CHESTER RISK PROJECT
TECHNICAL SUPPORT DOCUMENT
EXTERNAL REVIEW DRAFT VERSION 1.0

LIST OF FIGURES

2-1 Map of the Study Area
4-1 Private Wells
4-2 Number of Private Wells
4-3 Sensitive Ground Water Areas in Relationship to Private Wells
4-4 Risk Trade-Offs: Disinfection Byproducts vs. Microbial Growth
4-5 Comparison of Risk Levels for Finished Water Supplies: Lifetime Cancer Risks Based on Average Contaminant Levels
4-6 Comparison of Risk Levels for Finished Water Supplies: Lifetime Non-Cancer Risk Estimates Based on Average Contaminant Levels
4-7 Comparison of Risk Levels for Finished Water Supplies: Lifetime Cancer Risk Estimates for THMs Based on Average Levels Detected in 1993
4-8 Comparison of Risk Levels for Finished Water Supplies: Lifetime Non-Cancer Risk Estimates for THMs Based on Average Levels Detected in 1993
4-9 Comparison of Risk Levels for Finished Water Supplies: Annual Cancer Risk Estimates Based on Average Contaminant Levels
4-10 Comparison of Risk Levels for Finished Water Supplies: Annual Non-Cancer Risk Estimates Based on Average Contaminant Levels
4-11 Blood Lead in Children
4-12 Blood Lead in Children by Year
4-13 Trends in Children's Blood Lead
4-14 Distribution of Children's Blood Lead Predicted by the IEUBK Model, Assuming That Residential Soil and Interior Dust Contain 500 mg Pb/kg.
4-15 Distribution of Children's Blood Lead Predicted by the IEUBK Model, Assuming That Residential Soil and Interior Dust Contain 500 mg Pb/kg, Plus 130 ug Pb/day Intake.
4-16 Map of Children's Residence at Time of Blood Lead Measurement
4-17 Average Blood lead Levels Plotted on 100 m2 Grid
4-18 Site-Related Hazard Index for Soil: Child Receptor
4-19 Site-Related Hazard Index for Soil: Adult Receptor
4-20 Site-Related Carcingenic Risk for Soil: Child Receptor
4-21 Site-Related Carcinogenic Risk for Soil: Adult Receptor
4-22 STORET Locations: Delaware County, PA
4-23 Cancer Risks: Surface Water, Sediment, and Fish Tissue
4-24 Noncancer Risks to Children: Surface Water, Sediment, and Fish Tissue
4-25 Noncancer Risks to Adults: Surface Waer, Sediment, and Fish Tissue
4-26 Chronic Index: EPA Region III On-Site Releases
4-27 Residual Mass: EPA Region III On-Site Releases

4-28 Chronic Index and Residual Mass On-Site Releases
4-29 Upper Bound Lifetime Cancer Risk by Inhalation for VOCs
4-30 Upper Bound Lifetime Cancer Risk by Inhalation for PM
4-31 Upper Bound Lifetime Cancer Risk by Inhalation for VOC and PM
4-32 Non-Carcinogenic Hazard Index by Inhalation for VOCs
4-33 Non-Carcinogenic Hazard Index by Inhalation for PM
4-34 Non-Carcinogenic Hazard Index by Inhalation for VOC and PM
4-35 Criteria Air Pollutants
4-36 Estimated Area Emissions
4-37 Top Nine Area Emissions Blocks
4-38 Minority Distribution Overlay with Area Emissions
4-39 Annual Average HC Concentrations, Second Street 1200 m East of Thurlow Street
4-40 Annual Average HC Concentrations, Second Street 600 m East of Thurlow Street
4-41 Annual Average PM10 Concentrations, Second Street 1200 m East of Thurlow Street
4-42 Annual Average PM10 Concentrations, Second Street 600 m East of Thurlow Street

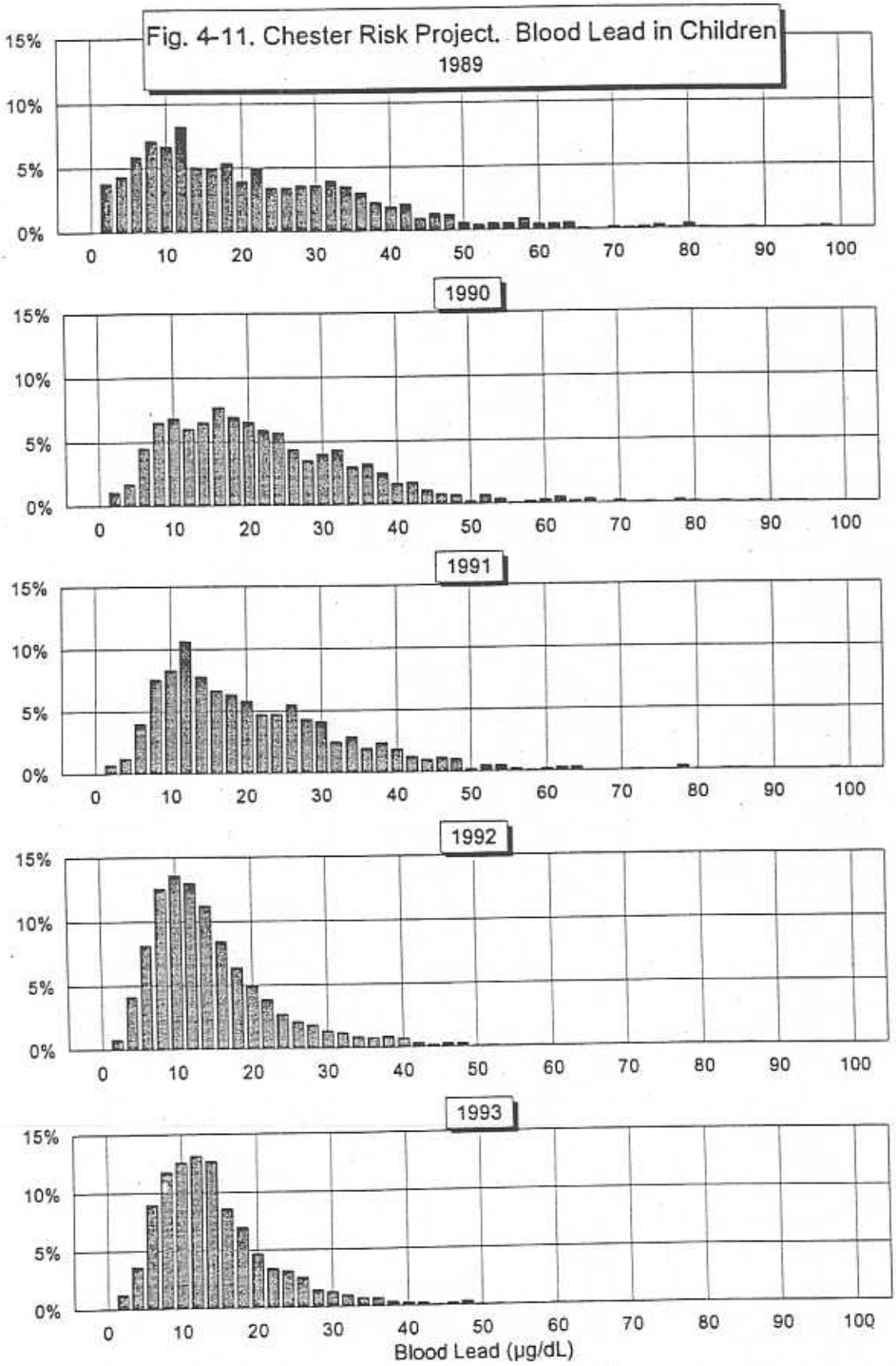


Fig. 4-11. Chester Risk Project. Blood Lead in Children
1989
1990
1991
1992
1993
15%
10%
5%
0%
0
10
20
30
40
50
60
70
80
90
100
Blood Lead (µg/dL)

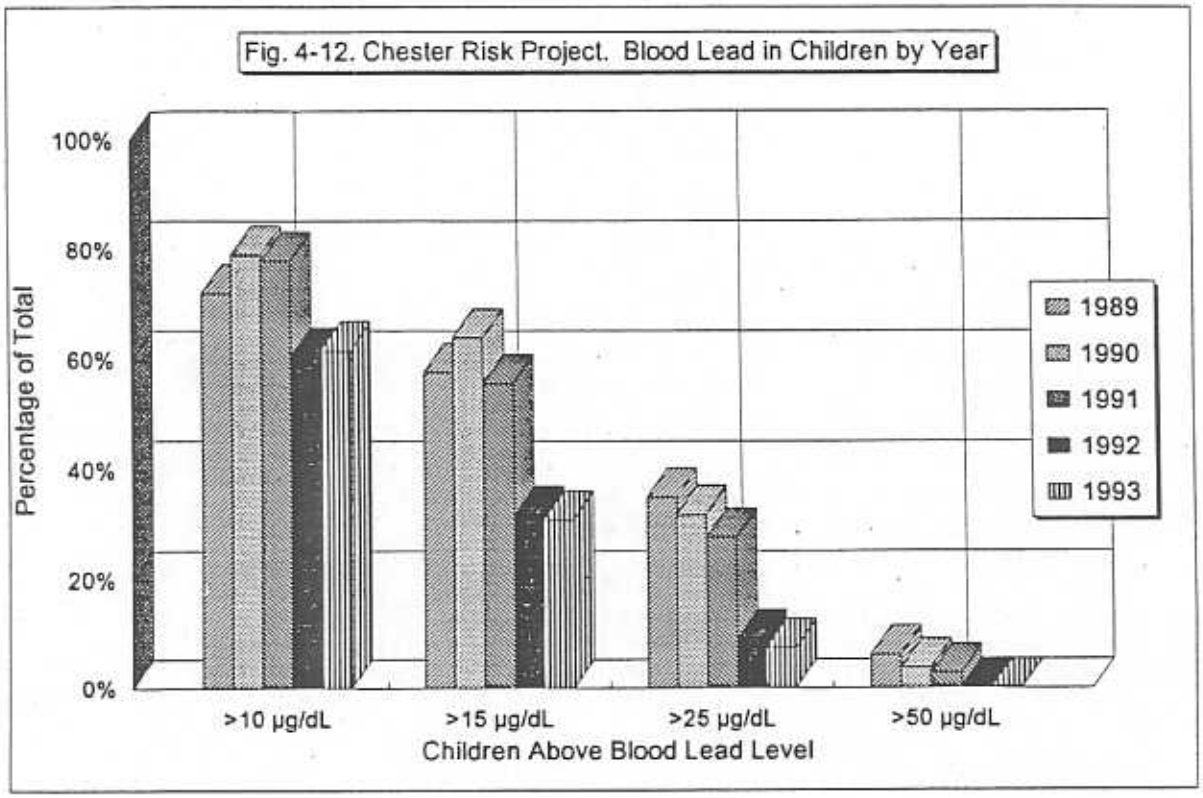


Fig. 4-12. Chester Risk Project. Blood Lead in Children by Year
100%
80%
60%
40%
20%
0%
Percentage of Total
1989
1990
1991
1992
1993
>10 µg/dL
>15 µg/dL
>25 µg/dL
>50 µg/dL
Children Above Blood Lead Level

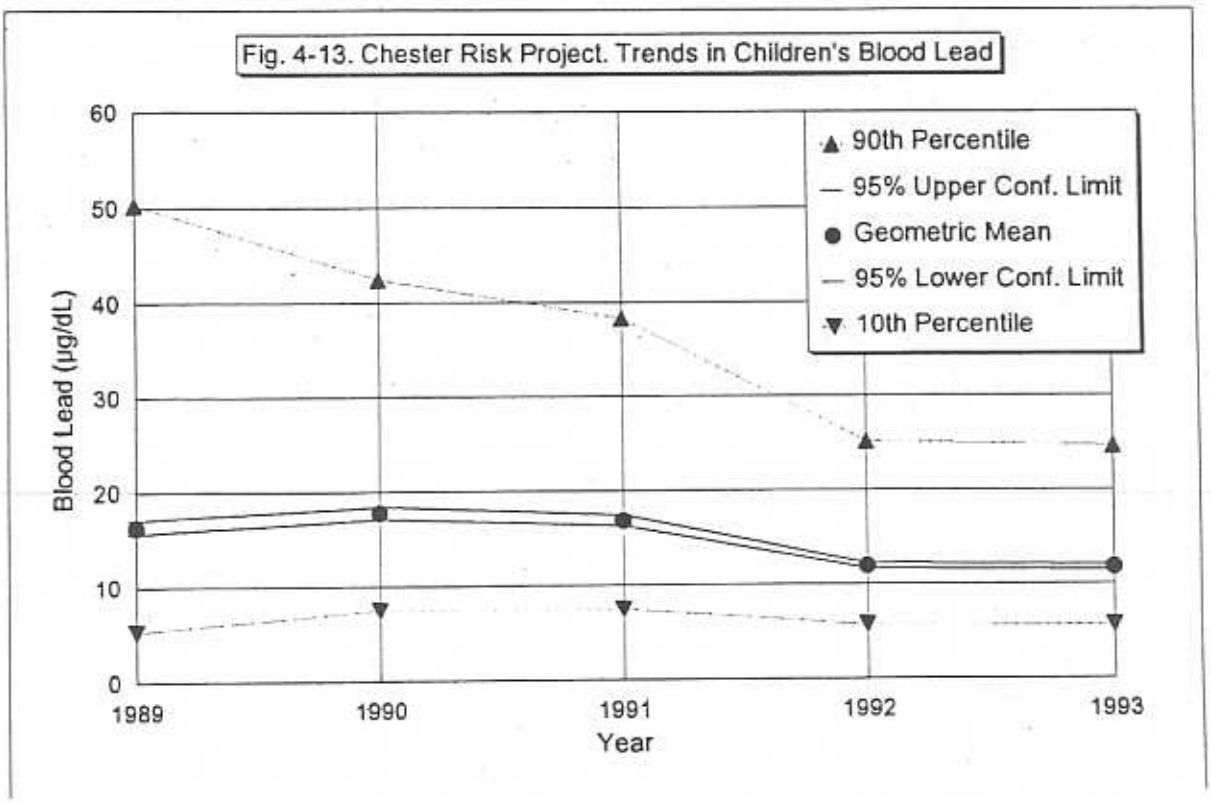


Fig. 4-13. Chester Risk Project. Trends in Children's Blood Lead
60
50
40
30
20
10
0
Blood Lead (µg/dL)
90th Percentile
95% Upper Conf. Limit
Geometric Mean
95% Lower Conf. Limit
10th Percentile
1989
1990
1991
1992
1993
Year

Figure 4-14. Chester Risk Project. Distribution of children's blood lead predicted by the IEUBK model, assuming that residential soil and interior dust contain 500 mg Pb/kg.

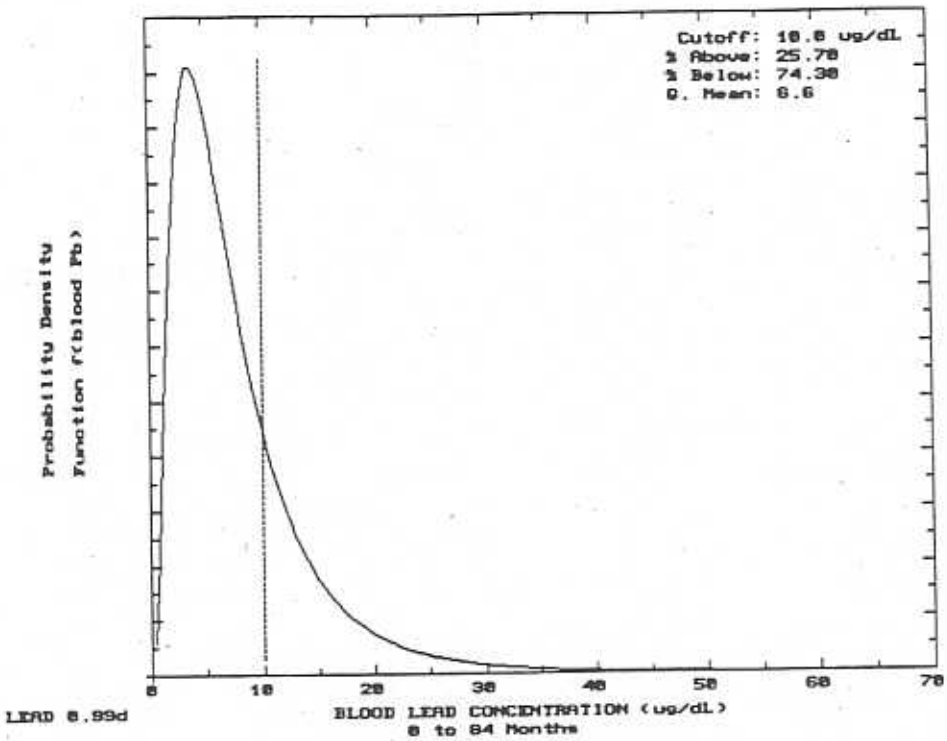
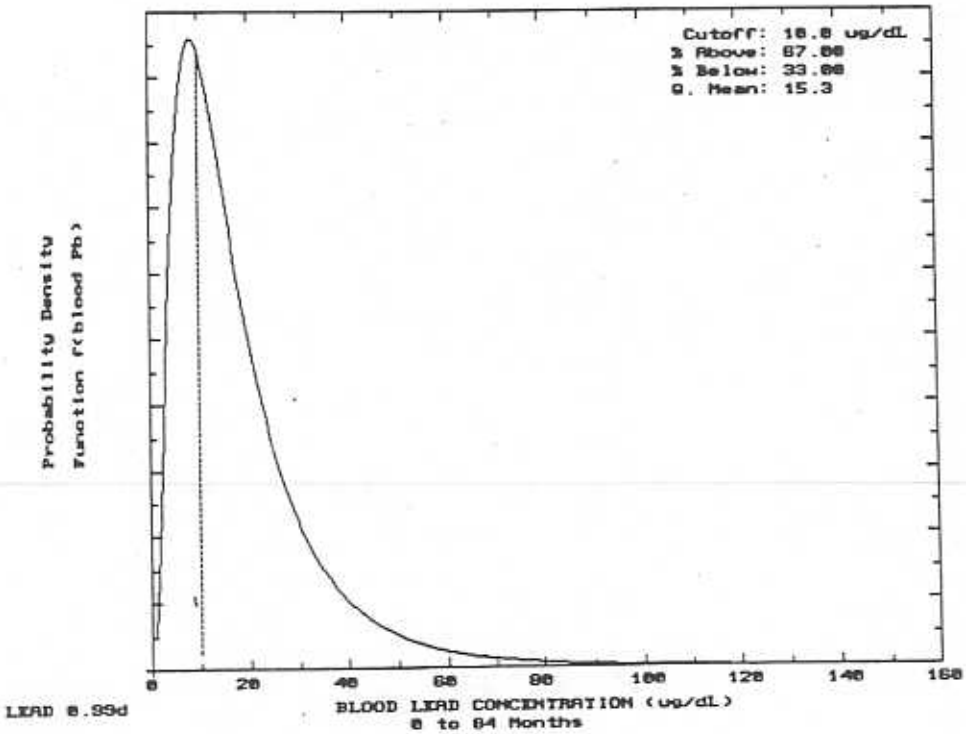


Figure 4-15. Chester Risk Project. Distribution of children's blood lead predicted by the IEUBK model, assuming that residential soil and interior dust contain 500 mg Pb/kg, plus 130 μg Pb/d additional intake.



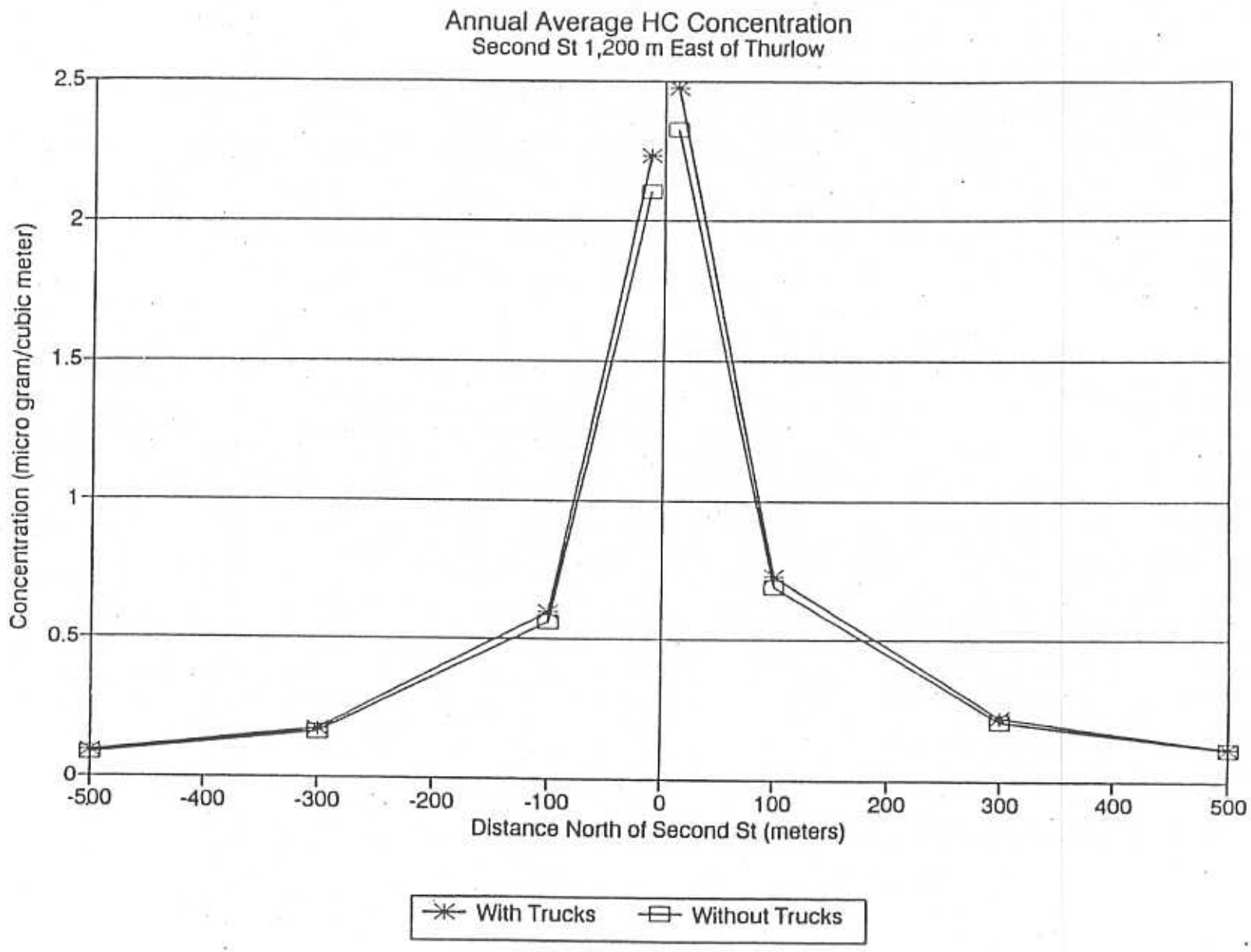


FIGURE 4-39 . Annual average HC concentrations, Second Street 1,200 m east of Thurlow Street.

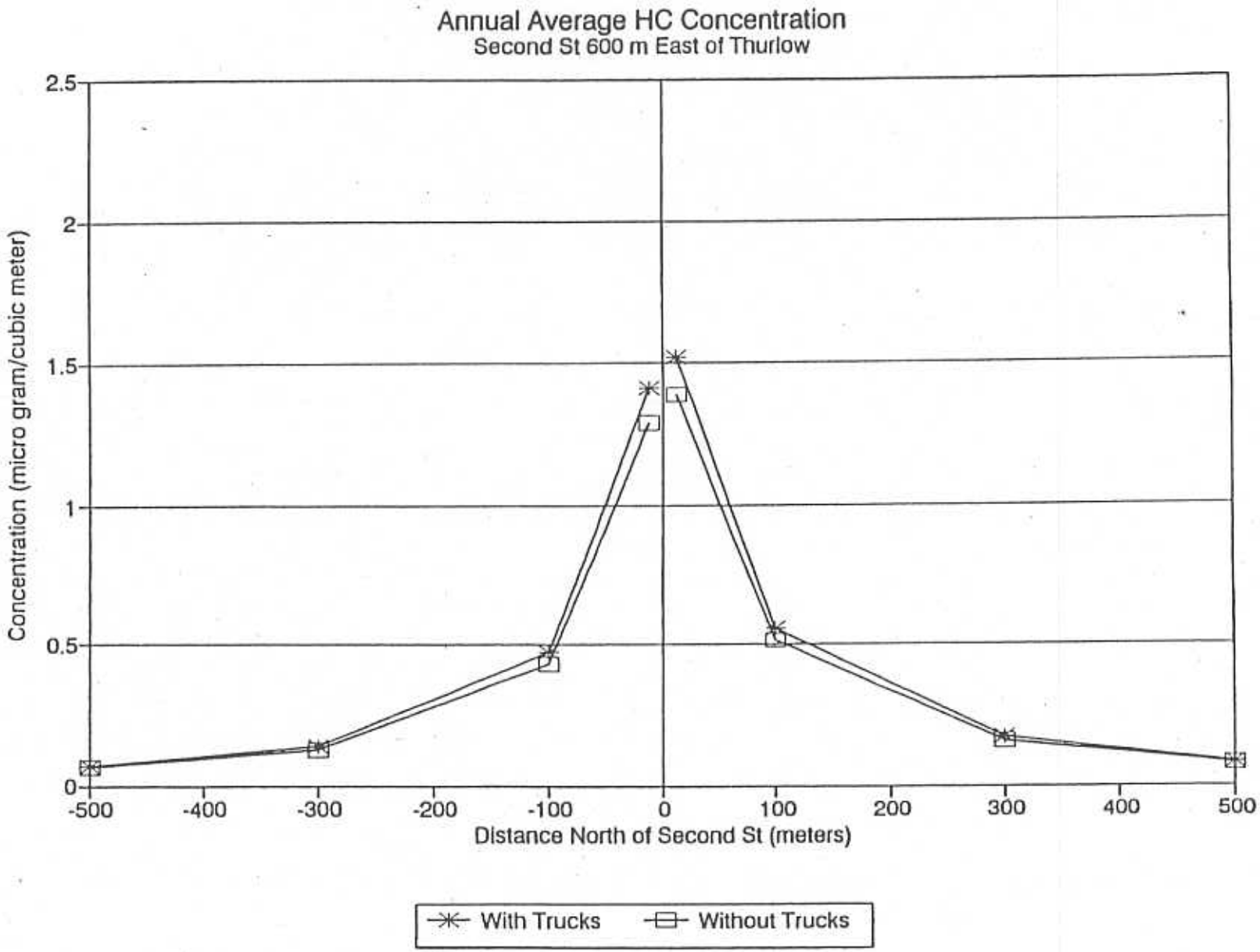


FIGURE 4-40 Annual average HC concentrations, Second Street 600 m east of Thurlow Street.

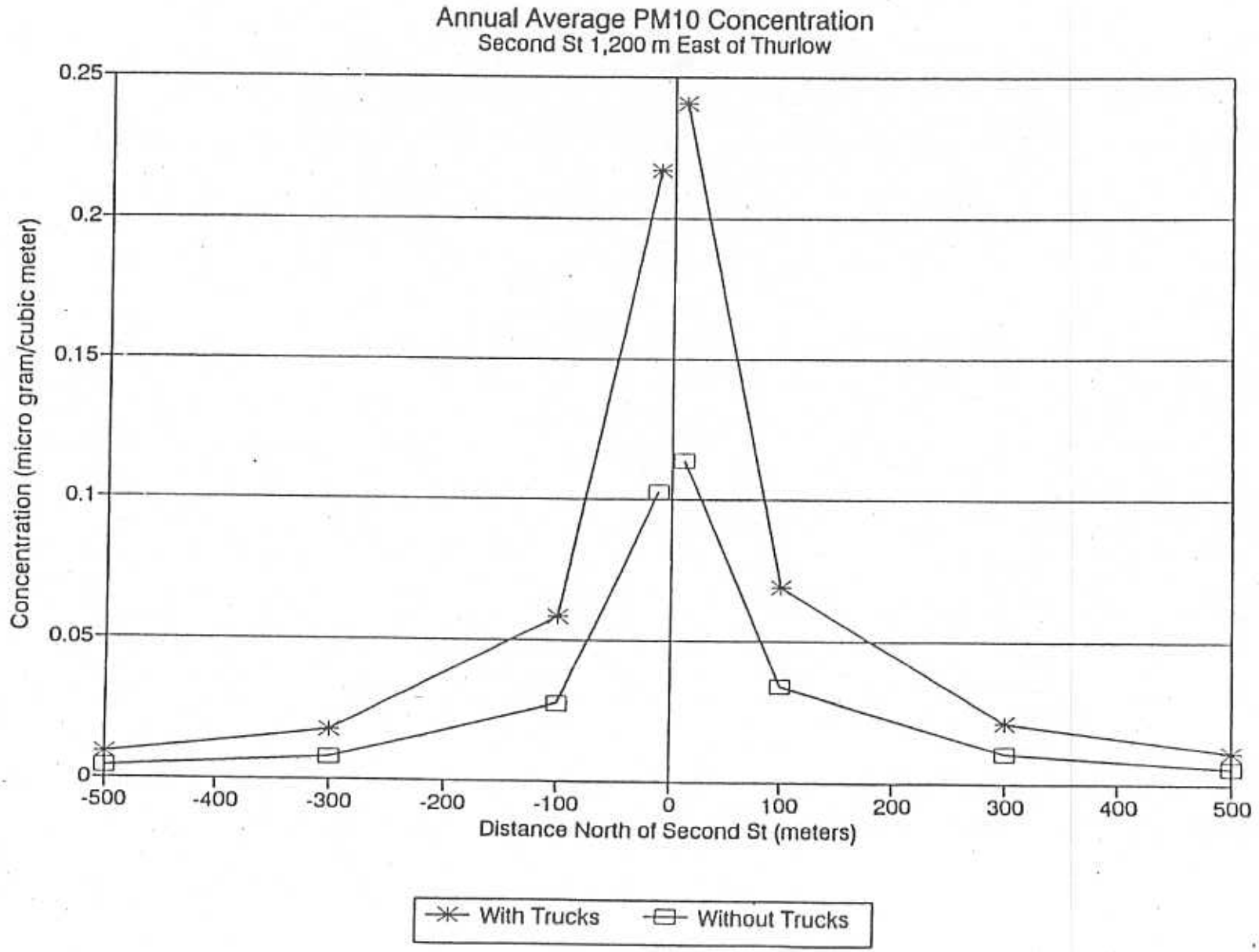


FIGURE 4-41 Annual average PM10 concentrations, Second Street 1,200 m east of Thurlow Street.

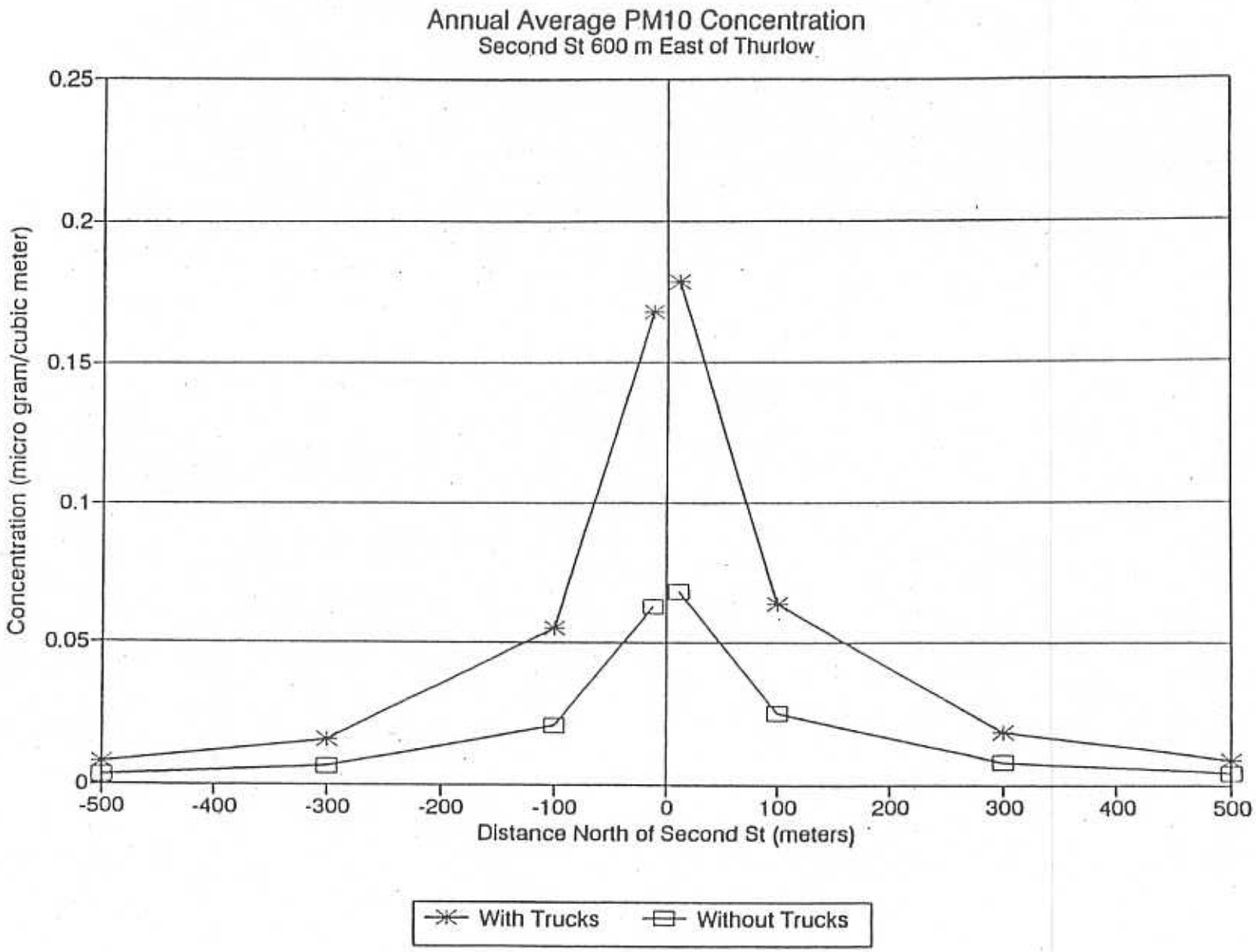


FIGURE 4-42 Annual average PM10 concentrations, Second Street 600 m east of Thurlow Street.

CHESTER RISK PROJECT
TECHNICAL SUPPORT DOCUMENT
EXTERNAL REVIEW DRAFT VERSION 1.0

LIST OF REFERENCES

Amdur, M.O., Doull, J. and Klaassen, C.D., Editors, 1993. Casarett and Doull's Toxicology, The Basic Science of Poisons. Fourth Edition. McGraw-Hill, Inc., NY.

BP Oil Groundwater Quality Data. February 1994.

Calabrese, E.J., Gilbert, C.E., and H. Pastides, (Editors), 1989. Safe Drinking Water Act: Amendments, Regulations and Standards. Lewis Publishers, Chelsea.

Doull, J., C.D. Klaassen, and M.O. Amdur, 1986. Casarett and Doull's Toxicology: The Basic Science of Poisons. Third Edition. MacMillan Publishing Company, New York.

Energy and Natural Resources (ENR), 1988. A Total Exposure and Risk Assessment for Drinking Water Contaminated with Volatile Organic Compounds. ILENR/RE-AQ-87/22. November.

Foster, S.A. and P.C. Chrostowski, 1987. Inhalation Exposures to Volatile Organic Contaminants in the Shower. ICF Clement Associates, Washington, D.C. For Presentation at the 80th Annual Meeting of APCA (The Association Dedicated to Air Pollution Control and Hazardous Waste Management), New York, June 21-26.

Gross, 1994. Personal Communication: June 1994. Carol Ann Gross. U.S. EPA. Region 3. Water Division.

Hall, G.M, 1934. 3rd printing, 1973. Ground Water in Southeastern Pennsylvania. 255p., 7 pls., geol. map, scale 1:380,160.

Hawley, Gessner G. 1981. The Condensed Chemical Dictionary. Tenth Edition. Van Nostrand Reinhold Co., New York.

Howard, P.H., 1989. Handbook of Environmental Fate and Exposure Data for Organic Chemicals. Volume 1. Lewis Publishers, Chelsea.

Layton, D.W., et al, 1987. Deriving allowable daily intakes for systemic toxicants lacking chronic toxicity data. Regulatory Toxicology and Pharmacology 7:96-112.

Lewis, Richard J., Sr., 1992. Sax's Dangerous Properties of Industrial Materials. Eighth Edition. Van Nostrand Reinhold Co., New York.

National Toxicology Program (NTP) Report #TR-267.

Olson, E.D., 1993. Natural Resources Defense Council. Think Before You Drink. The Failure of the Nation's Drinking Water System to Protect Public Health. September.

Pennsylvania Department of Environmental Resources (PADER), April 1994. Commonwealth of Pennsylvania 1994 Water Quality Assessment; 305(b) Report. Bureau of Water Quality Management.

PECO RCRA Facility Investigation Work Plan. April 1994.

Rice, 1993. Personal communication: March 1993. Eugene Rice, Ph.D. USEPA Headquarters. Microbiological Treatment Branch.

Rundell, 1994. Personal Communication: October 1994. Bruce Rundell. U.S. EPA. Region 3. Hydrogeologist, Superfund Branch, Technical Support Section.

Sax, N.I. and R.J. Lewis, Sr., 1989. Dangerous Properties of Industrial Materials. Seventh Edition. Van Nostrand Reinhold Co., New York.

Sittig, M., 1985. Handbook of Toxic and Hazardous Chemicals and Carcinogens. Second Edition. Noyes Publications, Park Ridge, New Jersey.

Sittig, Marshall, 1991. Handbook of Toxic and Hazardous Chemicals and Carcinogens. Third Edition. Noyes Publications, Park Ridge, New Jersey.

States 305(b) Water Quality Reports. 1989-1991. Delaware, District of Columbia, Maryland, Pennsylvania, Virginia and West Virginia.

Sun Oil Refinery Work Plan. September 1993.

Traffic Planning and Design, 1991. Delaware County Resource Recovery Facility Chester, Delaware County Traffic Generation Study. Memorandum from Kevin L. Johnson to Fred N. Stefany, Westinghouse Electric Corporation, January 28, 1991.

United States Department of Commerce (USDOC), 1990. Economic and Statistics Administration. Bureau of the Census. Summary Tape File 3 on CD-ROM.

United States Drinking Water Standards Division (USDWD), 1991. Final Draft for the Drinking Water Criteria Document on Radon. Office of Ground Water and Drinking Water. Office of Water. ICAIR Program No. 1524. June 14, 1991.

United States Environmental Protection Agency (USEPA), 1986a. Superfund Public Health Evaluation Manual. EPA 540/1-86/060. Office of Emergency and Remedial Response, Washington, D.C.

USEPA, 1986b. Pesticides in Ground Water: Background Document.

EPA 440/6-86-002. May.

USEPA, 1989a. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual. Interim Final. Office of Emergency and Remedial Response, Washington, D.C. December.

USEPA, 1989b. Exposure Factors Handbook. Office of Health and Environmental Assessment, Washington, D.C. EPA/600/8-89/043. May.

USEPA, 1989c. Health Effects Assessment Summary Tables (HEAST). Office of Emergency and Remedial Response, Washington, D.C.

USEPA, 1989d. Surface Water Treatment Rule. 54 Federal Register. June 29.

USEPA, 1990a. Health Effects Assessment Summary Tables (HEAST). Office of Emergency and Remedial Response, Washington, D.C.

USEPA, 1990b. Drinking Water Quantification of Toxicologic Effects for Methyl Tertiary-Butyl Ether (MTBE). Environmental Criteria and Assessment Office, Cincinnati, OH, prepared for Office of Drinking Water, ECAO-CIN-D023.

USEPA, 1990c. RCRA Orientation Manual. EPA 530-SW-90-036.

USEPA, 1991a. Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors. Office of Emergency and Remedial Response, Washington, D.C. OSWER Directive 9285.6-03. March.

USEPA, 1991b. Lead and Copper Rule. 56 Federal Register 26460-26564. June 7.

USEPA, 1991c. National Primary Drinking Water Regulations; Radionuclides; Proposed Rule. Part II. 56 Federal Register 33050-33127. July 18.

USEPA, 1991d. Procedures for the Preparation of Emission Inventories for Carbon Monoxide and Precursors of Ozone. Volume I: General Guidance for Stationary Sources. EPA 450/4-91-016. May 1991.

USEPA, 1991e. RCRA Prioritization System Scoring Summary. July.

USEPA, 1992a. Dermal Exposure Assessment: Principles and Applications. Interim Report. Office of Health and Environmental Assesment, Washington, D.C. EPA/600/8-91/011/B. January.

USEPA, 1992b. National Study of Chemical Residues in Fish. Office of Science and Technology, Washington, D.C. EPA 823-R-92-008. September.

USEPA, 1993a. Total Coliform Rule. Learner's Guide for Public Water Supply System Regulatory and Health Officials.

USEPA, 1993b. Health Effects Assessment Summary Tables (HEAST), Annual Update. Office of Emergency and Remedial Response, Washington, D.C. EPA/540-9-93/058. March.

USEPA, 1993c. Motor Vehicle-Related Air Toxics Study. EPA 420-R-93-005. April.

USEPA, 1993d. Chemical Indexing System for the Toxic Chemical Release Inventory Part I: Chronic Index. EPA/903/R-93/002.

USEPA, 1994a. Health Effects Assessment Summary Tables (HEAST). Office of Emergency and Remedial Response, Washington, D.C.

USEPA, 1994b. Region III Risk-Based Concentration Table, First Quarter 1994.

USEPA, 1994c. Integrated Risk Information System (IRIS) Database.

USEPA, 1994d. Drinking Water Regulations and Health Advisories. Office of Water. May.

USEPA, 1994e. National Primary Drinking Water Regulations; Disinfectants and Disinfection Byproducts. 59 Federal Register 34320-34325. July 29.

USEPA, 1994f. Integrated Exposure Uptake Biokinetic Model for Lead in Children. Office of Emergency and Remedial Response, Washington, D.C.

USEPA, 1994g. Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) Database.

USEPA, 1994h. STORET Database, Retrievals 4/13/94, 5/10/94, and 5/25/94. Research Triangle Park, N.C.

United States Geological Survey (USGS), 1989. Selected Ground-Water Data, Chester County, PA. Open-file Report 87-217.

USGS, 1992. Are Fertilizers and Pesticides in the Ground Water? A Case Study of the Delmarva Peninsula, Delaware, Maryland, and Virginia. Circular 1080.

USGS, 1993. Pesticides in Shallow Ground Water in the Delmarva Peninsula. Unpublished Draft Report, March.

Valley Forge Laboratories, 1985. Traffic Impact Study. Exhibit 1 of Solid Waste Permit Application submitted to Pennsylvania Department of Environmental Resources, June 1985.

Versar, Inc. for United States Environmental Protection Agency. 1979. Water-Related Fate of 129 Priority Pollutants. Monitoring and Data Support Division, Washington, D.C. EPA 440/4-79-029.

Verschueren, K. 1983. Handbook of Environmental Data on Organic Chemicals. Second Edition. Van Nostrand Reinhold Co., New York.

Weber, 1993. Personal Communication: March 1993. Pete Weber. U.S. EPA. Region 3. Maryland Program Manager for Ground Water Protection, Water Management Division.

Westinghouse Electric Corporation, 1991. Delaware County Resource Recovery Facility, Pre-Operational Noise Monitoring proposed by Roy F. Weston, Inc., and Analysis and Computing, Inc. February.

Westinghouse Electric Corporation, 1993. Delaware County Resource Recovery Facility, Noise Report Summary. October.