NSF-RANN
Trace
Contaminants
Abstracts

SEPTEMBER 1976

MASTER

TOXIC MATERIALS INFORMATION CENTER
Environmental Research Center
Information Center Complex
Information Division

OAK RIDGE NATIONAL LABORATORY
OPERATED BY UNION CARBIDE CORPORATION FOR THE ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION
NSF-RANN TRACE CONTAMINANTS ABSTRACTS

Emily D. Copenhaver, Editor
Deborah S. Harnden, Associate Editor

Prepared for
NATIONAL SCIENCE FOUNDATION RESEARCH APPLIED TO NATIONAL NEEDS
CHEMICAL THREATS TO MAN AND THE ENVIRONMENT PROGRAM

by
TOXIC MATERIALS INFORMATION CENTER
ENVIRONMENTAL RESOURCE CENTER
INFORMATION CENTER COMPLEX
INFORMATION DIVISION

Date Published: October 1976

Oak Ridge National Laboratory
Oak Ridge, Tennessee 37830
operated by
UNION CARBIDE CORPORATION
for the
ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION

Contract No. W-7405-eng-26
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TRACE CONTAMINANTS NEWS

PROGRAM CHANGES

On July 1, 1976, the Environmental Aspects of Trace Contaminants Program became the Chemical Threats to Man and the Environment Program. The new program, which has been expanded to encompass organic compounds and human ecosystems, focuses on the identification and quantification of hazardous compounds and assessment of the impact of the spread of these compounds on the environment and human populations. The specific areas of interest of the program are organic chemicals of commercial, metals and organometallic compounds, airborne contaminants, and environmental assay methodology. The objectives of the program are: to develop methodologies for hazard prediction of organic chemicals; to determine the transport, effects, and fates of critical organic compounds which pose threats to human populations and environments in high exposure areas; to investigate the human health effects of organic compound exposures; to assess the economic, legal and sociopolitical implications of hazardous levels of specific organic compounds in the environment; to identify and assess the effects of metals and organometallic compounds on biological life and on ecosystem structure and function; to identify, characterize and quantify contaminants produced from atmospheric precursors of anthropogenic and natural origin; to determine gas-phase kinetics and mechanisms of contaminant evolution, persistence, and conversion; to develop advanced instrumentation and analytical methodology for the collection, identification, and quantification of organic compounds present in a variety of environmental media. Although the program has a broader scope and a new name, the journal will still be entitled NSF-RANN TRACE CONTAMINANTS ABSTRACTS.

NEW GRANTS AND RENEWALS

Renewals

The Toxic Materials Information Center, Environmental Resource Center, Information Center Complex, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37830. Emily Copenhaver (615-483-3611; Ext. 3-6823), principal investigator: Information Support Services for Trace Contaminants Programs. $135,000 for 12 months; began January 1, 1976.

PERSONNEL CHANGES IN WASHINGTON OFFICE

On August 2, 1976, Mrs. Carter K. Schuth joined the National Science Foundation as Program Manager. She came to the Foundation from the Environmental Protection Agency's Office of Toxic Substances.
MEETINGS OF INTEREST

International Conference on Photochemical Oxidant Pollution and Its Control, September 12-17, Raleigh, N.C. Write: Dr. A. P. Altshuller, EPA, Research Triangle Park, N.C. 27711.


WPCF Annual Conference, October 3-8, Minneapolis, Minn. Write: Robert A. Canham, WPCF, 3900 Wisconsin Ave., N.W., Washington, D.C. 20016.

Symposium on Aquatic Toxicology and Hazard Evaluation, October 25-26, Holiday Inn-Holiday City, Memphis, Tenn. Write: Dr. Foster L. Mayer, Fish-Pesticide Research Laboratory, Rt. 1, Columbia, Mo. 65201.


ACS 28th Southeastern Regional Meeting, October 26-29, Gatlinburg, Tenn. Write: W. A. Van Hook, Department of Chemistry, University of Tennessee, Knoxville, Tenn. 37916.


CALL FOR PAPERS

Papers are being solicited for a symposium entitled "Drinking Water Quality Enhancement Through Source Protection" to be held in conjunction with the National American Chemical Society Meeting in New Orleans, Louisiana, March 20-25, 1977. This symposium is sponsored by the Environmental Chemistry Division of the ACS. Prospective speakers must submit a statement of intent to the session chairman by September 1, 1976. The deadline for abstracts is November 1, 1976. Questions pertaining to the symposium should be brought to the attention of the session chairman, Dr. Robert B. Pojasek, JBF Scientific Corporation, 2 Jewel Drive, Wilmington, Massachusetts 01887, 617-657-4170.
TRACE CONTAMINANT ABSTRACTS

1. Formation of Dimethylarsenicum from Dimethylarsine and Nitrite

NILS, A.L.; ALEXANDER, M.
Cornell University, Ithaca, NY

ABSTRACT: The addition of nitrite to dimethylarsine gas in culture media resulted in the formation of dimethylarsenic gas, which was identified by gas chromatography-mass spectrometry. Further studies are needed to determine the role of nitrite in the metabolism of dimethylarsine by microorganisms.

2. Microbial Stabilization of Dibutyrylarsenate

DOAN, J.W.; ALEXANDER, M.
Cornell University, Ithaca, NY

ABSTRACT: The metabolism of dibutyrylarsenate (DBA) by microorganisms in soil was studied. DBA was added to soils at concentrations of 10 mg/kg and the soil was incubated at 30°C for 30 days. The DBA was successively reduced to butylarsenite, butylarsenate, and tetraarsenate. The results suggest that DBA is a potential soil ameliorant and that microorganisms play a significant role in its transformation.

3. Stability of B-metallanes in Liquids and Solids

TAYLOR, J.L.; ALEXANDER, M.
Cornell University, Ithaca, NY

ABSTRACT: The stability of B-metallanes in liquid and solid forms was studied. The results indicate that B-metallanes are thermodynamically stable and that they can be isolated in pure form. The potential uses of B-metallanes in various applications were discussed.
Instrumental Transport Modeling of Pollutants in Water and Soil

Henry E. Battcock, M.E.; Robert H. battery, C.E.; and Jack B. Johnson, M.E.

Computer and Environmental Sciences Division
Oak Ridge National Laboratory, Oak Ridge, TN

ABSTRACT (900 words)

A suite of models is discussed which can be used for the determination of the fate and transport of substances in the environment. The suite, developed at Oak Ridge National Laboratory, is based on a mechanistic approach and includes models for the transport of substances in soil, groundwater, and surface water, as well as models for the transformation of substances in these environments. The suite of models is designed to provide information on the fate and transport of substances in the environment, and to provide guidance for the management of environmental contaminants.

A variety of models is discussed which can be used for the determination of the fate and transport of substances in the environment. The suite of models includes a mechanistic approach and includes models for the transport of substances in soil, groundwater, and surface water, as well as models for the transformation of substances in these environments. The suite of models is designed to provide information on the fate and transport of substances in the environment, and to provide guidance for the management of environmental contaminants.

Gas Chromatographic Analysis of Air Pollutants

Department of Chemistry, University of South Florida, Tampa, FL

ABSTRACT (1000 words)

Gas chromatography is a widely used technique for the analysis of air pollutants. The technique allows for the separation and identification of individual components in a complex mixture. Gas chromatography is used for the analysis of air pollutants, water pollutants, and soil pollutants. The technique is sensitive and selective, and it allows for the detection of trace amounts of pollutants.

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A Thermodynamic Model for Predicting the Formation, Identification, and Decomposition of Common Soil Minerals

A. A. Haines, R.E.

Department of Agronomy, Colorado State University, Fort Collins, CO 80523

ABSTRACT

A thermodynamic model has been developed to predict the occurrence of several mineral transformations that can occur in soils. According to this model, the stability of primary minerals increases in the order: quartz, feldspar, pyroxene, amphibole, hornblende, ilite, kaolinite, and montmorillonite. The stability of secondary clay minerals depends on solution silica, at pH 6 with high silica (approximately 10-18) the order of increasing stability is: chlorite, illite, kaolinite, and quartz. The model makes use of important thermodynamic data available for soil minerals and helps to identify deficiencies in these data. The need to examine the kinetics of mineral transformations in soils is greater detail also becomes evident from this model.

Identification of Soil Lead Compounds from Spectroscopic Methods

Olsen, R.E.; Stouffer, R.E.

Department of Chemistry, Colorado State University, Fort Collins, CO 80523

ABSTRACT

A recently developed technique makes possible the accurate analysis of atmospheric samples for particulate and volatile mercury. The "volatile" fraction can be analyzed for several chemical species. This work presents the results of some Tampa Bay area analyses and critical studies of atmospheric mercury speciation. The mercury is in the air in the form of mercury(II) dioxide, methylmercury(II) oxide, and elemental mercury. Methylmercury was rarely observed. Results were quite variable suggesting a variety of sources and irregular wind transport patterns. The data indicate that background mercury concentrations and the percentage distribution of mercury species in air in a local area may be established by mercury emanations from the ground or from adjacent bodies of water.
Silica, sulfur trioxide, and volatile sulfuric acid salts can be determined after collection of trophalassium fluoride deionized filtrates. The presence of acid react spontaneously with the silica to form the silicic acid surface which can be removed to produce aqueous extracts of sulfur dioxide. The silica is determined as a measure of the intact surface. The critical feature is the stabilization of the acid site at the moment of mixing of the reaction mixture with the reagent solution containing such as K2CO3, NH4Cl, and H2SO4. This reaction with the silicate-reagent reagent has been an inherent source of error in all previous methods for determining amounts of acid surface concentration. Total surface levels can be determined by a simple wet modification of the procedure after the determination for silica 0.4 of its soluble 0.3 as NH4Cl and the working range is 0.05 sq.

The determination of chloroform or organic contamination in natural and treated water using molybdenum blue spectrophotometry.

A new method for the first time in the chemical literature of the first American Congress held at Mexico City, Mexico, 1952-1953.

The isolation and identification of chloroform and other volatile organic compounds from natural and treated water using molybdenum blue spectrophotometry.

Cation exchange and adsorption of chloroform and other volatile organic compounds from natural and treated water using molybdenum blue spectrophotometry.

Chloroform in trophalassium fluoride deionized filtrates of electric power generating plants, sterilization of drinking water, and disinfection of effluents from municipal sewage treatment plants. The chloroform content of each water was determined directly with deionized water at different concentrations of chloroform. The negative pressure conditions were detected in and separated from several chloroform-treated water samples as well as chloroformated effluents. Chloroform was separated using high-pressure, high-resolution column chromatography. The reaction yields and types of chloroform compounds were determined with respect to (1) physical parameters such as light, temperature, and reaction time, and (2) chemical parameters such as chloroform content, aqueous and organic concentration, and chloroform content of the water.

The yield of chloroform bound to stable chloroformic compounds was estimated to be 65% of the chloroformic compounds under typical reaction conditions for cooling towers of the Kings River Plant (Carlsbad, CA) and 14% for cooling towers of the Aliso Canyon Plant (Thousand Oaks, CA). Typical disinfection chlorination results in a yield of about 96% for chlorinated wastewater treatment plant effluents.

Chloroform and other volatile organic contaminants in natural and treated water using molybdenum blue spectrophotometry.

The isolation and identification of chloroform and other volatile organic compounds from natural and treated water using molybdenum blue spectrophotometry.

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A study of North Carbonizer Gas Company and its impact on the Springfield, Oregon environment.


Department of Physics, University of Oregon, Eugene, OR 97403

A report prepared for the Eugene Springfield Water and Electric Board, 1974. Illustrated:


The Springfield Company's plant in Springfield, Oregon manufactures carbonaceous material from wood waste. Milled fuel is fed to a heated catalytic reactor where most of the volatile components are converted, producing a char that is later carbonized. The resulting char acts as a catalyst, allowing some combustion of the wood waste. The gas that leaves the catalytic reactor is combusted. In essence, it is burned in an after-combustion chamber (ACC) to control emissions. It is further treated to remove the "heating value" from the gas. The gas is then dried, containing large amounts of particulate and combusted hydrocarbons (tars) as well as the aqueous products of sulfurification reactions.

This study was performed to provide some additional information about the chemical composition and energy content of this off-gas in order to help evaluate possible commercial uses for the gas. The energy density for the energy crisis has been reduced from 0.05 MWh. The gas contains N2, CO, and H2, which supply most of the energy, and an inert fraction, CO2. Total energy flow into one of the two after-combustion chambers at the plant is of 5.0 MWh. (Copies of this report are available to interested parties.)

The Springfield Company's plant in Springfield, Oregon, produces carbonaceous material from wood waste. Milled fuel is fed to a heated catalytic reactor where most of the volatile components are converted, producing a char that is later carbonized. The resulting char acts as a catalyst, allowing some combustion of the wood waste. The gas that leaves the catalytic reactor is combusted. In essence, it is burned in an after-combustion chamber (ACC) to control emissions. It is further treated to remove the "heating value" from the gas. The gas is then dried, containing large amounts of particulate and combusted hydrocarbons (tars) as well as the aqueous products of sulfurification reactions.

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Although selenium has been recently used as a biocide, the effects of reaction products of selenium in natural waters upon the life are poorly understood. Using a recently developed method of chemical analysis, the concentration of selenium in secondary treatment effluents from two treatment plants, one without any treatment and the other with selenium treatment, was determined. The results showed that selenium treatment significantly reduced the concentration of selenium in the effluent. More data are needed to determine the significance of these results and future research needs will be discussed.

The Sequestration Cycle of Selenium in Lake Washington and its Relation to Water Quality

Cocke, F.A.

Department of Biochemistry, University of Washington, Seattle, WA 98195

Proc. W: (77) 40-46

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Department of Biochemistry, University of Washington, Seattle, WA 98195

Proc. W: (77) 40-46
Calculation of cooling waters as a source of chlorine-containing organic compounds with possible environmental significance

Jolley, H.L.; Shers, C.W.; Pitts, W.W., Jr.
Oak Ridge National Laboratory, Oak Ridge, TN

ABSTRACT

The different chlorinated or organics in primary effluent from a municipal sewage treatment plant and in the secondary effluent. In addition, 79 unknown constituents in the primary effluent and 17 in the secondary effluent have been characterized with respect to high-resolution liquid chromatographic and mass-spectrometric properties. The multicomponent analytical identification procedure used sequentially high-resolution ion exchange chromatography, high-resolution cation exchange chromatography, and gas chromatography. Twelve aliphatic and aromatic derivatives of two of these, quinoline acid and 2,5-dihydroxybenzoic acid, are presented. These mass spectra have not been reported previously in the literature.

Separation and analysis of refractory pollutants in water by high-resolution liquid chromatography

Pitts, W.W., Jr.; Jolley, H.L.; Rake, P.
Oak Ridge National Laboratory, Oak Ridge, TN

ABSTRACT

A multicomponent analytical technique developed at Oak Ridge National Laboratory for separation and identification of organics is complex, dilute aqueous solutions has been used to identify solubles and refractory organic compounds in the primary effluent from a municipal sewage treatment plant and in the secondary effluent. The multicomponent analytical identification procedure used sequentially high-resolution ion exchange chromatography, high-resolution cation exchange chromatography, and mass spectrometry. Twelve aliphatic and aromatic derivatives of two of these, quinoline acid and 2,5-dihydroxybenzoic acid, are presented. These mass spectra have not been reported previously in the literature.

High-resolution liquid chromatography has been applied to the problem of analyzing for refractory organic compounds present at microgram-per-liter levels in various polluted waters. Two different chromatographic systems, which were previously developed for the analysis of the molecular biochemical constituents in human body fluids, have been modified with satisfactory results, and the other for carbohydrate analysis. Various aqueous samples, sewage treatment plant effluents, coal liquefaction plant, liquid, water, and drinking water supplies, have been collected, concentrated up to 10,000-fold, and then chromatographed. The chromographic fractions were then subjected to a multiple analytical identification procedure using in sequence UV-spectroscopy, gas chromatography, and mass spectrometry. Any of the separated components were subsequently identified; for example, 16 organics were identified and quantitated at the ng-liter level in the effluent of a primary sewage treatment plant. In addition, numerous unknown constituents have been characterized with respect to gas-chromatographic and mass-spectrometric properties.
V. Ethylene-Surer Poisoning

Stereotypical symptoms of ethylene-sure poisoning are primarily by exposure. Exposure has been the result of the establishment of exposure sites. The study indicates that 
fish are more sensitive to temperature than to other factors. Temperature is a decisive factor in the outcome of fish in the process of adaptation to the environment.

GEOGRAPHICAL DESCRIPTION: MS (3), Virginia, Glen Burnie. New River, Appalachian Power Company

229 Industrial "Treatment of Heavy Metals to Protect Aquatic Ecosystems in the New Lead Belt Area

Jennett, J.C.; Waller, N.O.

University Missouri-Kansas, 300, MO

PROBE No: (376) 223-2554


BIODEGRADATION: PLANT LIFE; ANIMAL LIFE; LEAD; HEAVY METALS; INDUSTRIAL TREATMENT; AQUATIC SYSTEMS; BUFFER RAILLINES; SHELLFISH; ZINC; COFFEE; SILVER; PHYSICAL-CHEMICAL IMPACTS; LEAD-SILVER MINING; CLAY; FUMITE; EXHASTING CHARACTERS; TRANSPORT; BIOTA; NITROGEN DEPLETIONS; NITROGEN; NITROGEN; NITROGEN; SEDIMENT; VELOCITY PROFILES; SEDIMENTATION CONDITIONS; ALGAL BLOOMS; BENTHIC DIVERSITY; TAILINGS Ponds; ALGAE; BENTHIC DIVERSITY THROMES; MURRELL SITES; WASTE TREATMENT SYSTEMS; SEDIMENT TAILINGS POND; INSUFFICIENCY; DEP Ffos; SEDIMENTATION; ACID NEUTRALIZATION; HEAVY METAL PRECIPITATES; SEDIMENTATION OF METAL PRECIPITATES; LONG TAIL TIPION; PRECIPITATION; STABILIZATION; WASHABLE CONSTITUENTS; EQUILIBRATION; INFUSION AND INFUSION QUANTITY; QUALITY FLOCCULATION; FLOW BALANCING

As a result of the increase in turbidity and suspended solids, and total dissolved solids in effluent, fish require treatment methods to protect against stress. The second system, which may be used where tailings transport system is practical in a long-range system in which algal is used to remove heavy metals and to reduce trace nutrient levels. The effectiveness of the waste treatment system is monitored by the return of bentonic diversity indices to pre-mining levels.

GEOGRAPHICAL DESCRIPTION: MS, Missouri, Grass, Monroe, Logan Creek, Sinking Creek, Black River, Webb Creek, Clearwater Lake
Behavioral Applications of Prenatal and Early Postnatal Exposure to Chemical Pollutants

Weiss, B.; Snyder, J.M.

Dept. of Radiation Biology & Biophysics, University of Rochester Medical Center, Rochester, NY; Dept. of Anatomy, University of Virginia Medical School, Charlottesville, VA.

PHONE NO: (716) 275-2741

Pediatrics, 52(6), p. 2, April 1978

ABSTRACT: The central nervous system undergoes continuous loss of cells throughout postnatal life, that a large proportion of cells die during neurogenesis, and that neuronal structural and functional changes take place both in the developing and the aging brain. The brain possesses an enormous reserve capacity. Still, a process, as exposure to chemical pollutants, that reduces this reserve capacity may, at sometime late in life, because of additional losses imposed by a degenerative process, cause the brain incapable of coping with an additional load. Diverge deviations in behavior patterns, such as altered motor reactions, impaired regulation of appetite and reduced visual discrimination, at various stages of postnatal development are likely to remain uncorrected by a physician. It is suggested that a more thorough, critical assessment of the impact of new chemicals on the human central nervous system, especially the delayed and perinatal effects, be studied.

The Effect of Soil Lead Sorption Capacity on the Uptake of Lead by Corn

Miller, J.K.; Forester, J.; Kopp, B.E.

Department of Agronomy, University of Illinois, Urbana, IL 61801

PHONE NO: (217) 333-2775 (Kopp)


ABSTRACT: CORR: SOR; LEAD-BRANDED SOIL; LEAD UPTAKE; SOIL PH; CATION EXCHANGE CAPACITY; INDUSTRY; AUTOMOTIVE SOURCES; INDUSTRIAL SOURCES; TRACE ELEMENTS; ANALYSIS; Zn, Fe, Pb, Cu

Lead uptake by four-week-old corn shoots grown in Pb-amended soils was found to be dependent upon the level of Pb in the soil relative to the cation exchange capacity of each Pb. At a given level of added Pb, lead uptake by plants was found to increase with an increase in soil pH, cation exchange capacity, and available phosphorus.
Residues of Polychlorinated Biphenyl (PCB) Components in Broiler Chicks Resulting in Three Dietary Variations

Ramos, L.C.; Wilson, D.L.; McElvain, R.J.; Urbana, Ill.

College of Veterinary Medicine, University of Illinois, Urbana, Ill. 61801

PUBS NO: (27) 333-349 (Metcalfe)


KEYWORDS: chlorinated organics; polychlorinated biphenyls; chickens; analytical; dietary variations; fat accumulation; metabolic stability; tissue concentrations; metabolites; analysis; dietary compositions

Broiler chickens were fed three dietary variations, normal (23% protein, 9.5% fat), low protein (17% protein, 9.3% fat), high fat (23% protein, 8.3% fat), containing 25 ppm of the polychlorinated biphenyl mixture Aroclor 1242 or Aroclor 1254 for an 8 week growth period. The time course of residue accumulation in fat and blood was determined. Accumulation in fat over the 8 week period reached a maximum of 90 ppm for Aroclor 1242 (low protein diet) and 162 ppm for Aroclor 1254 (normal diet). Aroclor 1254 total residues were consistently higher than Aroclor 1242 total residues in all diets. This is because the constituents of Aroclor 1254 have a higher metabolic stability and lipid solubility. Highest residue levels were found for both mixtures to be in fat followed by liver and kidney, spleen, muscle, brain, and blood. Differences between tissues in component composition of total residues were examined.

Long-Pulse Monitoring of Atmospheric Carbon Monoxide: A Regional Air Pollution Study, St. Louis, Missouri

Son, S.I.; Minnley, D.D.

Lincoln Laboratory, Massachusetts Institute of Technology, Lexington, MA 02173

PUBS NO: (677) 862-5500, Ext. 5758

REMBARK/21/61-37603, 146 p.; 1976, April

KEYWORDS: laser monitoring system; carbon monoxide; resonance absorption; semiconductor diode lasers; closed cycle cryogenic cooler; effluent parabolic; remote retroreflector; atmospheric turbulence; high range tunable diode lasers; analysis; atmospheric chemistry

A sensitive (5 ppm) long-pulse laser monitoring system for CO has been developed and operated in the field. It is based on the principle of resonance absorption and employed a PAS 0.05 sec 0.1 m semiconductor diode laser mounted in a closed-cycle cryogenic cooler. A simple optical system consisting of off-axis parabolic, remote retroreflector, and beam-splitter was used to transmit and receive the laser beam. Tests were conducted over a 0.5 km path in order to determine the average ambient CO concentration using a novel operation technique which effectively eliminated the adverse effects of atmospheric turbulence and scattering. During these experiments it was possible to observe increases in CO levels due to individual automobiles as well as the longer-term increases caused by commuter traffic. This diode laser technique can be extended to other pollutants by incorporating an additional laser for each gas or by using one of the new wide-range tunable diode lasers which can monitor different pollutant gases in accuracy. We have assembled the present system into a mobile van for participation in the first Regional Air Pollution Study of the the U.S. Environmental Protection Agency in St. Louis Missouri; and the initial experiments confirmed our calibration procedure and extended the monitoring pathlength to 2 km.

Determination of Chlorine Containing Organics in Chlorinated Sewage Effluents by Coupled 121 Tracer High Resolution Chromatography

Jolley, E.L.

Oak Ridge National Laboratory, Oak Ridge, TN 37830

PUBS NO: (675) 845-4078, Ext. 3-1940

Environ. Lett., 7(6), 327-340; 1976

KEYWORDS: chlorination; sewage; sewage treatment plants; radioactive tracers; high resolution chromatography; chloro-organic constituents; effluents; 36Cl; analysis

A method was developed to study the effects of chlorination on sewage and the effluents from sewage treatment plants. This method combines radioactivity tracer (36Cl) chlorination with high resolution chromatography. The need for such methodology follows from the lack of data about chlorination effects and from the concern that chlorination will yield environmentally harmful substances. Utilizing this experimental technique, over 60 chlorine containing organic constituents were detected in the effluent from the primary stage of a domestic sanitary sewage treatment plant.
Trace Element Emissions of Coal-Fired Power Plants: A Study of the Chalk Point Electric Generating Station

Chalmers, E.S.

Department of Chemistry, University of Maryland, College Park, MD

Dissertation submitted to the Faculty of the Graduate School of the University of Maryland.

Analytical Procedure: Stacked Particles: Residue Smokes; Coal

Institutional neutron activation analysis: Source: Potassium; Barium; Calcium; Strontium; Lithium; Sodium; Cadmium; Scandium; Vanadium; Iodine; Manganese; Iron; Copper; Zinc; Calcium; Gallium; Barium; Strontium; Antimony; Antimony; Cesium; Rubidium; Strontium; Barium; Bismuth; Lead; Uranium; Thorium; Neptunium; Americium; Actinium; Plutonium; Thorium; Uranium; Silica; Alumina; Iron; Carbonaceous Particles: Electrostatic Precipitators: Volatile Elements: Various Samples: Particle Size Distribution

Samples of coal, bottom slag, economizer ash, fly ash, and in-stack suspended particulates were collected inside the Chalk Point power plant. Filter and cascade-impactor samples of the ambient aerosol in the vicinity of the power plant were also collected. These samples were analyzed by instrumental neutron activation analysis for 80 elements (Ba, Be, Cu, F, Fe, K, Li, Mg, Na, Al, Sc, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, As, Se, Br, I, K, Ca, Th, U, Pu, Th, W, Tc) and by instrumental photon activation analysis for 7 elements (Br, Si, Ti, H, He, Kr, Xe) in an effort to determine if coal-fired power plants are the source of a certain group of highly enriched trace elements, that had been observed in urban air particulates. Trace element distributions as a function of particle size were determined for both the in-stack suspended particulates and the ambient aerosol. The only elements which were strongly enriched (with respect to air) in the coal or on recorded particles beyond the electrostatic precipitators are Ba, Sr, Se, Br, and I. Of the Co and Pb, much of the Co, and perhaps non-negligible fractions of other volatile elements in the coal left the plant in the vapor phase. The power plant was found to increase the total particulate loading in the atmosphere around the plant. The composition of the elements in the plant emissions was quite similar to that of the ambient aerosol. The power plant did not act as a strong source for the highly enriched trace elements: Br, Ba, Br, Se, Sr, and Pb. The particle size distributions for these elements on the in-stack particulates and on the ambient aerosol were found to be completely different, suggesting that the power plant was not the source for the highly enriched species.

Measurement of Small Nitrous Oxide Concentrations by Gas Chromatography

Dolniche, C.C.; Felton, D.E.

Department of Land, Air, and Water Resources, University of California, Davis, CA 95616

Thesis No: (1967) 252-231 (Felton)


A method is described for determining N2O in small concentrations using a gas chromatograph with a flame ionization detector and a stainless steel column packed with Porapak T. Nitrous oxide was determined directly at concentrations of 0.1 ppm or greater. By cryogenic concentration, levels in the 1 ppt range or less were detected. Soil gases contained from 0.34 to 9.0 ppm N2O depending upon previous history of N fertilization and irrigation. Highest concentrations occurred in the top 10-20 cm of the soil profile. Liquid cultures of denitrifying organisms also showed N2O concentrations varying over a wide range as a function of culture conditions.

Surface Preferential of Trace Elements in Airborne Particles

Ivett, J. L.; Lab, A.; Babcock, O.P.C.; Evans, C.C.; Williams, F.

School of Chemical Sciences, University of Illinois, Urbana, IL 61801; Materials Research Laboratory, University of Illinois, Urbana, IL 61801

Thesis No: (1963) 591-6409 (Ivett)

Science, 190(4229), 852-854: 1975, February


A meter of trace and trace elements including Co, Cr, Cu, Fe, Li, Mn, Mo, Ni, Pb, S, Ti, V, and Zn present in coal fly ash was found to be preferentially concentrated on the particle surface. Environmental criteria of these elements at these much higher times indicated by conventional bulk analyses.
The Application of Paleontological Techniques to the Detection of Organic Contaminants of Environmental Concern

Williams, C.B.; Watkins, H.C.; Lovison, S.A.; Blandino, S.R.

117 Corporation, P. O. Box 80007, San Diego, CA 92138; Scripps Clinic and Research Foundation, 100 Prospect St., La Jolla, CA 92037

PHONE NO: (714) 545-7794, Ext. 356

Presented at the 39th Annual Conference on Trace Substances in Environmental Health, Columbia, MD, 6-10 June, 1978, 90 p., 1979

CHEMICAL: THERMAL; ORGANIC COMPOUNDS; SENSITIVITY; SELECTIVITY; ACTION; MILLIONS; RATE; SIGNAL; STRUCTURES; UTILIZATION; CEMENTATION; FLUORESCENCE; PHOTOLUMINESCENCE; DESIGN; FLUORESCENCE RESISTANCE; CRYPTO-RECEPTOR SITES; ANALYSIS

The high degree of specificity and sensitivity of antibody for the carcinogenic amines in tap water or in the pulse-wash which allows immunological techniques to be applied to the analysis of samples for the presence of trace quantities of organic contaminants. Assays have been developed for trace environmental contaminants presently of concern, as well as described in detail. These compounds are diquat, a herbicide which has been implicated in a number of human fatalities, dichlorobenzene, a synthetic whose use for defining both cattle and now known to be a carcinogen, and hexachlorophene, a diquat related to some infant deaths. Techniques for the preparation of the required fluorescent derivatives of these compounds, together with their antibodies, is discussed in detail. In particular, a novel flow method for the analysis of the conjugate using a high energy emitting radionuclide in increasing, have different parameters have been demonstrated as indicators of the presence of the contaminant, namely fluorescence intensity, fluorescence polarization, and in the case of dichlorobenzene, the use of cytoplasmic compartments. The assay can be conducted readily and with sensitivity in the microgram/gram range. It is anticipated that this sensitivity can be improved to the picogram/gram range with the improvement of improved antibody.

Chlorine-containing Organic Constituents in Chlorinated Effluents

Jolley, E.L.

Chemical Technology Division, Oak Ridge National Laboratory, Oak Ridge, TN 37830

PHONE NO: (615) 483-0641, Ext. 3-1940

JOURNAL OF THE WATER POLLUTION CONTROL FOUNDATION, 97(3), 605-610; 1975, North

CHEMICALS; DISTILLED NITROGEN; NITROGENOUS TREATMENT PLANTS; CHEMICALS; PROCESS; PRIMARY EFFLUENTS; SECONDARY EFFLUENTS; BOD; CHLORINATION CHEMISTRY; NATIONAL ENVIRONMENTAL TREATMENT; CLARIFICATION; AUTO-TEX incentive

CHEMICALS: CHLORINATION YIELD; ANALYTICAL; CHLORO-PHOSPHATES

Stable chlorine-containing organic constituents are present after effluents have been chlorinated at chlorine levels of 1 to 2 mg/l chlorine and several were specifically identified and quantitated at the microgram/liter level. The chlorination yield, the portion of the chlorine dosage associated with stable chlorine-containing organic compounds at the end of the chlorination reaction period, was about one percent for a typical chlorinated secondary effluent, was approximately constant with respect to chlorination. But increased with increasing reaction time and was approximately one percent for both primary and secondary systems. Essentially equivalent results were obtained with either chlorine gas or hypochlorite solution as chlorinating agent. Available chlorine in the effluent is primarily consumed in oxidation reactions.

Evidence for Primordial Superheavy Elements

Conway, F.J.; Cahill, T.; Fletcher, R.; Fanizza, R.J.; Redmer, L.P.; Nelson, R.J.; Ploce, K.C.

Chemistry Division, Oak Ridge National Laboratory, Oak Ridge, TN 37830

PHONE NO: (615) 522-222 (Cahill)


GIANT HALOS: THREE DIMENSIONAL STRUCTURES; PHANTOM; CHARGED HALOS; LOW-ENERGY PROTON BEAMS; L TRANSITIONS; K TRANSITIONS; RECONSTRUCTION; ACCOMMODATION; SI (111) X-RAY DETECTOR; X-RAY STRUCTURE; ELEMENT 126; ELEMENT 127; ELEMENT 128; PRIMORDIAL SUPERHEAVY ELEMENTS

Microscopic crystalline oxide inclusions showing giant halos formation in biotite mica have been analyzed by the method of proton-induced X-ray emission. The observed X-ray energy spectra are best explained by the presence of a number of superheavy elements. Systematic differences between the giant halo inclusions are found in the region of 22 to 31 kV. Evidence for the presence of element 128 is highly confident. The experimentally found energy spectra closely resemble the theoretically predicted spectra. There is also evidence supporting the presence of elements 126 or 127, 127 being the most probable and 128.
Sulfurizing Reactions and the Destruction of NO2 Fomed by Soil

Koch, W. C.; Alexander, H.

Cornell University, Ithaca, NY 14850

PAPERS: (607) 254-3267 (Alexander)

Abstracts of the Annual Meeting of the American Society of Microbiology, 24, 171, abst. No.; 1976

SULFATION: MICRORHISTOLOGY; NO2 REDUCTION; NITROGEN FIXATION: VITAMIN; SCOTCH BEETS: RESISTANT GARDENS; RESISTANCE: VEGETABLES: HEAT: NITROGENIC REACTIORS; ABILITY

Sulfurizing microorganisms participate in the destruction of NO2 formed by soil by catalyzing the nitrite formed as a nitrogen gas. The nitrite oxidation rate increases and shifts away from linearity as soil moisture increases toward field capacity. At constant soil moisture levels, the rate of nitrite oxidation in samples exposed to NO2 is greater than in samples not exposed, supporting adaptation and/or growth of a nitrosifying population. However, inhibition of nitrite oxidation by 100 but not 0.01m calcium suggests that, if autotrophs are involved, a varying rather than a growing population can limit the oxidation.

"NITROBACTER" numbers in the soil rise only after at least half of the nitrite initially formed from NO2 is oxidized, but the population increase does not produce a corresponding increase in nitrite oxidation rate. Heating the soil to 42-45 C for 1/2 hr reduces "NITROBACTER" numbers and NO2 oxidizes to nitrate, but does not eliminate nitrite oxidation. An increase in "NITROBACTER" numbers is observed during nitrite oxidation in the heated soil. These results indicate that nitrite turnover per organism that "NITROBACTER" is not a major contributor to nitrite oxidation in this soil, but heterotrophic mixotrophs may be involved in this mechanism for the destruction of NO2.

TAGENTS: NITROBACTER

Phenicillin Phosfoli; Phenicol Phosholi; Phenol SP.

Microbial Formation and Degradation of Dimethylamine

Tate, B. L.; Alexander, H.

Laboratory of Soil Microbiology, Department of Agronomy, Cornell University, Ithaca, 1976

PAPERS: (607) 254-3267 (Alexander)

Applied & Environmental Microbiology, 31(3), 789-90; 1976, March

DIMETHYLAMINE; DIMETHYLAMINE SOILS: PH; AMERICAN: HYDROGEN SULFIDE: BACTERIA: C-O B: PROTOPE: HOME: ACCUMULATION: MICRORHISTOLOGY; DEGRADATION: ANALYSIS

Dimethylamine was formed from trimethylamine in soils of different pH values. The rate of disappearance of the secondary amine from soil was affected by pH and was markedly reduced under anaerobic. The accumulation of dimethylamine in cultures of \textit{Mycobacterium} sp. provided with trimethylamine depended on the nitrogen sources available to the bacterium but was not greatly influenced by the C-O ratio of the medium. Dimethylamine was accumulated in large amounts at pH 8.0 to 9.0 in cultures containing the tertiary amine and nitrate, but dimethylaminohydrolase was apparently not produced.

"MICROC: HYDROBACTER SP."
CONTRIBUTION OF BPT AND ITS METABOLITES BY MICROORGANISMS

Subb-Dac, K.C.; Alexander, A.
Laboratory of Soil Microbiology, Cornell University, Ithaca, NY 14853

ABSTRACT: Of the bacteria isolated from soil water and marine sediments converted between 5 and 20% of the BPT supplied in vitro to water-soluble products, and 35% transferred less than 5% of the isomethylc to water-soluble metabolites. Several water-soluble compounds generated from BPT by BORDE ALTERNANS were partially characterized and were found to be different from known products of BPT metabolism. However, the isomethylc can act converted to water-soluble products in marine microorganisms supplemented with a large number of organic compounds and incubated aerobically, anaerobically, and with supplemental inorganic nutrients.

GEOGRAPHICAL DESCRIPTION: ES (RU), Connecticut, Long Island Sound, Shemline, Saybrook, Connecticut River, Westbrook, Back River, Delsey Point, Yamaha Terrace

ACKNOWLEDGMENTS: BORDE ALTERNANS

(1975) Continuous Source Atomic Absorption Spectroscopy with High Resolution and Wavelength Modulation

Linder, A.T.; O’Haver, T.E.; Bailer, P.H.
Department of Chemistry, University of Maryland, College Park, MD 20742; Department of Chemistry, Villanova University, Villanova, PA 19085

ABSTRACT: (1975) Analytical Chemistry, 40(15), 1166-1175; 1976, July

CONTINUOUS SOURCE ATOMIC ABSORPTION ON SPECTROMETER: WAVELENGTH MODULATION: TITIC; ISBD: CASSIE; NICKEL: IRON; SPECTRAL: SEMIQUANTITATIVE: COPPER: CALCIUM: ANALYSIS

A continuous source atomic absorption spectrometer has been assembled using a commercially available echelle monochromator which was modified for wavelength modulation with a quartz refractor. A 200-nm Mg-In arc and a 150-nm W-In-F3 arc were used as the continuous source high resolution wavelength modulated AA-CWMA-15 system. Two standard curves are linear over sufficiently wide ranges to be analytically useful. They compare well with standard curves for background corrected (2-lamp all AAICP20) and with precision high resolution AA. Sensitive (characteristic concentrations) were poorer only by a factor of 2-5 even though the system was not optimized specifically for sensitivity. For the nine elements studied, CWMA-15 detection limits were better in seven cases compared to AACP (AA).

Compared to uncorrected line source AA, the CWMA-15 detection limits were less than a factor of 10 lower.
Spatial Variability of the Leaching Characteristics of a Field Soil

Bigger, J.R.; Nelson, N.A.
Department of Land, Air and Water Resources, University of California, Davis, CA 95616

ABSTRACT: The leaching of water-soluble salts applied to the soil may affect the spatial variability of the field soil. Experiments were conducted to determine the spatial distribution of water-soluble salts in a 150-ha field. The mean water velocity was calculated using a time-lapse method. The results of these experiments showed that the water-soluble salts were distributed non-uniformly throughout the field.

Demarcation Practices in Soil Systems: The Significance of Good Fits of Data to Mathematical Forms

Consortium for the Biology of Natural Systems, Washington, D.C. 20010

ABSTRACT: A statistical model for soil systems was developed that incorporates the interactions between various factors. The model was used to predict soil moisture content and nutrient availability under different management practices.

Field Test with 40-B, Horsley Field Station

Stout, P.
The Horsley Foundation of Soil Science, University of California, Riverside, CA 92502

ABSTRACT: The Horsley Foundation of Soil Science conducted a field test with 40-B, Horsley Field Station to evaluate the effects of different fertilizer and irrigation practices on crop yields.
The reaction of O(18) atoms with toluene and 1-methylnaphthalene have been investigated at 50-800 Torr total pressure over the temperature range 200-620 K. With toluene the products and mechanisms of the reaction of O(18) atoms with toluene and 1-methylnaphthalene have been identified. These products consist of oxygen adducts of various organic and inorganic compounds, including a variety of chain and polymer structures. The products are discussed in terms of chemical mechanisms for gas-phase reactions. The available evidence suggests that the initial reaction step is that of addition of an oxygen atom to the aromatic ring, with the formation of a variety of species which will ultimately produce a tar or polymer containing oxygen.
Measurement of water and nitrogen fluxes in soil profiles pit to surface
Roger, J.W.; Nielsen, B.L., MacKay, J.L.
University of California, Davis, CA

**ABSTRACT**
A field experiment was conducted to study the influence of water and nitrogen fluxes from the root zone of saline dunes and shallow soils on the root zone. The experiment included five rates of fertilizer applied as 100 in 150-foot-long plots, and three irrigation regimes. Measurements for assessing soil water content, water balance, and nitrogen movement in the soil-water-plant system were conducted using radioactive tracers located in the experimental area. Water was supplied by a single irrigation system. Results demonstrate the importance of the fate of the tracer in the soil-water-plant system in controlling the behavior of the water and nitrogen. Previous work has shown that the soil water content and the soil water flux must be considered when accounting for electrical tracer methods. The movement of the tracer in the saline and homogeneous soil profiles and the transport of the nitrogen out of the root zone and the extraction of nitrogen by plants.

**ECOLOGICAL ASPECTS**: Environ Sci 85, California, Davis

**Impact of a Lead Mining-Smelting Complex on the Fish and Vegetation of Southeastern Minnesota**
Environmental Sciences Division, Oak Ridge National Laboratory, Oak Ridge, TN 37830

**ABSTRACT**
The project aimed to study the ecological impacts of a lead mining-smelting complex on the fish and vegetation of southeastern Minnesota. The study involved monitoring the ecological changes and their relationship to the mining activities. The results indicated significant changes in fish and vegetation communities, which were attributed to the lead mining-smelting activities. The study recommended the implementation of measures to mitigate these impacts and protect the ecological integrity of the region.

**ECOLOGICAL ASPECTS**: Environ Sci 85, California, Davis

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**ECOLOGICAL ASPECTS**: Environ Sci 85, California, Davis
Keywords: Environmental Health, Trace Elements, Coal Conversion, Toxicity, Bioaccumulation.

The potential toxicity and bioaccumulation in aquatic systems of trace elements present in aquatic coal conversion effluents.

Keywords: Coal Conversion Technology, Aquatic Environments, Environmental Impact, Heavy Metals, Alkali Metals, Alkaline Earth Metals, Non-Metals, Hydrogen, Oxygen, Carbon, Nitrogen, Oxygen, Trace Elements, Chemical Analysis, Biological Systems, Aquatic Organisms.

The implementation of coal conversion technology on a large scale may result in release of many elements to aquatic environments. To ensure the orderly and safe development of coal conversion technology, it is necessary to assess potential adverse effects of trace elements on aquatic ecosystems and human health. The results of analyses for 55 elements (Al, As, Ba, Be, Br, Cd, Cr, Cu, Co, C, Cs, Dy, Er, Eu, P, F, Sb, Se, Si, Te, Ti, Zn) in environmental samples show that the bioaccumulation and toxicity factors for aquatic biota of these elements are characterized.

Keywords: Nuclear Activation Methods, Environmental Samples, Radioactivity Measurement, Tracer Techniques, Stable Isotopes, Environmental Chemistry.
Trace Metal and Trace Organic Emission to the Environment by Lead-Zinc Mining and Milling Operations

Jennette, J.C.; Callister, R.J.; Fall, J.
Civil Engineering Department, Syracuse University, Syracuse, NY; Environmental Protection Agency, Kansas City, MO

Presented at the 10th Annual Conference on Trace Substances in Environmental Health, Columbia, MO, 8-10 June, 1976, pp. 1974

TRACK METALS: STERNS, LEAD, ETC.; WASTES: EFFLUENT; ORGANIC EMISSIONS: RADIOACTIVE: INTESTINAL; SOURCE: EFFLUENTS; ORGANIC: ANALYSIS

This paper reviews 5 years research on the trace metals, organic metallics, and trace organic levels emitted by the world's largest lead-zinc mining operations to the streams of Clark National Forest. Samples were collected at various points in the drainage system and analyzed for trace metals and organic compounds. The results indicate that trace metal levels are generally higher than those found in natural waters, while trace organic levels are lower. This suggests that the mining operations have a significant impact on the environment.

GEOGRAPHICAL DESCRIPTION: US, Missouri (51), Clark National Forest, Cocks Creek Watershed

Investigation of Clearwater Lake as a Potential Site for Heavy Metals from Lead Mining in Southeast Missouri

Gale, R.L.; Solter, R.; Visco, J.C.
University of Missouri, Columbia, MO

Presented at the 14th Annual Conference on Trace Substances in Environmental Health, Columbia, MO, 8-10 June, 1976, pp. 1976

TRACE SUBSTANCES: SURFACE WATERS; HEAVY METALS: OCCURRENCE; EFFLUENTS: ANIMAL: PLANTS; SOURCES: EFFLUENTS; ORGANIC: ANALYSIS

This paper describes the investigation of Clearwater Lake, a potential site for heavy metals from lead mining in Southeast Missouri. Samples were collected and analyzed for trace metals, organic compounds, and other potential contaminants. The results indicate that the lake is contaminated with heavy metals and organic compounds, suggesting that the mining operations in the area may be contributing to the pollution of the lake. This has implications for the management of the lake and the surrounding environment.

GEOGRAPHICAL DESCRIPTION: US, Missouri (51), Piedmont, Vernon Trend, Clearwater Lake
Influence of Nitroanilines on Microbial Attack

Lever, P. L.; Alexander, P.
Department of Agronomy, Cornell University, Ithaca, NY (165)

J. Environ. Qual., 5(2), 157-160; 1976

P-1-NITROANILINES; PICKED SOILS; MICROBIAL ENRICHMENTS; ECQ SEDIMENTS; SOILS; FRACTIONS;
P-1-NITROANILINES; B-1-NITROANILINES; SOIL MICROBES; BACTERIA; RESPIRATION; SOIL COMMUNITIES; MICROORGANISM HORMONE RESISTANCE; RESISTANCE; ANALYSIS

P-1-Nitroanilines was not degraded in flooded soil or in microbial enrichments from bog sediments. Enrichment cultures isolated with soil and sewage did not yield microorganisms capable of metabolizing P-1-nitroaniline, P-1-nitroethylaniline, or P-1-nitro-1-propylaniline. P-1-Nitroanilines was not metabolized by pure cultures of bacteria, and it was not significantly inhibitory to individual bacterial cultures or to stimulation of soil or sewage communities. The data suggest that the microorganisms present in samples of natural environments because of the influence of the nitroanilines bound in nitroanilines.

J. Environ. Qual., 5(2), 157-160; 1976

Update of Cadmium by Soybeans as Influenced by Exchange Capacity, pH, and Available Phosphorus

Miller, J.E.; Magid, J.J.; Koepp, I.E.
Department of Agronomy, Institute for Environmental Studies, University of Illinois, Urbana, IL 61801

PHONE NO: (217) 333-4370 (Koepp)

J. Environ. Qual., 5(2), 157-160; 1976

Cadmium; Soybeans; Soil; Cation Exchange Capacity; pH; Available Phosphorus; Cadmium Accumulation; Dilute Acid Harvest; Resistant Phytochelating Acid; Tissue Concentrations; Soil Extractants; Cadmium Accumulation; Heavy Metals; Analysis: Solute: Clay

The accumulation of cadmium (Cd) and its effect on vegetative growth of soybeans (Glycine max (L.) Merr. var. Emmy) in soils with a range in cation exchange capacity (CEC), pH, and available phosphorus (P) were investigated in greenhouse experiments. Cadmium uptake decreased as soil pH and CEC increased, while increasing available soil P was related to increased Cd accumulation. Cadmium extracted from the soil by Bray P1 

Cadmium concentration was significantly correlated with plant Cd concentrations. The growth of the soybean shoots was generally depressed when tissue concentrations reached 10 micrograms Ca/g dry weight. Cadmium uptake by soybeans was correlated with the ratio of added Cd to the Cd sorptive capacity of soil.

J. Environ. Qual., 5(2), 157-160; 1976

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J. Environ. Qual., 5(2), 157-160; 1976
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The Elements of the Study of the Architectural Environment of a City. By A. B. Campbell. A study of the architectural environment of a city, with special reference to the effects of the environment on human behavior. The study was conducted in the city of New York, and the results were published in a series of papers in the Journal of the American Institute of Architects. The study was intended to provide a basis for the development of a new architectural code for the city.

The study was conducted over a period of five years, during which time the architect and his team conducted a series of field studies in various parts of the city. The results of these studies were then analyzed, and the findings were used to develop a new architectural code for the city. The code was intended to provide a basis for the development of a new architectural code for the city.

The study was conducted in collaboration with the American Institute of Architects, and the results were published in a series of papers in the Journal of the American Institute of Architects. The study was intended to provide a basis for the development of a new architectural code for the city.