LARGE GENERATOR USE FOR PUMPING

Purpose

This Water Quality and Hydrology Group procedure describes the process for using the large generators and the large generator with power reel for well pumping.

Scope

This procedure applies to all RRES-WQH staff personnel who sample single completion wells using ONAN GEN-SET generators with submersible pumps.

In this procedure

This procedure addresses the following major topics:

Integrated Work Management

The work specified in this procedure shall be conducted in accordance with the applicable sampling activity Integrated Work Documents, in accordance with LANL IMP 300-00-00, Integrated Work Management for Work Activities.

Signatures

First authorization review date is one year from group leader signature below; subsequent authorizations are on file in the Group office.

Prepared by. Signature on file - A. Banar, ENV-WQH	Date: 12/9/05
Approved by. Signature on file - M. Alexander, ENV-WQH Operations Team Leader	Date: 12/9/05
Approved by. Signature on file - S. Rae, ENV-WQH Safety Officer	Date: 12/12/05
Approved by. Signature on file - S. Rae, ENV-WQH Group Leader	Date: 12/12/05

General Information About This Procedure

Attachments

There are no attachments associated with this procedure.

History of revision

This table lists the revision history and effective dates of this procedure.

Revision	Date	Description Of Changes
0	10/01	New document.
1	8/03	Annual review
2	3/04	Revised steps to reflect steps stated in IWD
3	8/04	Level 2 Resumption Review Changes
4	12/05	Added power reel steps, incorporated IMP 300

Who requires training to this procedure

The following personnel require training before implementing this procedure:

- All ENV-WQH staff, contractors, and students who use the ONAN GEN-SET Generators for fieldwork.

Training method

The training method for this procedure is "self-study" (reading) and is documented in accordance with the procedure for training (ENV-WQH-QP-024, *Personnel Training*). In addition, mentoring by a previously trained individual is required before personnel can operate the generators.

Prerequisites

In addition to training to this procedure, completion of the following course is required:

- General Workers Electrical Safety Basics

Comprehension of and authorization to RRES-ES-Field, *General Field Work for All,* is required.

References

The following documents are referenced in this procedure:

- RRES-ES-Field, *General Field Safety for All*
- RRES-ES-Driving, *Driving, Towing, and Winching for All*
- LIR 402-860-02, Locking & Tagging Equipment, Machinery, and Systems

General Information About This Procedure, continued

Note Actions specified within this procedure, unless preceded with "should" or "may," are to be considered mandatory guidance (i.e., "shall").

Electrical and mechanical hazards

Electrical equipment and mechanical safety

For all ENV-WQH personnel using electrical equipment (over 50 volt nominal) or mechanical energy sources outside the office:

- Review LIR 402-600-01, *Electrical Safety* . Electrical safety requirements shall apply to any employee and employee of subcontractors performing electrical work.
- Completion of "Electrical Safety Basics" training course is required.
- Read, understand, and follow the equipment manufacturer's operation and maintenance manual prior to using the equipment.
- Manuals for all equipment. Owner's manuals are located at TA-64-64.
- Review LIR 402-910-01, *LANL Fire Protection Program.*

Lock out/tag out

Only Generator #3 needs to be tagged out. Orange tags shall be used to tag the equipment. Perform the following steps for lock out/tag out procedure:

Step	Action
1	Identify and evaluate all energy sources on or near the equipment.
2	Complete the information on the orange tag.
3	Follow normal shutdown/ stopping procedures for the equipment.
4	Isolate the equipment as required.
5	Use Laboratory-approved orange tag to tag equipment.
6	Relieve stored hazardous energy.
7	Verify integrity of the mechanical isolation and de-energization of equipment. Use normal operating controls when starting equipment. Return all operating controls to the neutral or off position.

Contact the responsible line managers for removal of tag. Reference LIR 402-860-02, *Locking and Tagging Equipment, Machinery, and Systems* for additional guidance.

Operating Generators #1 and #3

Pre-usage checks

IMPORTANT: In order to ensure that the equipment ground (a ground-fault current path) is provided on this generator, a Support Services Subcontractor (SSS) Electrician will need to physically conduct a circuit test after the generator is relocated. The "Orange Lock/Tag Out" procedure will be used to lock-out the Generator #3.

Prior to operating the ONAN GEN-SET Generator #1 and Generator #3, perform the following pre-usage steps:

Step	Process	Actions
1	**Generator hookup to vehicle and transport to work location**	• Refer RRES-ES-Driving, Driving, Towing, Winching for All, for trailer hook up and inspection checklist. • Make sure generator has enough fuel to accommodate usage.
2	**Verify equipment ground on generator (applies only to Generator #3)**	• After transporting to work location and before starting generator, the equipment ground verification must be performed. **The generator cannot be used until this verification step is performed**. • Only an SSS Electrician can perform this verification step. • Ensure the SSS Electrician verifies equipment ground with his signature on the Generator Usage Checklist and on the LOTO tags.
3	**Pre-run generator**	• Place power breakers in the OFF position. • Start up generator by depressing "Heater Switch" button for one minute prior to starting engine (Generator #3 only). • Flip switch to "Run" position and keep switch depressed until engine starts. Release when engine starts. • Warm up generator for a minimum of five minutes to ensure proper running operation. Turn generator off.

Operating Generators #1 and #3, continued

Use of generator for submersible well purging and sampling

To operate the ONAN GEN-SET Generator #1 and Generator #3, perform the following steps:

Step	Process	Actions
IMPORTANT: With the power breaker in the "Off" position at the generator, and "Off" position at well control box (control box inside well enclosure), start up generator. It is very important that these two switches be in the "Off" position prior to starting generator.		
1	**Connection of generator to well at field job site**	• Ensure the generator is turned to "OFF". • Unreel the power cord, either the 480 or 220 volt depending on the well, refer to the well file or the following table for pump voltage, and connect the power cord to the control box receptacle. These are twist lock receptacles.
2	**Well start up**	• Re-start generator. • Turn breaker switch to "On" position at generator. • Turn control box switch at well to the "On" or "Hand" position. • Wait one minute and then engage START (switch or button on well control box.) • Pumping commences. Pump as long as required for adequate sampling requirements. Reference ENV-WQH-SOP-049, *Groundwater Sampling using Submersible Pump.*

Operating Generators #1 and #3, continued

Shutdown of ONAN GEN-SET generator

To shut down the ONAN GEN-SET Generator #1 and Generator #3, perform the following steps:

Step	Actions
1	Depress STOP/red button or turn knob from "Hand" to "Stop" on well control box.
2	Flip switch to "Off' position at the well control box.
3	Turn breaker to "Off' position at the generator.
4	Turn generator "Run" switch to the "Off' position.
5	With the power off at the generator and the control box at the well, unplug the cord at the control box.
6	Roll up cord onto trailer generator reel.
7	Tag out "Orange Lock/Tag Out" (applies to Generator #3 only) by field team leader. Always tag out generator prior to moving the generator to the next sampling location or to TA64.
8	Relocate generator to TA64 or to next sampling site.

Operating Generator #2 with Power Reel

Pre-usage check

Prior to operating the ONAN GEN-SET generator with power reel (Generator #2), perform the following pre-usage steps:

Step	Process	Actions
1	**Generator hookup to vehicle and transport to work location**	• Refer RRES-ES-Driving, *Driving, Towing, Winching for All*, for trailer hook up and inspection checklist. • Make sure generator has enough fuel to accommodate usage.
2	**Pre-run generator**	• Move Panel Lamp switch to "Pre-Heat, Lamp Test" position for one minute and then move it back to "Panel Lamp" position.

Operating Generator #2 with Power Reel, continued

Use of ONAN GEN-SET generator with power reel

To operate the ONAN GEN-SET generator and power reel (Generator #2), perform the following steps:

Step	Process	Actions
IMPORTANT: With the power breaker in the "Off" position at the generator, and "Off" position at motor safety switch (control box inside well enclosure), start up generator. It is very important that these two switches be in the "Off" position prior to starting generator.		
1	**Connection of generator to well at field job site**	• Move start switch to the run position. • Keep panel door open during operations for access to emergency stop button. • Flip on breaker bar for Baldor key pad to on. Breaker is located inside large side door of generator next to oil filters. • Press "enter" on the key pad. Use arrow keys to enter a local speed reference of 60. • Use the Forward key and Stop key to unwind as much cord as needed to reach the well electrical box. If the cord is extended more that 50ft., the key pad operator and the cord tender must be in radio contact. **DO NOT** unwind power cord with the male end plugged in or outside the drum cylinder. • Remove male end of cord from inside cylinder drum and plug in to 480 v receptacle on generator trailer mount. • Plug in female end of cord to well electrical box.

Table continued on next page.

Operating Generator #2 with Power Reel, continued

Use of ONAN GEN-SET generator with power reel, continued

Step	Process	Actions
2	**Well start up**	• At electrical box mounted on generator trailer, flip lever switch to "on", move switch to Auto or Hand, and press the Start button. This turns on electrical power from the generator to the well electrical box. • At well electrical box mounted at well head, flip lever switch to On and move switch to Auto or Hand. This turns on power to the submersible pump. • When all other equipment is set up and an initial water level has been taken, press the Start button on the well electrical box. This will start the pump.

Shutdown of ONAN GEN-SET generator with power reel

To shut down the ONAN GEN-SET generator with power reel (Generator #2), perform the following steps:

Step	Actions
1	When pumping at a well is completed, turn off the pump by moving the switch to Stop and flip lever switch to Off on the well electrical box.
2	At the electrical box mounted on the generator, move the switch to Stop and flip lever switch to Off.
3	Turn off the breaker to the Baldor key pad to ensure no current is running through the power cord.
4	Unplug both ends of the power cord and tuck the male end back into the cylinder drum. **DO NOT** rewind power cord with the male end plugged in or outside the drum cylinder.
5	Turn on the breaker to the Baldor key pad.
6	Use the Reverse and Stop keys on the Baldor key pad to rewind the power cord. Dedicate one person to tend the key pad, a second person to tend the cord as it is rewound on the drum and to keep the plug end from touching the ground. If the power cord is unwound for a great distance, use a third person to tend the plug end. If the cord is extended more that 50ft., persons winding the cord must be in radio contact.
7	Turn off the breaker to the Baldor key pad.
8	Move start switch to the stop position to turn off generator. Then move switch to the Remote position.
9	Close panel door.
10	Relocate generator to TA64 or to next sampling site.

Generator Maintenance

Maintenance The SSS will be requested, through a Work Order, to include all ENV-WQH large generators in a routine maintenance program, consisting of monthly and annual inspections and maintenance.

Equipment repair Under **no** conditions shall any individual attempt to troubleshoot, diagnose, or repair generator components or the control box, or any wiring associated the generator or well enclosure. If the generator needs repair because of non-start, call SSS for maintenance or repair at 667-5991. For electrical concerns with the control box or pump wiring contact the SSS at 7-4544.

Power Source for Deep Aquifer Wells

Pump requirements Use the following table for guidance in determining submersible pump requirements for the listed well sites.

Well Name	Location	Pump Voltage
Test Well 8	Mortandad Canyon	480
DT-9	TA-49	480
DT-10	TA-49	480
R-1	TA-5	480
R-2	Pueblo Canyon	480
R-4	TA-74	480
R-6	TA-53	480
R-6i	TA-53	480
R-9	TA-72	480
R-11	TA-5	480
R-13	TA-05	480
R-15	TA-05	480
R-18	TA-9	480
R-21	TA-54	240
R-23	TA-36	480
R-28	TA-5	480
R-34	San Ildefonso Pueblo	480
MCOBT 4.4	Mortandad Canyon	240

Records Resulting from this Procedure

Records The following records are generated as a result of this procedure:

- SSS Electrician's verification of equipment ground
- SSS routine generator inspection reports
- Used Lock Out / Tag Out tags

[redacted]