Global Environmental Operations, Inc.

This is a brief list of some of the courses I have taught with some examples of their content

Remediation (I have a book on the subject)

INDUSTRIAL SECURITY (based on my new book_- Details below)

Water Treatment (have a book on the subject)

Safety (both OSHA and British Systems)

ISO 14000 (all areas)

Chemical Engineering for non-Engineers

Cooling Towers

Machine Failure Analysis

Industrial Security (I have a book on that subject about to be published by John Wiley in March-2015)

Disaster Management & Incident Command

Lockout/Tagout

Laboratory Management

Boiler & Fired heaters and their Operations

Nuclear Safety

Valves

Bearings

Wastewater Treatment Plant Operations

Sequencing Batch Reactors for Wastewater Treatment

Wastewater Treatment Plant Modeling

Wastewater Treatment Microbiology

Incident Command System

Gas Sweetening

LNG Recovery and Fractionation

Multiple Project Management

Water system design, Pumping Station, and modeling

Hazardous Wastes, Hazardous Materials, and their Transportation (note I may be teaching this course in Dubai in November, 2014 for WWBC)

Drinking Water System modeling

Petroleum Surface Facilities

Movement and Storage of petroleum in pipelines

Process Safety Engineering

Multiple Project Management

Oily Water Treatment

Concrete Repair

Desalination

Contingency Planning

Environmental Managemen

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Global Environmental Operations, Inc.

Outline for Remediaton Course:

Based on "Remediation Manual for Contaminated Sites" by David L Russell, PE

I Introduction, Regulatory Framework, Specific Remediation Challenges, Exploration Specifics, Alternative cleanup Systems, Soil Treatment, Groundwater Treatment, Summary of Treatment Options

II Data Requirements: General Site Exploration Program & Requirements; Chemical Measurements; Non-well subsurface exploration; Data required for biological remediation; hydrogeological information requirements.

III Remedial Options: Associated Challenges; Trenches and Drains; Wells; Pumping Systems; Total Fluid vs. Recovery Pumping; Strippers and Aerators; Carbon Adsorption; Biological Treatment & Bioremediation; Solidification; Soil Venting

IV Costs of Remedial Activities- Case Histories and Cost Data

V Biological Remediation: Basics; Cellular Chemistry; Aerobic vs. Anaerobic Remediation; Cometabolic Treatment; Mycoremediation

VI Exploration Notes and Techniques: Direct Techniques; Indirect Techniques; GPR; EM Techniques; Horizontal Wells; & Other

VII Landfills, Brownfields, Barrier Walls, and Bottom Sealing

VIII Summary

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Outline for Water Treatment Course:

I Introduction: Water Composition, Properties of Pure Water; Principal Ions & Measurement methods; Water Quality; Legal Basis for Control; Sample Problems

II Effects of Pollution: Oxygen Depletion & Oxygen Uptake in a Stream; Biology of Polluted Water;

III Flow Measurements & Open Channel Hydraulics

IV Sampling and Statistical Considerations

V Important Concepts from Aquatic Chemistry: Important Chemicals in Water; Carbonate Chemistry; Metals in Water; Nitrogen; Sulfur; Phosphorous; Chromium Treatment

VI Elements of Biological Treatment: BOD, COD and Solids; Suspended Solids, Biological Growth Concepts; Activated Sludge Systems; Biological Treatment of Difficult Wastes; Modeling the Biological Process; Activated sludge models and Modeling the Waste Treatment Works

VII Precipitation and Sedimentation: Sedimentation Theory; clarifiers & their design; Lamellas and Specialty systems

VIII Filtration Theory and Practice: Depth Filters, Skin Filters, Hydraulics of Deep Bed Filters & Washing; Filter elements and design

IX Disinfection: General Principles: Rates of Kill, & Parameters; Chlorine; Ozone, UV Light, Other compounds

X Nitrogen Removal: Nitrogen Chemistry; Ammonia Toxicity; Nitrate and Nitrite; Removal Techniques; Nitrogen Removal Systems; Mixed Media and Attached Growth

XI Phosphorous Removal: General; Biological Phosphorous Removal; Chemical Phosphorous Removal

XII Anaerobic Digestion

XIII Micro/ Ultrafiltration: Introduction to Membrane Separations and MicroFiltration

XIV Reverse Osmosis; Membrane Theory; Membrane Selection; Materials of construction; RO Designs; Design Parametert

XV Carbon Adsorption: Chemical Kinetics; Langumir Equation, Freundlich Equation; Physical Coefficients; Selectivity Coefficients; Design Considerations

XVI Ion Exchange: Resins; Selectivity; Coefficients of Selectivity; Design Considerations

XVII Dissolved Air Flotation & Techniques: Design Basis for DAF, Operating Parameters; Electroflotation and Electrocoagulation;

XVIII Coagulation, Flocculation: Introduction; Flocculation and Mixing;Practice; Modeling

IXX Waste Topics: Oily Wastes, Blood Wastes; Milk Wastes; Refinery Wastes, Metal Plating Wastes; Starch Wastes; Phenols and Chemical Plant Wastes; Small Waste Flows

XX Final Thoughts.

Safety

I Basic Concepts in Worker Safety: Regulatory Framework; Types and Areas of Safety

II Construction Safety: Lift and Fall Protection; Trenches and Excavation; Striking Incidents; Electrocutions; Confined Spaces; Dusts; Temperature; Adequate Hydration

III Basics of Exposure: TWA; IDLH; Respiratory Protection; Physical Exposure; Toxicology and Chemical Exposure;

IV Elements of Protection: Equipment Selection; Clothing; Gloves; Boots; Coveralls; Types of chemical protective Suits; Levels of Protection A-D

V Fit Testing Respirators & Field Exercises & Equipment

VI SDS and Warning Labels

VII Emergency Response Organization

VIII OHSAS 18000

ISO 14000

I Introduction and Framework: Terms and Definitions; Structure of ISO 14000; The Environmental Management Systems Approach; Continuous Improvement; Recordkeeping

II Environmental Policy and Objectives: What is the Environment?; How to protect it;

III Processes, Procedures and Practices: Who, what, why, where, when and how; implementing the system

IV Organizational Models & Barriers & Commitments: How to involve top management; Practical exercises in writing procedures and policies

V Quality Control and the Role of Sampling and the Laboratory: Test, Test, Test; Check and Double Check; Setting reasonable standards for compliance

VI The Audit Function & Deficiency Checklists: Role of the Auditor; Role of the Certifying Agency

VII Managing the environmental audit: How to accomplish it; planning; accomplishing the audit; what to review; Audit Scope and Team; Keys to a Successful Audit

VIII Documenting the Results: What does it mean?

IX How does the audit translate into continuous improvement?

X Field Exercise and Practical Examples

Cooling Towers

I Cooling Tower Fundamentals: Types of Towers; Parts of a Cooling Tower; Determining water flow rates and temperatures; Heat rejection; Forced vs. Natural Draft Towers; Elements of Psychometry; Wind Loads, Tower Heat Transfer; Performance Factors

II Critical Parts of a Cooling Tower: Tower Fill Area; Spray, Splash and Film Fills; Structural Frame; Material Types: wood, vs. Steel, vs Galvanized Steel, vs Aluminum vs, Stainless Steel, vs. Composites, vs. Fiberglass; Water Distribution; Basins; Louvers, Fans, Motors, Drives, Gears, Belts, Bearings, Pumps

III Tower Configuration and Application: Counterflow vs. Crossflow; Mechanical Draft vs Natural Draft; Tower Placement; Condensers & multi-cell towers;

IV Practical Considerations of tower design and performance: wet and dry bulb considerations; grillage; piping, drains and Make up Water; Fan Speed Controls; Operating Safety Controls, Pump controls.

V Chemicals, Storage and Safety: Types of towers matched to chemicals used; Importance of Passivation of towers & corrosion protection for various materials: Safe Handling of Chemicals

VI Special Considerations: Plume Control & Drift; Fire Protection; Noise and Vibrations; tower specialty considerations

VII Tower Operation and Maintenance: Lubrication; Cleaning; increasing tower performance; overall operation of the tower

VIII How to buy a cooling tower: Specifications; white rust on galvanized towers; Contract water treatment; important parameters for self water treatment

IX How to test a cooling tower: Performance Criteria; Acceptance/Rejection Testing

X Some Important Tower Specification Pointers & Data

Machine Failure Analysis & Preventive Maintenance

I Understanding Maintenance: Organizations' Objectives; Quality, Profit, Satisfaction, Performance. Maintenance & PM; Cost Factors, Direct, Standby, Lost Production, Degradation; Definitions include Reliability and Maintainability.

II Policy and Procedures: Their impact on Maintenance & Performance

III PM Tradeoffs: Tradeoff Between Repairs and PM, PM Details, CLAIR (Clean, Lubricate, Adjust, Inspect, Repair); Cleaning; Wear; Lubricate & Lubricants; Storage and Warehousing Issues: Indoor vs. Outdoor storage; Equipment Protection; Order and Organization; Shelf Life

IV Predictive Maintenance: "Condition-Based Maintenance"; Monitor & trend; Detect onset of equipment deterioration; Diagnose the condition; Trend its progression over time; Predict when ultimate failure will Occur; Allow time for maintenance planning; PdM tools; Advantages & Disadvantages; Provides information to perform a Root Cause Failure Analysis (RCFA)

V Vibration Analysis: Pumps; Motors; Compressors; Gear Boxes; Engines; Failures Detected; Ultrasonics & Limitations

VI Thermography: Air leak identification; Steam trap leaks; inexpensive new equipment $400 or less; Uses; Applications; case histories

VII Oil Quality Analysis: 50% of bearing failures are lubrication failures; Lubricant condition; Lubricant/Oil system condition; Machine condition/Machine wear; Failures Detected by Oil Analysis; The Benefits of Oil Analysis; Taking the Oil Samples; Frequency & Information requirements

VIII Types of Loading & Shaft Failures; Bending, Static; Ductile failures; Brittle failures; Metal fatigue; Corrosion; Wear; Creep;

IX Root Cause Failure Analysis; Collection of Data; Required Steps for RCFA; Who, What, Where, When, Why and How; Five P's of Root Cause Failure Analysis ; Tracking for Results

X Specific Considerations: Threaded Fastener Failures; Bolted Joint Failures; Rolling Element Bearing Failure Analysis; Hydrodynamic Bearings;

XI Gears Failures: Statistics: Wear; Polishing; Corrosive Wear; Interference; Pitting; Plastic Flows; Tooth Breakage; Random Fracture;

XII Recordkeeping ad Management Programs

Outline for Security Course

Security Risk Assessment and Management

I Introduction & Definitions: *Incident; Risk Management; Incident Command System; Attack; Agents; TWA, TLV and IDLH; LD_{50}; PPE; Reliability and Fault Tree Analysis Software; ALOHA;* Security Risk Assessment; "D's" of Security"; Security Equation;

II Recognition of Threats, Consequences and Vulnerabilities: Street Calculus; Security Risk Assessment Structure; Threat Assessment; Vulnerability Assessment; Risk Analysis; Upgrade Recommendations; Re-evaluation of Risks; Security Risk Assessment Flow; Prioritizing Adverse Consequences to Avoid; Types of attacks & Weapons; Remote Location Security

III Evaluation of Protection System Effectivity: Evaluation of the Company's Physical Protection Systems' Effectiveness ; Development and Implementation of Practical Risk Reduction Options; How to conduct a Physical Security Audit; Risk Assessment Methods; Discussion and Application of Fault Tree, RIDM, Bow Tie Analysis; Other Statistical Methods

IV Detailed discussions on Risk Assessment Methods with Examples; Fault Tree Analysis; Department of Homeland Security; Vulnerability Analysis Systems; ▪ DHS Approach to Chemical Safety & Security; Security Vulnerability Assessment; Requirements; Process Hazard Analysis

V Security System Design: Agressor Tactics which must be defeated; Electronic Security System Design; ▪ Security System Sensor Types; ▪ Exterior Sensor Types; ▪ Access Control; ▪ Employee Screening; Security Forces; Cargo Security; Port Security Systems; Security Threat Level Factors

VI Communications & Cyber Security: Cyber Security; Risk Management Cycle ; Risk Assessment Process;▪ Risk Assessment Matrix; Organisational Approach to Security ; Assessment; ▪ Fixing Cyber Security; ▪ Cyber Security Recommendations;▪ Cyber Security Tools

VII ▪ Organizational Management: Managerial Duties; The Security Organization; SQUARE; Crisis Mode; Security Management Staff; Security Management Techniques ;▪ Maintenance Factors and Motivators; Techniques for Relieving Stress; Budgeting; Bad Management Traits;

Disaster Management and Incident Command System:

I Disasters Come in Many Forms: Some Likely Scenarios; Examples including Buncefield, Chernobyl, BP Texas City, Love Canal; Ecuador; Love Canal & Others; Cyber Attacks; Fire; Explosion; Chemical Spill; Gas or Liquid Release; Transportation Accident;

II Risk Assessment and Probabilities: What is Risk Assessment?; How do we monetize the Risk; What types of Risks should we plan for?; Incidents defined; How to develop a realistic Risk Assessment Plan; Committees and their Composition; the ISO Model: Plan, Do, Act, Check;

III Governmental Agencies and their Approaches to Disaster Management: FEMA; Preparedness Guides; Inventories; DHS Disaster Recovery Guide; the UK Approach; Disaster Recovery Planning and Audits.

IV Audit Tools, Assessment Tools, Hazard Tools: Prepositioning and Preparedness Guidance; Budget Constraints; Exercises; When does a Disaster Start?; When is it over?; The Role of various in-house functions: Legal, HR, PR; Consulting Resources

V Incident Command System: Organization, Command Structure, Role of each department, responsibilities, Commander duties, Role of the plant & security forces; when to declare and when to end an incident, Role of the LEPC examples of good and bad command situations

VI How to Write an emergency response plan: Plan Fundamentals; Red Tab Section; Plan Organization; Developing Scenarios; Communicating with outside agencies/groups; Coordinating responses, Using Software to develop scenarios; Training personnel on the software; Prepositioning Supplies; budgets vs likely scenarios

Lockout/ Tagout

I Introduction and General Safety Considerations: Why Do Accidents Happen?; short term profitability and denial of risk potential; External forces; When most incidents occur; Why Accidents Happen; Hierarchy of Control; Behavioral Safety Iceberg; Examples of Codes and Standards; Regulations Government and local; Company Safety Policy; Elements Safety and Health System; Safety inspections; Work environment monitoring;

II General Safety Considerations: Hazard Categories; General Hazards; Health Hazards discussed by type; Isolation Safety Scheme-Steps

III Chemical Fire and Explosion Hazards: Detailed discussion of Hazmat Examples; Safety Data Sheet and how to read; Sources of information for hazards; Toxicology; Reactivity, Energetic Reactions; Preventive Measures

IV Emergency Isolation: Discussion of methods and techniques; type of valves; types of actions; Automatic Valves; Relief Valves; Rupture Disks; Manual Valves

V Electrical Hazards and their Classification: Types of Hazards; Effects on the body; Arc Flash; Electrocution;

VI Confined Space Hazards: Defining a combined space; Confined Space Hazards; Monitoring equipment, safety procedures, positive ventilation, explosive atmospheres

VII Mechanical Hazards: Machinery & Equipment: Typical Machine Hazards; Cutting, Shaping, Boring and Forming; Grinding, shearing, turning, punching; bending, drilling and rolling; Power Transmission; Other moving parts; *Flywheels, Couplings, Pulleys, Cams, Spindles, Belts, Chains, Cranks, Sprockets, Gears, Shafts;* Rods; Other moving parts; Safeguarding Strageties;

VIII Safety "Atlas": Identifying types of things which are hazards; How Big is the Hazard; Consequences;, Identifying frequencies and likelihoods; Cost of Prevention; HIRA Procedures; Tools for Safe Design; HAZOP Studies on several industries; HAZOP Incident Examples

IX ZERO Energy State and it's importance: OSHA's CFR 1910.147 and ANSI Z244.1 Standards & their requirements

X Categories of Hazardous Energy: Definitions; Tagout definitions; Key Elements; Employees; Procedures; Categories of Hazardous Energy

XI Energy Control Program; Written Procedures; Preparation for shutdown; Shutdown; Equipment isolation; Application of Lockout/Tagout devices; Release of stored energy; Verifying equipment; isolation; Written Procedures; Successes and Failure Analysis

XII Lockout/Tagout Procedures: Examples and Analysis

XIII Personnel Training: OJT vs Classroom; Advantages vs. Disadvantages

XIV Program Auditing: Good vs. Bad Practices; Try to catch an employee doing something right!; benefits; Setting up an Audit; How to Audit

XV PSM: How to conduct a Process Safety Management Audit: Developing Operating Procedures; Startup and Shutdown Procedures; Deviation and return to normal operation; developing safe work practices; Control over entrance into a facility by maintenance, contractor, laboratory, or other support personnel ; Hot Work Permits; Mechanical Integrity; Inspections and Testing; Employee Responsibilities;

Laboratory Management

Section I Introduction: The ISO 17025 standard is comprised of 5 elements; Scope Normative References ;Terms and Definitions ;Management Requirements; Technical Requirements ; Achieving Management Requirements and Technical Requirements lead to certifications

Section II Management Requirements: Organization; Quality system; Document control; Review of requests, tenders and contracts; Subcontracting of tests and calibrations; Purchasing services and supplies; Service to client; Complaints; Control of nonconforming testing and/or calibration work; Corrective action; Preventive action; Control of records; Internal audits; Management reviews

Section III Technical Requirements: - General; Personnel; Accommodation and environmental conditions; Test and calibration methods and method validation; Equipment; Measurement traceability; Sampling; Handling of test and calibration items; Assuring the quality of test and calibration results; Reporting the results

Section IV Laboratory Information Management Systems (LIMS): Work Flow; Smart Laboratory; Informatics & Automation; Advantages of a LIMS; Appplication and Trends; Thick Client, Thin Client and Web enabling; Electronic Lab Notebook; Execution and Management Systems (SDMS)

Section V LIMS Selection: LIMS Process of Selection; Customization; LIMS Scripts (LIL) vs. Gt-LIMS; Network Bandwidth; Redundancy; Access; Security; Ease of Use; Costs

Section VI Preparing for LIMS: Work Flow Mapping; Why we do what we do in the lab- Custom, Evolution, Extensive Quality Control; Re-Design and Optimization; Capture Data at Origin; Balancing Date Requirements and Volume and Instrument Use; Data Reliability; Computer Hardware; IT and Security Issues; Lab Data Policies and Retention; Business Case Development; Human Factors; Implementation Planning and Plans- the group approach; Aligning the LIMS with your Business Model;

Section VII Data Validation: Why it's important; Significance; Documentation; Data Validation Plan; Project Plan; User Requirements; Vendor Audit Reporting; The Purchase and Installation of the system; Software Specifications; Installation and Qualifications; Configuration and Data Migration; Service Agreements and Maintenance

Section VIII Case Study

Boilers & Fired Heaters & their Operations:

Section I Introduction & Objectives: Heat Transfer Principles Modes & Equations; Conduction; Convection; Radiation; Heat Transfer Coefficients; LMTD; Transfer Barriers; Condensation Dropwise and Filmwise ; Example- transfer through a plane wall

Section II Steam and its Properties: Properties of Steam; Steam Defined; Latent and Sensible Heat; Enthalpy; Entropy; Saturated vs. Unsaturated Steam; Steam Diagrams & Tables

Section III Fouling & Resistance Factors

Section IV Heat Exchangers- Types and Configurations: Basics of Heat Transfer; Main Type of Exchangers; Best configuration for an application; Theoretical Analysis; Local and Mean Values, Overall Values and Resistances; Thermal Efficiency; Recuperators/ Regenerators; Types & Arrangements; Cooling Towers;

Section V Heat Exchanger Selection: The Steps & Suitability Determinations; Plate & frame Advantages and Disadvantages; Double Pipe- Advantages and Disadvantages; Normal; Shell and Tube- advantages and disadvantages; Plate & Fin Advantages and Disadvantages; Costs and Cost Factors; ESDU Cost Approach

Section VI More Detail on Shell and Tube Heat Exchangers: Detailed look at S & T exchangers and their types, including tube arrangements, baffles, heads, etc.

Section VII Heat Exchanger Design: Detailed Design considerations, including pressure drops, bypass, Crossflow Coefficients, etc.

Section VIII Inspection of Heat Exchangers: Preliminary Considerations and Safety; Protocols; non-destructive testing protocols; Organization & Style; Codes, Standards, Drawings, Details, & Conditions of Exchanger; Bolting, Joints, Parts, Plugged Tubes, Pressure Testing & Media for testing, Documentation; Inspection and Repair during shutdown & unplanned outages;

Section IX Overview of Boilers and Boiler Systems: Types of Boilers- Water vs. Fire Tube Boilers; Operating Principles and Types; Water Wall & Steam Boilers; Boiler Horsepower Ratings; Burners, Superheaters & Reheaters; Fuels and Boiler Operations; Turndown Ratios; Fuel Oil Trains & Operating Pressures; Boiler Instrumentation & Controls- Flow, level, pressure, temperature, and Analyzers; Combustion Safeguards; Checklists; Drying out the boiler; Startups; Shutdown; Air Pollution Control and Operating factors; Steam Traps

Nuclear Safety:

Section I Radiation Basics: Types, energies; natural vs. manmade; Radioactive Decay and Half Lives; Ionizing vs. Non-Ionizing Radiation; Alpha, Beta and Gamma Radiation specifics; Decay Mechanisms; X Rays; Radiation and Body Interactions; Energies

Section II Radiation Units & Measurement Terminologies: SI Units and Prefixes; Old vs New measurement and exposure standards; Dose and Dose Equivalent Factors; Conversions, Equivalents and Half Lives;

Section III Biological Effects of Radiation Exposure: Recognizing the Hazards; People affected to Radiation; Prompt Effects: Sensitivity of tissues; Direct vs. Indirect Actions; Terminology- Acute vs. Chronic Exposures; Blood Effects & Prodromal Stages & Illnesses; Dosages; Effects; ALARA Philosophy;

Section IV Radiation Dose Limits and Dosimetry: Radiation Protection Goals; Develop acceptable risk with derived benefits; Protection Objective; Exposure Routes; Dose Limits; Occupational Exposures; Radiation Detection & Monitoring- Survey meters, dosimeters, & Counters; What they measure; Operational monitoring & procedures;

Section V Radiation Monitoring and Dose Limits: Early Protection Recommendations; History of the forerunners of the IAEA; Who Needs to be Regulated; Byproduct, Source, Special nuclear material. NARM. & NORM; Federal laws & regulations; Radwaste;

Section VI Measurement Techniques: Personnel Training; Exposure Control; Types of Contamination and Monitoring Devices, particulate and gas monitors, record retention requirements; Detection & Measurement; Dose Rate Meters; Effect of mixed radiation fields; Survey Meter Characteristics; Calibration of Survey Meters;

Section VII Industrial & Medical Radiation Sources: Industrial Radiation Sources & Types; NORM, NARM; Detailed and Extensive Discussion of various sources and types of Radiation Sources; (subject has about 75 pages of discussion of types)

Section VIII Contamination and Control Limits: Daily Monitoring; Survey Meters for Contamination; Monthly Surveys; Areas to Monitor; Reporting; Example of a survey; Surveying for Removable Contamination; External Contamination Sources; Internal Contamination Sources; Contamination Control & Prevention; Security; Labeling and Identification

Section IX Airborne Contamination and Internal Dosimetry: Airborne Radioactivity; Internal Dosimetry; Absorbed Dose; Calculating Absorbed Dose; Dose Rate & Calculating Dose Rate& Effective Dose Equivalent;

Section X Posting for Radiation & Radioactive Materials: Discussion and listing of various types of Radiation warning symbols, signs and types

Section XI ALARA (As Low As Reasonably Achievable) Standards: ALARA = Dose Limitation; ICRP, & IAEA limits; justification and recommendations; Unjustified Exposures; ICRP Recommendations; ALARA Dose Limitation; Basic Protection Principles, Time, Distance, Shielding; Internal Exposure Protection- Inhalation, Ingestion, absorption & protection methods.

Section XII Worker & Management Responsibilities: Responsibilities of registrants, licensees & employers; Documentation, Policies, Procedures, Monitoring and Control, Suitable and Adequate Facilities; PPE; Training; Responsibilities of Workers- Abstain from injurious actions, Follow Procedures & Training, Responsible Behavior; Optimization of Protection; Appropriate Measures and Systems; Safety Surveys; Feedback.

Section XIII Design and Safety Assessments: Hazard Protection Principles – Remove & protect; Protection from External Hazards & Internal Hazards; Procedures for Field Work – X Ray, Unsealed Sources, Gamma Sources; Safe Storage Facilities; Area Classification Principles and Practices; Safe Handling of Equipment, Sources, X Ray Machines; Leak Testing & Checks; Maintenance

Section XIV Radiation Protection Programs: Detailed Discussion of Elements and practices of a Radiation Protection Program including Plans, Audits, PPE, Work Practices & Controls; Designation of Controlled Areas; PPE, Monitoring Programs & Forms; Recordkeeping, Management Responsibilities, Medical Program, Employee Moonlighting & Management

Section XV Detailed Discussion of Environmental Monitoring and techniques. Reporting, monitoring equipment, operation of equipment, Regulatory Response, Contamination Pathways, Source Monitoring, Individual Monitoring Programs and Setting up general environmental monitoring programs.

Section XVI Purchasing, Receipt & Disposal of Radiation Sources: Purchasing; Basic Information; Radiation Worker; Radiation Protection Program; Administrative Control Measures; Local regulations; Handling; Work area; Management requirements; Receipt of Rad. Sources; Authority to import; Approved packaging; Identification Packaging and Documentation; Disposal;

Section XVII Transport of RAM, Radwaste Management, & Emergency Planning and Response: Discussion includes examination of IAEA regulations on transport and newly codified EU and US transport regulations, location and transport and disposal of radioactive waste materials to secure and acceptable disposal sites, and a practical outline for Emergency Response to an incidents of various types.

Valves

Section I Control Valve Theory: What is a control Valve?; Energy & it's control; Control Valve innards; Basics of Valve Selection; Classification of Valves ; Choked Flow & Cavitation

Section II Types of Control Valves: Linear vs Rotary; This section contains a detailed discussion of the various types of linear and rotary control valves with exploded diagrams of their innards and operation and is supplemented with manufacturer's literature

Section III Valve Characteristics and Trim: Guide to selecting characteristics and trim on the innards of the valve, and a practical guide and discussion of the characteristics and hydraulic forces affecting the valve. In this section there is also an extensive discussion of control loops and items such as cavitation, pressure, control and noise control trim on control valves;

Section IV Control Valve Sizing: Control Valve Theory; Recovery Factor; Explanation of ISA-75 and IEC 60534-3-1 (2000-02); Factors affecting valve sizing, fluid, flow rate, pressure drop, etc.; Defining the Cv; Standard Sizing Equation; Simplified Sizing Equation; examples; comparison of valve types

Section V Manual Valves: Rotating Valves, Sliding Valves, Flexible Valves, Stopper Valves; Classification of Ball Valves; Analysis of Body types for Ball Valves; Butterfly Valves; Stopper Valves, Sliding Gate Valves; Classification of Gate Valves, and Sliding Valves; Section includes analysis of appropriateness of each type of valve.

Section VI Actuators and Positioners: Discussion includes detailed discussion and analysis of type of actuators, linear, rotatory, Positioners, and Actuator Forces, and Fail Safe Systems.

Section VII Check Valves: Introduction, Operational Detail, Main types of Check Valves; Selection Criteria; Types of check valves include- lift check, swing check, split disk check; diaphragm check valves; and nozzle check valves; Check Valve Selection Criteria- slamming characteristics, head loss, cost, applications

Section VIII Pressure Relief Valves: Principles of Operation; Types; Functioning; Rupture Disks; Back Pressure Valves; Safety Relief Valves; Pilot Operation of PRV's; Troubleshooting Analysis; Case Studies

Section IX Fire Safe Valves: Often required in refinery and petroleum applications; Requirements; Design of Fire Safe Valves; Seals, leakage, standards and testing; Examples

Section X Selection of Control Valves: Design Criteria, and functions; Materials of Construction; Selection Guides; Comparison of Applications; Actuator Consideration, Price Comparisons; Valve Sizing programs.

Section XI Materials of Construction: Standard, Special, and Advanced materials of construction, properties, requirement, and linings.

Section XII Valve Sealing, fugitive emissions, air pollution estimates, equipment standards, design parameters for sealing systems; Valve Stem packing designs and improvements; Analysis of the causes of leaks, Packing & Packing Glands; Live Loading

Section XIII Process Considerations: End connections, Face to face criterial, Materials Selection Criteria, Modes of Failure, Leakage Rates

Section XIV Valve Maintenance and Operating Issues: Maintenance; Installation; Troubleshooting, Corrosion, Galling

Section XV Valve Failure: Water Hammer, Noise Effects; Noise Attenuation; Fugitive Emissions.

Section XVI Control Valve Failures: Physical Failures, Velocity Problems, erosion; Cavitation & Erosion; Abrasion and Erosion; Noise, Vibration

Section XVII Cryogenic Valves: Discussion of special requirements for cryogenic valves

Section VIII Practical Examples of Valve Selection Criteria, Class exercise

Bearings. Couplings, Mechanical Seals Clutches, Gears and Shaft Alignment

Section I Bearings: Classifications and Types; Sliding Bearings; Rolling Bearings; Hydrodynamic Bearings and Lubrication; Advantages and Disadvantages of each type; Anti-Friction bearings (ball, roller, & needle); Ball bearings vs Roller Bearings and types of each including advantages and disadvantages; Bearing Failure Analysis; Failure Modes

Section II Lubrication Principles: Boundary Lubrication; Hydrodynamic Lubrication; EHL; Factors Affecting Lubrication; Selecting the right lubricant

Section III The role of Additives in Lubrication: Functions of an Oil; Why Additives?; Common Additives; Modifiers; Viscosity Improvers (VI); Pour Point Depressants (PPD); Seal-swell Controllers; Oil Protectors; Anti-oxidants; Metal De-activators; Anti-foam Agents; Surface Protectors; Anti-wear additives; Corrosion Inhibitors; Detergents; Dispersants; Friction Modifiers

Section IV Gears & Gear Boxes: Spur gears. Helical gears, Bevel gears, Worm gears, Open gears; Lubrication of Gears; Gear Lubricant Selection; Resources for Lubricant Selection; Viscosities of Lubricants; Lubricant Selection; Causes of Gear Failures; Analysis & Classification of Failures

Section V Clutches & Couplings: Types of clutches- hydrodynamic and Friction; Functions of a clutch; Cone, Single Plate, Mulit-plate, Semi-Centrifugal, & Centrifugal Clutches- their purpose and operation; Includes a detailed discussion of the functioning of each type of clutch and exploded diagrams and video supplement materials;

Couplings: Types of couplings: Torque considerations; Alignment & Mis-alignment of shafts; angular, vertical and horizontal; tolerances for most couplings; Guide to selection of various types of couplings;

Section VI Mechanical Seals: Seal Basics; Packing & Glands; Self-adjusting; Packing vs. Mechanical Seals; Mechanical Seal Basics and Detailed Analysis of components; Primary and Secondary Seals and rules for installation; Types of materials and seal facings; Detailed analysis of rings, and ring designs; Tertiary Seals & Design and Operation; Seal Maintenance & Operation; Other types of seals and their use

Section VII Shaft Alignment: General information; Flange preparation for alignment checking; Measurements; Correction calculation; Movement methodology; Shims; Flange Preparation for Alignment Checking; Verifying the alignment; Reviewing the alignment procedure; Re-alignment and checking on the vertical and horizontal planes;

Wastewater Treatment Plant Operations:

Section I Introduction: What's in the wastewater? Types and conditions; The tests; Characterization of wastewater; Flow characteristics and types of flows; Basic types of treatment Operations; The Activated Sludge Process and its Variations;

Section II The Treatment Plant Front End: Grit Removal; Primary Sedimentation; The Clarifier; Function of the various parts of the clarifier, Solids Handling

Section III Removing the Soluble Carbon Demand; Basics of BOD; Aeration Basics; How much air does it take to remove BOD, Ammonia?; Types and kinds of processes- Surface Aeration, Bubble Aeration, Jet Aerators; The Trickling Filter;

Section IV Secondary Clarifers: Design, Function, Types; Sludge Blankets; Hydraulic Surges; Maintenance; Sludge Collection; Wastewater Recycle; Effluent Quality; Tests & Measures of performance; Additives & Polymers

Section V Nitrogen and Phosphorous Removal: Theory; Practice; Chemical Addition; Biological Nitrogen and Phosphorous Removals; the importance of ORP; Operation of BNR & BPR systems; Operation Challenges

Section VI Sludge Collection, thickening, & disposal: Thickeners; Thickener Maintenance; Centrifuges- Disk and Solid Bowl & Maintenance; Polymer addition – Equipment, Making up the Polymers & Maintenance

Section VII Dewatering: The Filter Press- Theory, Operation, & Maintenance; Rotary and Drum Dryers- Theory, Operation, Maintenance; Performance results for dewatering equipment; Sand Beds and Greenhouses

Section IX Sludge Digestion: Theory of Anaerobic Digesters; Theory of Aerobic Digesters; Practical equipment details & construction; Digester Operation; Digester Maintenance

Section X Final Disposal: Landspreading; Landfilling; Composting; Incineration; Practical Tips on operation of each type of equipment; Landfill notes; Composting Plant Design Notes; Incineration Operation

Section XI Optional Material: Modeling the Wastewater Treatment Plant; Detailed discussion on models and their use, data requirements, problems and ability to predict operation upsets.

Microbiology of Wastewater Treatment

Section I Basic Microscopy: Historical Developments & Background; Types of Microscopes – Bright Field, PLM, Cross PLM, Dark Field, Dark Field vs. Light Field; Dark Field Variants, Kohler, Rheinberg; Phase Contrast Microscopy- Theory and Practice

Section II Wastewater Microbiology: Basics Taxonomy & Order of Biology; Types of Microorganisms, Bacteria, Protozoa, Metazoa; Viri, Parasites and Pathogens Worms, Nematodes, Fungi; Heterotrophs, Obligate Aerobes and Anaerobes, Facultative Organisms; Bacteria & identification and shapes; Parts of the Cell and Dye Staining; Spore Formers and Autotrophs; Psychrophilic, Mesophilic and Thermophilic Bacteria; Protozoa; Importance of Protozoa in Wastewater Treatment; Rotifers Identification and Classification & importance in wastewater treatment; Nematodes, identification & uses; Counting Chambers; Other Metezoa, Water Bears, Daphnia Magna, Helminth Ova; Dangerous Parasites in wastewater;

Session III Wastewater Microbiology Applications Relating Microbes to the Plant Operation: Identification of important microorganisms; Nitrifying Bacteria; Amoeba; Flagellates; Nematodes; Macro Population Dynamics; Competition and growth rates; Flavobacterium; Floc Formers & their importance; The Sludge Blanket and its application and use in wastewater treatment; SVI; Bulking Sludge; Staining Techniques for identification & types of stains; Types of identified organisms and their relation to operations; Scum control; BOD:N:P relationships

Session IV Identification of Filamentous Bacteria: What's Needed?; Slide Preparation; Filamentous Bacteria; Beggiatoa; Nocardia; Foaming & Bulking Types and Identification of Filaments;

Section V Troubleshooting Techniques & Helminth Ova; Review and discussion of Anaerobic Digester; Anaerobic Wastewater Basics; Membrane Bioreactors; Sequencing Batch Reactors, Secondary Treatment Videos.

Sequencing Batch Reactor

Session I Statistics and Operation: What do we measure?; How accurate are our measurements? What do the measurements mean?, How to spot trends;

Session II Sampling & Flow Measurement Techniques: Sampling; Direct Volume Measurement; Open Channel Flow & Measurement Devices; Indirect and Direct Flow Measurement; Area Velocity Meters; Sonic Flowmeters; Electro-Mechanical Systems; Pressure Drop; Flowmeter Calibration

Session III Laboratory Instruments and Testing- What Analyses do you need to perform?: BOD COD, TOC, TSS, VSS, TDS, MLSS Settlability, SVI Nitrogen Series Phosphorous Series Alkalinity Metals Chlorine Residual Dissolved Oxygen Oil and Grease pH (Detailed discussion about the tests and their significance)

Session IV Sampling- How to collect a sample under varying conditions; Where to sample; How much Sample do you need?; Sampling Checklist; Sampling Preservation;

Section V SBR Principles & Biological Treatment Basics: Walking through an SBR Plant; the components; Biological Growth Theory; Biological Treatment Principles; Operation; Biological Growth Principles; Monod Equation; The SBR Process; Troubleshooting: Other complimentary Processes, including Membrane Systems

Section VI Supplemental and fill in resources

Incident Command System:

Session I Introduction to the Incident Command System. What is the ICS? How does it work?; Detailed description of a typical incident; Basic Requirements and Enabeling Legislation required to use the ICS; Common Responsibilities; Planning for the Response; Key Decisions; Unified Command; Planning Staff; Command Staff; Operations; Organizational Guidance; Financial Organization; Direct vs. Remote Control & Field Offices

Session II Figuring out what Resources might be required: The value of the Planning Cycle; Planning and Scenarios; Planning and Scenario Tools; Other planning/training resources; Training of personnel & categories of trained personnel; Identifying Resources; Identifying available equipment; Identifying and cataloging all resources; Contractor and Outside Resources & Agreements; Contracting for Support & Response; Laboratory; Consumable Supplies; Safety Equipment; Sampling Equipment; Remedial Equipment; Booming Supplies; Pads & Absorbents; Clean & Disposable Drums;

Session III Coordinating with involved agencies: Phone lists & updates; Scope of Work and Cooperation; Areas of responsibility; How to Evaluate Outside Resources Required; Search and Rescue; Marine Resources; Equipment Required; Suppliers; Manpower Requirements; Training Requirements; Law Enforcement / Security; Environmental Monitoring; Casualty and Medical; Evacuation; Fire and Marine Fire; Public Relations and Information

Session IV Handling Hazmat/ Chemical, Biological, Radiological Materials: Waste Disposals; Tips on temporary or permanent storage; Recycling; Thermal Treatment; Landfilling; Composting; Nuclear Materials; Final Cleanup and Inspection; Equipment Decontamination ; Personnel Decontamination; How clean is clean?; When it the Emergency Over?; Follow up monitoring; Soil Sampling; Monitoring Wells; Other Concerns including bioassays; Project Closeout & financial concerns; How to handle fines and Damage to third parties

Session V How you set up an Incident Command System?: Discussion of the table of organization; Who commands what; The Role of the On-Scene Coordinator; Site Control & the command Center; Mobile Command Center? Vs Fixed Command Center; Establishing a perimeter; What's a safe distance?; The Buddy System of 3's; Training Requirements for all personnel; Safety Considerations; Basics of Contamination; IDLH & TLV ; Types of Protective Equipment; Selection of PPE Types & Equipment; Safety Concerns using PPE in hot climates; Donning and Doffing PPE; How to read a MSDS

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Conclusion