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{Company 's CCR Cage Code: 4N6X4 ; SBA Classified: Small Business, Veteran-Owned}

Synopsis of Professional Background:

More than 38 years of professional engineering experience and education since completing undergraduate degree. Work has been primarily in metallurgical /corrosion engineering, mechanical engineering areas and in completing related root-cause failure analyses.

Education:

- MS, Metallurgy and Corrosion, University of Delaware, 1986
- MBA, Business, Golden Gate University, 1972
- BS, Mechanical Engineering, Virginia Tech, 1968

Professional Certifications & Affiliations:

- Registered Professional Engineer in Virginia and Delaware
- Certified Materials Selection/Design Specialist, National Association of Corrosion Engineers (NACE International)
- Member American Society for Metals (ASM International)
- Member National Society of Professional Engineers (NSPE), Chairman - Richmond Chapter in 2008

Brief Summaries of Work Experiences:

Davis Materials & Mechanical Engineering, Inc., Glen Allen, VA – Co-Owner of independent consulting engineering firm began in July, 2004. Primary services are as forensic engineer providing metallurgical and mechanical engineering input and expert witness assistance to attorneys and completing root-cause failure analyses for industrial and government clients.

Henkels & McCoy, Inc., Richmond, VA - (8.8) years – First level manager of small group of engineering technicians applying corrosion control via cathodic protection (CP) technology. Duties entailed managerial and engineering tasks to apply CP for underground structures. Also completed several forensic engineering projects involving corrosion, metallurgical and mechanical engineering issues. H & M is a medium size construction and engineering firm.

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CC Technologies, Inc., Columbus, OH – (2.5) years – Most of period, (2 years), involved work as the primary, on-site corrosion engineer in a small team effort to develop an analytical model to predict the likely locations of external corrosion on the buried portions of the Trans Alaskan Pipeline System in Alaska. Remainder of the period involved work as a materials engineer completing failure analyses involving corrosion and metallurgical issues. CCT is a materials research and engineering firm.

Battelle Memorial Institute, Columbus, OH – (7) years – Worked as applied research scientist in corrosion section of this large contract research organization. Duties included a variety of applied research and engineering involving corrosion and metallurgy. Included were laboratory studies, literature searches, providing recommendations for corrosion-resistant materials selection, developing and presenting a short educational course, editing a newsletter on several materials topics for Department of Defense contractors, and completing several failure analyses.

University of Delaware, Newark, DE – (4) years – Undergraduate and graduate student while working towards completion of MS degree in metallurgy and corrosion. Graduate thesis involved laboratory studies of crevice corrosion of stainless steels. Summer internship with Haynes International Corp. in Indiana involved a laboratory corrosion study of nickel alloys.

Honeywell, Corp., Hopewell, VA – (7) years – Project engineer (4 years) and reliability engineer (3 years) in a typical chemical manufacturing plant. Work involved installation of capital improvements to plant (as project engineer) and various engineering tasks to contribute to the on-line reliability of operating systems and components in the plant (as reliability engineer). Regularly worked on both mechanical and corrosion problems in a variety of non-rotating process plant equipment including ASME coded pressure vessels, piping/valves, heat exchangers and chemical reactor vessels.

Ingersoll-Rand Company, Philipsburg, NJ – (2+) years – Mechanical project engineer in centrifugal compressor department of this large turbomachinery manufacturer. Duties involved several tasks as part of a team of engineers that designed, coordinated manufacture and completed shop tests of large horsepower compressors for process industry customers.

U.S. Air Force, Edwards AFB, CA – (4) years – While on active duty, acted as test/project engineer to evaluate the performance of prototype small-thrust rockets being developed for use for attitude control on communications satellites. Statistical test methodology and unique measuring devices were used.

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Representative Failure Analysis Projects Completed in Corrosion, Metallurgical and Mechanical Design Areas:

Metallic Water System Failures - Completed (8) failure analyses involving metallic water-piping systems. Piping materials included galvanized steel, carbon steel and copper. Two of these cases involved litigation. In each case the chemistry of the water was analyzed and evaluated for aggressiveness towards the particular pipe material being used. In three of the cases microbiological-influenced corrosion (MIC) was investigated as a contributor to the failure. Chemical corrosion inhibitors were being used – either correctly or incorrectly – in two of the cases and that usage was investigated. Other factors considered included flow velocities, pre-treatment with a biocide, the effect of debris in the water and poor welds at the pipe joints.

Personal Injury Due to Failure of Riding Lawnmower – Completed an analysis of the failure of an operating handle used to raise and lower the cutting blade deck on a riding lawnmower. The handle failed at welds and released an internal spring that flew up and caused serious eye injury to the mower operator. The investigation included evaluation of the material and welds used, the mechanical design of the operating handle and the role of low-cycle fatigue. Detailed mechanical design calculations were completed. The work involved a suit brought by the injured person. The case was settled before trial.

Failure of Steam Boiler Tubes – Carbon steel water wall tubes in a large electric power steam boiler were investigated after selected tubes split open and the boiler had to be shutdown. Both fireside and waterside deposits were found on the failed tubes. Heat transfer calculations were completed to define the likely, maximum in-service temperatures experienced by the tube material. The tubes failed because of their reduced yield stress at the raised temperatures predicted from the heat transfer calculations.

Failure of Cast Iron Valve Body – The in-service failure of a cast iron valve body used in a fire water protection system was investigated. The extent of internal corrosion, the mechanical properties of the cast material and the general quality of the casting were evaluated along with the specific service conditions. It was concluded that the cause of the failure was a very high strain rate produced by the rapid closure of an upstream automatic valve and the resulting water hammer effect that occurred in the failed valve.

Failure of Truck Tanker Trailer – The failure of a rubber-lined, steel tanker trailer that resulted in the release of several hundred gallons of hydrochloric acid onto a highway and acid burns to the ankles of the truck driver was investigated. The incident involved a suit and providing a deposition. It was found that the failure originated on the exterior surface of the carbon steel tanker shell under a rolled stiffener used to reinforce the trailer. Condensation collected on this unpainted portion of the tanker and over many years penetrated the shell thickness. The affected area was under the stiffener and could not be detected by routine inspections. A settlement between the parties was reached.

Investigation of Corrosion on a Weathering Steel Crane in a Marine Environment – Extensive atmospheric corrosion on an uncoated, multiple-ton crane fabricated from weathering steel (A588) used in a severe marine environment was investigated. Use of chloride field detection kits indicated chloride ion concentrations on the crane were very high in attacked areas. Weathering steel is not intended for marine applications. Recommendations were given to sandblast the crane to remove the existing salt and then apply a coating system resistant to marine environments.

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Failures of Lower Body Sections of Fire Fighting Trucks – The cause of premature failures by corrosion on coated steel and aluminum body panels of fire trucks used in the Cleveland, Ohio area was investigated. Initially the trucks’ manufacturer believed the problem was due to poor surface preparation or the type of primer or final coatings being used. Further evaluation showed this was not true. Instead the problems were caused by incorrect design details that did not permit the specified surface preparation and coating system to be correctly applied and did not permit the salt-rich slush from winter streets to be drained or washed away. Recommendations for improved design details were made.

Injury of a Child in a Sporting Goods Store – The cause of an accident in which a steel stand used to suspend a “heavy bag” boxing bag tipped over in a retail store and caused severe leg injury to a young boy was investigated for an attorney. The stand was not bolted to the floor as is normally done. The child was playing around the bag and running into it to make it swing. Calculations showed that a relatively small horizontal force was sufficient to make the stand tip over. The case settled.

Investigation of Excessive Corrosion of Aluminum Sheet Bulkheads at a Coastal Boat Marina – Significant pitting corrosion at specific locations along the length of the structure was found to be associated with concrete that contacted the aluminum. Alkaline compounds leached out from the concrete by rain combined with salt ions from the air and formed a very aggressive compound that caused the rapid pitting on particular areas of the bulkhead.

Failure of a Valve Push Rod in a Marine Engine – Fracture of this rod and associated other damage in the in-board engine of a small yacht was investigated as part of an insurance claim. It was found that the fracture originated from a small nick on the surface of the push rod due to stress concentration, propagated due to fatigue and final fracture was ductile in nature. Failure of the push rod allowed more costly damage to other engine components.

Personal Injury Case Involving a Recreational Boating Accident – Assisted an attorney representing the owner/operator of a bass boat that struck an underwater object and caused the still-running outboard motor to flip inside the boat and amputate the hand of a passenger in the rear of the boat. The passenger sued the owner/operator (plus other parties) claiming that the owner had not done sufficient maintenance on the jack-plate motor attachment to the boat and that omission caused the accident. It was shown that the owner had done normal maintenance on the jack-plate but small-scale damage (fretting) that could not be easily detected plus other contributing factors had likely caused the accident. A deposition was taken. The case settled without a trial.

Materials Selection & Consulting for Proposed Chemical Manufacturing Plant - Provided materials engineering services to an industrial design/build contractor that was preparing the chemical process and mechanical design for a large chemical manufacturing plant. The client sought outside help with specifying corrosion-resistant materials. This involved recommending carbon steel versus specific stainless steel alloys versus non-metallic materials. Different materials were needed for various parts of the plant depending on the particular equipment involved, the chemical make-up of the local process stream, susceptibility to the various forms of corrosion and the maximum local, operating temperature.