

# DACUM Research Chart for Class IV Wastewater Treatment Operator

## DACUM Panel

Stephen Elliott  
Wastewater Superintendent  
City of Marietta Wastewater  
Treatment Plant  
Marietta, OH

Rich Felton  
Superintendent  
Village of Sunbury  
Sunbury, OH

Gary Hickman  
Wastewater Plant Manager  
Jackson Pike Wastewater  
Treatment Plant  
Columbus, OH

Dan Ryan  
V.P., EHS&S  
Veolia Water North America  
Dayton, OH

Paul D. Sandstrom  
Retired Delaware County  
Sanitation Engineer  
Columbus, OH

## DACUM Facilitators

Andy Barienbrock  
Jessica Dingman  
Kirk Leifheit  
Christine Wagner, Team Leader

Sponsored by



Produced by



June 14-15, 2007

# DACUM Research Chart for Class IV Wastewater Treatment Operator

Duties		← Tasks			
<b>A</b>	<b>Manage Plant &amp; Collection System Operations</b>	A-1 Conduct plant and collection system “overview” via SCADA system	A-2 Conduct physical inspection of plant & collection system	A-3 Oversee laboratory data collection	A-4 Review laboratory data (see <i>Laboratory Data</i> list)
		A-11 Solicit feedback on plant & collection system status from O&M personnel	A-12 Prioritize workload (e.g., staff, self)	A-13 Develop schedules (e.g., staff, equipment, maintenance)	A-14 Manage workload (e.g., staff, self)
<b>B</b>	<b>Manage Facility Employees</b>	B-1 Develop employee training	B-2 Implement employee training	B-3 Assess employee training	B-4 Create employee accountability standards
		B-12 Acknowledge employee behavior (e.g., positive & negative)			
<b>C</b>	<b>Manage Plant &amp; Collection System Maintenance</b>	C-1 Develop written safe work practices	C-2 Prioritize maintenance activities	C-3 Implement (verify) safe work practices	C-4 Inventory equipment O&M manuals
		C-5 Ensure O&M manuals are current			
		C-11 Schedule preventive maintenance	C-12 Assign preventive maintenance	C-13 Evaluate equipment & infrastructure status	C-14 Verify completion of preventive maintenance (e.g., CMMS)
<b>D</b>	<b>Facilitate Pretreatment Program</b>	C-21 Verify completion of buildings & grounds maintenance	C-22 Maintain list of current vendors	C-23 Maintain list of critical equipment	C-24 Maintain parts/tools inventory
		D-1 Identify industrial/commercial users	D-2 Evaluate IPP needs (e.g., equipment, staffing)	D-3 Classify industrial/commercial users	D-4 Conduct baseline sampling of municipal & industrial contributors
		D-12 Conduct IPP inspections	D-13 Document IPP inspection (e.g., reports)	D-14 Evaluate IPP self monitoring reports	D-15 Evaluate pre-treatment program for effectiveness
<b>E</b>	<b>Oversee Sludge Management Program</b>	E-1 Develop sludge management plan	E-2 Calculate solids mass-balance	E-3 Identify quantity of sludge for removal	E-4 Select sludge end use options
<b>F</b>	<b>Perform Administrative Functions</b>	E-5 Select sludge treatment options			
		F-1 Complete regulatory reports (see <i>Regulatory Reports</i> list)	F-2 Verify compliance with regulatory requirements	F-3 Update superiors on plant status (e.g., verbal, written)	F-4 Set facility work rules (e.g., dress codes, leave time policy, conduct)
		F-12 Resolve employee grievances	F-13 Evaluate employee performance	F-14 Conduct progressive employee discipline (e.g., oral, written, suspension, termination)	F-15 Process employee time sheets

A-5 Oversee operational data collection (see Operational data list)	A-6 Review Operational data (see <i>Operational Data</i> list)	A-7 Develop process control directives	A-8 Assign process control directives	A-9 Evaluate results of process control directives	A-10 Review plant & collection system status with O&M supervisors (e.g., operations, maintenance, collection system)	
A-15 Manage preliminary treatment residuals (e.g., grit, grease, screenings)		A-16 Manage sludge treatment processes	A-17 Investigate odor complaints	A-18 Implement odor control corrective action plan	A-19 Exercise contingency plans	
B-6 Monitor employee accountability	B-7 Provide employees tools for success (e.g., time, money, resources)	B-8 Match employee skill set to tasks	B-9 Set employee goals & objectives	B-10 Manage work-related injuries & illnesses	B-11 Recognize employee behavior (e.g., positive & negative)	
C-6 Schedule predictive maintenance (e.g., infrared, vibration, oil analyses, sewer cleaning)		C-7 Assign predictive maintenance activities (e.g., infrared, vibration, oil analyses, sewer cleaning)		C-8 Verify completion of predictive maintenance	C-9 Analyze results of predictive maintenance	C-10 Assess overall equipment & infrastructure efficiency
C-15 Evaluate (aged, faulty, and/or inefficient) equipment & infrastructure for repair	C-16 Schedule corrective maintenance	C-17 Assign corrective maintenance activities	C-18 Verify completion of corrective maintenance	C-19 Schedule building & grounds maintenance (e.g., pump stations, retention)		C-20 Assign building & grounds maintenance activities
D-5 Calculate allowable headworks loading	D-6 Calculate local limits	D-7 Modify sewer use ordinances	D-8 Establish enforcement procedures	D-9 Establish permit conditions	D-10 Issue industrial/commercial user permits	D-11 Establish IPP inspection schedule
D-16 Take corrective actions (e.g., enforce, additional sampling, modify permit)		D-17 Process billings for industrial surcharge program (e.g., calculate, invoice, collection)				
E-6 Manage sludge end use						
F-5 Develop job descriptions	F-6 Recruit candidates for open positions	F-7 Interview candidates	F-8 Select candidates for new hire	F-9 Develop employee schedule	F-10 Implement employee schedule	F-11 Assess employee schedule
F-16 Process personnel requests (e.g., travel, leave, tuition reimbursement)	F-17 Process purchase orders	F-18 Respond to inquiries (e.g., email, phone calls, letters)	F-19 Manage documentation of work-related injuries & illness	F-20 Facilitate meetings (e.g., coordinate, schedule, attend)	F-21 Conduct presentations	

# DACUM Research Chart for Class IV Wastewater Treatment Operator

Duties		Tasks			
<b>F</b>	<b>Perform Administrative Functions (cont.)</b>	F-22 Participate in inspections (e.g., safety, regulatory)	F-23 Respond to audit/ inspection findings	F-24 Document safety training	F-25 Forecast short-term regulatory burden & facility
	<b>G</b>	<b>Facilitate Self &amp; Staff Professional Development-cont.</b>	G-1 Define professional development needs	G-2 Establish professional development plan consistent with employee goals & objectives	G-3 Provide employee professional development opportunities (e.g., certifications)
		G-9 Participate in conferences & workshops (e.g., host, attend, teach)	G-10 Participate in professional organizations	G-11 Network with wastewater professionals (e.g., calls, tours, forums)	
<b>H</b>		<b>Engage in Public Relations Activities</b>	H-1 Disseminate reports & notifications (e.g., water quality, sewer rates)	H-2 Respond to public inquiries & requests for information	H-3 Respond to media inquiries
	<b>I</b>	<b>Develop Facility Budgets</b>	I-1 Review previous facility budgets	I-2 Solicit resource needs from employees & department heads	I-3 Identify equipment needs in accordance with maintenance plan
		I-12 Forecast facility funding (e.g., rates, loans, grants, bonds)	I-13 Review draft budgets with fiscal officer	I-14 Calculate funding short-falls	I-15 Resolve budget short-falls (e.g., rate increases, reprioritize needs)
<b>J</b>		<b>Manage Facility Construction</b>	J-1 Prepare RFQ for design engineer	J-2 Process RFQ applications (e.g., review, short list, interview)	J-3 Prepare RFP
		J-12 Secure permits (e.g., PTI, NPDES, electrical)	J-13 Advertise project for construction bids	J-14 Evaluate construction bids	J-15 Award construction bids
		J-16 Conduct pre-construction meeting	J-23 Train plant O&M staff on new processes	J-24 Initiate operations plant improvements	J-25 Resolve punch list items
				J-26 Perform 1-year plant project performance certifications	

**Note:** Although panelists are licensed Class IV Wastewater Treatment Operators, all members of the panel do not perform every task on this chart.

F-26 Develop short-term facility improvement & compliance plan	F-27 Forecast long-term regulatory burden & facility improvement needs (10-20 yrs.)	F-28 Develop long-term regulatory burden & facility	F-29 Maintain vendor relations	F-30 Conduct contract negotiations (e.g., labor, vendor, utility)	F-31 Develop contingency plans (e.g., flood, security)	
G-4 Support continuing education (e.g., tuition reimbursement, release time)		G-5 Mentor employees	G-6 Cross-train employees	G-7 Maintain professional certifications (e.g., self, staff)	G-8 Monitor professional certifications (e.g., operator, CDL, HVAC, lab)	
G-12 Review trade literature (e.g., journals, books, media)						
H-5 Prepare presentations for water quality issues & information (e.g., city council, schools, special groups)		H-6 Disseminate potential risks to the community (e.g., environmental, health, safety)		H-7 Respond to complaints (e.g., odor, dust, noise, traffic)	H-8 Facilitate educational tours	H-9 Host professional & community groups
I-5 Develop operations budget	I-6 Develop maintenance budget	I-7 Develop IPP budget	I-8 Develop capital project budget for upcoming fiscal	I-9 Develop engineering budget	I-10 Develop laboratory budget	I-11 Prepare justification of expenditures
J-5 Award professional services contract	J-6 Develop DDM	J-7 Conduct 30% engineering design review	J-8 Conduct 60% engineering design review	J-9 Conduct Value Engineering assessment	J-10 Conduct 90% engineering design review	J-11 Finalize engineering design
J-17 Establish construction ground rules (e.g., laydown areas, safety, traffic flow)	J-18 Coordinate plant operations with construction	J-19 Initiate plant construction activities	J-20 Conduct progress meetings	J-21 Resolve change orders/design deficiencies	J-22 Conduct performance testing of plant improvements	

---

## Acronyms

CDL	Commercial Driver's License
CMMS	Computer Maintenance Management System
CSO	Combined Sewer Overflow
DDM	Detail Design Memorandum
DMRQA	Discharge Monitoring Report Quality Assurance
DO	Dissolved Oxygen
DOB	Depth of Blanket
HVAC	Heating, Ventilation, & Air Conditioning
IPP	Industrial Pretreatment Program
MBR	Membrane Bioreactor
MCC	Motor Control Centers
MCRT	Mean Cell Residence Time
MIPP	Municipal Industrial Pretreatment Program
MLSS	Mixed Liquor Suspended Solids
MLVSS	Mixed Liquor Volatile Suspended Solids
MOR	Monthly Operating Report
NPDES	National Pollutant Discharge Elimination System
O&M	Operation & Maintenance
OEPA	Ohio Environmental Protection Agency
ORP	Oxidation/Reduction Potential
OSHA	Occupational Health and Safety Administration
PIO	Public Information Officer
PTI	Permit to Install
RAS	Returned Activated Sludge
RBC	Rotating Biological Contactor
RFP	Request for Proposals
RFQ	Request for Qualifications
SARA	Superfund Amendments and Reauthorization Act
SBC	Sequential Batch Reactor
SCADA	Supervisory Control and Data Acquisition
SSO	Sanitary Sewer Overflow
SVI	Sludge Volume Index
TCLP	Toxic Characteristic Leaching Procedure
TSS	Total Suspended Solids
USEPA	United States Environmental Protection Agency
WAS	Waste Activated Sludge

---

## General Knowledge and Skills

Problem-solving skills  
Leadership skills  
Coaching skills  
Knowledge of regulations  
Laboratory procedures  
Listening skills  
Interpersonal skills  
Accounting skills  
Farming practices  
Biology  
Team building skills  
Safety procedures  
Ability to Interpret water quality data  
Use and interpret lab results  
Management skills and principles  
Communication skills: listening, presenting/speaking, writing  
Ability to read and interpret blueprints and schematics

## Tools, Equipment, Supplies and Materials

Hand tools	Power tools
Meters	Computers
Electrodes	Vehicles
Lab equipment	Sampling equipment
Office supplies	Diagnostic equipment
Material handling equipment	Radios
Heavy equipment	Trend recorder
Flow meters	Portable generator
Communication equipment	Safety equipment
Grounds maintenance equipment	CMMS
Electrical maintenance equipment	SCADA
Trenching and shoring equipment	
Process control & data management software	

## Worker Behaviors

Motivated  
Leader  
Common sense  
Calm  
Team player  
Accessible  
Responsive  
Reliable  
Dependable  
Trainable  
Honest  
Responsible  
Trustworthy  
Self starter  
Articulate

## Future Trends and Concerns

Asset management  
Litigation  
Environmental regulations  
Shortages of certified operators  
Membrane technology  
Endocrine disrupters  
SCADA  
Budgetary constraints  
Funding sources  
Failing infrastructure  
Utility security  
Decreasing loads from industry closings  
Increasing loads from new commercial and residential development

---

**Laboratory Data**

Chlorine residuals  
Fecal coliform  
Nitrate and nitrite  
Phosphorous  
Whole effluent toxicity  
Solids balance  
Volatile acid to alkalinity relationship  
Oxygen uptake rate  
ORP  
Filtrate Quality  
DO  
pH  
MCRT  
SVI  
30 minute settleability  
DOB  
Ammonia  
TSS  
MLSS  
MLVSS  
Total solids  
Volatile reduction  
Food to Microorganism ratio  
Temperature  
TCLP  
Metals

**Operational Data**

Sludge pumping  
RAS  
Flow  
Wasting rates  
Detention time  
Pumping rates  
Loading rates  
Solids balance  
Sludge inventory  
Bio solids inventory  
Scum quantity and quality  
\*Grit quantity  
\*Screenings  
Bench sheet  
Electrical and chemical consumption  
Logbooks  
\*Grease  
WAS  
  
\*Preliminary Treatment Residuals

**Critical Maintenance Equipment**

Influent pumps  
Aeration blowers/diffusers  
Disinfection equipment  
Incinerators  
Centrifuges  
Belt filter press  
Thickeners  
Digesters  
Screening equipment (i.e., course screens, fine screens, comminutors, etc.)  
Grit removal  
Primary clarifiers  
Secondary clarifiers  
Generator/switchgear  
Tertiary treatment (e.g. filters)  
Sludge Pumps (RAS and WAS)  
SCADA  
Programmable Controllers  
Computers  
Motor Control Centers  
Secondary treatment (e.g., RBC, SBR, MBR, Aeration tanks, oxidation ditch, trickling filters)  
Advanced secondary treatment (e.g. Nitrification Towers, Second-stage Aeration tanks, etc.)  
Rolling Stock  
Dechlorination equipment  
Chemical feed equipment (e.g. polymer, ferric chloride, alum, lime, etc.)

**Regulatory Reports**

Land application activity reports (e.g. loads hauled, application rates, agronomic rates, etc.)  
Swimwear/discharge monitoring reports  
MORS  
Biosolids reports per 40 CFR 503  
Annual sludge report to OEPA  
Annual pretreatment report

Chemical inventory reports (SARA Title III/Community right to know)  
Facility annual O&M Report  
Quarterly pretreatment report  
DMRQA  
Title V (annual report, semi-annual report, quarterly reports)  
Consent decree reports (SSO, CSO)

OSHA 300 and 300A Report for Occupational injuries/illnesses