

PHILIP B. LINDSAY, P.E.

Metallurgical and Corrosion Engineer

Mr. Philip Lindsay has over 30 years of experience in metallurgy, corrosion mitigation, non-ferrous alloy selection, corrosion failure analysis, and litigation support.

SPECIALIZED PROFESSIONAL COMPETENCE

- Materials Engineering
- Materials Selection
- Metallurgy
- Corrosion engineering
- Corrosion mitigation
- Failure Analysis
- Corrosion testing
- Stress corrosion
- Erosion corrosion
- Microbiological influenced corrosion
- Corrosion monitoring
- Cooling water corrosion
- Consulting and expert testimony

EQUIPMENT

- Tubing and piping
- Bolts
- Fasteners
- Water heaters
- Plumbing
- Condensers
- Air-conditioning chillers
- Pumps
- Tanks
- Cooling towers
- Heat exchangers
- Feedwater heaters
- Titanium piping and vessels
- Oil pipelines
- Aluminum and aluminum alloys
- Copper and copper alloys
- Stainless steel alloys

INDUSTRIES

- Fossil power generation
- Nuclear power generation
- Chemical
- Fertilizer
- Natural gas
- Domestic water
- Oil and gas pipeline
- Aerospace

RECENT WORK

- Reviewer of National Association of Corrosion Engineers (NACE) MIC Handbook
- Evaluation of Corrosion Protection System for Proposed Oman - India Pipeline
- Failure analysis of Colonial Pipeline, rupture in Reston, Virginia
- Corrosion failure investigation of fire protection systems
- Review of potential corrosion degradation mechanisms for carbon steel pipeline materials

- Evaluation of corrosion degradation in support of P.T. Badak Remaining Useful Life Program
- Corrosion failure analysis of oil pipelines
- Corrosion failure investigation of water heater
- Heat exchanger materials failure analyses
- Titanium, aluminum, and copper alloy corrosion studies
- Corrosion litigation support for domestic plumbing systems
- MIC management program review of steel piping cooling water system
- Materials selection consulting with the Electric Power Research Institute (EPRI) service cooling water working group
- Microbiological-influenced corrosion failure analyses
- Cooling water corrosion monitoring systems
- Corrosion evaluation program for geothermal steam supply system

EDUCATION AND PROFESSIONAL BACKGROUND

- M.S. (Metallurgy), University of Illinois (1966)
- B.S. (Metallurgical Engineering), University of Illinois (1965)
- Registered Engineer, Corrosion, California, No. CR349
- Registered Engineer, Manufacturing, California, No. MF1096
- Member:
 - Alpha Sigma Mu, Honorary Metallurgy Fraternity
 - American Society of Mechanical Engineers
 - American Society for Metals
 - National Association of Corrosion Engineers
 - American Waterworks Association

SELECTED REPORTS, PUBLICATIONS, AND INVITED LECTURES

Review of ICI Canada Inc. Fragments, APTECH Report AES 99123862-4-1, with K. Clark (April 2000).

Clover Bar Unit 1 Life Assessment - Phase II Inspection and Test Plan, APTECH Report AES 98023322-2-1, with K. Ecoffey, et. al. (July 1999).

Materials Selection for Alkylation Depropanizer Receiver, APTECH Report AES 97043017-3 (June 1997).

Investigation of Clear Lake Hydro Seal Failure, Yolo County Flood and Irrigation District, APTECH Report AES 96072800-4-2, with S. Nelson and R. Moser (October 1996).

Boiler Tube Failure Root Cause Identification and Mitigation Program, APTECH Report AES 96062777-2-1, with S. Nelson (August 1996).

Inspection of Evaporator Tube From No. 1 Capitol District Building Chiller, APTECH Report AES 96022676-4 (July 1996).

Investigation of Scrubbed Coke Oven Gas Pipeline Leak at AK Steel Middletown Works, APTECH Report AES 96022675-4-2, with C. Lee and K. Clark (May 1996).

Examination of Plastic Chuck Assembly, APTECH Report AES 96042732-5-1 (May 1996).

Materials Selection for Debutanizer Overhead Receiver, APTECH Report AES 96012636-3 (April 1996).

Metallurgical Analyses of Unit 5 Concentrator and Absorber Tubes, APTECH Report AES 96022653-5 (March 1996).

Boiler Tube Failure Reduction Program Phase I, Final Report, APTECH Report AES 95082505-2-9 (November 1995).

Hydrazine Chemistry for Pressurized Water Reactor Secondary Systems and its Application to Palo Verde Nuclear Generating Station, APTECH Report AES 94062216-1-1 (August 1995).

MIC Failure Analysis, Materials Performance, Vol. 33, No. 4 (April 1994).

Review of Existing Program for Evaluating the Integrity of Fiberglass Reinforced Plastic Pipe in the Circulating Water and Service Water Systems at the Perry Nuclear Power Plant, APTECH Report AES 93122083-1-1 (February 1994).

Chemistry Review of Lower Colorado River Authorities Sim Gideon Generating Station, Units 1 and 2, APTECH Report AES 92121821-2-1 (January 1993).

Sea Water Cooling System Remaining Useful Life Pilot Study APTECH Report AES 91121573-3-1 (August 1992)

Improvement in Check Valve Reliability by Integrity Analysis of Internals, EPRI Valve Technology Symposium, Charlotte (August 1990).

Progress Towards On-Line Surveillance of Corrosion Behavior in Service Water Systems, EPRI Service Water System Reliability Improvement Seminar, Charlotte (November 1989).

Microbiologically-Influenced Corrosion Failure Analyses, Materials Performance, Vol. 27, No. 3 (March 1988).

Metallurgical Investigation of Low Pressure Feedwater Heater 1 at Puerto Rico Electric Power Authority's Palo Seco Steam Plant Unit 3, APTECH Report AES 8610715-2-2 (September 1987).

Waterwall Tube Failures at Orange & Rockland Utilities Lovett Generating Station Unit 5 Boiler, APTECH Report AES 8701737-2-1 (April 1987).

Planning and Conducting Microbiological-Influenced Corrosion Failure Analysis, NACE Corrosion '87, San Francisco, California (March 1987).

The Effect of Heat Treatment on the Corrosion Resistance of High Alloy Stainless Steel and Nickel Base Alloys, Materials Performance, Vol. 25, No. 12 (December 1986).

Residual Life Assessment of Major Light Water Reactor Components, Nuclear Regulatory Commission, Research Report CR-04731 (August 1986).

Planning and Conducting Life Extension Programs, EPRI Life Assessment Conference, Washington, D.C. (June 1986).

Corrosion Failure Analyses, EPRI Workshop on Microbe-Induced Corrosion, Charlotte, North Carolina (May 1986).

Effect of Simulated Hot Roll Cladding Heat Treatment on Corrosion Resistance of High Alloy Stainless Steel and Nickel Base Alloys, NACE Corrosion '86, Houston, Texas (March 1986).

Guidelines for Design of Balance of Plant Systems, EPRI Steam Generator Owners Group, Annual Report (December 1983).

Review of Secondary Systems Materials Design and Water Chemistry of Diablo Canyon Unit 1, Bechtel Corporation, Report T1002/50 (April 1983).

Steam Surface Condenser Leakage Study, ASME Joint Conference on Structural Considerations of Nuclear Components, Denver, Colorado (June 1981).

Weldability Evaluation of Several Precipitation Hardening Austenitic Stainless Steels, Sandia National Laboratory, Report SLL-73-0023 (August 1973).

Development of Modified A286 Austenitic Stainless Steel, Sandia National Laboratory, Report SLL-73-0024 (August 1973).

The Protection of Beryllium in a Salt-Moist Environment, Lockheed Missiles and Space Company, Golden Gate SM Conference, San Francisco, California (February 1970).

ADDITIONAL INFORMATION

For more information regarding APTECH's personnel and services, please contact our Corporate Headquarters in Sunnyvale, California (USA) at (408) 745-7000 or visit our website (<http://www.aptecheng.com>).