0.045	0.044
SC	0.12	0.027	1.23	0.187	0.38	0.100	0.025
SCL	1.31	0.059	1.48	0.324	0.39	0.100	0.029
SI	0.25	0.016	1.37	0.270	0.46	0.034	0.0046
SIC	0.02	0.005	1.09	0.083	0.26	0.070	0.0039
SICL	0.07	0.010	1.23	0.187	0.43	0.089	0.0056
SIL	0.45	0.020	1.41	0.291	0.45	0.067	0.011
SL	4.42	0.075	1.89	0.471	0.41	0.065	0.030

Chemical Properties Lookup Table

CAS No.	Chemical	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Pure component water solubility, S (mg/L)	Henry's law constant H' (unitless)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
50293	DDT	2.63E+06	1.37E-02	4.95E-06	2.50E-02	3.32E-04	8.10E-06	25	533.15	720.75	11,000	9.7E-05	0.0E+00
50328	Benzo(a)pyrene	1.02E+06	4.30E-02	9.00E-06	1.62E-03	4.63E-05	1.13E-06	25	715.90	969.27	15,000	2.1E-03	0.0E+00
51285	2,4-Dinitrophenol	1.00E-02	2.73E-02	9.06E-06	2.79E+03	1.82E-05	4.44E-07	25	605.28	827.85	15,000	0.0E+00	7.0E-03
53703	Dibenz(a,h)anthracene	3.80E+06	2.02E-02	5.18E-06	2.49E-03	6.03E-07	1.47E-08	25	743.24	990.41	16,000	2.1E-03	0.0E+00
56235	Carbon tetrachloride	1.74E+02	7.80E-02	8.80E-06	7.93E+02	1.25E+00	3.05E-02	25	349.90	556.60	7,127	1.5E-05	0.0E+00
56553	Benz(a)anthracene	3.98E+05	5.10E-02	9.00E-06	9.40E-03	1.37E-04	3.34E-06	25	708.15	1004.79	15,000	2.1E-04	0.0E+00
57749	Chlordane	1.20E+05	1.18E-02	4.37E-06	5.60E-02	1.99E-03	4.85E-05	25	624.24	885.73	13,000	3.7E-04	0.0E+00
58899	gamma-HCH (Lindane)	1.07E+03	1.42E-02	7.34E-06	6.80E+00	5.74E-04	1.40E-05	25	596.55	839.36	13,000	3.7E-04	0.0E+00
60571	Dieldrin	2.14E+04	1.25E-02	4.74E-06	1.95E-01	6.19E-04	1.51E-05	25	613.32	842.25	13,000	4.6E-03	0.0E+00
65850	Benzoic Acid	6.00E-01	5.36E-02	7.97E-06	3.50E+03	6.31E-05	1.54E-06	25	720.00	751.00	10,000	0.0E+00	1.4E+01
67641	Acetone	5.75E-01	1.24E-01	1.14E-05	1.00E+06	1.59E-03	3.88E-05	25	329.20	508.10	6,955	0.0E+00	3.5E-01
67663	Chloroform	3.98E+01	1.04E-01	1.00E-05	7.92E+03	1.50E-01	3.66E-03	25	334.32	536.40	6,988	2.3E-05	0.0E+00
67721	Hexachloroethane	1.78E+03	2.50E-03	6.80E-06	5.00E+01	1.59E-01	3.88E-03	25	458.00	695.00	9,510	4.0E-06	0.0E+00
71363	Butanol	6.92E+00	8.00E-02	9.30E-06	7.40E+04	3.61E-04	8.80E-06	25	390.88	563.05	10,346	0.0E+00	3.5E-01
71432	Benzene	5.89E+01	8.80E-02	9.80E-06	1.75E+03	2.28E-01	5.56E-03	25	353.24	562.16	7,342	8.3E-06	0.0E+00
71556	1,1,1-Trichloroethane	1.10E+02	7.80E-02	8.80E-06	1.33E+03	7.05E-01	1.72E-02	25	347.24	545.00	7,136	0.0E+00	1.0E+00
72208	Endrin	1.23E+04	1.25E-02	4.74E-06	2.50E-01	3.08E-04	7.51E-06	25	718.15	986.20	12,000	0.0E+00	1.1E-03
72435	Methoxychlor	9.77E+04	1.56E-02	4.46E-06	4.50E-02	6.48E-04	1.58E-05	25	651.02	848.49	14,000	0.0E+00	1.8E-02
72548	DDD	1.00E+06	1.69E-02	4.76E-06	9.00E-02	1.64E-04	4.00E-06	25	639.90	863.77	14,000	6.9E-05	0.0E+00
72559	DDE	4.47E+06	1.44E-02	5.87E-06	1.20E-01	8.61E-04	2.10E-05	25	636.44	860.38	13,000	9.7E-05	0.0E+00
74839	Methyl bromide	1.05E+01	7.28E-02	1.21E-05	1.52E+04	2.56E-01	6.24E-03	25	276.71	467.00	5,714	0.0E+00	5.0E-03
75014	Vinyl chloride (chloroethene)	1.86E+01	1.06E-01	1.23E-06	2.76E+03	1.11E+00	2.71E-02	25	259.25	432.00	5,250	8.4E-05	0.0E+00
75092	Methylene chloride	1.17E+01	1.01E-01	1.17E-05	1.30E+04	8.98E-02	2.19E-03	25	313.00	510.00	6,706	4.7E-07	3.0E+00
75150	Carbon disulfide	4.57E+01	1.04E-01	1.00E-05	1.19E+03	1.24E+00	3.02E-02	25	319.00	552.00	6,391	0.0E+00	7.0E-01
75252	Bromoform	8.71E+01	1.49E-02	1.03E-05	3.10E+03	2.19E-02	5.34E-04	25	422.35	696.00	9,479	1.1E-06	0.0E+00
75274	Bromodichloromethane	5.50E+01	2.98E-02	1.06E-05	6.74E+03	6.56E-02	1.60E-03	25	363.15	585.85	7,000	1.8E-05	0.0E+00
75343	1,1-Dichloroethane	3.16E+01	7.42E-02	1.05E-05	5.06E+03	2.30E-01	5.61E-03	25	330.55	523.00	6,895	0.0E+00	5.0E-01
75354	1,1-Dichloroethylene	5.89E+01	9.00E-02	1.04E-05	2.25E+03	1.07E+00	2.61E-02	25	304.75	576.05	6,247	5.0E-05	0.0E+00
76448	Heptachlor	1.41E+06	1.12E-02	5.69E-06	1.80E-01	4.47E-02	1.09E-03	25	603.69	846.31	13,000	1.3E-03	0.0E+00
77474	Hexachlorocyclopentadiene	2.00E+05	1.61E-02	7.21E-06	1.80E+00	1.11E+00	2.71E-02	25	512.15	746.00	10,931	0.0E+00	7.0E-05
78591	Isophorone	4.68E+01	6.23E-02	6.76E-06	1.20E+04	2.72E-04	6.63E-06	25	488.35	715.00	10,271	2.7E-07	0.0E+00
78875	1,2-Dichloropropane	4.37E+01	7.82E-02	8.73E-06	2.80E+03	1.15E-01	2.80E-03	25	369.52	572.00	7,590	0.0E+00	4.0E-03
79005	1,1,2-Trichloroethane	5.01E+01	7.80E-02	8.80E-06	4.42E+03	3.74E-02	9.12E-04	25	386.15	602.00	8,322	1.6E-05	0.0E+00
79016	Trichloroethylene	1.66E+02	7.90E-02	9.10E-06	1.10E+03	4.22E-01	1.03E-02	25	360.36	544.20	7,505	1.7E-06	0.0E+00
79345	1,1,2,2-Tetrachloroethane	9.33E+01	7.10E-02	7.90E-06	2.97E+03	1.41E-02	3.44E-04	25	419.60	661.15	8,996	5.8E-05	0.0E+00
83329	Acenaphthene	7.08E+03	4.21E-02	7.69E-06	4.24E+00	6.36E-03	1.55E-04	25	550.54	803.15	12,155	0.0E+00	2.1E-01
84662	Diethylphthalate	2.88E+02	2.56E-02	6.35E-06	1.08E+03	1.85E-05	4.51E-07	25	567.15	757.00	13,733	0.0E+00	2.8E+00
84742	Di-n-butyl phthalate	3.39E+04	4.38E-02	7.86E-06	1.12E+01	3.85E-08	9.39E-10	25	613.15	798.67	14,751	0.0E+00	3.5E-01

85687	Butyl benzyl phthalate	5.75E+04	1.74E-02	4.83E-06	2.69E+00	5.17E-05	1.26E-06	25	660.60	839.68	13,000	0.0E+00	7.0E-01
86306	N-Nitrosodiphenylamine	1.29E+03	3.12E-02	6.35E-06	3.51E+01	2.05E-04	5.00E-06	25	632.28	890.45	13,000	1.4E-06	0.0E+00
86737	Fluorene	1.38E+04	3.63E-02	7.88E-06	1.98E+00	2.61E-03	6.37E-05	25	570.44	870.00	12,666	0.0E+00	1.4E-01
86748	Carbazole	3.39E+03	3.90E-02	7.03E-06	7.48E+00	6.26E-07	1.53E-08	25	627.87	899.00	13,977	5.7E-06	0.0E+00
87683	Hexachloro-1,3-butadiene	5.37E+04	5.61E-02	6.16E-06	3.23E+00	3.34E-01	8.15E-03	25	486.15	738.00	10,206	2.2E-05	0.0E+00
87865	Pentachlorophenol	5.92E+02	5.60E-02	6.10E-06	1.95E+03	1.00E-06	2.44E-08	25	582.15	813.20	14,000	3.4E-05	0.0E+00
88062	2,4,6-Trichlorophenol	3.81E+02	3.18E-02	6.25E-06	8.00E+02	3.19E-04	7.78E-06	25	519.15	749.03	12,000	3.1E-06	0.0E+00
91203	Naphthalene	2.00E+03	5.90E-02	7.50E-06	3.10E+01	1.98E-02	4.83E-04	25	491.14	748.40	10,373	0.0E+00	1.4E-01
91941	3,3-Dichlorobenzidine	7.24E+02	1.94E-02	6.74E-06	3.11E+00	1.64E-07	4.00E-09	25	560.26	754.03	13,000	1.3E-04	0.0E+00
95476	o-Xylene	3.63E+02	8.70E-02	1.00E-05	1.78E+02	2.13E-01	5.20E-03	25	417.60	630.30	8,661	0.0E+00	7.0E+00
95487	2-Methylphenol (o-cresol)	9.12E+01	7.40E-02	8.30E-06	2.60E+04	4.92E-05	1.20E-06	25	464.19	697.60	10,800	0.0E+00	1.8E-01
95501	1,2-Dichlorobenzene	6.17E+02	6.90E-02	7.90E-06	1.56E+02	7.79E-02	1.90E-03	25	453.57	705.00	9,700	0.0E+00	2.0E-01
95578	2-Chlorophenol	3.88E+02	5.01E-02	9.46E-06	2.20E+04	1.60E-02	3.90E-04	25	447.53	675.00	9,572	0.0E+00	1.8E-02
95954	2,4,5-Trichlorophenol	1.60E+03	2.91E-02	7.03E-06	1.20E+03	1.78E-04	4.34E-06	25	526.15	759.13	13,000	0.0E+00	3.5E-01
98953	Nitrobenzene	6.46E+01	7.60E-02	8.60E-06	2.09E+03	9.84E-04	2.40E-05	25	483.95	719.00	10,566	0.0E+00	2.0E-03
100414	Ethylbenzene	3.63E+02	7.50E-02	7.80E-06	1.69E+02	3.23E-01	7.88E-03	25	409.34	617.20	8,501	0.0E+00	1.0E+00
100425	Styrene	7.76E+02	7.10E-02	8.00E-06	3.10E+02	1.13E-01	2.76E-03	25	418.31	636.00	8,737	0.0E+00	1.0E+00
105679	2,4-Dimethylphenol	2.09E+02	5.84E-02	8.69E-06	7.87E+03	8.20E-05	2.00E-06	25	484.13	707.60	11,329	0.0E+00	7.0E-02
106423	p-Xylene	3.89E+02	7.69E-02	8.44E-06	1.85E+02	3.14E-01	7.66E-03	26	411.52	616.20	8,525	0.0E+00	7.0E+00
106467	1,4-Dichlorobenzene	6.17E+02	6.90E-02	7.90E-06	7.38E+01	9.96E-02	2.43E-03	25	447.21	684.75	9,271	0.0E+00	8.0E-01
106478	p-Chloroaniline	6.61E+01	4.83E-02	1.01E-05	5.30E+03	1.36E-05	3.32E-07	25	503.65	754.00	11,689	0.0E+00	1.4E-02
107062	1,2-Dichloroethane	1.74E+01	1.04E-01	9.90E-06	8.52E+03	4.01E-02	9.78E-04	25	356.65	561.00	7,643	2.6E-05	0.0E+00
108054	Vinyl acetate	5.25E+00	8.50E-02	9.20E-06	2.00E+04	2.10E-02	5.12E-04	25	345.65	519.13	7,800	0.0E+00	2.0E-01
108383	m-Xylene	4.07E+02	7.00E-02	7.80E-06	1.61E+02	3.01E-01	7.34E-03	25	412.27	617.05	8,523	0.0E+00	7.0E+00
108883	Toluene	1.82E+02	8.70E-02	8.60E-06	5.26E+02	2.72E-01	6.63E-03	25	383.78	591.79	7,930	0.0E+00	4.0E-01
108907	Chlorobenzene	2.19E+02	7.30E-02	8.70E-06	4.72E+02	1.52E-01	3.71E-03	25	404.87	632.40	8,410	0.0E+00	2.0E-02
108952	Phenol	2.88E+01	8.20E-02	9.10E-06	8.28E+04	1.63E-05	3.98E-07	25	455.02	694.20	10,920	0.0E+00	2.1E+00
111444	Bis(2-chloroethyl)ether	1.55E+01	6.92E-02	7.53E-06	1.72E+04	7.38E-04	1.80E-05	25	451.15	659.79	9,000	3.3E-04	0.0E+00
115297	Endosulfan	2.14E+03	1.15E-02	4.55E-06	5.10E-01	4.59E-04	1.12E-05	25	674.43	942.94	14,000	0.0E+00	2.1E-02
117817	Bis(2-ethylhexyl)phthalate	1.51E+07	3.51E-02	3.66E-06	3.40E-01	4.18E-06	1.02E-07	25	657.15	806.00	15,999	4.0E-06	0.0E+00
117840	Di-n-octyl phthalate	8.32E+07	1.51E-02	3.58E-06	2.00E-02	2.74E-03	6.68E-05	25	704.09	862.22	15,000	0.0E+00	7.0E-02
118741	Hexachlorobenzene	5.50E+04	5.42E-02	5.91E-06	6.20E+00	5.41E-02	1.32E-03	25	582.55	825.00	14,447	4.6E-04	0.0E+00
120127	Anthracene	2.95E+04	3.24E-02	7.74E-06	4.34E-02	2.67E-03	6.51E-05	25	615.18	873.00	13,121	0.0E+00	1.1E+00
120821	1,2,4-Trichlorobenzene	1.78E+03	3.00E-02	8.23E-06	3.00E+02	5.82E-02	1.42E-03	25	486.15	725.00	10,471	0.0E+00	2.0E-01
120832	2,4-Dichlorophenol	1.47E+02	3.46E-02	8.77E-06	4.50E+03	1.30E-04	3.17E-06	25	482.15	708.17	11,000	0.0E+00	1.1E-02
121142	2,4-Dinitrotoluene	9.55E+01	2.03E-01	7.06E-06	2.70E+02	3.80E-06	9.27E-08	25	590.00	814.00	13,467	1.9E-04	0.0E+00
124481	Chlorodibromomethane	6.31E+01	1.96E-02	1.05E-05	2.60E+03	3.21E-02	7.83E-04	25	416.14	678.20	8,000	2.4E-05	0.0E+00
127184	Tetrachloroethylene	1.55E+02	7.20E-02	8.20E-06	2.00E+02	7.54E-01	1.84E-02	25	394.40	620.20	8,288	5.8E-07	0.0E+00
129000	Pyrene	1.05E+05	2.72E-02	7.24E-06	1.35E-01	4.51E-04	1.10E-05	25	667.95	936.00	14,370	0.0E+00	1.1E-01
156592	cis-1,2-Dichloroethylene	3.55E+01	7.36E-02	1.13E-05	3.50E+03	1.67E-01	4.07E-03	25	333.65	544.00	7,192	0.0E+00	3.5E-02
156605	trans-1,2-Dichloroethylene	5.25E+01	7.07E-02	1.19E-05	6.30E+03	3.85E-01	9.39E-03	25	320.85	516.50	6,717	0.0E+00	7.0E-02
193395	Indeno(1,2,3-cd)pyrene	3.47E+06	1.90E-02	5.66E-06	2.20E-05	6.56E-05	1.60E-06	25	809.15	1078.24	17,000	2.1E-04	0.0E+00
205992	Benzo(b)fluoranthene	1.23E+06	2.26E-02	5.56E-06	1.50E-03	4.55E-03	1.11E-04	25	715.90	969.27	15,000	2.1E-04	0.0E+00
206440	Fluoranthene	1.07E+05	3.02E-02	6.35E-06	2.06E-01	6.60E-04	1.61E-05	25	655.95	905.00	13,815	0.0E+00	1.4E-01
207089	Benzo(k)fluoranthene	1.23E+06	2.26E-02	5.56E-06	8.00E-04	3.40E-05	8.29E-07	25	753.15	1019.70	16,000	2.1E-05	0.0E+00
218019	Chrysene	3.98E+05	2.48E-02	6.21E-06	1.60E-03	3.88E-03	9.46E-05	25	714.15	979.00	16,455	2.1E-06	0.0E+00
309002	Aldrin	2.45E+06	1.32E-02	4.86E-06	1.80E-01	6.97E-03	1.70E-04	25	603.01	839.37	13,000	4.9E-03	0.0E+00
319846	alpha-HCH (alpha-BHC)	1.23E+03	1.42E-02	7.34E-06	2.00E+00	4.35E-04	1.06E-05	25	596.55	839.36	13,000	1.8E-03	0.0E+00
319857	beta-HCH (beta-BHC)	1.26E+03	1.42E-02	7.34E-06	2.40E-01	3.05E-05	7.44E-07	25	596.55	839.36	13,000	5.3E-04	0.0E+00
542756	1,3-Dichloropropene	4.57E+01	6.26E-02	1.00E-05	2.80E+03	7.26E-01	1.77E-02	25	381.15	587.38	7,000	3.7E-05	2.0E-02
606202	2,6-Dinitrotoluene	6.92E+01	3.27E-02	7.26E-06	1.62E+02	3.06E-05	7.46E-07	25	558.00	770.00	12,938	1.9E-04	0.0E+00
621647	N-Nitrosodi-n-propylamine	2.40E+01	5.45E-02	8.17E-06	9.89E+03	9.23E-05	2.25E-06	25	509.60	746.87	11,000	2.0E-03	0.0E+00
1024573	Heptachlor epoxide	8.32E+04	1.32E-02	4.23E-06	2.00E-01	3.90E-04	9.51E-06	25	613.96	848.76	13,000	2.6E-03	0.0E+00
7439976	Mercury (elemental)	5.20E+01	3.07E-02	6.30E-06	5.62E-02	4.67E-01	1.14E-02	25	629.88	1750.00	14,127	0.0E+00	3.0E-04
8001352	Toxaphene	2.57E+05	1.16E-02	4.34E-06	7.40E-01	2.46E-04	6.00E-06	25	657.15	873.31	14,000	3.2E-04	0.0E+00
11096825	Aroclor 1260 (PCB-1260)	2.90E+05	1.38E-02	4.32E-06	8.00E-02	1.89E-01	4.60E-03	25	402.50	539.37	19,000	1.0E-04	0.0E+00
11097691	Aroclor 1254 (PCB-1254)	2.00E+05	1.56E-02	5.00E-06	5.70E-02	8.20E-02	2.00E-03	25	377.50	512.27	19,000	1.0E-04	0.0E+00
12674112	Aroclor 1016 (PCB-1016)	3.30E+04	2.22E-02	5.42E-06	4.20E-01	1.19E-02	2.90E-04	25	340.50	475.22	18,000	1.0E-04	0.0E+00
53469219	Aroclor 1242 (PCB-1242)	3.30E+04	2.14E-02	5.31E-06	3.40E-01	2.13E-02	5.20E-04	25	345.50	482.20	18,000	1.0E-04	0.0E+00

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

VERSION 1.2
September, 1998

YES | X

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES |

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
100414	39000	Ethylbenzene

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell D28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
10	33	140	140	0	0	A	SC			1.00E-09

ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
1.5	0.35	0.15	1.5	0.45	1	1.5	0.35	1

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm-s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)
33	40	961	961	488	0.1	1

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1

Used to calculate risk-based groundwater concentration.

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
7.50E-02	7.80E-06	7.88E-03	25	8,501	409.34	617.20	3.63E+02	1.69E+02	0.0E+00	1.0E+00

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	107	0.200	-0.550	-0.650	#N/A	#N/A	#N/A	1.00E-09	30.00	0.35	0.004	0.346	3,844

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.25E+05	9.24E+05	4.16E-04	33	10,155	3.18E-03	1.37E-01	1.75E-04	2.88E-03	0.00E+00	0.00E+00	1.36E-05	4.79E-05	107

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
33	1.37E+02	0.10	8.48E-01	2.88E-03	3.84E+02	9.55E+10	2.22E-06	3.04E-04	NA	1.0E+00

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
NA	3.43E+06	3.43E+06	1.69E+05	1.69E+05

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

VLOOKUP TABLES

Soil Properties Lookup Table

SCS Soil Type	K_s (cm/h)	α (1/cm)	N (unitless)	M (unitless)	θ_s (cm^3/cm^3)	θ_r (cm^3/cm^3)	Mean Grain Diameter (cm)
C	0.20	0.008	1.09	0.083	0.38	0.068	0.0092
CL	0.26	0.019	1.31	0.237	0.41	0.095	0.016
L	1.04	0.036	1.56	0.359	0.43	0.078	0.020
LS	14.59	0.124	2.28	0.561	0.41	0.057	0.040
S	29.70	0.145	2.68	0.627	0.43	0.045	0.044
SC	0.12	0.027	1.23	0.187	0.38	0.100	0.025
SCL	1.31	0.059	1.48	0.324	0.39	0.100	0.029
SI	0.25	0.016	1.37	0.270	0.46	0.034	0.0046
SIC	0.02	0.005	1.09	0.083	0.26	0.070	0.0039
SICL	0.07	0.010	1.23	0.187	0.43	0.089	0.0056
SIL	0.45	0.020	1.41	0.291	0.45	0.067	0.011
SL	4.42	0.075	1.89	0.471	0.41	0.065	0.030

Chemical Properties Lookup Table

CAS No.	Chemical	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Pure component water solubility, S (mg/L)	Henry's law constant H' (unitless)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
50293	DDT	2.63E+06	1.37E-02	4.95E-06	2.50E-02	3.32E-04	8.10E-06	25	533.15	720.75	11,000	9.7E-05	0.0E+00
50328	Benzo(a)pyrene	1.02E+06	4.30E-02	9.00E-06	1.62E-03	4.63E-05	1.13E-06	25	715.90	969.27	15,000	2.1E-03	0.0E+00
51285	2,4-Dinitrophenol	1.00E-02	2.73E-02	9.06E-06	2.79E+03	1.82E-05	4.44E-07	25	605.28	827.85	15,000	0.0E+00	7.0E-03
53703	Dibenz(a,h)anthracene	3.80E+06	2.02E-02	5.18E-06	2.49E-03	6.03E-07	1.47E-08	25	743.24	990.41	16,000	2.1E-03	0.0E+00
56235	Carbon tetrachloride	1.74E+02	7.80E-02	8.80E-06	7.93E+02	1.25E+00	3.05E-02	25	349.90	556.60	7,127	1.5E-05	0.0E+00
56553	Benz(a)anthracene	3.98E+05	5.10E-02	9.00E-06	9.40E-03	1.37E-04	3.34E-06	25	708.15	1004.79	15,000	2.1E-04	0.0E+00
57749	Chlordane	1.20E+05	1.18E-02	4.37E-06	5.60E-02	1.99E-03	4.85E-05	25	624.24	885.73	13,000	3.7E-04	0.0E+00
58899	gamma-HCH (Lindane)	1.07E+03	1.42E-02	7.34E-06	6.80E+00	5.74E-04	1.40E-05	25	596.55	839.36	13,000	3.7E-04	0.0E+00
60571	Dieldrin	2.14E+04	1.25E-02	4.74E-06	1.95E-01	6.19E-04	1.51E-05	25	613.32	842.25	13,000	4.6E-03	0.0E+00
65850	Benzoic Acid	6.00E-01	5.36E-02	7.97E-06	3.50E+03	6.31E-05	1.54E-06	25	720.00	751.00	10,000	0.0E+00	1.4E+01
67641	Acetone	5.75E-01	1.24E-01	1.14E-05	1.00E+06	1.59E-03	3.88E-05	25	329.20	508.10	6,955	0.0E+00	3.5E-01
67663	Chloroform	3.98E+01	1.04E-01	1.00E-05	7.92E+03	1.50E-01	3.66E-03	25	334.32	536.40	6,988	2.3E-05	0.0E+00
67721	Hexachloroethane	1.78E+03	2.50E-03	6.80E-06	5.00E+01	1.59E-01	3.88E-03	25	458.00	695.00	9,510	4.0E-06	0.0E+00
71363	Butanol	6.92E+00	8.00E-02	9.30E-06	7.40E+04	3.61E-04	8.80E-06	25	390.88	563.05	10,346	0.0E+00	3.5E-01
71432	Benzene	5.89E+01	8.80E-02	9.80E-06	1.75E+03	2.28E-01	5.56E-03	25	353.24	562.16	7,342	8.3E-06	0.0E+00
71556	1,1,1-Trichloroethane	1.10E+02	7.80E-02	8.80E-06	1.33E+03	7.05E-01	1.72E-02	25	347.24	545.00	7,136	0.0E+00	1.0E+00
72208	Endrin	1.23E+04	1.25E-02	4.74E-06	2.50E-01	3.08E-04	7.51E-06	25	718.15	986.20	12,000	0.0E+00	1.1E-03
72435	Methoxychlor	9.77E+04	1.56E-02	4.46E-06	4.50E-02	6.48E-04	1.58E-05	25	651.02	848.49	14,000	0.0E+00	1.8E-02
72548	DDD	1.00E+06	1.69E-02	4.76E-06	9.00E-02	1.64E-04	4.00E-06	25	639.90	863.77	14,000	6.9E-05	0.0E+00
72559	DDE	4.47E+06	1.44E-02	5.87E-06	1.20E-01	8.61E-04	2.10E-05	25	636.44	860.38	13,000	9.7E-05	0.0E+00
74839	Methyl bromide	1.05E+01	7.28E-02	1.21E-05	1.52E+04	2.56E-01	6.24E-03	25	276.71	467.00	5,714	0.0E+00	5.0E-03
75014	Vinyl chloride (chloroethene)	1.86E+01	1.06E-01	1.23E-06	2.76E+03	1.11E+00	2.71E-02	25	259.25	432.00	5,250	8.4E-05	0.0E+00
75092	Methylene chloride	1.17E+01	1.01E-01	1.17E-05	1.30E+04	8.98E-02	2.19E-03	25	313.00	510.00	6,706	4.7E-07	3.0E+00
75150	Carbon disulfide	4.57E+01	1.04E-01	1.00E-05	1.19E+03	1.24E+00	3.02E-02	25	319.00	552.00	6,391	0.0E+00	7.0E-01
75252	Bromoform	8.71E+01	1.49E-02	1.03E-05	3.10E+03	2.19E-02	5.34E-04	25	422.35	696.00	9,479	1.1E-06	0.0E+00
75274	Bromodichloromethane	5.50E+01	2.98E-02	1.06E-05	6.74E+03	6.56E-02	1.60E-03	25	363.15	585.85	7,000	1.8E-05	0.0E+00
75343	1,1-Dichloroethane	3.16E+01	7.42E-02	1.05E-05	5.06E+03	2.30E-01	5.61E-03	25	330.55	523.00	6,895	0.0E+00	5.0E-01
75354	1,1-Dichloroethylene	5.89E+01	9.00E-02	1.04E-05	2.25E+03	1.07E+00	2.61E-02	25	304.75	576.05	6,247	5.0E-05	0.0E+00
76448	Heptachlor	1.41E+06	1.12E-02	5.69E-06	1.80E-01	4.47E-02	1.09E-03	25	603.69	846.31	13,000	1.3E-03	0.0E+00
77474	Hexachlorocyclopentadiene	2.00E+05	1.61E-02	7.21E-06	1.80E+00	1.11E+00	2.71E-02	25	512.15	746.00	10,931	0.0E+00	7.0E-05
78591	Isophorone	4.68E+01	6.23E-02	6.76E-06	1.20E+04	2.72E-04	6.63E-06	25	488.35	715.00	10,271	2.7E-07	0.0E+00
78875	1,2-Dichloropropane	4.37E+01	7.82E-02	8.73E-06	2.80E+03	1.15E-01	2.80E-03	25	369.52	572.00	7,590	0.0E+00	4.0E-03
79005	1,1,2-Trichloroethane	5.01E+01	7.80E-02	8.80E-06	4.42E+03	3.74E-02	9.12E-04	25	386.15	602.00	8,322	1.6E-05	0.0E+00
79016	Trichloroethylene	1.66E+02	7.90E-02	9.10E-06	1.10E+03	4.22E-01	1.03E-02	25	360.36	544.20	7,505	1.7E-06	0.0E+00
79345	1,1,2,2-Tetrachloroethane	9.33E+01	7.10E-02	7.90E-06	2.97E+03	1.41E-02	3.44E-04	25	419.60	661.15	8,996	5.8E-05	0.0E+00
83329	Acenaphthene	7.08E+03	4.21E-02	7.69E-06	4.24E+00	6.36E-03	1.55E-04	25	550.54	803.15	12,155	0.0E+00	2.1E-01
84662	Diethylphthalate	2.88E+02	2.56E-02	6.35E-06	1.08E+03	1.85E-05	4.51E-07	25	567.15	757.00	13,733	0.0E+00	2.8E+00
84742	Di-n-butyl phthalate	3.39E+04	4.38E-02	7.86E-06	1.12E+01	3.85E-08	9.39E-10	25	613.15	798.67	14,751	0.0E+00	3.5E-01

85687	Butyl benzyl phthalate	5.75E+04	1.74E-02	4.83E-06	2.69E+00	5.17E-05	1.26E-06	25	660.60	839.68	13,000	0.0E+00	7.0E-01
86306	N-Nitrosodiphenylamine	1.29E+03	3.12E-02	6.35E-06	3.51E+01	2.05E-04	5.00E-06	25	632.28	890.45	13,000	1.4E-06	0.0E+00
86737	Fluorene	1.38E+04	3.63E-02	7.88E-06	1.98E+00	2.61E-03	6.37E-05	25	570.44	870.00	12,666	0.0E+00	1.4E-01
86748	Carbazole	3.39E+03	3.90E-02	7.03E-06	7.48E+00	6.26E-07	1.53E-08	25	627.87	899.00	13,977	5.7E-06	0.0E+00
87683	Hexachloro-1,3-butadiene	5.37E+04	5.61E-02	6.16E-06	3.23E+00	3.34E-01	8.15E-03	25	486.15	738.00	10,206	2.2E-05	0.0E+00
87865	Pentachlorophenol	5.92E+02	5.60E-02	6.10E-06	1.95E+03	1.00E-06	2.44E-08	25	582.15	813.20	14,000	3.4E-05	0.0E+00
88062	2,4,6-Trichlorophenol	3.81E+02	3.18E-02	6.25E-06	8.00E+02	3.19E-04	7.78E-06	25	519.15	749.03	12,000	3.1E-06	0.0E+00
91203	Naphthalene	2.00E+03	5.90E-02	7.50E-06	3.10E+01	1.98E-02	4.83E-04	25	491.14	748.40	10,373	0.0E+00	1.4E-01
91941	3,3-Dichlorobenzidine	7.24E+02	1.94E-02	6.74E-06	3.11E+00	1.64E-07	4.00E-09	25	560.26	754.03	13,000	1.3E-04	0.0E+00
95476	o-Xylene	3.63E+02	8.70E-02	1.00E-05	1.78E+02	2.13E-01	5.20E-03	25	417.60	630.30	8,661	0.0E+00	7.0E+00
95487	2-Methylphenol (o-cresol)	9.12E+01	7.40E-02	8.30E-06	2.60E+04	4.92E-05	1.20E-06	25	464.19	697.60	10,800	0.0E+00	1.8E-01
95501	1,2-Dichlorobenzene	6.17E+02	6.90E-02	7.90E-06	1.56E+02	7.79E-02	1.90E-03	25	453.57	705.00	9,700	0.0E+00	2.0E-01
95578	2-Chlorophenol	3.88E+02	5.01E-02	9.46E-06	2.20E+04	1.60E-02	3.90E-04	25	447.53	675.00	9,572	0.0E+00	1.8E-02
95954	2,4,5-Trichlorophenol	1.60E+03	2.91E-02	7.03E-06	1.20E+03	1.78E-04	4.34E-06	25	526.15	759.13	13,000	0.0E+00	3.5E-01
98953	Nitrobenzene	6.46E+01	7.60E-02	8.60E-06	2.09E+03	9.84E-04	2.40E-05	25	483.95	719.00	10,566	0.0E+00	2.0E-03
100414	Ethylbenzene	3.63E+02	7.50E-02	7.80E-06	1.69E+02	3.23E-01	7.88E-03	25	409.34	617.20	8,501	0.0E+00	1.0E+00
100425	Styrene	7.76E+02	7.10E-02	8.00E-06	3.10E+02	1.13E-01	2.76E-03	25	418.31	636.00	8,737	0.0E+00	1.0E+00
105679	2,4-Dimethylphenol	2.09E+02	5.84E-02	8.69E-06	7.87E+03	8.20E-05	2.00E-06	25	484.13	707.60	11,329	0.0E+00	7.0E-02
106423	p-Xylene	3.89E+02	7.69E-02	8.44E-06	1.65E+02	3.14E-01	7.66E-03	26	411.52	616.20	8,525	0.0E+00	7.0E+00
106467	1,4-Dichlorobenzene	6.17E+02	6.90E-02	7.90E-06	7.38E+01	9.96E-02	2.43E-03	25	447.21	684.75	9,271	0.0E+00	8.0E-01
106478	p-Chloroaniline	6.61E+01	4.83E-02	1.01E-05	5.30E+03	1.36E-05	3.32E-07	25	503.65	754.00	11,689	0.0E+00	1.4E-02
107062	1,2-Dichloroethane	1.74E+01	1.04E-01	9.90E-06	8.52E+03	4.01E-02	9.78E-04	25	356.65	561.00	7,643	2.6E-05	0.0E+00
108054	Vinyl acetate	5.25E+00	8.50E-02	9.20E-06	2.00E+04	2.10E-02	5.12E-04	25	345.65	519.13	7,800	0.0E+00	2.0E-01
108383	m-Xylene	4.07E+02	7.00E-02	7.80E-06	1.61E+02	3.01E-01	7.34E-03	25	412.27	617.05	8,523	0.0E+00	7.0E+00
108883	Toluene	1.82E+02	8.70E-02	8.60E-06	5.26E+02	2.72E-01	6.63E-03	25	383.78	591.79	7,930	0.0E+00	4.0E-01
108907	Chlorobenzene	2.19E+02	7.30E-02	8.70E-06	4.72E+02	1.52E-01	3.71E-03	25	404.87	632.40	8,410	0.0E+00	2.0E-02
108952	Phenol	2.88E+01	8.20E-02	9.10E-06	8.28E+04	1.63E-05	3.98E-07	25	455.02	694.20	10,920	0.0E+00	2.1E+00
111444	Bis(2-chloroethyl)ether	1.55E+01	6.92E-02	7.53E-06	1.72E+04	7.38E-04	1.80E-05	25	451.15	659.79	9,000	3.3E-04	0.0E+00
115297	Endosulfan	2.14E+03	1.15E-02	4.55E-06	5.10E-01	4.59E-04	1.12E-05	25	674.43	942.94	14,000	0.0E+00	2.1E-02
117817	Bis(2-ethylhexyl)phthalate	1.51E+07	3.51E-02	3.66E-06	3.40E-01	4.18E-06	1.02E-07	25	657.15	806.00	15,999	4.0E-06	0.0E+00
117840	Di-n-octyl phthalate	8.32E+07	1.51E-02	3.58E-06	2.00E-02	2.74E-03	6.68E-05	25	704.09	862.22	15,000	0.0E+00	7.0E-02
118741	Hexachlorobenzene	5.50E+04	5.42E-02	5.91E-06	6.20E+00	5.41E-02	1.32E-03	25	582.55	825.00	14,447	4.6E-04	0.0E+00
120127	Anthracene	2.95E+04	3.24E-02	7.74E-06	4.34E-02	2.67E-03	6.51E-05	25	615.18	873.00	13,121	0.0E+00	1.1E+00
120821	1,2,4-Trichlorobenzene	1.78E+03	3.00E-02	8.23E-06	3.00E+02	5.82E-02	1.42E-03	25	486.15	725.00	10,471	0.0E+00	2.0E-01
120832	2,4-Dichlorophenol	1.47E+02	3.46E-02	8.77E-06	4.50E+03	1.30E-04	3.17E-06	25	482.15	708.17	11,000	0.0E+00	1.1E-02
121142	2,4-Dinitrotoluene	9.55E+01	2.03E-01	7.06E-06	2.70E+02	3.80E-06	9.27E-08	25	590.00	814.00	13,467	1.9E-04	0.0E+00
124481	Chlorodibromomethane	6.31E+01	1.96E-02	1.05E-05	2.60E+03	3.21E-02	7.83E-04	25	416.14	678.20	8,000	2.4E-05	0.0E+00
127184	Tetrachloroethylene	1.55E+02	7.20E-02	8.20E-06	2.00E+02	7.54E-01	1.84E-02	25	394.40	620.20	8,288	5.8E-07	0.0E+00
129000	Pyrene	1.05E+05	2.72E-02	7.24E-06	1.35E-01	4.51E-04	1.10E-05	25	667.95	936.00	14,370	0.0E+00	1.1E-01
156592	cis-1,2-Dichloroethylene	3.55E+01	7.36E-02	1.13E-05	3.50E+03	1.67E-01	4.07E-03	25	333.65	544.00	7,192	0.0E+00	3.5E-02
156605	trans-1,2-Dichloroethylene	5.25E+01	7.07E-02	1.19E-05	6.30E+03	3.85E-01	9.39E-03	25	320.85	516.50	6,717	0.0E+00	7.0E-02
193395	Indeno(1,2,3-cd)pyrene	3.47E+06	1.90E-02	5.66E-06	2.20E-05	6.56E-05	1.60E-06	25	809.15	1078.24	17,000	2.1E-04	0.0E+00
205992	Benzo(b)fluoranthene	1.23E+06	2.26E-02	5.56E-06	1.50E-03	4.55E-03	1.11E-04	25	715.90	969.27	15,000	2.1E-04	0.0E+00
206440	Fluoranthene	1.07E+05	3.02E-02	6.35E-06	2.06E-01	6.60E-04	1.61E-05	25	655.95	905.00	13,815	0.0E+00	1.4E-01
207089	Benzo(k)fluoranthene	1.23E+06	2.26E-02	5.56E-06	8.00E-04	3.40E-05	8.29E-07	25	753.15	1019.70	16,000	2.1E-05	0.0E+00
218019	Chrysene	3.98E+05	2.48E-02	6.21E-06	1.60E-03	3.88E-03	9.46E-05	25	714.15	979.00	16,455	2.1E-06	0.0E+00
309002	Aldrin	2.45E+06	1.32E-02	4.86E-06	1.80E-01	6.97E-03	1.70E-04	25	603.01	839.37	13,000	4.9E-03	0.0E+00
319846	alpha-HCH (alpha-BHC)	1.23E+03	1.42E-02	7.34E-06	2.00E+00	4.35E-04	1.06E-05	25	596.55	839.36	13,000	1.8E-03	0.0E+00
319857	beta-HCH (beta-BHC)	1.26E+03	1.42E-02	7.34E-06	2.40E-01	3.05E-05	7.44E-07	25	596.55	839.36	13,000	5.3E-04	0.0E+00
542756	1,3-Dichloropropene	4.57E+01	6.26E-02	1.00E-05	2.80E+03	7.26E-01	1.77E-02	25	381.15	587.38	7,000	3.7E-05	2.0E-02
606202	2,6-Dinitrotoluene	6.92E+01	3.27E-02	7.26E-06	1.82E+02	3.06E-05	7.46E-07	25	558.00	770.00	12,938	1.9E-04	0.0E+00
621647	N-Nitrosodi-n-propylamine	2.40E+01	5.45E-02	8.17E-06	9.89E+03	9.23E-05	2.25E-06	25	509.60	746.87	11,000	2.0E-03	0.0E+00
1024573	Heptachlor epoxide	8.32E+04	1.32E-02	4.23E-06	2.00E-01	3.90E-04	9.51E-06	25	613.96	848.76	13,000	2.6E-03	0.0E+00
7439976	Mercury (elemental)	5.20E+01	3.07E-02	6.30E-06	5.62E-02	4.67E-01	1.14E-02	25	629.88	1750.00	14,127	0.0E+00	3.0E-04
8001352	Toxaphene	2.57E+05	1.16E-02	4.34E-06	7.40E-01	2.46E-04	6.00E-06	25	657.15	873.31	14,000	3.2E-04	0.0E+00
11096825	Aroclor 1260 (PCB-1260)	2.90E+05	1.38E-02	4.32E-06	8.00E-02	1.89E-01	4.60E-03	25	402.50	539.37	19,000	1.0E-04	0.0E+00
11097691	Aroclor 1254 (PCB-1254)	2.00E+05	1.56E-02	5.00E-06	5.70E-02	8.20E-02	2.00E-03	25	377.50	512.27	19,000	1.0E-04	0.0E+00
12674112	Aroclor 1016 (PCB-1016)	3.30E+04	2.22E-02	5.42E-06	4.20E-01	1.19E-02	2.90E-04	25	340.50	475.22	18,000	1.0E-04	0.0E+00
53469219	Aroclor 1242 (PCB-1242)	3.30E+04	2.14E-02	5.31E-06	3.40E-01	2.13E-02	5.20E-04	25	345.50	482.20	18,000	1.0E-04	0.0E+00

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

VERSION 1.2
September, 1998

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
75092	11	Methylene chloride

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell D28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
10	33	180	180	0	0	A	SC			1.00E-09

ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
1.5	0.35	0.15	1.5	0.45	1	1.5	0.35	1

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm-s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)
33	40	961	961	488	0.1	1

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1

Used to calculate risk-based groundwater concentration.

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
1.01E-01	1.17E-05	2.19E-03	25	6,706	313.00	510.00	1.17E+01	1.30E+04	4.7E-07	3.0E+00

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	147	0.200	-0.550	-0.650	#N/A	#N/A	#N/A	1.00E-09	30.00	0.35	0.004	0.346	3,844

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.25E+05	9.24E+05	4.16E-04	33	7,034	1.17E-03	5.03E-02	1.75E-04	3.88E-03	0.00E+00	0.00E+00	5.55E-05	2.57E-04	147

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
33	5.03E+01	0.10	8.48E-01	3.88E-03	3.84E+02	1.41E+08	4.44E-06	2.23E-04	4.7E-07	3.0E+00

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
2.32E+04	1.40E+07	2.32E+04	1.30E+07	2.32E+04

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

VLOOKUP TABLES

Soil Properties Lookup Table

SCS Soil Type	K_s (cm/h)	α (1/cm)	N (unitless)	M (unitless)	θ_s (cm^3/cm^3)	θ_r (cm^3/cm^3)	Mean Grain Diameter (cm)
C	0.20	0.008	1.09	0.083	0.38	0.068	0.0092
CL	0.26	0.019	1.31	0.237	0.41	0.095	0.016
L	1.04	0.036	1.56	0.359	0.43	0.078	0.020
LS	14.59	0.124	2.28	0.561	0.41	0.057	0.040
S	29.70	0.145	2.68	0.627	0.43	0.045	0.044
SC	0.12	0.027	1.23	0.187	0.38	0.100	0.025
SCL	1.31	0.059	1.48	0.324	0.39	0.100	0.029
SI	0.25	0.016	1.37	0.270	0.46	0.034	0.0046
SIC	0.02	0.005	1.09	0.083	0.26	0.070	0.0039
SICL	0.07	0.010	1.23	0.187	0.43	0.089	0.0056
SIL	0.45	0.020	1.41	0.291	0.45	0.067	0.011
SL	4.42	0.075	1.89	0.471	0.41	0.065	0.030

Chemical Properties Lookup Table

CAS No.	Chemical	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Pure component water solubility, S (mg/L)	Henry's law constant H' (unitless)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
50293	DDT	2.63E+06	1.37E-02	4.95E-06	2.50E-02	3.32E-04	8.10E-06	25	533.15	720.75	11,000	9.7E-05	0.0E+00
50328	Benzo(a)pyrene	1.02E+06	4.30E-02	9.00E-06	1.62E-03	4.63E-05	1.13E-06	25	715.90	969.27	15,000	2.1E-03	0.0E+00
51285	2,4-Dinitrophenol	1.00E-02	2.73E-02	9.06E-06	2.79E+03	1.82E-05	4.44E-07	25	605.28	827.85	15,000	0.0E+00	7.0E-03
53703	Dibenz(a,h)anthracene	3.80E+06	2.02E-02	5.18E-06	2.49E-03	6.03E-07	1.47E-08	25	743.24	990.41	16,000	2.1E-03	0.0E+00
56235	Carbon tetrachloride	1.74E+02	7.80E-02	8.80E-06	7.93E+02	1.25E+00	3.05E-02	25	349.90	556.60	7,127	1.5E-05	0.0E+00
56553	Benz(a)anthracene	3.98E+05	5.10E-02	9.00E-06	9.40E-03	1.37E-04	3.34E-06	25	708.15	1004.79	15,000	2.1E-04	0.0E+00
57749	Chlordane	1.20E+05	1.18E-02	4.37E-06	5.60E-02	1.99E-03	4.85E-05	25	624.24	885.73	13,000	3.7E-04	0.0E+00
58899	gamma-HCH (Lindane)	1.07E+03	1.42E-02	7.34E-06	6.80E+00	5.74E-04	1.40E-05	25	596.55	839.36	13,000	3.7E-04	0.0E+00
60571	Dieldrin	2.14E+04	1.25E-02	4.74E-06	1.95E-01	6.19E-04	1.51E-05	25	613.32	842.25	13,000	4.6E-03	0.0E+00
65850	Benzoic Acid	6.00E-01	5.36E-02	7.97E-06	3.50E+03	6.31E-05	1.54E-06	25	720.00	751.00	10,000	0.0E+00	1.4E+01
67641	Acetone	5.75E-01	1.24E-01	1.14E-05	1.00E+06	1.59E-03	3.88E-05	25	329.20	508.10	6,955	0.0E+00	3.5E-01
67663	Chloroform	3.98E+01	1.04E-01	1.00E-05	7.92E+03	1.50E-01	3.66E-03	25	334.32	536.40	6,988	2.3E-05	0.0E+00
67721	Hexachloroethane	1.78E+03	2.50E-03	6.80E-06	5.00E+01	1.59E-01	3.88E-03	25	458.00	695.00	9,510	4.0E-06	0.0E+00
71363	Butanol	6.92E+00	8.00E-02	9.30E-06	7.40E+04	3.61E-04	8.80E-06	25	390.88	563.05	10,346	0.0E+00	3.5E-01
71432	Benzene	5.89E+01	8.80E-02	9.80E-06	1.75E+03	2.28E-01	5.56E-03	25	353.24	562.16	7,342	8.3E-06	0.0E+00
71556	1,1,1-Trichloroethane	1.10E+02	7.80E-02	8.80E-06	1.33E+03	7.05E-01	1.72E-02	25	347.24	545.00	7,136	0.0E+00	1.0E+00
72208	Endrin	1.23E+04	1.25E-02	4.74E-06	2.50E-01	3.08E-04	7.51E-06	25	718.15	986.20	12,000	0.0E+00	1.1E-03
72435	Methoxychlor	9.77E+04	1.56E-02	4.46E-06	4.50E-02	6.48E-04	1.58E-05	25	651.02	848.49	14,000	0.0E+00	1.8E-02
72548	DDD	1.00E+06	1.69E-02	4.76E-06	9.00E-02	1.64E-04	4.00E-06	25	639.90	863.77	14,000	6.9E-05	0.0E+00
72559	DDE	4.47E+06	1.44E-02	5.87E-06	1.20E-01	8.61E-04	2.10E-05	25	636.44	860.38	13,000	9.7E-05	0.0E+00
74839	Methyl bromide	1.05E+01	7.28E-02	1.21E-05	1.52E+04	2.56E-01	6.24E-03	25	276.71	467.00	5,714	0.0E+00	5.0E-03
75014	Vinyl chloride (chloroethene)	1.86E+01	1.06E-01	1.23E-05	2.76E+03	1.11E+00	2.71E-02	25	259.25	432.00	5,250	8.4E-05	0.0E+00
75092	Methylene chloride	1.17E+01	1.01E-01	1.17E-05	1.30E+04	8.98E-02	2.19E-03	25	313.00	510.00	6,706	4.7E-07	3.0E+00
75150	Carbon disulfide	4.57E+01	1.04E-01	1.00E-05	1.19E+03	1.24E+00	3.02E-02	25	319.00	552.00	6,391	0.0E+00	7.0E-01
75252	Bromoform	8.71E+01	1.49E-02	1.03E-05	3.10E+03	2.19E-02	5.34E-04	25	422.35	696.00	9,479	1.1E-06	0.0E+00
75274	Bromodichloromethane	5.50E+01	2.98E-02	1.06E-05	6.74E+03	6.56E-02	1.60E-03	25	363.15	585.85	7,000	1.8E-05	0.0E+00
75343	1,1-Dichloroethane	3.16E+01	7.42E-02	1.05E-05	5.06E+03	2.30E-01	5.61E-03	25	330.55	523.00	6,895	0.0E+00	5.0E-01
75354	1,1-Dichloroethylene	5.89E+01	9.00E-02	1.04E-05	2.25E+03	1.07E+00	2.61E-02	25	304.75	576.05	6,247	5.0E-05	0.0E+00
76448	Heptachlor	1.41E+06	1.12E-02	5.69E-06	1.80E-01	4.47E-02	1.09E-03	25	603.69	846.31	13,000	1.3E-03	0.0E+00
77474	Hexachlorocyclopentadiene	2.00E+05	1.61E-02	7.21E-06	1.80E+00	1.11E+00	2.71E-02	25	512.15	746.00	10,931	0.0E+00	7.0E-05
78591	Isophorone	4.68E+01	6.23E-02	6.76E-06	1.20E+04	2.72E-04	6.63E-06	25	488.35	715.00	10,271	2.7E-07	0.0E+00
78875	1,2-Dichloropropane	4.37E+01	7.82E-02	8.73E-06	2.80E+03	1.15E-01	2.80E-03	25	369.52	572.00	7,590	0.0E+00	4.0E-03
79005	1,1,2-Trichloroethane	5.01E+01	7.80E-02	8.80E-06	4.42E+03	3.74E-02	9.12E-04	25	386.15	602.00	8,322	1.6E-05	0.0E+00
79016	Trichloroethylene	1.66E+02	7.90E-02	9.10E-06	1.10E+03	4.22E-01	1.03E-02	25	360.36	544.20	7,505	1.7E-06	0.0E+00
79345	1,1,2,2-Tetrachloroethane	9.33E+01	7.10E-02	7.90E-06	2.97E+03	1.41E-02	3.44E-04	25	419.60	661.15	8,996	5.8E-05	0.0E+00
83329	Acenaphthene	7.08E+03	4.21E-02	7.69E-06	4.24E+00	6.36E-03	1.55E-04	25	550.54	803.15	12,155	0.0E+00	2.1E-01
84662	Diethylphthalate	2.88E+02	2.56E-02	6.35E-06	1.08E+03	1.85E-05	4.51E-07	25	567.15	757.00	13,733	0.0E+00	2.8E+00
84742	Di-n-butyl phthalate	3.39E+04	4.38E-02	7.86E-06	1.12E+01	3.85E-08	9.39E-10	25	613.15	798.67	14,751	0.0E+00	3.5E-01

VLOOKUP TABLES

85687	Butyl benzyl phthalate	5.75E+04	1.74E-02	4.83E-06	2.69E+00	5.17E-05	1.26E-06	25	660.60	839.68	13,000	0.0E+00	7.0E-01
86306	N-Nitrosodiphenylamine	1.29E+03	3.12E-02	6.35E-06	3.51E+01	2.05E-04	5.00E-06	25	632.28	890.45	13,000	1.4E-06	0.0E+00
86737	Fluorene	1.38E+04	3.63E-02	7.88E-06	1.98E+00	2.61E-03	6.37E-05	25	570.44	870.00	12,666	0.0E+00	1.4E-01
86748	Carbazole	3.39E+03	3.90E-02	7.03E-06	7.48E+00	6.26E-07	1.53E-08	25	627.87	899.00	13,977	5.7E-06	0.0E+00
87683	Hexachloro-1,3-butadiene	5.37E+04	5.61E-02	6.16E-06	3.23E+00	3.34E-01	8.15E-03	25	486.15	738.00	10,206	2.2E-05	0.0E+00
87865	Pentachlorophenol	5.92E+02	5.60E-02	6.10E-06	1.95E+03	1.00E-06	2.44E-08	25	582.15	813.20	14,000	3.4E-05	0.0E+00
88062	2,4,6-Trichlorophenol	3.81E+02	3.18E-02	6.25E-06	8.00E+02	3.19E-04	7.78E-06	25	519.15	749.03	12,000	3.1E-06	0.0E+00
91203	Naphthalene	2.00E+03	5.90E-02	7.50E-06	3.10E+01	1.98E-02	4.83E-04	25	491.14	748.40	10,373	0.0E+00	1.4E-01
91941	3,3-Dichlorobenzidine	7.24E+02	1.94E-02	6.74E-06	3.11E+00	1.64E-07	4.00E-09	25	560.26	754.03	13,000	1.3E-04	0.0E+00
95476	o-Xylene	3.63E+02	8.70E-02	1.00E-05	1.78E+02	2.13E-01	5.20E-03	25	417.60	630.30	8,661	0.0E+00	7.0E+00
95487	2-Methylphenol (o-cresol)	9.12E+01	7.40E-02	8.30E-06	2.60E+04	4.92E-05	1.20E-06	25	464.19	697.60	10,800	0.0E+00	1.8E-01
95501	1,2-Dichlorobenzene	6.17E+02	6.90E-02	7.90E-06	1.56E+02	7.79E-02	1.90E-03	25	453.57	705.00	9,700	0.0E+00	2.0E-01
95578	2-Chlorophenol	3.88E+02	5.01E-02	9.46E-06	2.20E+04	1.60E-02	3.90E-04	25	447.53	675.00	9,572	0.0E+00	1.8E-02
95954	2,4,5-Trichlorophenol	1.60E+03	2.91E-02	7.03E-06	1.20E+03	1.78E-04	4.34E-06	25	526.15	759.13	13,000	0.0E+00	3.5E-01
98953	Nitrobenzene	6.46E+01	7.60E-02	8.60E-06	2.09E+03	9.84E-04	2.40E-05	25	483.95	719.00	10,566	0.0E+00	2.0E-03
100414	Ethylbenzene	3.63E+02	7.50E-02	7.80E-06	1.69E+02	3.23E-01	7.88E-03	25	409.34	617.20	8,501	0.0E+00	1.0E+00
100425	Styrene	7.76E+02	7.10E-02	8.00E-06	3.10E+02	1.13E-01	2.76E-03	25	418.31	636.00	8,737	0.0E+00	1.0E+00
105679	2,4-Dimethylphenol	2.09E+02	5.84E-02	8.69E-06	7.87E+03	8.20E-05	2.00E-06	25	484.13	707.60	11,329	0.0E+00	7.0E-02
106423	p-Xylene	3.89E+02	7.69E-02	8.44E-06	1.85E+02	3.14E-01	7.66E-03	26	411.52	616.20	8,525	0.0E+00	7.0E+00
106467	1,4-Dichlorobenzene	6.17E+02	6.90E-02	7.90E-06	7.38E+01	9.96E-02	2.43E-03	25	447.21	684.75	9,271	0.0E+00	8.0E-01
106478	p-Chloroaniline	6.61E+01	4.83E-02	1.01E-05	5.30E+03	1.36E-05	3.32E-07	25	503.65	754.00	11,689	0.0E+00	1.4E-02
107062	1,2-Dichloroethane	1.74E+01	1.04E-01	9.90E-06	8.52E+03	4.01E-02	9.78E-04	25	356.65	561.00	7,643	2.6E-05	0.0E+00
108054	Vinyl acetate	5.25E+00	8.50E-02	9.20E-06	2.00E+04	2.10E-02	5.12E-04	25	345.65	519.13	7,800	0.0E+00	2.0E-01
108383	m-Xylene	4.07E+02	7.00E-02	7.80E-06	1.61E+02	3.01E-01	7.34E-03	25	412.27	617.05	8,523	0.0E+00	7.0E+00
108883	Toluene	1.82E+02	8.70E-02	8.60E-06	5.26E+02	2.72E-01	6.63E-03	25	383.78	591.79	7,930	0.0E+00	4.0E-01
108907	Chlorobenzene	2.19E+02	7.30E-02	8.70E-06	4.72E+02	1.52E-01	3.71E-03	25	404.87	632.40	8,410	0.0E+00	2.0E-02
108952	Phenol	2.88E+01	8.20E-02	9.10E-06	8.28E+04	1.63E-05	3.98E-07	25	455.02	694.20	10,920	0.0E+00	2.1E+00
111444	Bis(2-chloroethyl)ether	1.55E+01	6.92E-02	7.53E-06	1.72E+04	7.38E-04	1.80E-05	25	451.15	659.79	9,000	3.3E-04	0.0E+00
115297	Endosulfan	2.14E+03	1.15E-02	4.55E-06	5.10E-01	4.59E-04	1.12E-05	25	674.43	942.94	14,000	0.0E+00	2.1E-02
117817	Bis(2-ethylhexyl)phthalate	1.51E+07	3.51E-02	3.66E-06	3.40E-01	4.18E-06	1.02E-07	25	657.15	806.00	15,999	4.0E-06	0.0E+00
117840	Di-n-octyl phthalate	8.32E+07	1.51E-02	3.58E-06	2.00E-02	2.74E-03	6.68E-05	25	704.09	862.22	15,000	0.0E+00	7.0E-02
118741	Hexachlorobenzene	5.50E+04	5.42E-02	5.91E-06	6.20E+00	5.41E-02	1.32E-03	25	582.55	825.00	14,447	4.6E-04	0.0E+00
120127	Anthracene	2.95E+04	3.24E-02	7.74E-06	4.34E-02	2.67E-03	6.51E-05	25	615.18	873.00	13,121	0.0E+00	1.1E+00
120821	1,2,4-Trichlorobenzene	1.78E+03	3.00E-02	8.23E-06	3.00E+02	5.82E-02	1.42E-03	25	486.15	725.00	10,471	0.0E+00	2.0E-01
120832	2,4-Dichlorophenol	1.47E+02	3.46E-02	8.77E-06	4.50E+03	1.30E-04	3.17E-06	25	482.15	708.17	11,000	0.0E+00	1.1E-02
121142	2,4-Dinitrotoluene	9.55E+01	2.03E-01	7.06E-06	2.70E+02	3.80E-06	9.27E-08	25	590.00	814.00	13,467	1.9E-04	0.0E+00
124481	Chlorodibromomethane	6.31E+01	1.96E-02	1.05E-05	2.60E+03	3.21E-02	7.83E-04	25	416.14	678.20	8,000	2.4E-05	0.0E+00
127184	Tetrachloroethylene	1.55E+02	7.20E-02	8.20E-06	2.00E+02	7.54E-01	1.84E-02	25	394.40	620.20	8,288	5.8E-07	0.0E+00
129000	Pyrene	1.05E+05	2.72E-02	7.24E-06	1.35E-01	4.51E-04	1.10E-05	25	667.95	936.00	14,370	0.0E+00	1.1E-01
156592	cis-1,2-Dichloroethylene	3.55E+01	7.36E-02	1.13E-05	3.50E+03	1.67E-01	4.07E-03	25	333.65	544.00	7,192	0.0E+00	3.5E-02
156605	trans-1,2-Dichloroethylene	5.25E+01	7.07E-02	1.19E-05	6.30E+03	3.85E-01	9.39E-03	25	320.85	516.50	6,717	0.0E+00	7.0E-02
193395	Indeno(1,2,3-cd)pyrene	3.47E+06	1.90E-02	5.66E-06	2.20E-05	6.56E-05	1.60E-06	25	809.15	1078.24	17,000	2.1E-04	0.0E+00
205992	Benzo(b)fluoranthene	1.23E+06	2.26E-02	5.56E-06	1.50E-03	4.55E-03	1.11E-04	25	715.90	969.27	15,000	2.1E-04	0.0E+00
206440	Fluoranthene	1.07E+05	3.02E-02	6.35E-06	2.06E-01	6.60E-04	1.61E-05	25	655.95	905.00	13,815	0.0E+00	1.4E-01
207089	Benzo(k)fluoranthene	1.23E+06	2.26E-02	5.56E-06	8.00E-04	3.40E-05	8.29E-07	25	753.15	1019.70	16,000	2.1E-05	0.0E+00
218019	Chrysene	3.98E+05	2.48E-02	6.21E-06	1.60E-03	3.88E-03	9.46E-05	25	714.15	979.00	16,455	2.1E-06	0.0E+00
309002	Aldrin	2.45E+06	1.32E-02	4.86E-06	1.80E-01	6.97E-03	1.70E-04	25	603.01	839.37	13,000	4.9E-03	0.0E+00
319846	alpha-HCH (alpha-BHC)	1.23E+03	1.42E-02	7.34E-06	2.00E+00	4.35E-04	1.06E-05	25	596.55	839.36	13,000	1.8E-03	0.0E+00
319857	beta-HCH (beta-BHC)	1.26E+03	1.42E-02	7.34E-06	2.40E-01	3.05E-05	7.44E-07	25	596.55	839.36	13,000	5.3E-04	0.0E+00
542756	1,3-Dichloropropene	4.57E+01	6.26E-02	1.00E-05	2.80E+03	7.26E-01	1.77E-02	25	381.15	587.38	7,000	3.7E-05	2.0E-02
606202	2,6-Dinitrotoluene	6.92E+01	3.27E-02	7.26E-06	1.82E+02	3.06E-05	7.46E-07	25	558.00	770.00	12,938	1.9E-04	0.0E+00
621647	N-Nitrosodi-n-propylamine	2.40E+01	5.45E-02	8.17E-06	9.89E+03	9.23E-05	2.25E-06	25	509.60	746.87	11,000	2.0E-03	0.0E+00
1024573	Heptachlor epoxide	8.32E+04	1.32E-02	4.23E-06	2.00E-01	3.90E-04	9.51E-06	25	613.96	848.76	13,000	2.6E-03	0.0E+00
7439976	Mercury (elemental)	5.20E+01	3.07E-02	6.30E-06	5.62E-02	4.67E-01	1.14E-02	25	629.88	1750.00	14,127	0.0E+00	3.0E-04
8001352	Toxaphene	2.57E+05	1.16E-02	4.34E-06	7.40E-01	2.46E-04	6.00E-06	25	657.15	873.31	14,000	3.2E-04	0.0E+00
11096825	Aroclor 1260 (PCB-1260)	2.90E+05	1.38E-02	4.32E-06	8.00E-02	1.89E-01	4.60E-03	25	402.50	539.37	19,000	1.0E-04	0.0E+00
11097691	Aroclor 1254 (PCB-1254)	2.00E+05	1.56E-02	5.00E-06	5.70E-02	8.20E-02	2.00E-03	25	377.50	512.27	19,000	1.0E-04	0.0E+00
12674112	Aroclor 1016 (PCB-1016)	3.30E+04	2.22E-02	5.42E-06	4.20E-01	1.19E-02	2.90E-04	25	340.50	475.22	18,000	1.0E-04	0.0E+00
53469219	Aroclor 1242 (PCB-1242)	3.30E+04	2.14E-02	5.31E-06	3.40E-01	2.13E-02	5.20E-04	25	345.50	482.20	18,000	1.0E-04	0.0E+00

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

VERSION 1.2
September, 1998

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
108883	2400	Toluene

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell D28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
10	33	260	260	0	0	A	SC			1.00E-09

ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
1.5	0.35	0.15	1.5	0.45	1	1.5	0.35	1

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s^2)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)
33	40	961	961	488	0.1	1

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{Nc} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1

Used to calculate risk-based groundwater concentration.

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
8.70E-02	8.60E-06	6.63E-03	25	7,930	383.78	591.79	1.82E+02	5.26E+02	0.0E+00	4.0E-01

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	227	0.200	-0.550	-0.650	#N/A	#N/A	#N/A	1.00E-09	30.00	0.35	0.004	0.346	3,844

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.25E+05	9.24E+05	4.16E-04	33	9,154	2.92E-03	1.26E-01	1.75E-04	3.34E-03	0.00E+00	0.00E+00	1.63E-05	1.19E-04	227

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
33	1.26E+02	0.10	8.48E-01	3.34E-03	3.84E+02	2.92E+09	2.47E-06	3.10E-04	NA	4.0E-01

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
NA	1.34E+06	1.34E+06	5.26E+05	5.26E+05

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

VLOOKUP TABLES

Soil Properties Lookup Table

SCS Soil Type	K_s (cm/h)	α (1/cm)	N (unitless)	M (unitless)	θ_s (cm^3/cm^3)	θ_r (cm^3/cm^3)	Mean Grain Diameter (cm)
C	0.20	0.008	1.09	0.083	0.38	0.068	0.0092
CL	0.26	0.019	1.31	0.237	0.41	0.095	0.016
L	1.04	0.036	1.56	0.359	0.43	0.078	0.020
LS	14.59	0.124	2.28	0.561	0.41	0.057	0.040
S	29.70	0.145	2.68	0.627	0.43	0.045	0.044
SC	0.12	0.027	1.23	0.187	0.38	0.100	0.025
SCL	1.31	0.059	1.48	0.324	0.39	0.100	0.029
SI	0.25	0.016	1.37	0.270	0.46	0.034	0.0046
SIC	0.02	0.005	1.09	0.083	0.26	0.070	0.0039
SICL	0.07	0.010	1.23	0.187	0.43	0.089	0.0056
SIL	0.45	0.020	1.41	0.291	0.45	0.067	0.011
SL	4.42	0.075	1.89	0.471	0.41	0.065	0.030

Chemical Properties Lookup Table

CAS No.	Chemical	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Pure component water solubility, S (mg/L)	Henry's law constant H' (unitless)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
50293	DDT	2.63E+06	1.37E-02	4.95E-06	2.50E-02	3.32E-04	8.10E-06	25	533.15	720.75	11,000	9.7E-05	0.0E+00
50328	Benzo(a)pyrene	1.02E+06	4.30E-02	9.00E-06	1.62E-03	4.63E-05	1.13E-06	25	715.90	969.27	15,000	2.1E-03	0.0E+00
51285	2,4-Dinitrophenol	1.00E-02	2.73E-02	9.06E-06	2.79E+03	1.82E-05	4.44E-07	25	605.28	827.85	15,000	0.0E+00	7.0E-03
53703	Dibenz(a,h)anthracene	3.80E+06	2.02E-02	5.18E-06	2.49E-03	6.03E-07	1.47E-08	25	743.24	990.41	16,000	2.1E-03	0.0E+00
56235	Carbon tetrachloride	1.74E+02	7.80E-02	8.80E-06	7.93E+02	1.25E+00	3.05E-02	25	349.90	556.60	7,127	1.5E-05	0.0E+00
56553	Benz(a)anthracene	3.98E+05	5.10E-02	9.00E-06	9.40E-03	1.37E-04	3.34E-06	25	708.15	1004.79	15,000	2.1E-04	0.0E+00
57749	Chlordane	1.20E+05	1.18E-02	4.37E-06	5.60E-02	1.99E-03	4.85E-05	25	624.24	885.73	13,000	3.7E-04	0.0E+00
58899	gamma-HCH (Lindane)	1.07E+03	1.42E-02	7.34E-06	6.80E+00	5.74E-04	1.40E-05	25	596.55	839.36	13,000	3.7E-04	0.0E+00
60571	Dieldrin	2.14E+04	1.25E-02	4.74E-06	1.95E-01	6.19E-04	1.51E-05	25	613.32	842.25	13,000	4.6E-03	0.0E+00
65850	Benzoic Acid	6.00E-01	5.36E-02	7.97E-06	3.50E+03	6.31E-05	1.54E-06	25	720.00	751.00	10,000	0.0E+00	1.4E+01
67641	Acetone	5.75E-01	1.24E-01	1.14E-05	1.00E+06	1.59E-03	3.88E-05	25	329.20	508.10	6,955	0.0E+00	3.5E-01
67663	Chloroform	3.98E+01	1.04E-01	1.00E-05	7.92E+03	1.50E-01	3.66E-03	25	334.32	536.40	6,988	2.3E-05	0.0E+00
67721	Hexachloroethane	1.78E+03	2.50E-03	6.80E-06	5.00E+01	1.59E-01	3.88E-03	25	458.00	695.00	9,510	4.0E-06	0.0E+00
71363	Butanol	6.92E+00	8.00E-02	9.30E-06	7.40E+04	3.61E-04	8.80E-06	25	390.88	563.05	10,346	0.0E+00	3.5E-01
71432	Benzene	5.89E+01	8.80E-02	9.80E-06	1.75E+03	2.28E-01	5.56E-03	25	353.24	562.16	7,342	8.3E-06	0.0E+00
71556	1,1,1-Trichloroethane	1.10E+02	7.80E-02	8.80E-06	1.33E+03	7.05E-01	1.72E-02	25	347.24	545.00	7,136	0.0E+00	1.0E+00
72208	Endrin	1.23E+04	1.25E-02	4.74E-06	2.50E-01	3.08E-04	7.51E-06	25	718.15	986.20	12,000	0.0E+00	1.1E-03
72435	Methoxychlor	9.77E+04	1.56E-02	4.46E-06	4.50E-02	6.48E-04	1.58E-05	25	651.02	848.49	14,000	0.0E+00	1.8E-02
72548	DDD	1.00E+06	1.69E-02	4.76E-06	9.00E-02	1.64E-04	4.00E-06	25	639.90	863.77	14,000	6.9E-05	0.0E+00
72559	DDE	4.47E+06	1.44E-02	5.87E-06	1.20E-01	8.61E-04	2.10E-05	25	636.44	860.38	13,000	9.7E-05	0.0E+00
74839	Methyl bromide	1.05E+01	7.28E-02	1.21E-05	1.52E+04	2.56E-01	6.24E-03	25	276.71	467.00	5,714	0.0E+00	5.0E-03
75014	Vinyl chloride (chloroethene)	1.86E+01	1.06E-01	1.23E-06	2.76E+03	1.11E+00	2.71E-02	25	259.25	432.00	5,250	8.4E-05	0.0E+00
75092	Methylene chloride	1.17E+01	1.01E-01	1.17E-05	1.30E+04	8.98E-02	2.19E-03	25	313.00	510.00	6,706	4.7E-07	3.0E+00
75150	Carbon disulfide	4.57E+01	1.04E-01	1.00E-05	1.19E+03	1.24E+00	3.02E-02	25	319.00	552.00	6,391	0.0E+00	7.0E-01
75252	Bromoform	8.71E+01	1.49E-02	1.03E-05	3.10E+03	2.19E-02	5.34E-04	25	422.35	696.00	9,479	1.1E-06	0.0E+00
75274	Bromodichloromethane	5.50E+01	2.98E-02	1.06E-05	6.74E+03	6.56E-02	1.60E-03	25	363.15	585.85	7,000	1.8E-05	0.0E+00
75343	1,1-Dichloroethane	3.16E+01	7.42E-02	1.05E-05	5.06E+03	2.30E-01	5.61E-03	25	330.55	523.00	6,895	0.0E+00	5.0E-01
75354	1,1-Dichloroethylene	5.89E+01	9.00E-02	1.04E-05	2.25E+03	1.07E+00	2.61E-02	25	304.75	576.05	6,247	5.0E-05	0.0E+00
76448	Heptachlor	1.41E+06	1.12E-02	5.69E-06	1.80E-01	4.47E-02	1.09E-03	25	603.69	846.31	13,000	1.3E-03	0.0E+00
77474	Hexachlorocyclopentadiene	2.00E+05	1.61E-02	7.21E-06	1.80E+00	1.11E+00	2.71E-02	25	512.15	746.00	10,931	0.0E+00	7.0E-05
78591	Isophorone	4.68E+01	6.23E-02	6.76E-06	1.20E+04	2.72E-04	6.63E-06	25	488.35	715.00	10,271	2.7E-07	0.0E+00
78875	1,2-Dichloropropane	4.37E+01	7.82E-02	8.73E-06	2.80E+03	1.15E-01	2.80E-03	25	369.52	572.00	7,590	0.0E+00	4.0E-03
79005	1,1,2-Trichloroethane	5.01E+01	7.80E-02	8.80E-06	4.42E+03	3.74E-02	9.12E-04	25	386.15	602.00	8,322	1.6E-05	0.0E+00
79016	Trichloroethylene	1.66E+02	7.90E-02	9.10E-06	1.10E+03	4.22E-01	1.03E-02	25	360.36	544.20	7,505	1.7E-06	0.0E+00
79345	1,1,2,2-Tetrachloroethane	9.33E+01	7.10E-02	7.90E-06	2.97E+03	1.41E-02	3.44E-04	25	419.60	661.15	8,996	5.8E-05	0.0E+00
83329	Acenaphthene	7.08E+03	4.21E-02	7.69E-06	4.24E+00	6.36E-03	1.55E-04	25	550.54	803.15	12,155	0.0E+00	2.1E-01
84662	Diethylphthalate	2.88E+02	2.56E-02	6.35E-06	1.08E+03	1.85E-05	4.51E-07	25	567.15	757.00	13,733	0.0E+00	2.8E+00
84742	Di-n-butyl phthalate	3.39E+04	4.38E-02	7.86E-06	1.12E+01	3.85E-08	9.39E-10	25	613.15	798.67	14,751	0.0E+00	3.5E-01

85687	Butyl benzyl phthalate	5.75E+04	1.74E-02	4.83E-06	2.69E+00	5.17E-05	1.26E-06	25	660.60	839.68	13,000	0.0E+00	7.0E-01
86306	N-Nitrosodiphenylamine	1.29E+03	3.12E-02	6.35E-06	3.51E+01	2.05E-04	5.00E-06	25	632.28	890.45	13,000	1.4E-06	0.0E+00
86737	Fluorene	1.38E+04	3.63E-02	7.88E-06	1.98E+00	2.61E-03	6.37E-05	25	570.44	870.00	12,666	0.0E+00	1.4E-01
86748	Carbazole	3.39E+03	3.90E-02	7.03E-06	7.48E+00	6.26E-07	1.53E-08	25	627.87	899.00	13,977	5.7E-06	0.0E+00
87683	Hexachloro-1,3-butadiene	5.37E+04	5.61E-02	6.16E-06	3.23E+00	3.34E-01	8.15E-03	25	486.15	738.00	10,206	2.2E-05	0.0E+00
87865	Pentachlorophenol	5.92E+02	5.60E-02	6.10E-06	1.95E+03	1.00E-06	2.44E-08	25	582.15	813.20	14,000	3.4E-05	0.0E+00
88062	2,4,6-Trichlorophenol	3.81E+02	3.18E-02	6.25E-06	8.00E+02	3.19E-04	7.78E-06	25	519.15	749.03	12,000	3.1E-06	0.0E+00
91203	Naphthalene	2.00E+03	5.90E-02	7.50E-06	3.10E+01	1.98E-02	4.83E-04	25	491.14	748.40	10,373	0.0E+00	1.4E-01
91941	3,3-Dichlorobenzidine	7.24E+02	1.94E-02	6.74E-06	3.11E+00	1.64E-07	4.00E-09	25	560.26	754.03	13,000	1.3E-04	0.0E+00
95476	o-Xylene	3.63E+02	8.70E-02	1.00E-05	1.78E+02	2.13E-01	5.20E-03	25	417.60	630.30	8,661	0.0E+00	7.0E+00
95487	2-Methylphenol (o-cresol)	9.12E+01	7.40E-02	8.30E-06	2.60E+04	4.92E-05	1.20E-06	25	464.19	697.60	10,800	0.0E+00	1.8E-01
95501	1,2-Dichlorobenzene	6.17E+02	6.90E-02	7.90E-06	1.56E+02	7.79E-02	1.90E-03	25	453.57	705.00	9,700	0.0E+00	2.0E-01
95578	2-Chlorophenol	3.88E+02	5.01E-02	9.46E-06	2.20E+04	1.60E-02	3.90E-04	25	447.53	675.00	9,572	0.0E+00	1.8E-02
95954	2,4,5-Trichlorophenol	1.60E+03	2.91E-02	7.03E-06	1.20E+03	1.78E-04	4.34E-06	25	526.15	759.13	13,000	0.0E+00	3.5E-01
98953	Nitrobenzene	6.46E+01	7.60E-02	8.60E-06	2.09E+03	9.84E-04	2.40E-05	25	483.95	719.00	10,566	0.0E+00	2.0E-03
100414	Ethylbenzene	3.63E+02	7.50E-02	7.80E-06	1.69E+02	3.23E-01	7.88E-03	25	409.34	617.20	8,501	0.0E+00	1.0E+00
100425	Styrene	7.76E+02	7.10E-02	8.00E-06	3.10E+02	1.13E-01	2.76E-03	25	418.31	636.00	8,737	0.0E+00	1.0E+00
105679	2,4-Dimethylphenol	2.09E+02	5.84E-02	8.69E-06	7.87E+03	8.20E-05	2.00E-06	25	484.13	707.60	11,329	0.0E+00	7.0E-02
106423	p-Xylene	3.89E+02	7.69E-02	8.44E-06	1.85E+02	3.14E-01	7.66E-03	26	411.52	616.20	8,525	0.0E+00	7.0E+00
106467	1,4-Dichlorobenzene	6.17E+02	6.90E-02	7.90E-06	7.38E+01	9.96E-02	2.43E-03	25	447.21	684.75	9,271	0.0E+00	8.0E-01
106478	p-Chloroaniline	6.61E+01	4.83E-02	1.01E-05	5.30E+03	1.36E-05	3.32E-07	25	503.65	754.00	11,689	0.0E+00	1.4E-02
107062	1,2-Dichloroethane	1.74E+01	1.04E-01	9.90E-06	8.52E+03	4.01E-02	9.78E-04	25	356.65	561.00	7,643	2.6E-05	0.0E+00
108054	Vinyl acetate	5.25E+00	8.50E-02	9.20E-06	2.00E+04	2.10E-02	5.12E-04	25	345.65	519.13	7,800	0.0E+00	2.0E-01
108383	m-Xylene	4.07E+02	7.00E-02	7.80E-06	1.61E+02	3.01E-01	7.34E-03	25	412.27	617.05	8,523	0.0E+00	7.0E+00
108883	Toluene	1.82E+02	8.70E-02	8.60E-06	5.26E+02	2.72E-01	6.63E-03	25	383.78	591.79	7,930	0.0E+00	4.0E-01
108907	Chlorobenzene	2.19E+02	7.30E-02	8.70E-06	4.72E+02	1.52E-01	3.71E-03	25	404.87	632.40	8,410	0.0E+00	2.0E-02
108952	Phenol	2.88E+01	8.20E-02	9.10E-06	8.28E+04	1.63E-05	3.98E-07	25	455.02	694.20	10,920	0.0E+00	2.1E+00
111444	Bis(2-chloroethyl)ether	1.55E+01	6.92E-02	7.53E-06	1.72E+04	7.38E-04	1.80E-05	25	451.15	659.79	9,000	3.3E-04	0.0E+00
115297	Endosulfan	2.14E+03	1.15E-02	4.55E-06	5.10E-01	4.59E-04	1.12E-05	25	674.43	942.94	14,000	0.0E+00	2.1E-02
117817	Bis(2-ethylhexyl)phthalate	1.51E+07	3.51E-02	3.66E-06	3.40E-01	4.18E-06	1.02E-07	25	657.15	806.00	15,999	4.0E-06	0.0E+00
117840	Di-n-octyl phthalate	8.32E+07	1.51E-02	3.58E-06	2.00E-02	2.74E-03	6.68E-05	25	704.09	862.22	15,000	0.0E+00	7.0E-02
118741	Hexachlorobenzene	5.50E+04	5.42E-02	5.91E-06	6.20E+00	5.41E-02	1.32E-03	25	582.55	825.00	14,447	4.6E-04	0.0E+00
120127	Anthracene	2.95E+04	3.24E-02	7.74E-06	4.34E-02	2.67E-03	6.51E-05	25	615.18	873.00	13,121	0.0E+00	1.1E+00
120821	1,2,4-Trichlorobenzene	1.78E+03	3.00E-02	8.23E-06	3.00E+02	5.82E-02	1.42E-03	25	486.15	725.00	10,471	0.0E+00	2.0E-01
120832	2,4-Dichlorophenol	1.47E+02	3.46E-02	8.77E-06	4.50E+03	1.30E-04	3.17E-06	25	482.15	708.17	11,000	0.0E+00	1.1E-02
121142	2,4-Dinitrotoluene	9.55E+01	2.03E-01	7.06E-06	2.70E+02	3.80E-06	9.27E-08	25	590.00	814.00	13,467	1.9E-04	0.0E+00
124481	Chlorodibromomethane	6.31E+01	1.96E-02	1.05E-05	2.60E+03	3.21E-02	7.83E-04	25	416.14	678.20	8,000	2.4E-05	0.0E+00
127184	Tetrachloroethylene	1.55E+02	7.20E-02	8.20E-06	2.00E+02	7.54E-01	1.84E-02	25	394.40	620.20	8,288	5.8E-07	0.0E+00
129000	Pyrene	1.05E+05	2.72E-02	7.24E-06	1.35E-01	4.51E-04	1.10E-05	25	667.95	936.00	14,370	0.0E+00	1.1E-01
156592	cis-1,2-Dichloroethylene	3.55E+01	7.36E-02	1.13E-05	3.50E+03	1.67E-01	4.07E-03	25	333.65	544.00	7,192	0.0E+00	3.5E-02
156605	trans-1,2-Dichloroethylene	5.25E+01	7.07E-02	1.19E-05	6.30E+03	3.85E-01	9.39E-03	25	320.85	516.50	6,717	0.0E+00	7.0E-02
193395	Indeno(1,2,3-cd)pyrene	3.47E+06	1.90E-02	5.66E-06	2.20E-05	6.56E-05	1.60E-06	25	809.15	1078.24	17,000	2.1E-04	0.0E+00
205992	Benzo(b)fluoranthene	1.23E+06	2.26E-02	5.56E-06	1.50E-03	4.55E-03	1.11E-04	25	715.90	969.27	15,000	2.1E-04	0.0E+00
206440	Fluoranthene	1.07E+05	3.02E-02	6.35E-06	2.06E-01	6.60E-04	1.61E-05	25	655.95	905.00	13,815	0.0E+00	1.4E-01
207089	Benzo(k)fluoranthene	1.23E+06	2.26E-02	5.56E-06	8.00E-04	3.40E-05	8.29E-07	25	753.15	1019.70	16,000	2.1E-05	0.0E+00
218019	Chrysene	3.98E+05	2.48E-02	6.21E-06	1.60E-03	3.88E-03	9.46E-05	25	714.15	979.00	16,455	2.1E-06	0.0E+00
309002	Aldrin	2.45E+06	1.32E-02	4.86E-06	1.80E-01	6.97E-03	1.70E-04	25	603.01	839.37	13,000	4.9E-03	0.0E+00
319846	alpha-HCH (alpha-BHC)	1.23E+03	1.42E-02	7.34E-06	2.00E+00	4.35E-04	1.06E-05	25	596.55	839.36	13,000	1.8E-03	0.0E+00
319857	beta-HCH (beta-BHC)	1.26E+03	1.42E-02	7.34E-06	2.40E-01	3.05E-05	7.44E-07	25	596.55	839.36	13,000	5.3E-04	0.0E+00
542756	1,3-Dichloropropene	4.57E+01	6.26E-02	1.00E-05	2.80E+03	7.26E-01	1.77E-02	25	381.15	587.38	7,000	3.7E-05	2.0E-02
606202	2,6-Dinitrotoluene	6.92E+01	3.27E-02	7.26E-06	1.82E+02	3.06E-05	7.46E-07	25	558.00	770.00	12,938	1.9E-04	0.0E+00
621647	N-Nitrosodi-n-propylamine	2.40E+01	5.45E-02	8.17E-06	9.89E+03	9.23E-05	2.25E-06	25	509.60	746.87	11,000	2.0E-03	0.0E+00
1024573	Heptachlor epoxide	8.32E+04	1.32E-02	4.23E-06	2.00E-01	3.90E-04	9.51E-06	25	613.96	848.76	13,000	2.6E-03	0.0E+00
7439976	Mercury (elemental)	5.20E+01	3.07E-02	6.30E-06	5.62E-02	4.67E-01	1.14E-02	25	629.88	1750.00	14,127	0.0E+00	3.0E-04
8001352	Toxaphene	2.57E+05	1.16E-02	4.34E-06	7.40E-01	2.46E-04	6.00E-06	25	657.15	873.31	14,000	3.2E-04	0.0E+00
11096825	Aroclor 1260 (PCB-1260)	2.90E+05	1.38E-02	4.32E-06	8.00E-02	1.89E-01	4.60E-03	25	402.50	539.37	19,000	1.0E-04	0.0E+00
11097691	Aroclor 1254 (PCB-1254)	2.00E+05	1.56E-02	5.00E-06	5.70E-02	8.20E-02	2.00E-03	25	377.50	512.27	19,000	1.0E-04	0.0E+00
12674112	Aroclor 1016 (PCB-1016)	3.30E+04	2.22E-02	5.42E-06	4.20E-01	1.19E-02	2.90E-04	25	340.50	475.22	18,000	1.0E-04	0.0E+00
53469219	Aroclor 1242 (PCB-1242)	3.30E+04	2.14E-02	5.31E-06	3.40E-01	2.13E-02	5.20E-04	25	345.50	482.20	18,000	1.0E-04	0.0E+00

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

VERSION 1.2
September, 1998

YES | X

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES |

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
79016	25000	Trichloroethylene

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell D28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
10	33	140	140	0	0	A	SC			1.00E-09

ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
1.5	0.35	0.15	1.5	0.45	1	1.5	0.35	1

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)
33	40	961	961	488	0.1	1

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1

Used to calculate risk-based groundwater concentration.

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
7.90E-02	9.10E-06	1.03E-02	25	7,505	360.36	544.20	1.66E+02	1.10E+03	1.7E-06	0.0E+00

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	107	0.200	-0.550	-0.650	#N/A	#N/A	#N/A	1.00E-09	30.00	0.35	0.004	0.346	3,844

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.25E+05	9.24E+05	4.16E-04	33	8,557	4.79E-03	2.06E-01	1.75E-04	3.03E-03	0.00E+00	0.00E+00	1.05E-05	3.72E-05	107

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
33	2.06E+02	0.10	8.48E-01	3.03E-03	3.84E+02	2.66E+10	1.86E-06	3.84E-04	1.7E-06	NA

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
3.73E+03	NA	3.73E+03	1.10E+06	3.73E+03

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

Soil Properties Lookup Table

SCS Soil Type	K_s (cm/h)	α (1/cm)	N (unitless)	M (unitless)	θ_s (cm^3/cm^3)	θ_r (cm^3/cm^3)	Mean Grain Diameter (cm)
C	0.20	0.008	1.09	0.083	0.38	0.068	0.0092
CL	0.26	0.019	1.31	0.237	0.41	0.095	0.016
L	1.04	0.036	1.56	0.359	0.43	0.078	0.020
LS	14.59	0.124	2.28	0.561	0.41	0.057	0.040
S	29.70	0.145	2.68	0.627	0.43	0.045	0.044
SC	0.12	0.027	1.23	0.187	0.38	0.100	0.025
SCL	1.31	0.059	1.48	0.324	0.39	0.100	0.029
SI	0.25	0.016	1.37	0.270	0.46	0.034	0.0046
SIC	0.02	0.005	1.09	0.083	0.26	0.070	0.0039
SICL	0.07	0.010	1.23	0.187	0.43	0.089	0.0056
SIL	0.45	0.020	1.41	0.291	0.45	0.067	0.011
SL	4.42	0.075	1.89	0.471	0.41	0.065	0.030

Chemical Properties Lookup Table

CAS No.	Chemical	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Pure component water solubility, S (mg/L)	Henry's law constant H' (unitless)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
50293	DDT	2.63E+06	1.37E-02	4.95E-06	2.50E-02	3.32E-04	8.10E-06	25	533.15	720.75	11,000	9.7E-05	0.0E+00
50328	Benzo(a)pyrene	1.02E+06	4.30E-02	9.00E-06	1.62E-03	4.63E-05	1.13E-06	25	715.90	969.27	15,000	2.1E-03	0.0E+00
51285	2,4-Dinitrophenol	1.00E-02	2.73E-02	9.06E-06	2.79E+03	1.82E-05	4.44E-07	25	605.28	827.85	15,000	0.0E+00	7.0E-03
53703	Dibenz(a,h)anthracene	3.80E+06	2.02E-02	5.18E-06	2.49E-03	6.03E-07	1.47E-08	25	743.24	990.41	16,000	2.1E-03	0.0E+00
56235	Carbon tetrachloride	1.74E+02	7.80E-02	8.80E-06	7.93E+02	1.25E+00	3.05E-02	25	349.90	556.60	7,127	1.5E-05	0.0E+00
56553	Benz(a)anthracene	3.98E+05	5.10E-02	9.00E-06	9.40E-03	1.37E-04	3.34E-06	25	708.15	1004.79	15,000	2.1E-04	0.0E+00
57749	Chlordane	1.20E+05	1.18E-02	4.37E-06	5.60E-02	1.99E-03	4.85E-05	25	624.24	885.73	13,000	3.7E-04	0.0E+00
58899	gamma-HCH (Lindane)	1.07E+03	1.42E-02	7.34E-06	6.80E+00	5.74E-04	1.40E-05	25	596.55	839.36	13,000	3.7E-04	0.0E+00
60571	Dieldrin	2.14E+04	1.25E-02	4.74E-06	1.95E-01	6.19E-04	1.51E-05	25	613.32	842.25	13,000	4.6E-03	0.0E+00
65850	Benzoic Acid	6.00E-01	5.36E-02	7.97E-06	3.50E+03	6.31E-05	1.54E-06	25	720.00	751.00	10,000	0.0E+00	1.4E+01
67641	Acetone	5.75E-01	1.24E-01	1.14E-05	1.00E+06	1.59E-03	3.88E-05	25	329.20	508.10	6,955	0.0E+00	3.5E-01
67663	Chloroform	3.98E+01	1.04E-01	1.00E-05	7.92E+03	1.50E-01	3.66E-03	25	334.32	536.40	6,988	2.3E-05	0.0E+00
67721	Hexachloroethane	1.78E+03	2.50E-03	6.80E-06	5.00E+01	1.59E-01	3.88E-03	25	458.00	695.00	9,510	4.0E-06	0.0E+00
71363	Butanol	6.92E+00	8.00E-02	9.30E-06	7.40E+04	3.61E-04	8.80E-06	25	390.88	563.05	10,346	0.0E+00	3.5E-01
71432	Benzene	5.89E+01	8.80E-02	9.80E-06	1.75E+03	2.28E-01	5.56E-03	25	353.24	562.16	7,342	8.3E-06	0.0E+00
71556	1,1,1-Trichloroethane	1.10E+02	7.80E-02	8.80E-06	1.33E+03	7.05E-01	1.72E-02	25	347.24	545.00	7,136	0.0E+00	1.0E+00
72208	Endrin	1.23E+04	1.25E-02	4.74E-06	2.50E-01	3.08E-04	7.51E-06	25	718.15	986.20	12,000	0.0E+00	1.1E-03
72435	Methoxychlor	9.77E+04	1.56E-02	4.46E-06	4.50E-02	6.48E-04	1.58E-05	25	651.02	848.49	14,000	0.0E+00	1.8E-02
72548	DDD	1.00E+06	1.69E-02	4.76E-06	9.00E-02	1.64E-04	4.00E-06	25	639.90	863.77	14,000	6.9E-05	0.0E+00
72559	DDE	4.47E+06	1.44E-02	5.87E-06	1.20E-01	8.61E-04	2.10E-05	25	636.44	860.38	13,000	9.7E-05	0.0E+00
74839	Methyl bromide	1.05E+01	7.28E-02	1.21E-05	1.52E+04	2.56E-01	6.24E-03	25	276.71	467.00	5,714	0.0E+00	5.0E-03
75014	Vinyl chloride (chloroethene)	1.86E+01	1.06E-01	1.23E-06	2.76E+03	1.11E+00	2.71E-02	25	259.25	432.00	5,250	8.4E-05	0.0E+00
75092	Methylene chloride	1.17E+01	1.01E-01	1.17E-05	1.30E+04	8.98E-02	2.19E-03	25	313.00	510.00	6,706	4.7E-07	3.0E+00
75150	Carbon disulfide	4.57E+01	1.04E-01	1.00E-05	1.19E+03	1.24E+00	3.02E-02	25	319.00	552.00	6,391	0.0E+00	7.0E-01
75252	Bromoform	8.71E+01	1.49E-02	1.03E-05	3.10E+03	2.19E-02	5.34E-04	25	422.35	696.00	9,479	1.1E-06	0.0E+00
75274	Bromodichloromethane	5.50E+01	2.98E-02	1.06E-05	6.74E+03	6.56E-02	1.60E-03	25	363.15	585.85	7,000	1.8E-05	0.0E+00
75343	1,1-Dichloroethane	3.16E+01	7.42E-02	1.05E-05	5.06E+03	2.30E-01	5.61E-03	25	330.55	523.00	6,895	0.0E+00	5.0E-01
75354	1,1-Dichloroethylene	5.89E+01	9.00E-02	1.04E-05	2.25E+03	1.07E+00	2.61E-02	25	304.75	576.05	6,247	5.0E-05	0.0E+00
76448	Heptachlor	1.41E+06	1.12E-02	5.69E-06	1.80E-01	4.47E-02	1.09E-03	25	603.69	846.31	13,000	1.3E-03	0.0E+00
77474	Hexachlorocyclopentadiene	2.00E+05	1.61E-02	7.21E-06	1.80E+00	1.11E+00	2.71E-02	25	512.15	746.00	10,931	0.0E+00	7.0E-05
78591	Isophorone	4.68E+01	6.23E-02	6.76E-06	1.20E+04	2.72E-04	6.63E-06	25	488.35	715.00	10,271	2.7E-07	0.0E+00
78875	1,2-Dichloropropane	4.37E+01	7.82E-02	8.73E-06	2.80E+03	1.15E-01	2.80E-03	25	369.52	572.00	7,590	0.0E+00	4.0E-03
79005	1,1,2-Trichloroethane	5.01E+01	7.80E-02	8.80E-06	4.42E+03	3.74E-02	9.12E-04	25	386.15	602.00	8,322	1.6E-05	0.0E+00
79016	Trichloroethylene	1.66E+02	7.90E-02	9.10E-06	1.10E+03	4.22E-01	1.03E-02	25	360.36	544.20	7,505	1.7E-06	0.0E+00
79345	1,1,2,2-Tetrachloroethane	9.33E+01	7.10E-02	7.90E-06	2.97E+03	1.41E-02	3.44E-04	25	419.60	661.15	8,996	5.8E-05	0.0E+00
83329	Acenaphthene	7.08E+03	4.21E-02	7.69E-06	4.24E+00	6.36E-03	1.55E-04	25	550.54	803.15	12,155	0.0E+00	2.1E-01
84662	Diethylphthalate	2.88E+02	2.56E-02	6.35E-06	1.08E+03	1.85E-05	4.51E-07	25	567.15	757.00	13,733	0.0E+00	2.8E+00
84742	Di-n-butyl phthalate	3.39E+04	4.38E-02	7.86E-06	1.12E+01	3.85E-08	9.39E-10	25	613.15	798.67	14,751	0.0E+00	3.5E-01

85687	Butyl benzyl phthalate	5.75E+04	1.74E-02	4.83E-06	2.69E+00	5.17E-05	1.26E-06	25	660.60	839.68	13,000	0.0E+00	7.0E-01
86306	N-Nitrosodiphenylamine	1.29E+03	3.12E-02	6.35E-06	3.51E+01	2.05E-04	5.00E-06	25	632.28	890.45	13,000	1.4E-06	0.0E+00
86737	Fluorene	1.38E+04	3.63E-02	7.88E-06	1.98E+00	2.61E-03	6.37E-05	25	570.44	870.00	12,666	0.0E+00	1.4E-01
86748	Carbazole	3.39E+03	3.90E-02	7.03E-06	7.48E+00	6.26E-07	1.53E-08	25	627.87	899.00	13,977	5.7E-06	0.0E+00
87683	Hexachloro-1,3-butadiene	5.37E+04	5.61E-02	6.16E-06	3.23E+00	3.34E-01	8.15E-03	25	486.15	738.00	10,206	2.2E-05	0.0E+00
87865	Pentachlorophenol	5.92E+02	5.60E-02	6.10E-06	1.95E+03	1.00E-06	2.44E-08	25	582.15	813.20	14,000	3.4E-05	0.0E+00
88062	2,4,6-Trichlorophenol	3.81E+02	3.18E-02	6.25E-06	8.00E+02	3.19E-04	7.78E-06	25	519.15	749.03	12,000	3.1E-06	0.0E+00
91203	Naphthalene	2.00E+03	5.90E-02	7.50E-06	3.10E+01	1.98E-02	4.83E-04	25	491.14	748.40	10,373	0.0E+00	1.4E-01
91941	3,3-Dichlorobenzidine	7.24E+02	1.94E-02	6.74E-06	3.11E+00	1.64E-07	4.00E-09	25	560.26	754.03	13,000	1.3E-04	0.0E+00
95476	o-Xylene	3.63E+02	8.70E-02	1.00E-05	1.78E+02	2.13E-01	5.20E-03	25	417.60	630.30	8,661	0.0E+00	7.0E+00
95487	2-Methylphenol (o-cresol)	9.12E+01	7.40E-02	8.30E-06	2.60E+04	4.92E-05	1.20E-06	25	464.19	697.60	10,800	0.0E+00	1.8E-01
95501	1,2-Dichlorobenzene	6.17E+02	6.90E-02	7.90E-06	1.56E+02	7.79E-02	1.90E-03	25	453.57	705.00	9,700	0.0E+00	2.0E-01
95578	2-Chlorophenol	3.88E+02	5.01E-02	9.46E-06	2.20E+04	1.60E-02	3.90E-04	25	447.53	675.00	9,572	0.0E+00	1.8E-02
95954	2,4,5-Trichlorophenol	1.60E+03	2.91E-02	7.03E-06	1.20E+03	1.78E-04	4.34E-06	25	526.15	759.13	13,000	0.0E+00	3.5E-01
98953	Nitrobenzene	6.46E+01	7.60E-02	8.60E-06	2.09E+03	9.84E-04	2.40E-05	25	483.95	719.00	10,566	0.0E+00	2.0E-03
100414	Ethylbenzene	3.63E+02	7.50E-02	7.80E-06	1.69E+02	3.23E-01	7.88E-03	25	409.34	617.20	8,501	0.0E+00	1.0E+00
100425	Styrene	7.76E+02	7.10E-02	8.00E-06	3.10E+02	1.13E-01	2.76E-03	25	418.31	636.00	8,737	0.0E+00	1.0E+00
105679	2,4-Dimethylphenol	2.09E+02	5.84E-02	8.69E-06	7.87E+03	8.20E-05	2.00E-06	25	484.13	707.60	11,329	0.0E+00	7.0E-02
106423	p-Xylene	3.89E+02	7.69E-02	8.44E-06	1.85E+02	3.14E-01	7.66E-03	26	411.52	616.20	8,525	0.0E+00	7.0E+00
106467	1,4-Dichlorobenzene	6.17E+02	6.90E-02	7.90E-06	7.38E+01	9.96E-02	2.43E-03	25	447.21	684.75	9,271	0.0E+00	8.0E-01
106478	p-Chloroaniline	6.61E+01	4.83E-02	1.01E-05	5.30E+03	1.36E-05	3.32E-07	25	503.65	754.00	11,689	0.0E+00	1.4E-02
107062	1,2-Dichloroethane	1.74E+01	1.04E-01	9.90E-06	8.52E+03	4.01E-02	9.78E-04	25	356.65	561.00	7,643	2.6E-05	0.0E+00
108054	Vinyl acetate	5.25E+00	8.50E-02	9.20E-06	2.00E+04	2.10E-02	5.12E-04	25	345.65	519.13	7,800	0.0E+00	2.0E-01
108383	m-Xylene	4.07E+02	7.00E-02	7.80E-06	1.61E+02	3.01E-01	7.34E-03	25	412.27	617.05	8,523	0.0E+00	7.0E+00
108883	Toluene	1.82E+02	8.70E-02	8.60E-06	5.26E+02	2.72E-01	6.63E-03	25	383.78	591.79	7,930	0.0E+00	4.0E-01
108907	Chlorobenzene	2.19E+02	7.30E-02	8.70E-06	4.72E+02	1.52E-01	3.71E-03	25	404.87	632.40	8,410	0.0E+00	2.0E-02
108952	Phenol	2.88E+01	8.20E-02	9.10E-06	8.28E+04	1.63E-05	3.98E-07	25	455.02	694.20	10,920	0.0E+00	2.1E+00
111444	Bis(2-chloroethyl)ether	1.55E+01	6.92E-02	7.53E-06	1.72E+04	7.38E-04	1.80E-05	25	451.15	659.79	9,000	3.3E-04	0.0E+00
115297	Endosulfan	2.14E+03	1.15E-02	4.55E-06	5.10E-01	4.59E-04	1.12E-05	25	674.43	942.94	14,000	0.0E+00	2.1E-02
117817	Bis(2-ethylhexyl)phthalate	1.51E+07	3.51E-02	3.66E-06	3.40E-01	4.18E-06	1.02E-07	25	657.15	806.00	15,999	4.0E-06	0.0E+00
117840	Di-n-octyl phthalate	8.32E+07	1.51E-02	3.58E-06	2.00E-02	2.74E-03	6.68E-05	25	704.09	862.22	15,000	0.0E+00	7.0E-02
118741	Hexachlorobenzene	5.50E+04	5.42E-02	5.91E-06	6.20E+00	5.41E-02	1.32E-03	25	582.55	825.00	14,447	4.6E-04	0.0E+00
120127	Anthracene	2.95E+04	3.24E-02	7.74E-06	4.34E-02	2.67E-03	6.51E-05	25	615.18	873.00	13,121	0.0E+00	1.1E+00
120821	1,2,4-Trichlorobenzene	1.78E+03	3.00E-02	8.23E-06	3.00E+02	5.82E-02	1.42E-03	25	486.15	725.00	10,471	0.0E+00	2.0E-01
120832	2,4-Dichlorophenol	1.47E+02	3.46E-02	8.77E-06	4.50E+03	1.30E-04	3.17E-06	25	482.15	708.17	11,000	0.0E+00	1.1E-02
121142	2,4-Dinitrotoluene	9.55E+01	2.03E-01	7.06E-06	2.70E+02	3.80E-06	9.27E-08	25	590.00	814.00	13,467	1.9E-04	0.0E+00
124481	Chlorodibromomethane	6.31E+01	1.96E-02	1.05E-05	2.60E+03	3.21E-02	7.83E-04	25	416.14	678.20	8,000	2.4E-05	0.0E+00
127184	Tetrachloroethylene	1.55E+02	7.20E-02	8.20E-06	2.00E+02	7.54E-01	1.84E-02	25	394.40	620.20	8,288	5.8E-07	0.0E+00
129000	Pyrene	1.05E+05	2.72E-02	7.24E-06	1.35E-01	4.51E-04	1.10E-05	25	667.95	936.00	14,370	0.0E+00	1.1E-01
156592	cis-1,2-Dichloroethylene	3.55E+01	7.36E-02	1.13E-05	3.50E+03	1.67E-01	4.07E-03	25	333.65	544.00	7,192	0.0E+00	3.5E-02
156605	trans-1,2-Dichloroethylene	5.25E+01	7.07E-02	1.19E-05	6.30E+03	3.85E-01	9.39E-03	25	320.85	516.50	6,717	0.0E+00	7.0E-02
193395	Indeno(1,2,3-cd)pyrene	3.47E+06	1.90E-02	5.66E-06	2.20E-05	6.56E-05	1.60E-06	25	809.15	1078.24	17,000	2.1E-04	0.0E+00
205992	Benzo(b)fluoranthene	1.23E+06	2.26E-02	5.56E-06	1.50E-03	4.55E-03	1.11E-04	25	715.90	969.27	15,000	2.1E-04	0.0E+00
206440	Fluoranthene	1.07E+05	3.02E-02	6.35E-06	2.06E-01	6.60E-04	1.61E-05	25	655.95	905.00	13,815	0.0E+00	1.4E-01
207089	Benzo(k)fluoranthene	1.23E+06	2.26E-02	5.56E-06	8.00E-04	3.40E-05	8.29E-07	25	753.15	1019.70	16,000	2.1E-05	0.0E+00
218019	Chrysene	3.98E+05	2.48E-02	6.21E-06	1.60E-03	3.88E-03	9.46E-05	25	714.15	979.00	16,455	2.1E-06	0.0E+00
309002	Aldrin	2.45E+06	1.32E-02	4.86E-06	1.80E-01	6.97E-03	1.70E-04	25	603.01	839.37	13,000	4.9E-03	0.0E+00
319846	alpha-HCH (alpha-BHC)	1.23E+03	1.42E-02	7.34E-06	2.00E+00	4.35E-04	1.06E-05	25	596.55	839.36	13,000	1.8E-03	0.0E+00
319857	beta-HCH (beta-BHC)	1.26E+03	1.42E-02	7.34E-06	2.40E-01	3.05E-05	7.44E-07	25	596.55	839.36	13,000	5.3E-04	0.0E+00
542756	1,3-Dichloropropene	4.57E+01	6.26E-02	1.00E-05	2.80E+03	7.26E-01	1.77E-02	25	381.15	587.38	7,000	3.7E-05	2.0E-02
606202	2,6-Dinitrotoluene	6.92E+01	3.27E-02	7.26E-06	1.82E+02	3.06E-05	7.46E-07	25	558.00	770.00	12,938	1.9E-04	0.0E+00
621647	N-Nitrosodi-n-propylamine	2.40E+01	5.45E-02	8.17E-06	9.89E+03	9.23E-05	2.25E-06	25	509.60	746.87	11,000	2.0E-03	0.0E+00
1024573	Heptachlor epoxide	8.32E+04	1.32E-02	4.23E-06	2.00E-01	3.90E-04	9.51E-06	25	613.96	848.76	13,000	2.6E-03	0.0E+00
7439976	Mercury (elemental)	5.20E+01	3.07E-02	6.30E-06	5.62E-02	4.67E-01	1.14E-02	25	629.88	1750.00	14,127	0.0E+00	3.0E-04
8001352	Toxaphene	2.57E+05	1.16E-02	4.34E-06	7.40E-01	2.46E-04	6.00E-06	25	657.15	873.31	14,000	3.2E-04	0.0E+00
11096825	Aroclor 1260 (PCB-1260)	2.90E+05	1.38E-02	4.32E-06	8.00E-02	1.89E-01	4.60E-03	25	402.50	539.37	19,000	1.0E-04	0.0E+00
11097691	Aroclor 1254 (PCB-1254)	2.00E+05	1.56E-02	5.00E-06	5.70E-02	8.20E-02	2.00E-03	25	377.50	512.27	19,000	1.0E-04	0.0E+00
12674112	Aroclor 1016 (PCB-1016)	3.30E+04	2.22E-02	5.42E-06	4.20E-01	1.19E-02	2.90E-04	25	340.50	475.22	18,000	1.0E-04	0.0E+00
53469219	Aroclor 1242 (PCB-1242)	3.30E+04	2.14E-02	5.31E-06	3.40E-01	2.13E-02	5.20E-04	25	345.50	482.20	18,000	1.0E-04	0.0E+00

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
1.06E-01	1.23E-06	2.71E-02	25	5,250	259.25	432.00	1.86E+01	2.76E+03	8.4E-05	0.0E+00

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	107	0.200	-0.550	-0.650	#N/A	#N/A	#N/A	1.00E-09	30.00	0.35	0.004	0.346	3,844

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.25E+05	9.24E+05	4.16E-04	33	5,000	1.73E-02	7.46E-01	1.75E-04	4.07E-03	0.00E+00	0.00E+00	4.02E-07	1.43E-06	107

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
33	7.46E+02	0.10	8.48E-01	4.07E-03	3.84E+02	5.90E+07	9.74E-08	7.26E-05	8.4E-05	NA

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
3.99E+02	NA	3.99E+02	2.76E+06	3.99E+02

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

VERSION 1.2
September, 1998

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

ENTER Chemical CAS No. (numbers only, no dashes)	**ENTER** Initial groundwater conc., C_W (µg/L)	Chemical
95476	200000	o-Xylene

ENTER Average soil/ groundwater temperature, T_S (°C)	**ENTER** Depth below grade to bottom of enclosed space floor, L_F (cm)	**ENTER** Depth below grade to water table, L_{WT} (cm)	**ENTER** Totals must add up to value of L_{WT} (cell D28) Thickness of soil stratum A, h_A (cm)	**ENTER** Thickness of soil stratum B, (Enter value or 0) h_B (cm)	**ENTER** Thickness of soil stratum C, (Enter value or 0) h_C (cm)	**ENTER** Soil stratum directly above water table, (Enter A, B, or C)	**ENTER** SCS soil type directly above water table	**ENTER** Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	**ENTER** User-defined stratum A soil vapor permeability, k_v (cm^2)
10	33	140	140	0	0	A	SC			1.00E-09

ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	**ENTER** Stratum A soil total porosity, n^A (unitless)	**ENTER** Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	**ENTER** Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	**ENTER** Stratum B soil total porosity, n^B (unitless)	**ENTER** Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	**ENTER** Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	**ENTER** Stratum C soil total porosity, n^C (unitless)	**ENTER** Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
1.5	0.35	0.15	1.5	0.45	1	1.5	0.35	1

ENTER Enclosed space floor thickness, L_{crack} (cm)	**ENTER** Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	**ENTER** Enclosed space floor length, L_B (cm)	**ENTER** Enclosed space floor width, W_B (cm)	**ENTER** Enclosed space height, H_B (cm)	**ENTER** Floor-wall seam crack width, w (cm)	**ENTER** Indoor air exchange rate, ER (1/h)
33	40	961	961	488	0.1	1

ENTER Averaging time for carcinogens, AT_C (yrs)	**ENTER** Averaging time for noncarcinogens, AT_{NC} (yrs)	**ENTER** Exposure duration, ED (yrs)	**ENTER** Exposure frequency, EF (days/yr)	**ENTER** Target risk for carcinogens, TR (unitless)	**ENTER** Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1

Used to calculate risk-based groundwater concentration.

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
8.70E-02	1.00E-05	5.20E-03	25	8,661	417.60	630.30	3.63E+02	1.78E+02	0.0E+00	7.0E+00

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	107	0.200	-0.550	-0.650	#N/A	#N/A	#N/A	1.00E-09	30.00	0.35	0.004	0.346	3,844

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.25E+05	9.24E+05	4.16E-04	33	10,404	2.05E-03	8.83E-02	1.75E-04	3.34E-03	0.00E+00	0.00E+00	2.70E-05	9.43E-05	107

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
33	8.83E+01	0.10	8.48E-01	3.34E-03	3.84E+02	2.91E+09	3.32E-06	2.93E-04	NA	7.0E+00

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
NA	2.49E+07	2.49E+07	1.78E+05	1.78E+05

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

VLOOKUP TABLES

Soil Properties Lookup Table

SCS Soil Type	K_s (cm/h)	α (1/cm)	N (unitless)	M (unitless)	θ_s (cm^3/cm^3)	θ_r (cm^3/cm^3)	Mean Grain Diameter (cm)
C	0.20	0.008	1.09	0.083	0.38	0.068	0.0092
CL	0.26	0.019	1.31	0.237	0.41	0.095	0.016
L	1.04	0.036	1.56	0.359	0.43	0.078	0.020
LS	14.59	0.124	2.28	0.561	0.41	0.057	0.040
S	29.70	0.145	2.68	0.627	0.43	0.045	0.044
SC	0.12	0.027	1.23	0.187	0.38	0.100	0.025
SCL	1.31	0.059	1.48	0.324	0.39	0.100	0.029
SI	0.25	0.016	1.37	0.270	0.46	0.034	0.0046
SIC	0.02	0.005	1.09	0.083	0.26	0.070	0.0039
SICL	0.07	0.010	1.23	0.187	0.43	0.089	0.0056
SIL	0.45	0.020	1.41	0.291	0.45	0.067	0.011
SL	4.42	0.075	1.89	0.471	0.41	0.065	0.030

Chemical Properties Lookup Table

CAS No.	Chemical	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Pure component water solubility, S (mg/L)	Henry's law constant H' (unitless)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
50293	DDT	2.63E+06	1.37E-02	4.95E-06	2.50E-02	3.32E-04	8.10E-06	25	533.15	720.75	11,000	9.7E-05	0.0E+00
50328	Benzo(a)pyrene	1.02E+06	4.30E-02	9.00E-06	1.62E-03	4.63E-05	1.13E-06	25	715.90	969.27	15,000	2.1E-03	0.0E+00
51285	2,4-Dinitrophenol	1.00E-02	2.73E-02	9.06E-06	2.79E+03	1.82E-05	4.44E-07	25	605.28	827.85	15,000	0.0E+00	7.0E-03
53703	Dibenz(a,h)anthracene	3.80E+06	2.02E-02	5.18E-06	2.49E-03	6.03E-07	1.47E-08	25	743.24	990.41	16,000	2.1E-03	0.0E+00
56235	Carbon tetrachloride	1.74E+02	7.80E-02	8.80E-06	7.93E+02	1.25E+00	3.05E-02	25	349.90	556.60	7,127	1.5E-05	0.0E+00
56553	Benz(a)anthracene	3.98E+05	5.10E-02	9.00E-06	9.40E-03	1.37E-04	3.34E-06	25	708.15	1004.79	15,000	2.1E-04	0.0E+00
57749	Chlordane	1.20E+05	1.18E-02	4.37E-06	5.60E-02	1.99E-03	4.85E-05	25	624.24	885.73	13,000	3.7E-04	0.0E+00
58899	gamma-HCH (Lindane)	1.07E+03	1.42E-02	7.34E-06	6.80E+00	5.74E-04	1.40E-05	25	596.55	839.36	13,000	3.7E-04	0.0E+00
60571	Dieldrin	2.14E+04	1.25E-02	4.74E-06	1.95E-01	6.19E-04	1.51E-05	25	613.32	842.25	13,000	4.6E-03	0.0E+00
65850	Benzoic Acid	6.00E-01	5.36E-02	7.97E-06	3.50E+03	6.31E-05	1.54E-06	25	720.00	751.00	10,000	0.0E+00	1.4E+01
67641	Acetone	5.75E-01	1.24E-01	1.14E-05	1.00E+06	1.59E-03	3.88E-05	25	329.20	508.10	6,955	0.0E+00	3.5E-01
67663	Chloroform	3.98E+01	1.04E-01	1.00E-05	7.92E+03	1.50E-01	3.66E-03	25	334.32	536.40	6,988	2.3E-05	0.0E+00
67721	Hexachloroethane	1.78E+03	2.50E-03	6.80E-06	5.00E+01	1.59E-01	3.88E-03	25	458.00	695.00	9,510	4.0E-06	0.0E+00
71363	Butanol	6.92E+00	8.00E-02	9.30E-06	7.40E+04	3.61E-04	8.80E-06	25	390.88	563.05	10,346	0.0E+00	3.5E-01
71432	Benzene	5.89E+01	8.80E-02	9.80E-06	1.75E+03	2.28E-01	5.56E-03	25	353.24	562.16	7,342	8.3E-06	0.0E+00
71556	1,1,1-Trichloroethane	1.10E+02	7.80E-02	8.80E-06	1.33E+03	7.05E-01	1.72E-02	25	347.24	545.00	7,136	0.0E+00	1.0E+00
72208	Endrin	1.23E+04	1.25E-02	4.74E-06	2.50E-01	3.08E-04	7.51E-06	25	718.15	986.20	12,000	0.0E+00	1.1E-03
72435	Methoxychlor	9.77E+04	1.56E-02	4.46E-06	4.50E-02	6.48E-04	1.58E-05	25	651.02	848.49	14,000	0.0E+00	1.8E-02
72548	DDD	1.00E+06	1.69E-02	4.76E-06	9.00E-02	1.64E-04	4.00E-06	25	639.90	863.77	14,000	6.9E-05	0.0E+00
72559	DDE	4.47E+06	1.44E-02	5.87E-06	1.20E-01	8.61E-04	2.10E-05	25	636.44	860.38	13,000	9.7E-05	0.0E+00
74839	Methyl bromide	1.05E+01	7.28E-02	1.21E-05	1.52E+04	2.56E-01	6.24E-03	25	276.71	467.00	5,714	0.0E+00	5.0E-03
75014	Vinyl chloride (chloroethene)	1.86E+01	1.06E-01	1.23E-06	2.76E+03	1.11E+00	2.71E-02	25	259.25	432.00	5,250	8.4E-05	0.0E+00
75092	Methylene chloride	1.17E+01	1.01E-01	1.17E-05	1.30E+04	8.98E-02	2.19E-03	25	313.00	510.00	6,706	4.7E-07	3.0E+00
75150	Carbon disulfide	4.57E+01	1.04E-01	1.00E-05	1.19E+03	1.24E+00	3.02E-02	25	319.00	552.00	6,391	0.0E+00	7.0E-01
75252	Bromoform	8.71E+01	1.49E-02	1.03E-05	3.10E+03	2.19E-02	5.34E-04	25	422.35	696.00	9,479	1.1E-06	0.0E+00
75274	Bromodichloromethane	5.50E+01	2.98E-02	1.06E-05	6.74E+03	6.56E-02	1.60E-03	25	363.15	585.85	7,000	1.8E-05	0.0E+00
75343	1,1-Dichloroethane	3.16E+01	7.42E-02	1.05E-05	5.06E+03	2.30E-01	5.61E-03	25	330.55	523.00	6,895	0.0E+00	5.0E-01
75354	1,1-Dichloroethylene	5.89E+01	9.00E-02	1.04E-05	2.25E+03	1.07E+00	2.61E-02	25	304.75	576.05	6,247	5.0E-05	0.0E+00
76448	Heptachlor	1.41E+06	1.12E-02	5.69E-06	1.80E-01	4.47E-02	1.09E-03	25	603.69	846.31	13,000	1.3E-03	0.0E+00
77474	Hexachlorocyclopentadiene	2.00E+05	1.61E-02	7.21E-06	1.80E+00	1.11E+00	2.71E-02	25	512.15	746.00	10,931	0.0E+00	7.0E-05
78591	Isophorone	4.68E+01	6.23E-02	6.76E-06	1.20E+04	2.72E-04	6.63E-06	25	488.35	715.00	10,271	2.7E-07	0.0E+00
78875	1,2-Dichloropropane	4.37E+01	7.82E-02	8.73E-06	2.80E+03	1.15E-01	2.80E-03	25	369.52	572.00	7,590	0.0E+00	4.0E-03
79005	1,1,2-Trichloroethane	5.01E+01	7.80E-02	8.80E-06	4.42E+03	3.74E-02	9.12E-04	25	386.15	602.00	8,322	1.6E-05	0.0E+00
79016	Trichloroethylene	1.66E+02	7.90E-02	9.10E-06	1.10E+03	4.22E-01	1.03E-02	25	360.36	544.20	7,505	1.7E-06	0.0E+00
79345	1,1,2,2-Tetrachloroethane	9.33E+01	7.10E-02	7.90E-06	2.97E+03	1.41E-02	3.44E-04	25	419.60	661.15	8,996	5.8E-05	0.0E+00
83329	Acenaphthene	7.08E+03	4.21E-02	7.69E-06	4.24E+00	6.36E-03	1.55E-04	25	550.54	803.15	12,155	0.0E+00	2.1E-01
84662	Diethylphthalate	2.88E+02	2.56E-02	6.35E-06	1.08E+03	1.85E-05	4.51E-07	25	567.15	757.00	13,733	0.0E+00	2.8E+00
84742	Di-n-butyl phthalate	3.39E+04	4.38E-02	7.86E-06	1.12E+01	3.85E-08	9.39E-10	25	613.15	798.67	14,751	0.0E+00	3.5E-01

85687	Butyl benzyl phthalate	5.75E+04	1.74E-02	4.83E-06	2.69E+00	5.17E-05	1.26E-06	25	660.60	839.68	13,000	0.0E+00	7.0E-01
86306	N-Nitrosodiphenylamine	1.29E+03	3.12E-02	6.35E-06	3.51E+01	2.05E-04	5.00E-06	25	632.28	890.45	13,000	1.4E-06	0.0E+00
86737	Fluorene	1.38E+04	3.63E-02	7.88E-06	1.98E+00	2.61E-03	6.37E-05	25	570.44	870.00	12,666	0.0E+00	1.4E-01
86748	Carbazole	3.39E+03	3.90E-02	7.03E-06	7.48E+00	6.26E-07	1.53E-08	25	627.87	899.00	13,977	5.7E-06	0.0E+00
87683	Hexachloro-1,3-butadiene	5.37E+04	5.61E-02	6.16E-06	3.23E+00	3.34E-01	8.15E-03	25	486.15	738.00	10,206	2.2E-05	0.0E+00
87865	Pentachlorophenol	5.92E+02	5.60E-02	6.10E-06	1.95E+03	1.00E-06	2.44E-08	25	582.15	813.20	14,000	3.4E-05	0.0E+00
88062	2,4,6-Trichlorophenol	3.81E+02	3.18E-02	6.25E-06	8.00E+02	3.19E-04	7.78E-06	25	519.15	749.03	12,000	3.1E-06	0.0E+00
91203	Naphthalene	2.00E+03	5.90E-02	7.50E-06	3.10E+01	1.98E-02	4.83E-04	25	491.14	748.40	10,373	0.0E+00	1.4E-01
91941	3,3-Dichlorobenzidine	7.24E+02	1.94E-02	6.74E-06	3.11E+00	1.64E-07	4.00E-09	25	560.26	754.03	13,000	1.3E-04	0.0E+00
95476	o-Xylene	3.63E+02	8.70E-02	1.00E-05	1.78E+02	2.13E-01	5.20E-03	25	417.60	630.30	8,661	0.0E+00	7.0E+00
95487	2-Methylphenol (o-cresol)	9.12E+01	7.40E-02	8.30E-06	2.60E+04	4.92E-05	1.20E-06	25	464.19	697.60	10,800	0.0E+00	1.8E-01
95501	1,2-Dichlorobenzene	6.17E+02	6.90E-02	7.90E-06	1.56E+02	7.79E-02	1.90E-03	25	453.57	705.00	9,700	0.0E+00	2.0E-01
95578	2-Chlorophenol	3.88E+02	5.01E-02	9.46E-06	2.20E+04	1.60E-02	3.90E-04	25	447.53	675.00	9,572	0.0E+00	1.8E-02
95954	2,4,5-Trichlorophenol	1.60E+03	2.91E-02	7.03E-06	1.20E+03	1.78E-04	4.34E-06	25	526.15	759.13	13,000	0.0E+00	3.5E-01
98953	Nitrobenzene	6.46E+01	7.60E-02	8.60E-06	2.09E+03	9.84E-04	2.40E-05	25	483.95	719.00	10,566	0.0E+00	2.0E-03
100414	Ethylbenzene	3.63E+02	7.50E-02	7.80E-06	1.69E+02	3.23E-01	7.88E-03	25	409.34	617.20	8,501	0.0E+00	1.0E+00
100425	Styrene	7.76E+02	7.10E-02	8.00E-06	3.10E+02	1.13E-01	2.76E-03	25	418.31	636.00	8,737	0.0E+00	1.0E+00
105679	2,4-Dimethylphenol	2.09E+02	5.84E-02	8.69E-06	7.87E+03	8.20E-05	2.00E-06	25	484.13	707.60	11,329	0.0E+00	7.0E-02
106423	p-Xylene	3.89E+02	7.69E-02	8.44E-06	1.85E+02	3.14E-01	7.66E-03	26	411.52	616.20	8,525	0.0E+00	7.0E+00
106467	1,4-Dichlorobenzene	6.17E+02	6.90E-02	7.90E-06	7.38E+01	9.96E-02	2.43E-03	25	447.21	684.75	9,271	0.0E+00	8.0E-01
106478	p-Chloroaniline	6.61E+01	4.83E-02	1.01E-05	5.30E+03	1.36E-05	3.32E-07	25	503.65	754.00	11,689	0.0E+00	1.4E-02
107062	1,2-Dichloroethane	1.74E+01	1.04E-01	9.90E-06	8.52E+03	4.01E-02	9.78E-04	25	356.65	561.00	7,643	2.6E-05	0.0E+00
108054	Vinyl acetate	5.25E+00	8.50E-02	9.20E-06	2.00E+04	2.10E-02	5.12E-04	25	345.65	519.13	7,800	0.0E+00	2.0E-01
108383	m-Xylene	4.07E+02	7.00E-02	7.80E-06	1.61E+02	3.01E-01	7.34E-03	25	412.27	617.05	8,523	0.0E+00	7.0E+00
108883	Toluene	1.82E+02	8.70E-02	8.60E-06	5.26E+02	2.72E-01	6.63E-03	25	383.78	591.79	7,930	0.0E+00	4.0E-01
108907	Chlorobenzene	2.19E+02	7.30E-02	8.70E-06	4.72E+02	1.52E-01	3.71E-03	25	404.87	632.40	8,410	0.0E+00	2.0E-02
108952	Phenol	2.88E+01	8.20E-02	9.10E-06	8.28E+04	1.63E-05	3.98E-07	25	455.02	694.20	10,920	0.0E+00	2.1E+00
111444	Bis(2-chloroethyl)ether	1.55E+01	6.92E-02	7.53E-06	1.72E+04	7.38E-04	1.80E-05	25	451.15	659.79	9,000	3.3E-04	0.0E+00
115297	Endosulfan	2.14E+03	1.15E-02	4.55E-06	5.10E-01	4.59E-04	1.12E-05	25	674.43	942.94	14,000	0.0E+00	2.1E-02
117817	Bis(2-ethylhexyl)phthalate	1.51E+07	3.51E-02	3.66E-06	3.40E-01	4.18E-06	1.02E-07	25	657.15	806.00	15,999	4.0E-06	0.0E+00
117840	Di-n-octyl phthalate	8.32E+07	1.51E-02	3.58E-06	2.00E-02	2.74E-03	6.68E-05	25	704.09	862.22	15,000	0.0E+00	7.0E-02
118741	Hexachlorobenzene	5.50E+04	5.42E-02	5.91E-06	6.20E+00	5.41E-02	1.32E-03	25	582.55	825.00	14,447	4.6E-04	0.0E+00
120127	Anthracene	2.95E+04	3.24E-02	7.74E-06	4.34E-02	2.67E-03	6.51E-05	25	615.18	873.00	13,121	0.0E+00	1.1E+00
120821	1,2,4-Trichlorobenzene	1.78E+03	3.00E-02	8.23E-06	3.00E+02	5.82E-02	1.42E-03	25	486.15	725.00	10,471	0.0E+00	2.0E-01
120832	2,4-Dichlorophenol	1.47E+02	3.46E-02	8.77E-06	4.50E+03	1.30E-04	3.17E-06	25	482.15	708.17	11,000	0.0E+00	1.1E-02
121142	2,4-Dinitrotoluene	9.55E+01	2.03E-01	7.06E-06	2.70E+02	3.80E-06	9.27E-08	25	590.00	814.00	13,467	1.9E-04	0.0E+00
124481	Chlorodibromomethane	6.31E+01	1.96E-02	1.05E-05	2.60E+03	3.21E-02	7.83E-04	25	416.14	678.20	8,000	2.4E-05	0.0E+00
127184	Tetrachloroethylene	1.55E+02	7.20E-02	8.20E-06	2.00E+02	7.54E-01	1.84E-02	25	394.40	620.20	8,268	5.8E-07	0.0E+00
129000	Pyrene	1.05E+05	2.72E-02	7.24E-06	1.35E-01	4.51E-04	1.10E-05	25	667.95	936.00	14,370	0.0E+00	1.1E-01
156592	cis-1,2-Dichloroethylene	3.55E+01	7.36E-02	1.13E-05	3.50E+03	1.67E-01	4.07E-03	25	333.65	544.00	7,192	0.0E+00	3.5E-02
156605	trans-1,2-Dichloroethylene	5.25E+01	7.07E-02	1.19E-05	6.30E+03	3.85E-01	9.39E-03	25	320.85	516.50	6,717	0.0E+00	7.0E-02
193395	Indeno(1,2,3-cd)pyrene	3.47E+06	1.90E-02	5.66E-06	2.20E-05	6.56E-05	1.60E-06	25	809.15	1078.24	17,000	2.1E-04	0.0E+00
205992	Benzo(b)fluoranthene	1.23E+06	2.26E-02	5.56E-06	1.50E-03	4.55E-03	1.11E-04	25	715.90	969.27	15,000	2.1E-04	0.0E+00
206440	Fluoranthene	1.07E+05	3.02E-02	6.35E-06	2.06E-01	6.60E-04	1.61E-05	25	655.95	905.00	13,815	0.0E+00	1.4E-01
207089	Benzo(k)fluoranthene	1.23E+06	2.26E-02	5.56E-06	8.00E-04	3.40E-05	8.29E-07	25	753.15	1019.70	16,000	2.1E-05	0.0E+00
218019	Chrysene	3.98E+05	2.48E-02	6.21E-06	1.60E-03	3.88E-03	9.46E-05	25	714.15	979.00	16,455	2.1E-06	0.0E+00
309002	Aldrin	2.45E+06	1.32E-02	4.86E-06	1.80E-01	6.97E-03	1.70E-04	25	603.01	839.37	13,000	4.9E-03	0.0E+00
319846	alpha-HCH (alpha-BHC)	1.23E+03	1.42E-02	7.34E-06	2.00E+00	4.35E-04	1.06E-05	25	596.55	839.36	13,000	1.8E-03	0.0E+00
319857	beta-HCH (beta-BHC)	1.26E+03	1.42E-02	7.34E-06	2.40E-01	3.05E-05	7.44E-07	25	596.55	839.36	13,000	5.3E-04	0.0E+00
542756	1,3-Dichloropropene	4.57E+01	6.26E-02	1.00E-05	2.80E+03	7.26E-01	1.77E-02	25	381.15	587.38	7,000	3.7E-05	2.0E-02
606202	2,6-Dinitrotoluene	6.92E+01	3.27E-02	7.26E-06	1.82E+02	3.06E-05	7.46E-07	25	558.00	770.00	12,938	1.9E-04	0.0E+00
621647	N-Nitrosodi-n-propylamine	2.40E+01	5.45E-02	8.17E-06	9.89E+03	9.23E-05	2.25E-06	25	509.60	746.87	11,000	2.0E-03	0.0E+00
1024573	Heptachlor epoxide	8.32E+04	1.32E-02	4.23E-06	2.00E-01	3.90E-04	9.51E-06	25	613.96	848.76	13,000	2.6E-03	0.0E+00
7439976	Mercury (elemental)	5.20E+01	3.07E-02	6.30E-06	5.62E-02	4.67E-01	1.14E-02	25	629.88	1750.00	14,127	0.0E+00	3.0E-04
8001352	Toxaphene	2.57E+05	1.16E-02	4.34E-06	7.40E-01	2.46E-04	6.00E-06	25	657.15	873.31	14,000	3.2E-04	0.0E+00
11096825	Aroclor 1260 (PCB-1260)	2.90E+05	1.38E-02	4.32E-06	8.00E-02	1.89E-01	4.60E-03	25	402.50	539.37	19,000	1.0E-04	0.0E+00
11097691	Aroclor 1254 (PCB-1254)	2.00E+05	1.56E-02	5.00E-06	5.70E-02	8.20E-02	2.00E-03	25	377.50	512.27	19,000	1.0E-04	0.0E+00
12674112	Aroclor 1016 (PCB-1016)	3.30E+04	2.22E-02	5.42E-06	4.20E-01	1.19E-02	2.90E-04	25	340.50	475.22	18,000	1.0E-04	0.0E+00
53469219	Aroclor 1242 (PCB-1242)	3.30E+04	2.14E-02	5.31E-06	3.40E-01	2.13E-02	5.20E-04	25	345.50	482.20	18,000	1.0E-04	0.0E+00

ATTACHMENT C

Previously negotiated exposure assumptions

Interim Memorandum

Human Health Risk Assessment Approach Former IFG Facility and Deferred Media Syracuse, New York

General Motors Corporation
Syracuse, New York

October 1999

O'BRIEN & GERE
ENGINEERS, INC.

4966/21535

INTERIM MEMORANDUM

Human Health Risk Assessment Approach Former IFG Facility and Deferred Media Syracuse, New York

General Motors Corporation
Syracuse, New York

Swiatoslav W. Kaczmar, Ph.D., CIH
Vice President

October 1999

O'BRIEN & GERE ENGINEERS, INC.

5000 Brittonfield Parkway
P.O. Box 4873
Syracuse, New York

Contents

1. Introduction 1

2. Technical summary 3

References 4

List of tables

2-1 Human health risk assessment - approach

List of attachments

A Proposed exposure equations and parameters

1. Introduction

In 1997, O'Brien & Gere Engineers, Inc. (O'Brien & Gere) completed a Remedial Investigation/Feasibility Study (RI/FS) report for the Former IFG Facility and Ley Creek Deferred Media (O'Brien & Gere 1997). The Ley Creek Deferred Media consist of the surface water and sediments of Ley Creek between Townline Road and Route 11, as well as ground water underlying the Ley Creek PCB Dredgings Site. The 1997 RI/FS report included an evaluation of human health risk based on:

- focussed pathway evaluation of conditions at the Former IFG Facility considering likely future remedial actions

- evaluation of human health risks associated with constituents detected at the Ley Creek Deferred Media site and upstream contributions of constituents to surface water and sediments of Ley Creek.

NYSDEC reviewed and commented on the 1997 RI/FS report and concluded that several data gaps existed, requiring the preparation of a Supplemental RI Work Plan and preparation of a Baseline Risk Assessment. A meeting was held with NYSDEC and United States Environmental Protection Agency (USEPA) staff on June 9, 1998 to define the scope of the Supplemental RI. A separate meeting was held to discuss the Baseline Risk Assessment on June 16, 1998. General Motors Corporation (GM), NYSDEC, and USEPA agreed that an Interim Technical Memorandum regarding Baseline Risk Assessment methods and assumptions be submitted by July 24, 1998. A report summarizing the technical issues discussed at the June 16 meeting and the proposed methods and assumptions for the IFG / Ley Creek Deferred Media RI / FS Baseline Human Health Risk Assessment Approach (HHRAA) was presented to NYSDEC and USEPA on July 24 1998. On January 6, 1999, NYSDEC and USEPA issued a comment letter on the HHRAA.

This revised HHRAA interim memorandum incorporates NYSDEC's and USEPA's January 6, 1999 comments with subsequent discussions between GM and NYSDEC. The proposed methods and assumptions in this report will form the basis for the *Human Health Risk Assessment Exposure Pathway Analysis Report* which will be submitted to NYSDEC and USEPA following review of the analytical data collected as part of the Supplemental

RI, and prior to completion of the Baseline Human Health Risk Assessment. The HHRA Exposure Pathway Analysis Report will include the information regarding how risks will be assessed at the site, including statistical methods, constituents of potential concern (COPCs), screening exposure pathways, receptors, toxicity values, and a description of the risk characterization process. The Exposure Pathway Analysis Report will also fulfill the requirements of the Risk Assessment memorandum required by the Administrative Order on Consent between GM and NYSDEC, dated September 25, 1997.

2. Technical summary

The risk assessment methods, procedures, and assumptions are presented in Table 2-1.

References

This section contains the references cited in this Interim Memorandum as well as general references which would be pertinent to the human health risk assessment.

ASTDR. 1997. *Toxicological Profiles.* U.S. Department of Health and Human Services Agency for Toxic Substances and Disease Registry.

Benjamin, Susan (NYSDEC). Letter to James Hartnett (GM). January 6, 1999

Bouer, H. & Rice, R.C. 1976. A Slug Test for Hydraulic Conductivity of Unconfined Aquifers with Completely or Partially Penetrating Wells. Water Resources Research. Vol. 12, No. 3.

Callahan MA, Slimak MW, Gabel NW, et al. 1979. *Water - related environmental fate of 129 priority pollutants. Vol. I. Introduction and technical background, metals and inorganics, pesticides and PCB's.* Washington, DC: U.S. Environmental Protection Agency, Office of Water Planning and Standards. EPA-440/4-79-029a, 27.1-27.16.

Carter, M. and Bentley, S.P. 1991, *Correlations of Soil Properties*, Pentech Press, London. p.39. 130pp.

Cohen, S.M., Ellwein, L.B. 1990. Cell proliferation in Carcinogenesis. Science 249: 1007-1011.

Coleman, E.W. , Munch J.W., Streicher R.P., Ringland P.H., and Kopfler, F.C. The Identification and Measurement of Components in Gasoline, Kerosene, and No. 2 Fuel Oil that Partition Into the Aqueous Phase After Mixing. Arch. Environ. Contam. Toxicol. 13;171-178.

CRC Press. 1985. Handbook of Chemistry & Physics.

Dean, John A., Editor. Lange's Handbook of Chemistry. 1973. McGraw-Hill Book Company.

Dragun, J. PhD. 1988. *The Soil Chemistry of Hazardous Materials.* Hazardous Material Control Research Institute, Silver Springs, MD.

Driscoll, F.G. 1986, *Groundwater and Wells*, Johnson Division, St. Paul, MN.

EG&G Florida, Inc. and Edward Clark Engineers-Scientists, Inc. 1992. *Environmental Resources Document*. John F. Kennedy Space Center, NASA.

EHRAV. 1995. *Electronic Handbook of Risk Assessment Values*. Volume 4, Issue 9. 1995 Electronic Handbook Publishers, Inc. 15 September 1995.

Epstein,C.M. Undated - circa 1993. *The Hydrology of New Jersey Wetlands*, Cook College with Stockton State College. Stockton State College Pomona, NJ.

Freeze, R.A. and J. A. Cherry. 1979. *Groundwater*. Prentice-Hall, Inc. Englewood Cliffs, NJ.

Gilbert, R.O. 1987. Statistical Methods for Environmental Pollution Monitoring, Van Nostrand Reinhold Company, Inc. New York, New York.

Hansch, C. and A.J. Leo. 1985. *Medchem Project Issue No. 26.* Pomona College, Claremont, CA.

Health Effects Assessment Summary Table (HEAST), Updated Quarterly.

Hoffman F. Owen and Hammonds Jana S. Propogation of Uncertainty in Risk Assessments: The Need to Distinguish Between Uncertainty Due to the Lack of Knowledge and Uncertainty Due to Variability, Risk Analysis, Volume 14, No.5, 1994.

Howard, P.H. 1989. Handbook of Environmental Fate and Exposure Data for Organic Chemicals. Volumes I and II. Lewis Publishers, Chelsea, Michigan.

HSDB. 1991. Hazardous Substances Data Bank. National Library of Medicine, National toxicology Information Program, Bethesda, MD. May, 1991.

Former IFG Facility / Ley Creek Deferred Media Site
Table 2-1

Human Health Risk Assessment- Approach

Proposed Approach	Discussion
Objective Baseline risk assessment - assessment of human health risk related to chemical constituents at the site assuming no remedial measures.	It was agreed that the risk assessment would be a baseline risk assessment
Primary Guidance USEPA 1989, *Risk Assessment Guidance for Superfund* (RAGS) USEPA. 1991. *Risk Assessment Guidance for Superfund Volume I, Human Health Supplemental Guidance Standard Default Exposure Factors.* USEPA. 1998 (January). *Risk Assessment Guidance for Superfund: Volume I, Human Health Evaluation Manual (Part D, Standardized Planning, Reporting, and Review of Superfund Risk Assessments)*. Interim. USEPA9285.7-01D. EPA 540/G-89/004 USEPA 1997, *Exposure Factors Handbook Volumes I - III*, EPA/600/P-95/002Fa	Agreed

Former IFG Facility / Ley Creek Deferred Media Site
Table 2-1

Human Health Risk Assessment- Approach

Proposed Approach	Discussion
Conceptual Site Model (CSM) Industrial site located in an industrial / commercial area - Future uses are likely to be industrial / commercial No potable ground water users at or in the vicinity of the site. However, it may be appropriate to evaluate risks associated with future industrial uses since the ground water is classified as GA. In addition, the potential for constituents detected in ground water to migrate to surface water in Ley Creek will be assessed and, if necessary, resultant human health risks associated with this pathway will be assessed. **Nature and Extent of Contamination** PCBs, VOCs, SVOCs and metals potentially in surface soil, sub-surface soil, shallow overburden ground water, and possibly deep ground water at former IFG facility PCBs, VOCs, SVOCs and metals in Ley Creek sediments . Ley Creek receives urban run-off and industrial discharges from numerous upstream sources Ley Creek discharges to Onondaga Lake - the lake is the subject of an on-going RI / FS, and will not be evaluated in this assessment	In general, it was agreed that the CSM is likely appropriate for the site. However, the following additional items were discussed : *USEPA indicated that verification of future land use should be documented in accordance with USEPA guidance* - USEPA 1995, *Land Use in the CERCLA Remedy Selection Process*, OSWER Directive No. 9355.7-04 *USEPA and NYSDEC indicated that further documentation is appropriate to establish the absence of industrial or residential wells in the vicinity of the site. However, since the ground water is classified as GA, the detected ground water concentrations will be compared against Federal MCLs and State ground water Standards*

Former IFG Facility / Ley Creek Deferred Media Site
Table 2-1

Human Health Risk Assessment- Approach

Proposed Approach	Discussion
Receptors / Exposure Pathways Former IFG facility *Current Adolescent Trespasser* - exposed to surface soil (0 to 2 ft) *Future Industrial Workers* - exposed to surface soil (0 to 2 ft), indoor air, ambient air, ingestion of ground water. *Future Construction Workers* - exposed to surface soil, sub-surface soil, ambient air, shallow ground water Human Receptors - Ley Creek *Recreational Users* - exposed to sediment (0 to 2 ft), surface water, edible fish *Dredging Workers* - exposed to sediment (0 to 2 ft), surface water	*It was agreed that the appropriate receptors / exposure pathways were identified for the former IFG Facility* *At the request of NYSDEC, a dredging worker receptor was added to the list of human receptors.*

Former IFG Facility / Ley Creek Deferred Media Site
Table 2-1

Human Health Risk Assessment- Approach

Proposed Approach	Discussion
Exposure Parameters USEPA 1997, *Exposure Factors Handbook Volumes I - III*, EPA/600/P-95/002Fa Preliminary estimates of proposed exposure factors were presented and discussed.	*Based on discussions and comments by USEPA and NYSDEC the parameter values and exposure equationsto be applied in the risk assessment are presented in Attachment A*

Former IFG Facility / Ley Creek Deferred Media Site
Table 2-1

Human Health Risk Assessment- Approach

Proposed Approach	Discussion
Exposure Parameters USEPA 1997, *Exposure Factors Handbook Volumes I - III*, EPA/600/P-95/002Fa Preliminary estimates of proposed exposure factors were presented and discussed.	*Based on discussions and comments by USEPA and NYSDEC the parameter values and exposure equationsto be applied in the risk assessment are presented in Attachment A*

Former IFG Facility / Ley Creek Deferred Media Site
Table 2-1

Human Health Risk Assessment- Approach

Proposed Approach	Discussion
Additional Samples: **Former IFG Facility** Additional samples will be collected from surface soil (0-1 ft.), sub-surface soil (>1 ft.), and ground water as part of the supplemental RI. Samples will be analyzed for PCBs, VOCs, SVOCs, metals, CN, and selected samples will be analyzed for mercury and chlorinated dioxins/dibenzofurans. **Ley Creek** Sediment samples will be collected from depositional areas adjacent to, downstream of, and upstream of the former IFG Facility outfalls. Data collected during supplemental RI will be used. In addition, sediment quality data collected by NYSDEC may also be included. Sediment quality data collected during or before the 1992 sampling event will not be included, since the data may not be representative of current conditions. Background samples will be collected from locations immediately upstream of the former IFG Facility outfall Samples will be analyzed for PCBs, SVOCs, VOCs, and metalsand selected samples will be analyzed for chlorinated dioxins/dibenzofurans.	*It was agreed that sediment or surface water data collected during or before the 1992 sampling would not be used, since the data may not be representative of current conditions.* *It was agreed that surface soil samples would be collected during the supplemental RI from the 0 to 1 ft interval. The risk assessment will include a discusssion regarding the uncertainty of not having data from the 1 to 2 ft interval.*

Former IFG Facility / Ley Creek Deferred Media Site
Table 2-1

Human Health Risk Assessment- Approach

Proposed Approach	Discussion
Constituents of Potential Concern (COPCs) Region III Risk Based Concentrations (RBCs), based on a target cancer risk of 10^{-6} or Hazard Quotient of 0.1, or USEPAs Soil Screening Levels (SSLs) will be used to screen COPCs. Inorganic constituents less than naturally occurring background will be eliminated as COPCs. According to USEPA, naturally occurring background is defined as 2 x arithmetic mean of the concentrations detected in site specific background samples. COPCs attributable to anthropogenic background will be identified based on the data from the off-site soil samples and upstream Ley Creek sediment samples COPCs will not be eliminated from the risk calculations on the basis of anthropogenic background. However, the risk contributed by anthropogenic background constituents will be calculated separately to facilitate risk management decisions and presented in the Uncertainty Analysis section of the report. The approach for evaluating anthropogenic background data will be determined based on a review of the collected field data, based on one or more of the following considerations *tolerance limits* *2 x mean* *loading calculations from tributaries*	*USEPA indicated that a risk based screening step is appropriate as a means of focussing the risk assessment on constituents which significantly contribute to the derived risk levels.* *USEPA indicated that 2 x arithmetic mean from background samples was their default method for determining site specific background.* *It was agreed that the specific approach for evaluating anthropogenic background would be identified after reviewing the field data.*

Former IFG Facility / Ley Creek Deferred Media Site
Table 2-1

Human Health Risk Assessment- Approach

Proposed Approach	Discussion
Exposure Point Concentrations **Soil** - RME exposure point concentrations will be selected as follows : The data distribution will be evaluated based on a review of the skewness and kurtosis of the frequency distribution of the un-transformed and log-transformed data set for site soils. In addition, normal probability plots and the Shapiro Wilkes test will be applied to assess normality. In accordance with Risk Assessment Guidance for Superfund (USEPA 1989) (RAGS) the 95 % UCL (normal or log-normal) or maximum detected concentration, whichever is lower, will be used as the exposure point concentration. In general, ½ the practical quantitation limit (PQL) will be used for non-detects, as indicated in RAGS. However, as discussed in RAGS, the data set will be reviewed to assess potentially elevated detection limits due to matrix interferences / sample dilution during the lab analysis. If the elevated detection limits result in anomalously high derived average concentrations or UCLs, then these results may be excluded from the calculations. As such, the specific approach as to how non-detected data will be utilized in the risk assessment will be developed following review of the analytical data from the RI, and will be presented in the Exposure Pathway Analysis Report (EPAR). **Sediment** - Specific methods for RME exposure point concentrations will be selected as described above **Direct contact with ground water (Construction worker)** - Specific methods for RME exposure point concentrations will be selected based on review of collected field data. The selected approach will be presented in the EPAR **Indoor Air** - Specific quantitative models and parameter estimates for indoor air migration from soil and ground water sources will be identified based on review of collected field data. The selected approach will be presented in the EPAR.	*The 95 % UCL is a statement of the upper 95 % confidence limit on the arithmetic mean of the data. As discussed in RAGS, the 95 % UCL is an appropriate basis for estimating the exposure point concentration for data which is collected based on random or representative sampling approaches. However, as discussed in RAGS (Section 6.5.3), the cited methodology may be inappropriate for sampling schemes which are biased towards sampling "hot spot" areas. In these cases, it is appropriate to consider the proportionate exposure time at the "hot spot" areas as compared to the total anticipated receptor activity at the site.* *The RI sampling program at the former IFG facility has been designed to sample likely source areas at the site at a higher frequency than anticipated "uncontaminated areas". As such, the resulting data set may result in exposure point concentrations which are biased high. Depending on the results of the field sampling data, GM may discuss this factor in the Uncertainty Assessment and address it in the Feasibility Study, and / or may choose to collect supplemental data to obtain a more representative evaluation of site-wide conditions.*

Former IFG Facility / Ley Creek Deferred Media Site
Table 2-1

Human Health Risk Assessment- Approach

Proposed Approach	Discussion
Toxicity Assessment Chronic Reference Dose (RfD) for non-cancer endpoints Cancer slope factor for cancer endpoints Primary source - USEPA's Integrated Risk Information System (IRIS) Secondary sources - USEPA Health Effects Assessment Summary Tables (HEAST), National Center for Environmental Assessment (NCEA), open literature	*USEPA and NYSDEC agreed that the appropriate sources were cited for toxicity information. USEPA provided standard default estimates for gastro-intestinal and dermal absorption factors. The default absorption factors will be used in the risk assessment if appopriate constituent specific data is not available in the literature. The dermal absorption factors recommended by NYSDEC are:* *arsenic : 3 %,* *cadmium : 0.1 %,* *chlordane : 4 %,* *DDT : 3%* *TCDD (dioxin) - < 10 % organic soil : 3%, > 10% organic soil : 0.1%* *PAHs : 13 %* *PCBs (Aroclor 1254 and 1242) : 14 %* *Pentachlorophenol : 25 %* *SVOC (generic default) : 10 %* *Inorganics (generic default) : 1%*

Former IFG Facility / Ley Creek Deferred Media Site
Table 2-1

Human Health Risk Assessment- Approach

Proposed Approach	Discussion
Risk Characterization Hazard Index (HI) for noncancer endpoints - HI < 1 indicates no risk for non-cancer effects Lifetime excess cancer risk (CR) for cancer endpoints - $< 10^{-6}$ - no significant risk $> 10^{-4}$ - unacceptable risk 10^{-6} to 10^{-4} - site specific risk management decision In accordance with RAGS, HI and CR associated with anthropogenic background for Ley Creek will be calculated separately to facilitate risk management decisions	Agreed *OBG indicated that in order to facilitate risk management decisions it may be appropriate to perform the risk characterization for separate areas, and derive the total site risk by combining the area specific risk - the resultant risk estimate would be identical either way. If necessary, this approach may be presented in an Appendix to the HHRA.*
Uncertainty Analysis A qualitative discussion of uncertainty related to the calculated risk estimates.	Agreed

Attachment A

Table of Contents

A-1 Former IFG Facility/Ley Creek Defered Media - Chronic daily Intake Equations

A-2 Former IFG Facility/Ley Creek Defered Media - Future Construction Worker

A-3 Former IFG Facility/Ley Creek Defered Media - Future Industrial Worker

A-4 Former IFG Facility/Ley Creek Defered Media - Adolescent Trespasser - Plant Site

A-5 Former IFG Facility/Ley Creek Defered Media - Recreator - Ley Creek

A-6 Former IFG Facility/Ley Creek Defered Media - Future Dredging Worker

ATTACHMENT A

Table A-1

Former IFG Facility/Ley Creek Deferred Media
Human Health Risk Assessment
Chronic Daily Intake Equations

Pathway	Equation* to Calculate Chronic Daily Intake (CDI)
Incidental Ingestion of Soil/Sediment	$CDI = \frac{C_{soil} * IR * EF * ED * 10E-6 \ kg/mg}{BW * AT}$
Dermal Contact with Soil/Sediment	$CDI = \frac{C_{soil} * SA * ABS * AF * EF * ED * 10E-6 \ kg/mg}{BW * AT}$
Incidental Ingestion of Surface Water	$CDI = \frac{C_{sw} * IR * ET * EF * ED}{BW * AT}$
Ingestion of Ground Water (Industrial Worker)	$CDI = \frac{C_{gw} * IR * EF * ED}{BW * AT}$
Ingestion of Fish	$CDI = \frac{C_{fish} * IR * EF * ED}{BW * AT}$
Dermal Contact with Surface Water	$CDI = \frac{C_{sw} * SA * PC * ET * EF * ED * 10E-3 \ l/ml}{BW * AT}$
Inhalation of Air	$CDI = \frac{C_{air} * IR * ET * EF * ED}{BW * AT}$

* The acronyms for the chronic daily intake parameters that are presented in this table are defined in Tables 2 through 5.

ATTACHMENT A

Table A-2

Former IFG Facility/Ley Creek Deferred Media
Human Health Risk Assessment

Adult Future Construction Worker

Exposure Pathway/Exposure Factor	Value	Comment
Ingestion of Soil (0-10ft)		
Surface Soil Ingestion Rate (mg/d)	480	USEPA Default
Fraction Surface Soil from Contaminated Source	1	
Conversion Factor (kg/mg)	0.000001	
Dermal Contact with Soil (0-10ft)		
Soil/Skin Adherence Factor (mg/cm^2)	0.03	Based on NYSDEC direction
Surface Area Exposed to Surface Soil (cm^2/event)	6600	Based on NYSDEC Comments, June 23, 1998
Conversion Factor (kg/mg)	0.000001	
General Exposure Factors		
Exposure Frequency (d/yr)	100	Assumes duration of construction project to be 5 months
Exposure Duration (yr)	1	Judgement
Body Weight (kg)	70	USEPA, 1991.
Averaging Time - Cancer (d)	25550	USEPA, 1991.
Averaging Time - Noncancer (d)	365	

ATTACHMENT A

Table A-3

Former IFG Facility/Ley Creek Deferred Media
Human Health Risk Assessment

Adult Future Industrial Worker

Exposure Pathway/Exposure Factor	Value	Comment
Ingestion of Surface Soil		
Surface Soil Ingestion Rate (mg/d)	50	Recommended adult daily soil ingestion rate, USEPA 1997
Fraction Surface Soil from Contaminated Source	1	Conservative estimate; workers likely spend most time indoors.
Conversion Factor (kg/mg)	0.000001	
Dermal Contact with Surface Soil		
Soil/Skin Adherence Factor (mg/cm^2)	0.03	Based on NYSDEC Comments, June 23, 1998
Surface Area Exposed to Surface Soil (cm^2/event)	6600	Based on NYSDEC Comments, June 23, 1998
Conversion Factor (kg/mg)	0.000001	
General Exposure Factors		
Exposure Frequency (d/yr)	250	USEPA default - actual exposures are likely to be lower since the ground is covered by snow for
Exposure Duration (yr)	25	a portion of the year.
Body Weight (kg)	70	USEPA, 1991.
Averaging Time - Cancer (d)	25550	USEPA, 1991.
Averaging Time - Noncancer (d)	9125	USEPA, 1991.
		25 year occupational exposure duration, 365 days/year.
Indoor Air Exposure Factors		
Exposure Frequency (d/yr)	250	
Indoor Air Inhalation Rate (m^3/hr)	1.6	Recommended hourly average inhalation rate for outdoor workers (USEPA 1997, Table 5-23)
Exposure Time (hr/d)	8	Typical industrial work shift.
Ingestion of Ground Water		
Ingestion rate (l/day)	1	USEPA Default (USEPA 1991)

ATTACHMENT A

Table A-4

Former IFG Facility/Ley Creek Deferred Media
Human Health Risk Assessment

Adolescent Trespasser - Plant Site

Exposure Pathway/Exposure Factor	Value	Comment
Ingestion of Surface Soil		
Surface Soil Ingestion Rate (mg/d)	50	Recommended adult daily soil ingestion rate, USEPA, 1997.
Fraction Surface Soil from Contaminated Source	1	
Conversion Factor (kg/mg)	0.000001	
Dermal Contact with Surface Soil		
Soil/Skin Adherence Factor (mg/cm^2)	0.03	Based on NYSDEC Comments
Surface Area Exposed to Surface Soil (cm^2/event)	6600	Based on NYSDEC Comments (June 23,1998)
Conversion Factor (kg/mg)	0.000001	
General Exposure Factors		
Exposure Frequency (d/yr)	18	Based on NYSDEC Comments (Jan 6 1999)
Exposure Duration (yr)	9	Number of years the recptor will be exposed to the media (12-21 yrs)
Body Weight (kg)	61.8	Mean body weight for males, ages 12-21, USEPA 1997
Averaging Time (cancer) (days)	25550	Recommended default for assessing cancer risk (70 years), USEPA 1989
Averaging Time (non-cancer) (days)	3285	Equal to exposure duration (9years), USEPA 1989

ATTACHMENT A

Table A-5

Former IFG Facility/Ley Creek Deferred Media

Adult Recreator - Ley Creek

Exposure Pathway/Exposure Factor	Value	Comment
Incidental Ingestion of Sediment		
Sediment Ingestion Rate (mg/d)	50	Recommended adult daily soil ingestion rate, USEPA, 1997.
Fraction from Contaminated Sediment	1	
Conversion Factor (kg/mg)	0.000001	
Exposure Frequency (sed) (days/year)	18	Based on NYSDEC Comments (June 23,1998)
Dermal Contact with Surface Soil/Sediment		
Soil/Skin Adherence Factor (mg/cm^2)	0.03	Based on NYSDEC Comments (June 23,1998)
Surface Area Exposed to Sediment (cm^2/event)	6600	Based on NYSDEC Comments (June 23,1998)
Conversion Factor (kg/mg)	0.000001	
Exposure Frequency (sed) (days/year)	18	Based on NYSDEC Comments (June 23,1998)
Ingestion of Fish		
Concentration in Fish (mg/kg)	Chem. Spec.	Based on analytical data
Fish Ingestion Rate (kg/meal)	0.25	Professional judgement (~0.5 lb. / meal)
Exposure Frequency for Fish (meals/year)	3	Based on NYSDEC Comments (June 23,1998)
Incidental Ingestion of, and Dermal Contact with Surface Water		
Chemical Concentration in Water (mg/L)	Chem. Spec.	
Water Ingestion Rate (L/hour)	0.005	USEPA (1989) recommended value is 0.05 l/hr for swimming. Exposures to surface water are estimated to be 10 x lower than the rate for swimming
Skin Surface Area Available for Contact (cm^2)	6600	Based on NYSDEC comments (June 23, 1998)
Chemical Specific Permeability Constant (cm/hr)	Chem. Spec.	Value obtained from literature review
Exposure Frequency (sw) (days/year)	18	Based on NYSDEC Comments (June 23 1998)
Exposure Time (hours/day)	1	Judgment

ATTACHMENT A

Table A-5

Former IFG Facility/Ley Creek Deferred Media

Adult Recreator - Ley Creek

Exposure Pathway/Exposure Factor	Value	Comment
General Exposure Factors		
Body Weight (kg)	70	Mean body weight for males, USEPA, 1997
Exposure Duration (years/lifetime)	30	Based on NYSDEC Comments (June 23, 1998)
Averaging Time - Cancer (d)	25550	USEPA, 1991.
Averaging Time - Noncancer (d)	10950	Exposure duration 30 yrs x 365 days/yr.

ATTACHMENT A

Table A-5

Former IFG Facility/Ley Creek Deferred Media

Child Recreator - Ley Creek

Exposure Pathway/Exposure Factor	Value	Comment
General Exposure Factors		
Body Weight (kg)	50.8	Average body weight for 10-16 yr old child
Exposure Duration (years/lifetime)	6	The number of years the receptor (10-16 yr old) will be exposed to the media.
Averaging Time - Cancer (d)	25550	USEPA, 1991.
Averaging Time - Noncancer (d)	2190	Exposure duration 6 yrs x 365 days/yr.

Missing pg?