

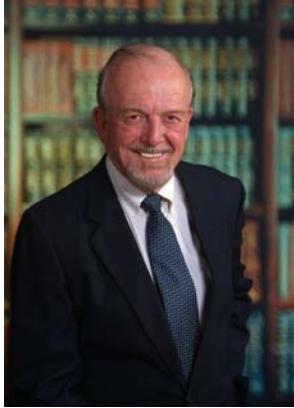


BUSHMAN & Associates, Inc.

CORROSION CONSULTANTS

P.O. Box 425, Medina, OH 44258 • Phone 330/769-3694, Fax 330/769-2197

Resume of James B. Bushman, P.E., C.P.S., S.C.T.



Employment:

Years Employed by B&A: 17

Total Years of Corrosion Engineering Experience: 47

Education:

Case Institute of Technology, Cleveland, OH

General Motors Institute of Technology, Flint Michigan

- Major Industrial Engineering

Professional Registrations and Licenses Currently in Effect

- Professional Engineer (Corrosion / California / 1977 / N0. 512)
- NACE International Certified Cathodic Protection Specialist and Senior Corrosion Technologist (1973/1991, No. 1619)

Professional Society Activities

- NACE International Member – 1968 to date – Current Program Coordinator and Previous Assistant Program Coordinator for Specific Technology Groups STG 01 Reinforced Concrete, STG 02 Coating and Linings – Atmospheric, STG 03 Coatings and Linings – Immersion and Buried Service, STG 04 Coatings and Linings - Surface Preparation and STG 043 Transportation – Land. In addition, is Current Member of Technology Exchange Groups 016X, 024X, 043X (Current Vice Chair), 102X, 179X, 262X, 053X and 338X, Task Groups 011, 013, 017, 019, 044, 045, 047, 048, 049, 054, 055, 167, 169, 264, 290, 321 & 324
- Chairman of 1994 NACE National Convention Symposium – “Corrosion and Corrosion Control of Steel Reinforced Concrete Structures”
- American Society for Testing & Materials (ASTM) – 1992 to date – Active member of the G-1 (Corrosion) and the E-50 (Environmental) Committees including serving as Chair of the E-50 Committee (1993 – 1996) which developed the original standard on “Evaluating UST’s prior to Upgrading”, and Secretary of the Follow-Up Committee G-1-10 Task Group, which prepared the current standard (1996 – 1999).
- American Water Works Association - Chairman of the Cathodic Protection Task Force (1965 – 1975), and member of Underground Corrosion Task Force.
- Accredited NACE Instructor, 1975 – 1985
- SSPC – The Society for Protective Coating – Member since 1996

Professional Experience:

Principal Corrosion Engineer, Bushman Associates. Mr. Bushman interfaces with numerous clients with respect to research, development of new concepts and technology, applicable for detection and evaluation of corrosion and corrosion control technologies. During his 47 year career, he has held a number of different positions in what was then the world’s largest Corrosion Control Firms including member of the Board of Directors (1983 – 1992), Senior Vice President 1981 – 1992, Manager of Research and Development (1975 – 1992), Manager of European Operations (1978 – 1992), Manager of Concrete Services Group for 1978 – 1992), Northeast US Area Manager (1968 – 1972), Manager of Water and Waste Water Corrosion Control Operations (1964 – 1968) and US & International Marketing Manager (1972 – 1991). In 1992, he left to found Bushman & Associates as an independent consulting engineering firm. His commitment was to operate as an independent corrosion research and engineering consultant with no ties to manufacturers or suppliers of corrosion control materials or systems.

He has provided both general corrosion engineering services, performing research and development studies in corrosion and corrosion control for a wide variety of structures as well as expert witness services where appropriate for buried and submerged metallic structures including:

Buried Fuel Storage Tanks	Above Ground Fuel Storage Tanks	P.O.L. Pipelines
Natural Gas Pipelines	Offshore Production & Drilling Platforms	Ship Hulls & Submarines
Water & Wastewater Piping	Steel Reinforced Concrete (SRC) Bridges	SRC Piers, Docks & Wharf's
Pipe Type Power Cable	Lead Sheathed Telephone Cable	SRC Parking Garages
Traveling Screens	Nuclear Reactor Containment Shells	Cooling Towers
Elect. Power Gen. Plants	Steel & Cast Iron Tunnel Liners	Sub-sea Oil & Gas Pipelines
Cable Stay Bridges	Water & Wastewater Treatment Units	Coating Performance Testing
Building Foundations	Lead Based Paint Removal/Replacement	Building Structural Steel

In addition to his fundamental corrosion control development work on many of the above structures and his 24 patents, some of his most notable research and project management efforts include:

- Project Principal Engineer for the first computer based close interval surveys including both “On” and “Instant-Off” potential measurements to determine cathodic protection system effectiveness on underground pipelines in Europe (British Gas for 7 of their 12 divisions – 1976)
- Project Principal Engineer for the first Telluric Current compensated close interval surveys performed anywhere in the world (British Gas – East Midland division – 1977)
- Project Principal Engineer for the first close interval surveys performed on subsea pipelines at depths to 800’ and lengths over 200 miles (North Sea – Total Oil – Aberdeen, Scotland – 1979)
- Project Co-Principal Researcher – Corrosion and cathodic protection of steel reinforced concrete and structures (F.H.W.A. Turner-Fairbanks Research Center, McClean, VA (1976/1983).
- Corporate Co-Principal Research Director – Underground Storage Tanks (UST’s) working with various state and federal agencies including the U.S. Environmental Protection Agency in developing new standards for and methods of achieving more effective corrosion control on underground fuel storage tanks (1968/1983).
- Project Principal Engineer – Develop galvanic anode design approach and engineering application methodology to facilitate use of single cavity molds to cast multiple length and cross section aluminum and zinc anodes for use in applying cathodic protection to subsea pipelines, docks, piers and platforms (Dow Chemical Company in association with Federated Metals – 1975/1983).
- Co-Project Engineer – Analyze and test alternative galvanic aluminum alloy anode materials for use in sub-sea muds containing various chloride levels and at different temperatures both in the Gulf of Mexico and North Sea (Dow Chemical Company and Phillips Petroleum – 1976/1978)
- Research, Field Model and Develop Anode Resistance Formula for various slab shaped galvanic anodes used to provide Cathodic Protection for submerged metal structures (US Army Construction Engineering Research Laboratories – 2005)
- Develop systematic Cathodic Protection System Design Manuals for various structures both at military bases and civil works facilities (US Army Construction Engineering Research Laboratories – 2001)

Awards:

- One of only two persons to be recognized by the U.S.. Secretary of Transportation as an Expert in Cathodic Protection.
- Recipient of the 1994 Colonel George C. Cox Award for Individual Public Contribution to the Science of Underground Corrosion and Control awarded at the 39th Annual Appalachian Underground Corrosion Short Course, University of West Virginia.
- Recipient of the 1992 Charles W. Sonnenberg Award for Technical Contributions on Corrosion and Corrosion Control for Steel Underground Storage Tanks, Steel Tank Institute, Lake Zurich, IL
- Recipient of numerous certificates of appreciation from the U.S.. Air Force, U.S. Army, NACE, AWWA, and the Steel Plate Fabricator's Association.
- Only Corrosion Engineer selected to serve on the Federal Highway Administration's Technical Work Group to implement the Transferring of Technology from their Strategic Highway Research Program to their operating Federal and State Highway Agencies.

Patents:

- Inventor or Co-Inventor, 24 U.S. Patents

Publications:

- "Field Application of Performance Enhancing Chemicals to Metallized Zinc Anodes"
- "Statistical Analysis of Soil Characteristics to Predict Mean Time to Corrosion Failure of Underground Metallic Structures"
- "Cathodic Protection of Underground Storage Tanks"
- "Calculation of Corrosion Rate from Corrosion Current (Faraday's Law)"
- "Corrosion and Cathodic Protection Theory"
- "Cathodic Protection of Underground Storage Tanks"
- "Corrosion and Cathodic Protection for Steel Reinforced Concrete Bridge, Garage and Marine Substructure Support Members"
- "Fundamentals of Electricity"
- "Galvanic Anode Cathodic Protection System Design"
- "Maintenance of Cathodic Protection Systems"
- "Financial Impact of Corrosion on the Economy"
- "Technical Review of 100 mV Polarization Shift Criterion for Reinforcing Steel in Concrete"
- "Liner Polarization, Potentio-Static & Potentio-Dynamic Electrochemical Corrosion Rate Testing in the Laboratory and in the Field"
- "Impressed Current Cathodic Protection System Design"
- "Cathodic Protection of Water Storage Tanks"
- "Computers for Corrosion Engineering Testing and Information Management"
- "IR Drop in Cathodic Protection Measurements"
- "Cathodic Protection for Traveling Screens"
- "Interpretation of Potential Measurements of Cathodically Protected Sub-sea Pipelines"
- "Corrosion and Cathodic Protection of Steel Reinforced Concrete Bridge Decks"
- "Corrosion Protection Systems for Bridge Stay Cables and Anchorage's"
- "Evaluating the Performance of the Electro-Osmotic Pulse Basement Dewatering System"
- "Lessons Learned from Ductile and Cast Iron Pipe, Volumes I, II, & III"
- "Chapter 64 – Highways, Bridges & Tunnels" of ASTM Textbook
- "A New Awareness of Copper Pipe Failures in Water Distribution Systems" – Co-Author
- "Copper Pipe Failure by Microbiologically Influenced Corrosion"
- "Evaluating the Performance of the Electro-Osmotic Pulse Basement Dewatering System"
- "Ice Free Cathodic Protection Systems for Elevated Water Storage Tank in Cold Climates"
- "Wireless Technologies for Remote Monitoring of Cathodic Protection"
- "Practical Applications of Cathodic Protection for Corrosion Control of USTs"
- "Ice Free Cathodic Protection for Water Storage Tanks"

Textbooks and Courses:

- Course and Textbook entitled “Corrosion and Cathodic Protection for Steel Reinforced Concrete Bridge Decks” together with preparation of student notebooks and experiments followed by instruction on behalf of the Federal Highway Administration of over thirty (32 hours each) courses for state highway agencies at various locations throughout the United States.
- Course Preparation with multiple presentations on “Corrosion and Corrosion Control for Gas Distribution Companies” including over 2000 slides and 30 “hands”-on experiments for both in-house and outside personnel training for Northern Illinois Gas Company, Chicago, IL
- Develop Course Textbook and Instruct over 30 2-Day Courses throughout the U.S. on “Corrosion and Corrosion Control for Steel Underground Storage Tanks and Piping”, Steel Tank Institute, Lake Zurich, IL
- Co-Author Course Textbook with Michael Szeliga and Debra Simpson with multiple presentations on “Corrosion and Corrosion Control for Steel Reinforced Concrete Pressure Pipe”, American Concrete Pressure Pipe Association, Reston, VA
- “Cathodic Protection Rectifier Handbook”
- “Marine Corrosion in Tropical Environments”, Co-Editor with Sheldon W. Dean and Guillermo Hernandez-Duque Delgadillo, published by the American Society for Testing and Materials, ASTM Stock Number STP1399
- “Guide Manual - Selection, design, installation, operation, and maintenance of cathodic protection systems (CPSs) for navigation lock gates and other civil works hydraulic structures”, James B. Bushman for the US Army Corps of Engineers Construction Engineering Research Laboratories, Champaign, IL

Guest lecturer on Corrosion and Corrosion Control --

(Total of more than 3000 lectures running from 1 Hour to 2 Weeks in length) for the following:

UNIVERSITIES

- University of West Virginia, Morgantown, WV
- University of Wisconsin, Madison, WI
- Purdue University, West Lafayette, IN
- Worcester Polytechnic Institute, Boston, MA
- California State Polytechnic Institute, Pomona, CA
- Iowa State University, Ames, IA

UNITED STATES GOVERNMENT

- Training Safety Institute, U.S.. Department of Transportation, Oklahoma City, OK
- Federal Highway Administration, Washington, DC
- Federal Office of Underground Storage Tanks, Washington, DC
- Air Force Institute of Technology, Dayton, OH
- Strategic Air Command, United States Air Force, various locations in the United States
- Civil Engineering Research Laboratories, U.S. Army Corps of Engineers, Champaign, IL
- Kennedy Space Center, NASA., Cape Kennedy, FL

PRIVATELY SPONSORED FEE PAID SEMINARS

- More than 500 — 1 to 3 day Seminars at various locations in the United States, Canada, United Kingdom, and the Netherlands sponsored by various clients and companies

NACE SPONSORED LECTURES AND SEMINARS

- NACE Course No. 2 Lecturer at various locations in the United States, Kuwait, and Iran. (Note: Each complete course was taught for 4 1/2 days in the U.S.. and 9 1/2 days overseas with a minimum of 7 hours of lecture per day.)
- Presentation of over 300 lectures on a diversity of Corrosion and Cathodic Protection subjects at various NACE Seminars, Regional, and National meetings in the U.S., Mexico, and the United Kingdom.

Partial list of lecture topics presented since 2000:

- “Fundamentals of Corrosion and Cathodic Protection for Steel Reinforced Concrete Structures”
- “Computer Controlled Electrochemical Corrosion Testing Methodologies including Linear Polarization, Galvanostatic, Potentiodynamic, E-LogI, Cyclic Polarization and Polarization Resistance Scanning Methods”
- “Mechanism and Impact of Corrosion on Steel Reinforcing in Concrete”
- “Economic Analysis of Alternative Corrosion Control Methods for Steel Reinforced Concrete Bridges and Parking Structures”
- “PC Computer Software & Hardware – What is the latest, greatest and best for your use?”
- “Corrosion Control Methods for Underground Pipelines”
- “Design of Galvanic Cathodic Protection for Underground Pipelines”
- “Electrolyte Resistivity Measuring Techniques”
- “Anode Selection Options for Underground Storage Tanks”
- “Generation of Telluric Earth Currents by Solar Flare (Sunspot) Activity and their Impact of Corrosion Measurements and Control”
- “Basic Electricity”
- “Corrosion Control Methods”
- “Design of Galvanic Anode Systems”
- “Coating Systems for Underground Storage Tanks”
- “Computers and Technology”
- “Linear and Non-Linear Polarization Measurement Techniques for Analyzing Corrosion and Corrosion Control Criteria”
- “Analysis and Selection of Alternative Criteria for Cathodic Protection”
- “Cathodic Protection of Water Storage Tanks - How do you know it is working?”
- “Use of Computers for Cathodic Protection Measurements and Analysis”
- “Statistical Procedures including Multi-variant Linear Regression Analysis and Analysis of Variance to Evaluate Measurable Values Impacting Corrosion of Ferrous Metals in Various Electrolytes”
- “Corrosion and Cathodic Protection of Underground Steel Water Pipelines and Aqueducts”
- “Selection, Design and Successful Implementation of Deep Anode Beds for Cathodic Protection”
- “Cathodic Protection of Water Treatment Clarifiers and Flocculators”
- “IR Drop Error in Cathodic Protection Potential Measurements”
- “Cathodic Protection Alternatives for Ship Channel Lock and Dam Structures”
- “The What and Why of the Controversy Over NACE Recommended Practice RP-01-69, Corrosion Control for Buried and Submerged Metallic Pipelines”
- “Anode Beds, Which, When and Where”
- “Cathodic Protection of Marine Structures – Issues and Answers”

Partial list of additional significant corrosion engineering projects:

General Representative Corrosion Engineering Projects

Principal Corrosion Consultant – National Academy of Science/Transportation Research Board Panel on Corrosion in the Soil Environment, NCHRP Project 21-06, Washington, DC

Principal Consultant — Evaluation of Interior Corrosion Attack and Develop Recommendation including Design for Corrosion Control on 6 Above Grade Type 316 Stainless Steel Alloy Chemical Storage Tanks, Catalytic Corporation, North Carolina containing two different electrolytes using Liner Polarization and Tafel (ElogI) Potentiodynamic Corrosion Rate Analysis Systems.

Expert Witness — Evaluate Corrosion Attack Mechanism and Probability of Failure Mode of Above Grade Storage Tanks containing Acid Contaminated Solvents, Boston, MA. Client Name and Location Confidential

Principal Corrosion Value Engineer – Member of Value Engineering Team responsible for Detailed Review and Prepare Alternative Recommendations for Corrosion Control on proposed Lake Hodges Reclaimed Water High Pressure Transmission Pipeline, City of San Diego Metropolitan Waste Water District, CA.

Expert Witness — Evaluate Mode of Failure of Interior Coating System in Cathodically Protected Steel Water Storage Tank and Provide Recommendations for Design Changes in System Design to Prevent Similar Failures in the Future, Eidson Steel Products, Albuquerque, NM

Principal Corrosion Value Engineer – Member of Value Engineering Team responsible for Detailed Review and Prepare Alternative Recommendations for Corrosion Control on existing and new Water Transmission Pipelines, Miramar Road Area, City of San Diego Metropolitan Water District, CA.

Principal Investigator – Perform Laboratory Corrosion Pitting and Rate Analysis on 316L Stainless Steel in Contact with Elevated Temperature Spent Solvent using Computer Controlled Potentio-Dynamic and Linear Polarization Measurements and Develop Corrosion Control Program based on Data Obtained, Catalytica Pharmaceuticals, Inc., Raleigh, NC

Principal Engineer — Evaluation of Corrosion Conditions and Preparation of Plans & Specifications for Installing Cathodic Protection on Multiple On-Grade Heating Oil Storage Tanks, Seymour Johnson Air Force Base, NC

Principal Engineer – Evaluation of Alternative Anode Materials and Development of Selection Criteria for Use in Cathodic Protection Systems, Cathodic Protection Management, Inc., Hoffman Estates, IL

Principal Engineer — Investigate Characteristics, Extent, Impact and Remediation Methods for Geomagnetically Induced Stray Currents (Telluric Currents) on Natural Gas Transmission Lines in England and Scotland, British Gas Corporation, Great Britain

Principal Consultant — Investigate Corrosion Control Systems, Methodologies, Practices and Effectiveness on 20,000 Mile High Pressure Gas Transmission and Storage System including Development of Recommended Changes to Improve Mitigation Effectiveness, Natural Gas Pipeline Corporation of America, Lombard, IL

Principal Consultant – Development Detailed Specifications for Cathodic Protection of Alternative Water Transmission Pipeline Systems in Florida, CPM, Inc., Hoffman Estates, IL

Principal Corrosion Value Engineer – Member of Value Engineering Team responsible for Detailed Review and Prepare Alternative Recommendations for Corrosion Control on proposed new Water Transmission Pipeline and Tunneling Project, Miramar Early Start Project, City of San Diego Metropolitan Water District, CA.

Expert Witness — Corrosion Control System Failure Analysis of Flexible Carbon Based Anode System in Steel Reinforced Concrete Structure, Twin Cities Fire Insurance Companies, San Francisco, CA

Principal Instructor — Program No. 6980 – Flammable Liquid Storage Tank Systems Management, College of Engineering, University of Wisconsin, Madison, WI

Principal Consultant – Measuring Corrosion Control System Effectiveness including Analysis of Stray DC Currents using Computerized Automatic Data Logging System, Gridley Lock & Dam, Port of Boston, Massachusetts, CPM, Inc., Hoffman Estates, IL

Principal Engineer — Develop Cathodic Protection System Design Manual for Military Base and Civil Works Structures, U.S.. Army Construction Engineering Research Laboratories, Champaign, Illinois

Expert Witness — Analysis of Mode of Failure Resulting in Gas Distribution System Leak leading to Explosion and Loss of Dwelling in Baltimore, Maryland, Name of Case and Client Confidential

Principal Consultant — Review of Corrosion Control Program on Steel, Cast Iron and Steel Reinforced Concrete Water Transmission Systems including Preparation of Recommendations for Changes to Improve Methodologies, City of San Diego, CA

Principal Consultant — Review Corrosion Protection Practices for Insulated Steel Underground Steam Heating Piping, Ft. Bragg Army Base, NC

Corrosion Consultant — Value Engineering Analysis (Multiple Projects) of Proposed Sludge & Reclaimed Water Pipelines & Potable Water Lines, City of San Diego, CA

Principal Corrosion Value Engineer – Member of Value Engineering Team responsible for Detailed Review and Prepare Alternative Recommendations for Corrosion Control on Hot Heating Pipe Heating System in Elevated Reinforced Concrete Roadway Ramps, Port Authority Bus Terminal, Port Authority of New York and New Jersey, NY

Principal Researcher — "Instant-Off" and Polarization Decay Measurement Methods on Cathodically Protected Steel Structures, Corpro Companies, Inc., Medina, Ohio

Principal Researcher — Optimization of Precious Metal Oxide Titanium Based Anode Shapes and Configurations for Steel Reinforced Concrete Structures, Corpro Companies, Inc., Medina, Ohio

Principal Consultant – Lock Miter Gate Cathodic Protection System Performance Evaluation Survey, Gridely Lock & Dam, City of Boston, MA

Principal Researcher — Development of Distributed Ribbon Type Precious Metal Oxide Coated Titanium Anode System for Cathodic Protection of On-Grade Fuel Storage Tanks, Corpro Companies, Inc., Medina, Ohio

Expert Witness — Evaluate Corrosion Pattern and Morphology of Corrosion Attack on Interior of Copper Domestic Hot Water Piping System, Client Name Confidential, St. Louis, MO,

Principal Consultant — Evaluation of Corrosion Control Systems on 3 - 1,000,000 On-Grade Molten Sulfur Storage Tanks, Texas Gulf Sulfur, Moorehead City, NC

Expert Instructor– Prepare Presentation Materials and Present Multiple Courses on the Subject of Corrosion and Corrosion Control at the Research Offices of the Corps of Engineers – U.S. Army, Ft. Lee, VA

Expert Witness & Principal Consultant — Analysis of Stray Current Corrosion Leading to Failure of Oil Filled Pipe Type Power Transmission Cable in Conjunction with adjacent Water Distribution System and Light Rail Transit System, PECO Energy Company, Philadelphia, PA

Corrosion Consultant — Value Engineering Analysis of Condition of Existing Lead Based Painting System on Multiple Large Suspension Bridges providing Vehicle Access to the City of New York including Determining Most Effective Means for Removal and Replacement with State of the Art Coating System, New York City, NY

Expert Witness — Evaluate Corrosion Pattern and Morphology of Corrosion Attack on Exterior of Buried Propane Tank, Client Name Confidential, Orlando, FL

Principal Consultant – Preparation of Operations Manual for Steel Reinforced Concrete Building Moisture Removal System, EOP Systems, LaCrosse, WI

Develop New Anode Configuration for Seawater Immersed Aluminum Galvanic Anodes used to provide Cathodic Protection for Offshore Drilling and Production Platforms and At Shore Pier, Dock and Wharf Piles, Dow Chemical Company, Houston, TX

Principal Engineer – Conduct Continuing Evaluation of Cathodic Protection System Corrosion Control Effectiveness on Steel Solder Pile, 1st Hawaiian Center Building Authority, Honolulu, HI

Principal Engineer – Conduct Basic Research into the Corrosion Interaction Between Type 316L Stainless Steel and ASTM A-36 Grade Carbon Steel in Contact with Lightweight Fire Insulating Concrete, Steel Tank Insurance Company, Chicago, IL

Corrosion Consultant – Conduct Field Evaluation and Prepare Written Report with Remediation Recommendations for Structural Steel Building Components in Contact with Cement Mortared Brick in National Historic Building, US Department of Interior, North Carolina

Corrosion Consultant — Evaluation and Recommendations for Use Bonded Light Rail System, Greater Cleveland Regional Transit Authority, Bowser-Morner, Inc., Dayton, OH

Corrosion Consultant – Evaluation of Corrosion and Corrosion Control Procedures on New Ductile Iron Pipe Water Distribution System, Gross Builders, Inc., Sagamore Hills, OH

Co-Principal Engineer — Develop and Conduct Performance and Life Test Program on Alternative Aluminum Alloy Anodes for installation on Heated Oil Sub Sea Pipelines — Phillips Petroleum Company, Stavanger, Norway

Expert Witness and Principal Researcher — Analysis of Failure of Water Service Line in Vicinity of Impressed Current Cathodic Protected Medium and Low Pressure Gas Distribution System, Peoples Gas, Pittsburgh, PA

Principal Corrosion Engineer — Perform Computerized Corrosion Mitigation Survey and Analysis on approximately 600 miles of Partially Submerged and Partially Buried Sub-Sea Pipelines using various Positioning and ROV equipment, Total Oil Company, Aberdeen, Scotland

Principal Engineer — Research and Test Effectiveness of Existing Cathodic Protection System on Lock and Dam Gates, Construction Engineering Research Laboratories, U.S. Army Corps of Engineers, Champaign, Illinois

Expert Witness – Corrosion and Corrosion Control Expert Witness on Failure of Underground Storage Tanks in West Virginia, Name of Client and Location withheld, Active Legal Case.

Principal Engineer — Develop "State-of-the-Art" Design for Cathodic Protection on Lock and Dam Gates, Construction Engineering Research Laboratories, U.S. Army Corps of Engineers, Champaign, Illinois

Principal Corrosion Consultant – Failure of Ductile Iron Pipe at Wastewater Treatment Plant, Malcolm Pirnie, Inc., White Plains, NY

Principal Engineer — Development of "State-of-the-Art" Design, Plans and Specifications for Cathodic Protection of Water Storage Tanks, Construction Engineering Research Laboratories, U.S. Army Corps of Engineers, Champaign, Illinois

Keynote Speaker – Speech on “Corrosion Economics” for the Minnesota Department of Public Safety, Minneapolis, MN

Principal Consultant – Utilization of Corrosion Rate Measurement Methodologies for Evaluating Cathodic Protection System Effectiveness, LaGuardia Airport Runway Extensions over Long Island Sound, Port Authority of New York and New Jersey, NY

Principal Consultant — Study to Evaluate the Long Term Corrosion Durability of Galvanized Steel Culverts in the United States, National Corrugated Steel Pipe Association, Washington, DC

Principal Engineer — Corrosion Evaluation and Cathodic Protection Feasibility Study, 1,500,000 sq. ft. of wharf deck and substructure support members in the Arabian Gulf, Sultanate of Abu Dahbi, United Arab Emirates,

Expert Witness – Failure Analysis and Cathodic Protection System Operational Procedures Impacting System Effectiveness, Name of Project and Location Withheld at Client’s Request.

Expert Witness -- Buried Transmission Pipeline Coating System Failure Analysis including Effects of ICCP Cathodic Protection, Name of Project and Location Withheld at Client’s Request.

Underground Storage Tank (UST) Projects

Principal Instructor — UST Corrosion and Corrosion Control Training Courses, Region 7, Office of Underground Storage Tanks, U.S. Environmental Protection Agency, Kansas City, KN

Principal Consultant — Impact of Methanol and Ethanol Based Fuels on Corrosion of Steel U.S.T. Interiors, Steel Tank Institute, Lake Zurich, IL

Principal Consultant — Evaluation of Corrosion Conditions and Preparation of Plans & Specifications for Installing Cathodic Protection on Underground Heating Oil Storage Tanks, Gaston County School System, Gaston, NC

Principal Consultant — Obtain Structure Baseline Data and Prepare Detailed Design, Plans and Specifications for State-of-the-Art Environmentally Compatible Deep Anode Cathodic Protection for On-Grade Fuel Storage Tanks at Seymour Johnson AFB, Law Engineering, Inc., Raleigh, NC

Principal Corrosion Consultant — Develop 2-Day Training Courses and Manual on Corrosion Control and Testing of Regulated Underground Storage Tanks, U.S. Environmental Protection Agency, Washington, DC

Expert Witness — Corrosion Failure Analysis of 2 – 30K Gallon Emergency Fuel Storage Tanks, Concord, CA, Client and Project Specifics Confidential

Principal Corrosion Consultant — Evaluation of Inspection Methods for Determining the Extent and Depth of Corrosion Attack on UST's, 20 – 50K Underground Fuel Storage Tanks at Hunter Army Air Base, Georgia, Russell Corrosion Consultants, Baltimore, MD

Principal Instructor – Conduct more than 25, 2-Day Training Course on “Corrosion & Corrosion Control System Effectiveness Testing on UST's” for various Regional Environmental Protection Agencies and the UST State Regulatory Personnel for the States of Arizona, California, Delaware, Iowa, Kansas, Maryland, Missouri, New Jersey, New York, Nevada, Nebraska, Ohio, Pennsylvania, Virginia, West Virginia, and Utah

Principal Consultant – Perform Field Investigation and Design Corrosion Control System for 3 – 15,000 Gallon Pressurized Ethylene Oxide Underground Storage Tanks buried in Earthen Filled Reinforced Concrete Vaults, Henkel Corporation, Mauldin, NC

Expert Instructor – Corrosion and Cathodic Protection System Testing Procedures on Underground Storage Tanks, University of Wisconsin, Madison, Wisconsin

Expert Corrosion Consultant Witness — Corrosion Failure of Underground Storage Tanks in Indianapolis, IN area, Client and Project Location Confidential

Principal Consultant — Corrosion Probability Analysis using multi-variate linear and non-linear regression statistical techniques on underground storage tanks at 2095 Fuel Dispensing Sites, The Southland Corporation, Dallas, Texas

Principal Instructor — Corrosion and Corrosion Control Training Course for Steel Underground Storage Tank Cathodic Protection System Inspectors, Gilbarco, Inc., Greensboro, NC

Principal Consultant — Probability and Cause of Corrosion Protection Deterioration on STI-P3 Steel U.S.T.'s., Steel Tank Institute, Lake Zurich, Illinois

Expert Witness — Evaluate Procedures Used by Major Oil Companies operating in the State of Texas in Mitigating Corrosion on Underground Storage Tanks at Fuel Service Station in Texas. Client Name and Location Confidential

Steel Reinforced Concrete Projects

Principal Consultant — Evaluation of Corrosion Conditions and Preparation of Detailed Plans & Specifications for Installation of Cathodic Protection on Submerged Steel Reinforced Concrete Elevating Pool Floor, Mecklenburg Aquatic Center, Charlotte, NC

Expert Corrosion Engineering Witness — Failure of Cathodic Protection Anode Systems on 400,000 Square Foot Parking Garage, St. Louis, MO, Client and Specific Project Location Confidential.

Principal Corrosion Consultant — Evaluation of Corrosion and Develop Remediation Plan for Corrosion on Metals in Chloride Contaminated Soil Cements, Construction Technology Laboratories, Inc., Skokie, IL

Principal Consultant — Investigation Corrosion and Develop Corrosion Mitigation Program for Steel Soldier Beam “H” Piles in Chloride Contaminated Soil Cement supporting 55 Story Office Building, 1st Hawaiian Bank, Honolulu, HI

Principal Corrosion Consultant — Federal Highway Administration Technical Work Group - Implementation of Strategic Highway Research Program (SHRP) developments for Concrete and Structures, Washington, DC

Principal Corrosion Consultant — Evaluate Corrosion and Corrosion Control Methods Available for Pre-Stressed Steel Cylinder Cement Mortar Coated and Lined Pipe, Corpro Companies, Inc., Medina, OH

Principal Engineer and Research Group Chairman — Development of Federal Highway Administration Manual “Cathodic Protection of Reinforced Concrete Bridge Elements”, Contract C102D, Strategic Highway Research Program (SHRP), Washington, DC.

Principal Consultant — Stray DC Current Corrosion Investigations on Various Steel Reinforced Concrete Structures including the World Trade Center Building, numerous bridge structures and several subway tunnel systems, The Port Authority of New York and New Jersey

Principal Consultant — Development of Stray Current Investigation and Mitigation Plan, Anchorage International Airport Steel Reinforced Concrete Elevated Highway and Entrance Ramps, City of Anchorage, Alaska

Principal Consultant — Investigation on the Extent and Pattern of Corrosion and Means for Long Term Monitoring and Programmed Prevention, Loveland Pass Steel Reinforced Concrete & Tile Tunnel Lining Panels, U.S. Interstate 80, State of Colorado Department of Transportation, Loveland, Colorado

Principal Consultant — Evaluation of Corrosion Protection Systems for Bridge Stay Cables and Anchorage’s, Federal Highway Administration, Washington, DC

Principal Consultant — Perform Corrosion Evaluation and Develop Detailed Plans & Specifications and Provide On-Site Construction Implementation Inspection for the Installation of Galvanic Anode Cathodic Protection System for Pre-stressed, Post-tensioned 400,000 Square Foot Steel Reinforced Concrete Deck, City of Wilkes-Barre, PA

Expert Witness – Expert Corrosion Consultant and Witness in the Investigation and Analysis of the Deterioration of Corrosion Control Sytem Effectiveness, Multi-Story Parking Garage System, Madison, Dane County Parking Authority, Wisconsin

Principal Consultant — Electrochemical Chloride Removal and Protection of Concrete Bridge Components, Strategic Highway Research Program, Washington, DC

Project Administrator and Co-Principal Investigator, F.H.W.A. Research project DTFH61-85-C-00124 to prepare textbook on "Corrosion and Corrosion Control of Steel Reinforced Concrete Bridge Decks" and develop a Training Course based on this textbook material including an Instructor's Guide, Student's

Workbook, and present 24, 1 week courses at various locations throughout the United States for the U.S.. Department of Transportation

Principal Consultant — Close Interval Corrosion Potential Study on 24 Foot Diameter Steel Reinforced Concrete Siphon Pipe, U.S.. Bureau of Reclamation, Phoenix, Arizona

Project Consultant — F.H.W.A. Research Project DTFH61-84-C-00119, "Further Improvements in Cathodic Protection for Steel Reinforced Concrete Structures" including designing, testing, inspecting and adjusting of eight different cathodic protection systems on two bridge decks in Ohio and Virginia

Principal Consultant — General Corrosion Engineering Consulting Services including corrosion testing, evaluation and design, construction supervision, inspection, testing and commissioning corrosion control systems for various steel reinforced concrete bridges, tunnels, parking garages, etc., The Port Authority of New York and New Jersey