

Acronyms

ASR	aquifer storage and recovery
CDL	commercial driver's license
CPI	Certified Pump Installer
CWD	Certified Well Driller
Decon	decontaminate/decontamination
DOT	Department of Transportation
EPA	Environmental Protection Agency
GPM	gallons per minute
GVW	gross vehicle weight
GW	groundwater
Haz-Mat	hazardous materials
HAZWOPER	hazardous waste operations and emergency response standards
MDL	minimum detection level
MGWC	Master Groundwater Contractor
OJT	on-the-job training
OSHA	Occupational Safety and Health Administration
P&C	property and casualty
PL	pumping level
PM	preventive maintenance
PM	project manager
PPB	parts per billion
PPE	personal protective equipment
PPM	parts per million
Pre-trip	DOT-required pre-trip inspection of truck
PSI	pounds per square inch
SW	surface water
SWL	static water level
TDH	total dynamic head

Worker Behaviors

Able to handle stress	Efficient	Open-minded
Appropriately dressed	Good personal hygiene	Optimistic
Common sense	Honest	Organized
Communicative	Imaginative	Persistent
Conscientious	Industrious	Professional
Courteous	Intelligent	Punctual
Dependable	Intuitive	Receptive
Detail-oriented	Mechanically inclined	Resourceful
Effective	Motivated	Self-confident
		Self-starter
		Team player

Tools, Equipment, Supplies, and Materials

Backhoe	Global positioning system	Sample bags
Bailers	Grout	Sample bottles
Blocking/cribbing	Grout pumps	Sample catcher
Bobcat	Hand tools	Sand/filter pack
Buckets	Inclination tool	Screens
Cable	Jars	Shale shaker
Casing	Jetting tools	Shoes
Casing locator	Landing clamps	Shovel
Compressors	Logging equipment	Slings
Crane	Lubricants	Stabilizers
Desanders	Marsh funnel	Stem
Develop/rehab chemicals	Measurement equipment	Sub adaptors
Disinfectants	Mud additives	Support truck
Dog house	Mud balance	Surge block
Downhole hammer	Mud gun	Swab
Drill bits	Mud mixer	Test pumps
Drill collars	Mud pumps	Thermometer
Drill fluids	Orifice	Torch
Drill pipe	Packers	Trencher
Drill rig	Personal protective equipment	Video camera
Drill stem	Pickup	Water
Drive head	Portable mud pit	Water meter
Elevators	Portolet	Water test kit
Fishing tools	Reports/logs/forms	Weir
Forklift	Rope socket/mandrel	Welder
Generators		Wrenches

General Knowledge and Skills

Active listening	Management of personnel resources
Building and construction	Math skills
Chemistry	Mechanical skills
Complex problem solving	Monitoring
Coordination	Operation and control
Critical thinking	Personnel and human resources
Customer and personal services	Physics
Design	Public safety and security
Engineering and technology	Quality control analysis
Equipment maintenance	Reading comprehension
Equipment selection	Repairing
Geology	Science (geology)
Installation	Speaking
Instructing	Time management
Judgment and decision making	Transportation
Law and government	Troubleshooting
Management of material resources	

DACUM Research Chart for Geothermal Contractors

Research Panel

Jeffrey Blinn
Spring, Texas

Joseph Dobry
Burlleson, Texas

George Dugan
Humble, Texas

L. Franklin Easterday Jr.,
CWD/PI, CVCLD
Mount Airy, Maryland

David Henrich, CWD/PI, CVCLD
Maple Plain, Minnesota

John W. Henrich, MGWC, CVCLD
Maple Plain, Minnesota

Richard L. Layman Jr.,
MGWC, CVCLD
Lachine, Michigan

Ron Peterson, MGWC
North Eastham, Massachusetts

John W. Pitz, CPI, NGWAF
Batavia, Illinois

Roger E. Renner, MGWC, NGWAF
Elk River, Minnesota

Cary Smith
Sandy, Utah

Douglas C. Walker,
MGWC, CVCLD
Egg Harbor Township, New Jersey

Sponsored by



Phone (800) 551-7379 or (614) 898-7791

Fax (614) 898-7786

Websites NGWA.org and WellOwner.org

Address 601 Dempsey Road, Westerville, Ohio 43081-8978 U.S.A.

June 2017



DACUM Research Chart for Geothermal Contractors

Duties	Tasks															
A Assess Client Needs	A-1. Respond to client inquiry	A-2. Collect client information	A-3. Determine client needs (e.g., water supply, decommission, time schedule, rehab)	A-4. Conduct site assessment (e.g., access, setbacks)	A-5. Explain construction options to client	A-6. Provide verbal cost estimate	A-7. Assess client payment ability									
B Develop Project Plan	B-1. Research geological/hydrological conditions (e.g., well records)	B-2. Determine proposed well structure	B-3. Determine equipment needs	B-4. Estimate material needs	B-5. Determine contractual terms and conditions	B-6. Estimate human resource requirements	B-7. Formulate project/time schedule	B-8. Estimate contractor costs	B-9. Prepare written proposal	B-10. Execute contract (e.g., sell, close)						
C Initiate Project Plan	C-1. Obtain required permits (e.g., notices of intent, start cards, notifications)	C-2. Obtain bonds and insurance	C-3. Prepare project specific submittals (e.g., health and safety plan)	C-4. Order project materials	C-5. Determine well location	C-6. Participate in preconstruction meeting	C-7. Schedule rig and equipment	C-8. Schedule project crew(s)	C-9. Brief drilling crew	C-10. Schedule subcontractors	C-11. Notify inspectors (e.g., regulators, engineers)	C-12. Locate underground utilities				
D Mobilize for the Site	D-1. Prepare drilling equipment (e.g., pre-trip, safety, preventive maintenance)	D-2. Load tools and materials	D-3. Deliver tools and materials	D-4. Verify utility locations	D-5. Prepare site for crew (e.g., postings, portolet, communications)	D-6. Prepare site for equipment (e.g., leveling, fencing, excavation)	D-7. Set up equipment	D-8. Establish adequate water supply	D-9. Check water quality for compatibility with grout and drilling fluids	D-10. Conduct tailgate/safety meeting						
E Construct Closed Loop Well	E-1. Perform equipment maintenance and startup	E-2. Prepare drilling fluids after checking water quality and temperature	E-3. Drill borehole	E-4. Install temporary casing and shoe if needed	E-5. Install and seal permanent casing as required	E-6. Manage and dispose of drill cuttings	E-7. Collect geologic samples	E-8. Analyze and document geologic samples	E-9. Arrange geophysical logging	E-10. Pressure test loop assembly	E-11. Install loop assembly	E-12. Pressure test installed loop assembly	E-13. Install tremie and grout borehole	E-14. Manage displaced fluids	E-15. Remove temporary casing	E-16. Manage grout subsidence
	E-17. Conduct flow test, freeze protect, and seal loop	E-18. Secure borehole location	E-19. Monitor grout level and top off as needed	E-20. Survey surrounding area prior to leaving site												
F Decommission Wells	F-1. Monitor location of underground utilities	F-2. Employ erosion controls	F-3. Determine existing wellfield construction	F-4. Pressure test and isolate leaks	F-5. Address any leaking segments	F-6. Excavate and expose loop well	F-7. Evacuate and properly dispose of fluid solution	F-8. Select proper decommissioning fluid or sealing material	F-9. Install decommissioning fluid or sealing material in all pipes not removed	F-10. Address any grout subsidence issues	F-11. Cut off piping below grade	F-12. Document and report all decommissioning activities	F-13. Restore site to original condition			
G Demobilize the Site	G-1. Load tools and materials	G-2. Tear down and secure equipment	G-3. Conduct site housekeeping and maintenance	G-4. Dispose of drill cuttings and fluids	G-5. Perform site restoration and inspect erosion controls	G-6. Secure loop well locations	G-7. Transport equipment and materials									
H Close Out Project	H-1. Document well construction (e.g., reports, well logs)	H-2. Distribute well construction documentation (e.g., regulatory, client, contractors)	H-3. Close out contract (e.g., clear punch list)	H-4. Process final invoice	H-5. Process supplier and subcontractor invoices	H-6. Evaluate project performance	H-7. Analyze project profit or loss	H-8. Market additional services (e.g., service plan)								
I Manage Business Activities	I-1. Manage financial resources	I-2. Manage human resources	I-3. Obtain business licenses and business permits	I-4. Maintain insurance coverage	I-5. Maintain external professional relationships	I-6. Maintain company facilities (e.g., clean up shop, plow snow)	I-7. Manage supplies and materials	I-8. Comply with regulatory standards (e.g., OSHA, DOT, EPA, IRS)	I-9. Implement safety plan	I-10. Manage tool and equipment resources	I-11. Develop marketing plan	I-12. Implement marketing plan	I-13. Manage marketing plan	I-14. Establish policies and company procedures	I-15. Develop business succession plan	
J Pursue Professional Development	J-1. Assess training needs	J-2. Implement internal training sessions (e.g., safety, craft, equipment)	J-3. Conduct on-the-job training	J-4. Obtain out-sourced training/education	J-5. Participate in professional associations	J-6. Network with industry professionals	J-7. Obtain professional certifications (e.g., state, national)	J-8. Pursue advanced certifications (e.g., MGWC)	J-9. Enhance business skills (e.g., leadership, information systems)	J-10. Encourage employee feedback	J-11. Explore new technologies	J-12. Teach external classes and workshops				