BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:	)	
	)	
Petition of Noveon, Inc.	)	
	)	**AS 02-5**
	)	
for an Adjusted Standard from	)	
35 Ill. Adm. Code 304.122	)	

NOTICE OF FILING

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Illinois Pollution Control Board
James R. Thompson Center
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PLEASE TAKE NOTICE that on **Friday, February 6, 2004**, we filed the attached **Written Expert Testimony of William L. Goodfellow** with the Illinois Pollution Control Board, a copy of which is herewith served upon you.

Respectfully submitted,

NOVEON, INC.

By: _____
One of Its Attorneys

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THIS FILING IS SUBMITTED ON RECYCLED PAPER

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Written Expert Testimony of William L. Goodfellow

Introduction

I, William L. Goodfellow, Jr. have been employed at EA Engineering, Science, and Technology, Inc since February, 14, 1984. Currently, I am a Vice President with primary responsibility for the Water, Natural Resources, and Ecotoxicology Profit Center in our Mid-Atlantic operations and National Technology Director for Ecotoxicology and Bioassessment. Prior to coming to EA, I was employed as a contract employee at the Johns Hopkins University, Applied Physics Laboratory in the Aquatic Ecology Section, Shady Side, and MD. I was with JHU from 1982-1984.

Academically, I have received my M.S. in 1982 from Frostburg State College (now Frostburg State University) while attending the Appalachian Environmental Laboratory program in Fishery Management. At the time of my graduate school attendance, specialization in Ecotoxicology was obtained in a program such as the one I was enrolled. The Appalachian Environmental Laboratory is a University of Maryland facility on the campus at Frostburg State. However, the degree comes from Frostburg State. Additionally, I have a B.S. (1979) in Biology from York College of Pennsylvania and an A.S. (1978) in Chemistry also from York College of Pennsylvania.

Qualifications and Experience

I have more than 26 years of experience in environmental toxicology and bioassessments. My primary technical responsibilities include: design and performance of Toxicity Reduction Evaluations (TRE); assisting with treatability assessments of wastewater; researching and writing technical documents on federal and state water quality criteria and other water pollution control issues; conceptual and experimental evaluations on the toxicity, fate, and effects of chemicals in aquatic ecosystems; and the assessment of environmental damage resulting from point and non-point source discharges.

I am an internationally recognized expert in toxicology and TRE technology having served on peer review panels, task forces, and editorial committees for toxicology and TRE issues. I have currently authored and/or presented more than 100 technical papers and articles as well as taught short-courses and seminars. Subjects I have taught include TREs, Toxicity Identification Evaluations (TIEs), acute and chronic toxicity assessments of aqueous, sediment and soil samples, treatability studies, and pollution prevention initiatives.

My specific professional experience includes: developed and conducted more than 85 TREs for numerous industrial, municipal and federal facilities. Responsibilities included characterization of effluent's chemical constituents and associated toxicity, variability of effluent, identification of components causing toxicity in effluent, and development of strategies for removal of toxicity from effluent. Directed engineering activities associated with TREs, including plant performance evaluations, housekeeping surveys, source identification evaluations, and treatability studies/refractory toxicity assessments. Performed toxicity identification of various toxicants using fractionation procedures such as those outlined in US EPA's Toxicity Identification Evaluation Procedural manuals. Co-authored original and revised TRE municipal protocol manual. Participated as panel member for Technical Peer Review of US EPA's effluent assessment program. Was Project Manager for EA's participation as the US EPA's Referee Laboratory for freshwater and saltwater toxicity testing program, which was one of the requirements of the agency's compliance with a settlement between the Arid States Association and American Metropolitan Sewer

Authorities. Taught short-courses and seminars on TRE strategies, methodologies, and research needs for future. Invited delegate to Society of Environmental Toxicology and Chemistry Education Foundation sponsored Pellston Workshop to address science of Whole Effluent Toxicity (WET) testing as well as co-authored resulting book on WET testing. Presently serving on WET Steering Committee, with role of assisting in better implementation of WET programs and establishment of expert advisory panels. Served on Steering Committee for TIE professional workshop and currently a co-editor of the in press book titled, "Toxicity Identification Evaluations (TIEs) for Effluents, Ambient Waters, and Other Aqueous Media." SETAC Press, Pensacola, FL.

I have specifically performed numerous effluent toxicity assessments as well as TIEs and TREs that addressed ammonia toxicity, effects of salinity or total dissolved solids (TDS) in effluents, and determined the toxicity associated with organic compounds in effluents with high ammonia and TDS. Specifically, I was senior author for a peer review paper in the international journal Environmental Toxicology and Chemistry titled "Major Ion Toxicity in Effluents: A Review with Permitting Recommendations." This paper is co-authored by US EPA and state/local government staff, as well as regulated industry and academic personnel. Additionally, I was senior scientist of a project for the City of Lincoln, NE that evaluated the effects of ammonia and salinity to *Ceriodaphnia dubia* and *Pimephales promelas*. This project was used as the demonstration of an NPDES variance for ammonia in the effluent, discharged from the two City of Lincoln facilities to the high saline receiving waters of Salt Creek. The overall toxicity testing program as well as other a Peer Review Panel convened at the request of the regulatory agencies evaluated ecological evaluations. The Water Environment Research Foundation (WERF) organized the Peer Review Panel. The Peer Review Panel found the strategy of our experiments to be well suited for determination of ammonia and salinity effects on the receiving water and found the testing to be performed using state of the science as well as accepted practices. Another specific example of my experience is with the Village of Sauget, IL where I developed specific toxicity characterization tests to evaluate the role of ammonia and organic compounds in the effluent to *C. dubia*. Overall, I have evaluated more than 50 specific facilities that had ammonia as a principal toxicant.

Summary of Projects at the Henry Noveon Plant

In August 1998, I was retained by Gardner, Carton, and Douglas to assist with a wastewater treatment plant project at the Noveon (formally BF Goodrich) Henry, IL facility. I reviewed the available water quality and other data as well as developed recommendations for additional testing that would be required to better understand the effluent from the Henry, IL facility.

On 22 December 1998, I went on a site visit of the facility, which included discussions with facility personnel to better understand the production and wastewater treatment process. At this time, we also finalized the initial round of toxicity testing which was proposed.

EA Engineering, Science, and Technology performed acute and chronic toxicity testing on a suite of three grab samples of effluent from the facility. The samples were collected on 6, 7, and 11 January 1999. The test species were *Ceriodaphnia dubia* (water flea) and *Pimephales promelas* (fathead minnow), two commonly used freshwater test organisms typically employed in Illinois EPA and US EPA toxicity testing programs. The chronic toxicity testing consisted of a 3-brood daily renewal survival and reproduction potential test (*C. dubia*) and a 7-day daily renewal survival and growth test (*P. promelas*). The acute tests included a 48-hour (*C. dubia*) and 96-hour (*P. promelas*) definitive test. Test solutions in the *P. promelas* acute test were renewed at 48 hours. For both the acute and chronic toxicity tests, the test organisms were exposed to 100, 50, 25, 12.5, and 6.25 percent effluent and a laboratory dilution water control. The objective of the chronic toxicity testing was to determine the No Observed Effect Concentration (NOEC), the Lowest Observed Effect Concentration (LOEC), and the Chronic Value (ChV). The acute test endpoint was the LC50, which is the lethal concentration that causes a 50 mortality of the test organisms.

The results of this first set of tests indicated that filter effluent sample from BF Goodrich/Noveon's Henry facility were acutely toxic to both *C. dubia* and *P. promelas* with 48-hour LC50 of 16.9 percent effluent and 96-hour LC50 of 7.8 percent effluent,

respectively. The chronic toxicity of suite of samples were also chronically toxic with the NOEC of <6.25 percent effluent and LOEC of 6.25 percent effluent for both species. The characteristics of this effluent was total ammonia ranging from 193-199 mg/L as ammonia-nitrogen, alkalinity ranging from 108-178 mg/L, hardness ranging from 84-164 mg/L, and salinity ranging from 5.9-6.7 part per thousand (ppt).

Additionally, a Toxicity Identification Evaluation (TIE) was performed on the 7 January sample using *C. dubia*, because it appeared to be the most toxic of the suite of three samples. A standard US EPA Phase I Acute TIE were performed. This test, often called a fractionation test, was used to characterize and potentially identify the specific toxicant in the effluent. This procedure is a tiered approach and involves fractionation of the wastewater and testing each of the individual fractions for toxicity. A summary of the various TIE Phase I treatments steps utilized in this study were:

- Initial toxicity verification
- Baseline toxicity (pH i, which is the sample at the discharge pH)
- pH adjustments (pH 3 and pH 11)-characterizes the solubility of the toxicant, pH11 is an indication of metals and pH3 helps in identification of toxicants such as cyanide and various polymers
- Aeration (pH 3, pH i, and pH 11)-characterizes whether the toxicant is in oxidized or reduced form.
- Filtration (pH 3, pH i, and pH 11)-characterizes whether the toxicant is associated with the particulates in effluent.
- C18 Solid Phase Extraction Column (pH 3, pH i, and pH 9)-characterizes whether toxicant is non-polar organic compound.
- Methanol elution of the C18 Column to remove non-polar organic compounds that were removed by the column (pH 3, pH i, and pH 9)-confirms whether toxicant is non-polar organic compound.
- EDTA Chelation (pH i)-characterize whether the compound is metal.

- Oxidant Reduction (using sodium thiosulfate at pH i)-characterizes the toxicant as an oxidant as well as assists in fingerprinting whether the toxicant is a specific metal with the help of the EDTA Chelation treatment.
- Graduated pH (pH 6, 7, 8)-characterizes whether the toxicant is ammonia as well as whether it is a metal as the principal toxicant.

The results of the TIE indicated that none of the fractionation treatments were successful in removing, or significantly reducing the observed toxicity of the effluent sample. These results suggested that the toxicant was associated with salinity (which is an expression of the total dissolved solids in effluent) and un-ionized ammonia and/or amine contributing organic compounds. The amine contributing organic compounds are mentioned, because this effluent had higher ammonia concentrations as measured by colorimetric chemical assays when compared to ion specific electrodes. Together un-ionized ammonia and amines represented the toxicant identified as part of the TIE. For the rest of the discussion in this section, un-ionized ammonia will be used to indicate both un-ionized ammonia and amine contributing organic compounds.

Additionally, these results suggested that non-polar organic compounds were not the principal toxicant. It was also recommended that additional testing be performed to further characterize the toxicants and to determine whether the toxicant was principally un-ionized ammonia and salinity in the effluent.

The next round of toxicity testing was performed on a suite of samples collected 10, 12, and 15 March 1999 and 24, 26, 29 March 1999. These tests were the same as in the evaluation of the January samples (described above). The results were similar with NOEC of <6.25 percent effluent and LOEC of 6.25 percent effluent for both species tested in both rounds of testing. The *C. dubia* 48-hour LC50's were 9.9 and 11.5 percent effluent for both sets of samples, respectively. The *P. promelas* 96-hour LC50's were 8.2 for both sets of samples. The characteristics of the effluents were also similar to the January samples evaluated. The alkalinity ranged from 56-196 mg/L, the hardness ranged from 88-104 mg/L, and the salinity

ranged from 9.5 to 9.9 ppt. The total ammonia was slightly lower in these two suites of samples versus the January samples, ranging from 100-137 mg/L as ammonia-nitrogen.

Two TIEs were performed on the 12 and 24 March 1999 samples using the same procedures as the TIE procedures described above for the evaluation of the January samples. However, only the pH i treatments were used. Only pH i was used for this round of testing because pH 3 and pH 11 treatments were not beneficial for the characterization of the toxicants in the effluent. This reduction of pH treatments and addition of other treatments is consistent with the US EPA TIE testing protocols. Several additional treatments were added to the standard TIE performed on the January sample. These treatments included:

- Filtration/C18 SPE Column Extraction-to further characterize whether the toxicant was a particulate or dissolved organic compound.
- Zeolite-a natural resin that has a high affinity for ammonia. Zeolite resin is a treatment of choice for the evaluation of ammonia as a toxicant.
- Zeolite/Aeration-to evaluate whether a toxicant additional to ammonia is present and is an oxidized or reduced form.
- Zeolite/Filtration-to evaluate whether a toxicant other than ammonia is present and is associated with the suspended particulates in effluent.
- Filtration/C18 SPE Column/Zeolite-to characterize whether a toxicant that is a non-polar organic compound is in effluent additional to ammonia toxicity.
- Filtration/C18 SPE Column/Zeolite/Aeration-to further characterize whether any of the treatments can reduce or eliminate the toxicity other than that associated with ammonia. This treatment is developed to evaluate whether toxicity is associated with salinity in effluent.

The results of the two TIEs performed on the March 1999 samples were very similar to the January results. None of the fractionation treatments were successful in removing, or significantly reducing the observed toxicity. There was a slight reduction in toxicity following C18 SPE Column treatments and from the zeolite treatments, including zeolite followed by aeration and filtration. The C18 SPE Column and zeolite treatments brought the

observed toxicity to a level that would be expected based on the salinity of the two samples (9.7-9.8 ppt salinity). In both TIEs, removing both organic compounds and ammonia (C18 SPE Column-zeolite treatments removed the toxicity to a level that is also expected with this salinity. These two TIEs further indicated that the principal toxicant in this effluent was un-ionized ammonia or amine contributing organic compounds and salinity. No further evidence was observed to indicate that non-polar organic compounds were a toxicant in these two TIEs based on the methanol elution of the C18 SPE Columns.

Definition of Terms of Art used in Testimony

Alkalinity is the acid-neutralizing capacity of water typically expressed as mg/L calcium carbonate.

Amines are compounds derived from ammonia by the replacement of hydrogen by one or more univalent hydrocarbons. Amines contributing organic compounds are organic compounds that are polar and are very water-soluble. Typically, polar organic compounds are considerably less toxic to aquatic organisms than non-polar organic compounds because they have a tendency of staying in solution rather than entering the organism (which is necessary for a compound to be toxic).

Ammonia is a common toxicant in aquatic systems that is from the decomposition of proteins and is associated as a waste product from vertebrates. The toxic fraction of total ammonia is the un-ionized fraction. Typically un-ionized ammonia is expressed as NH_3-N.

Control is a treatment in a toxicity test that duplicates all the conditions of the exposure treatment with out the specific effluent or toxicant (Rand 1995).

Hardness is the measurement of the calcium and magnesium ions in water and is typically expressed as mg/L calcium carbonate (Rand 1995)

Salinity is the generic term used for the inorganic salts or ions in an aqueous matrix. Salinity is typically presented in parts per thousands (ppt) or g/L.

Statistically Significant effects are effects or responses in the exposed population that are different from those in the control at a given statistical probability level, typically $P \leq 0.05$ (Rand 1995)

Toxicity is defined as the inherent potential or capacity of a material to cause adverse effects in a living organism (Rand 1995).

> **Acute** toxicity is defined as having a sudden onset, lasting a short time. Typically acute toxicity is defined as 48 hours or 96 hours exposure and expressed as the Lethal Concentration that causes a 50% effect level in the test population.
>
> **Chronic** toxicity is defined as involving a stimulus that is lingering or continues for a long-time. The chronic toxicity test is used to evaluate the effects of long-term exposure of a chemical or effluent on aquatic organism. The typical endpoints are expressed as the No Observable Effect Concentration (NOEC) which is the highest concentration that is not different from the control treatment; the Lowest Observable Effect Concentration (LOEC) which is the lowest concentration that is statistically different from the controls; and Chronic Value (ChV) which is defined as the geometric mean of the NOEC and LOEC.

Toxicant is an agent or material capable of producing an adverse response (effect) in a biological organism, seriously injuring structure and/or function or producing death (Rand 1995)

Toxicity Identification Evaluation (TIE) is a set of procedures to identify the specific chemicals responsible for the toxicity of effluents (Rand 1995). Typically TIEs are called fractionation tests and the most commonly employed TIE is the US EPA Phase I procedure.

Toxicity Reduction Evaluation (TRE) is a site-specific study conducted in a stepwise process designed to identify the causative agents in a toxic effluent, isolate the sources of toxicity, evaluate the effectiveness of toxicity control options, and then confirm the reduction in effluent toxicity (Rand 1995).

Many of these definitions are taken from:

> Rand, G.M, editor. 1995. Fundamentals of Aquatic Toxicology: Effects, Environmental Fate, and Risk Assessment, Second Edition. Taylor & Francis, Washington, DC. 1125 pp.

Conclusions and Opinions

The results of the acute and chronic toxicity testing performed by EA Engineering, Science, and Technology indicates that the effluent was toxic to both *C. dubia* and *P. promelas*. Further evaluation of the toxic samples indicated that the principal toxicant was un-ionized ammonia as characterized by two separate TIE treatments, the Graduated pH test and Zeolite Resin tests. Furthermore, none of the standard TIE treatments were successful in removing, or significantly reducing the observed toxicity, which is consistent with salinity as the other principal toxicant. It is also important to note that if you would remove ammonia as a toxicant in this effluent, the salinity would still have similar toxicity in the effluent.

It is my professional opinion that the toxicants in the effluent samples evaluated by EA were un-ionized ammonia or amine contributing organic compounds and salinity. No typical characteristic indicative of non-polar organic compound toxicity was observed in the TIEs performed by EA.

William L. Goodfellow, Jr.
Vice President
EA Engineering, Science, and Technology, Inc.
Water, Natural Resources, and Ecotoxicology

Mr. Goodfellow has more than 26 years of experience in environmental toxicology and bioassessments. He manages the Mid-Atlantic Region's practice for Water, Natural Resources, and Ecotoxicology and is EA's National Technical Director of Ecotoxicology and Bioassessment. His primary technical responsibilities include: design and performance of Toxicity Reduction Evaluations (TRE); assisting with treatability assessments of waste water; researching and writing technical documents on federal and state water quality criteria and other water pollution control issues; conceptual and experimental evaluations on the toxicity, fate, and effects of chemicals in aquatic ecosystems; assessment of environmental damage resulting from point and non-point source discharge; assessment of potentially toxic sludge, sediment, dredge materials and soils; technical input on vertebrate and invertebrate culture maintenance, and bioassay procedures; as well as project design, management, and proposal development. Mr. Goodfellow is an internationally recognized expert in toxicology and TRE technology. He has served on peer review panels, task forces, and editorial committees for toxicology and TRE issues, as well as being widely published.

Education

M.S.; Frostburg State University, Appalachian Environmental Laboratory, University of Maryland, Fishery Management; Frostburg, MD, 1982
B.S.; York College of Pennsylvania, Biology; York, PA, 1979
A.S.; York College of Pennsylvania, Chemistry; York, PA, 1978

Training

Whole Effluent Toxicity Training Course (WEFTEC, SETAC), 1998, 1999, 2000
Toxicity Reduction Evaluations (SETAC), 1998, 1999, 2000
Pesticides in the Toxicity Identification Process (SETAC), 1997
Culturing and Testing Marine Toxicity Test Organisms (SETAC), 1987
Management Development Program (EA), 1987
Government Contract Management Training (EA), 1990
Advanced Toxicity Identification Workshop (SETAC), 1991
Project Management Program (EA), 1994, 1997, 2000

Professional Experience

Toxicology—Investigated bioaccumulation, tissue distribution, metabolism, and depuration of nitrophenols in fresh water fish and estuarine bivalves. Conducted acute and chronic bioassays on a variety of fresh water and estuarine vertebrates and invertebrates, investigating both organic and inorganic compounds in effluents and single chemical exposures. Evaluated bioaccumulation of single chemicals and selected components of effluents, sediments, dredge materials and soils to fresh water, estuarine, marine, and terrestrial organisms. Researched sublethal effects of organic and inorganic compounds to various aquatic organisms during long-term exposure. Evaluated toxicological effects of sediments, sludges, dredge materials, and soils to both fresh water and marine organisms as

well as terrestrial invertebrates and plants. Developed and managed Water Effect Ratio and Biological Translator studies for fresh water and marine/estuarine organisms. Was Project Manager for the Referee Laboratory program for the WET Program and the resulting litigation between Arid States Association and USEPA.

Sediment and Soil Toxicity—Evaluated acute and chronic toxicity and bioaccumulative potential of toxicants from various sediment and soil samples to fresh water, salt water, and terrestrial organisms. Performed sediment TIE analyses of sediment elutriates, pore water, and municipal sewage sludges. Past member of sediment subcommittee for American Society for Testing and Materials (ASTM) and co-author of study design document for developing sediment toxicity testing programs. Managed several large dredge material programs part of Environmental Impact Study including vibracoring samples, analyzed testing, toxicity testing, and bioremediation assessment.

Toxicity Reduction Evaluation (TRE)—Developed and conducted more than 85 TREs for numerous industrial, municipal and federal facilities. Responsibilities included characterization of effluent's chemical constituents and associated toxicity, variability of effluent, identification of components causing toxicity in effluent, and development of strategy for removal of toxicity from effluent. Directed engineering activities associated with TREs, including plant performance evaluations, housekeeping surveys, source identification evaluations, and treatability studies/refractory toxicity assessments. Performed toxicity identification of various toxicants using fractionation procedures such as those outlined in Environmental Protection Agency's (EPA) Toxicity Identification Evaluation Procedural manuals. Co-authored original and revised TRE municipal protocol manual. Participated as panel member for Technical Peer Review of EPA's effluent assessment program. Participated in the Steering Committee and as a panel member in a TIE workshop for the determination of the state of the science for TIEs. Taught short-courses and seminars on TRE strategy, methodologies, and research needs for future. Invited delegate to SETAC Education Foundation sponsored Pellston Workshop to address science of Whole Effluent Toxicity (WET) testing as well as co-authored resulting book on WET testing. Presently serving on WET Steering Committee, with role of assisting in better implementation of WET programs and establishment of expert advisory panels. Widely published in area of TREs.

Treatability Studies/Environmental Assessment—Evaluated impacts on fish and macro benthic communities associated with acid mine and thermal pollution discharges, as well as future impacts due to siting of power and municipal sewage treatment plants. Participated in extensive hazard assessment of depot facility for U.S. Army Toxic and Hazardous Materials Agency, including evaluation of facility materials storage information, pesticide handling, chemical data on drinking water wells and monitoring wells, disposal facilities, and demilitarization facilities. Evaluated interactions of heated effluent from large nuclear power plant with organics (including dioxin), total dissolved solids and other inorganics constituents in facilities' receiving water. Designed and conducted treatability studies to access ability of municipal and industrial WWTPs to treat and reduce effluent toxicity as well as meet pre-treatment requirements. Evaluated coliform contamination of large drinking water distribution system. Program investigated potential cross-connections, distribution system flushing, storage tanks and reservoir, and coliform contamination within distribution system.

Project Management—Manager of EA's Mid-Atlantic practice for Water, Natural Resources, and Ecotoxicology, directing the region's activities with regards to technical issues and business development. As Manager of Client Services within EA Laboratories, directed project managers within analytical, ecotoxicology, and biology laboratories. Responsible for directing activities of approximately $10 million annually of environmental services. Managed large multi-disciplinary programs for public and private sector clients incorporating toxicology, chemistry, hydrology, and engineering aspects into successful technical completion of projects on time and within budget. Managed toxicity testing programs conducted in environmental toxicology laboratory and onsite mobile laboratories, including effluent biomonitoring for industrial and municipal clients; bioaccumulation and flesh impairment studies; multi disciplinary TREs; and round-robin bioassay programs.

Professional Affiliations/Memberships

Chesapeake Water Environment Association
Pennsylvania Water Environment Association

Society of Environmental Toxicology and Chemistry (SETAC)
    Member of Program Committee
    Member of Awards Committee
Chesapeake and Potomac Regional Chapter (SETAC)
Water Environment Federation
Standard Methods Joint Task Group Member
Steering Committee Chemical Industrial Advisory Council (York, Pa.)

Publications and Presentations

Authored and presented more than 100 technical papers and articles as well as taught short-courses and seminars. Subjects include Toxicity Reduction Evaluation, Toxicity Identification Evaluations, Acute and Chronic Toxicity Assessments of Aqueous, Sediment and Soil Samples, Bioaccumulation and Metabolism Studies, Treatability Studies, and Pollution Prevention Initiatives.

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Program. Society of Environmental Toxicology and Chemistry, 23rd Annual Meeting, Austin, TX, November 2003.

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Goodfellow, W. L. 2001. Toxicity Testing and Bioavailability of Contaminants in Sediments, Chapter 5. In: Sediment Guidance Compendium. Electric Power Research Institute, Inc. Concord, CA. Report 1005216.

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Employment History

Years of EA Experience: 20
Years W/Other Firms: 8

Employment History—Detailed

Employer—EA Engineering, Science and Technology
Dates of Employment—1984–present
Title—Vice President, Profit Center Manager- Water, Natural Resources, and Ecotoxicology, Senior Scientist, Manager of Client Services, National Technical Director

Employer—The Johns Hopkins University, Applied Physics Laboratory
Dates of Employment—1982–1984
Title—Associate Biologist, Aquatic Ecology Section

Employer—University of Maryland, Appalachian Environmental Laboratory
Dates of Employment—1979–1982
Title—Research Assistant

Employer—Taxonomic Consultants, Inc.
Dates of Employment—1980–1982
Title—Biological Technician

Employer—Texas Instruments, Inc.
Dates of Employment—1980
Title—Water Chemistry Technician

Employer—National Brick Corporation
Dates of Employment—1979
Title—Quality Control and Research and Development Supervisor

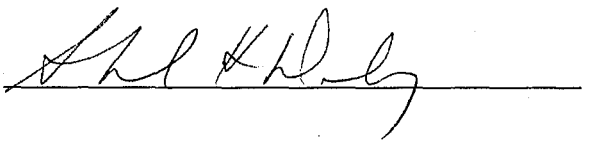
Employer—Dr. Robert F. Denoncourt
Dates of Employment—1978–1979
Title—Biological Consultant

Employer—Gent-L-Kleen
Dates of Employment—1977–1979
Title—Senior Laboratory Technician, Quality Control (part-time)

Employer—York College of Pennsylvania
Dates of Employment—1977
Title—Teaching Assistant, Summer Instructor for Chemistry Department

CERTIFICATE OF SERVICE

The undersigned certifies that a copy of the foregoing **Notice of Filing** and **Written Expert Testimony of William L. Goodfellow** was filed by hand delivery with the Clerk of the Illinois Pollution Control Board and served upon the parties to whom said Notice is directed by first class mail, postage prepaid, by depositing in the U.S. Mail at 191 N. Wacker Drive, Chicago, Illinois on Friday, February 6, 2004 and facsimile.



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