



Procedures and Guidelines (PG)

DIRECTIVE NO. 200-PG-8500.5.1E
EFFECTIVE DATE: 10/17/2016
EXPIRATION DATE: 10/17/2021

APPROVED BY Signature: Original Signed By
NAME: Raymond J. Rubilotta
TITLE: Director, Management Operations Directorate

COMPLIANCE IS MANDATORY

Responsible Office: 250/Medical and Environmental Management Division (MEMD)

Title: Well Management

PREFACE

P.1 PURPOSE

The purpose of this directive is to define the responsibilities and controls for Goddard Space Flight Center (GSFC) Greenbelt operations to ensure the regulatory compliance of wells under its purview.

P.2 APPLICABILITY

- a. This Procedure and Guideline (PG) is applicable to Management Operations Directorate employees and their authorized contract employees at Greenbelt only.
- b. In this document citations are assumed to be the latest version unless otherwise noted.
- c. In this document, all mandatory actions (i.e., requirements) are denoted by statements containing the term “shall.” The terms “may” or “can” denote discretionary privilege or permission; “should” denotes a good practice and is recommended but not required; “will” denotes expected outcome; and “are/is” denotes descriptive material.

P.3 AUTHORITY

- a. NASA Policy Directive 8500.1, NASA Environmental Management.
- b. Goddard Policy Directive 8500.1, Environmental Program Management.
- c. GPR 8500.5, Water Management.

P.4 APPLICABLE DOCUMENTS AND FORMS

- a. Code of Maryland Regulations (COMAR) Title 26.04.04, Well Construction.
- b. Water Appropriation and Use Permit, issued to GSFC by the Maryland Department of the Environment (MDE).
- c. COMAR 09.15.05, Compliance with International Mechanical Code.

P.5 CANCELLATION

200-PG-8500.5.1D

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P.6 SAFETY

Well inspection and maintenance can present certain safety hazards. Proper protective equipment, including as sturdy work boots, gloves (when handling lubricating oils or paints), and insect repellent (during spring, summer, and fall months to protect against ticks and other biting insects), should be used. A GSFC radio or cell phone shall be brought along during all well maintenance and inspections.

P.7 TRAINING

There is no formal training requirement for this activity.

P.8 RECORDS

Record Title	Record Custodian	Retention
Well Construction Permits and Abandonment Records	MEMD (Code 250)	*NRRS 8/48B2 Permanent. May retire to FRC 2 years after disposal of property. Transfer to NARA 25 years after disposal of property.
Water Appropriation Permit Records	MEMD (Code 250)	*NRRS 8/23A11 Destroy after second reissuance of permit or 10 years after permit expires or is cancelled.
Production and Geothermal Well Maintenance/Inspection/Repair Record	Facilities Management Division [FMD] (Code 220)	*NRRS 8/23A4 Cut off annually. Destroy 3 years after cutoff.
Monitoring Well Maintenance/Inspection/Repair Records	MEMD (Code 250)	*NRRS 8/23A4 Cut off annually. Destroy 3 years after cutoff.

* NRRS 1441.1 – NASA Records Retention Schedule

P.9 MEASUREMENT/VERIFICATION

None.

PROCEDURES

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1.0 Summary

There are groundwater monitoring wells, production wells, and geothermal wells at Greenbelt. The monitoring wells are located throughout GSFC's main site and the Beltsville Agricultural Research Center property on the northwestern perimeter of GSFC. The two production wells are located at buildings 24 and 31. The network of geothermal wells are located northwest of building 25, providing service to that building. A description of existing groundwater and production wells, including locations, is available in the MEMD files. The security inspections shall be completed for all wells on the Well Maintenance Inspection Checklist provided in Appendix C.

To ensure adequate security and maintenance of the wells, a well security inspection for each of the wells will be performed. The security inspection for monitoring wells involves inspecting the outer protective casing and well for damage and checking the condition of the concrete pad, padlocks, steel casing caps, and inner well riser caps. The production well security inspection involves inspecting the outer structures and concrete pad for damage. The geothermal wells are inspected to verify that permit well tags are displayed and to identify any damage to the well field that may present a problem to the wells. Corrective action will be initiated immediately for any malfunctioning items. For production and geothermal wells, this may involve submitting a service repair ticket to initiate corrective actions. Maintenance related repairs will be prioritized and corrective actions shall be provided in the inspection report.

All types of wells are installed and maintained according to COMAR 26.04.04. Should MEMD determine that an existing well is no longer needed, abandonment procedures shall follow COMAR 26.04.04.34-36. Production wells are installed and maintained by FMD in accordance with GSFC's Water Appropriation and Use Permit requirements and COMAR 26.04.04.33. Geothermal wells are installed and maintained by FMD and will adhere to the standards and requirements set forth in COMAR 26.04.04.23 and COMAR 09.15.05.

2.0 Equipment

The following is a list of recommended equipment and supplies to perform the security inspection of the wells at Greenbelt:

- a. A copy of this PG;
- b. The Well Maintenance Inspection Checklist (available in Appendix C);
- c. A map of GSFC Greenbelt with the well locations;
- d. A black or blue indelible ink pen;
- e. A clipboard;
- f. Digital camera;
- g. The key from MEMD for opening the monitoring well padlocks;
- h. A GSFC radio or cell phone;
- i. A box of disposable gloves;
- j. A flashlight;

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- k. Corrosion inhibiting, greaseless lubricant;
- l. Replacement padlocks;
- m. Paper towels;
- n. Insect repellent;
- o. A flat head screwdriver;
- p. A ratchet set with standard sized sockets;
- q. Hex or Allen key;
- r. Well caps;
- s. Concrete crack sealant;
- t. Black and red spray paint;
- u. Stencils to trace well IDs;
- v. Drill and drill bits;
- w. Replacement gaskets, o-rings, bolts, washers;
- x. A bilge pump; and
- y. Drain hole screens with adhesives.

3.0 Roles and Responsibilities

MEMD shall be responsible for the following:

- a. Conducting a security inspection at least twice per year of all wells;
- b. Complete well inspection and maintenance report;
- c. Maintain monitoring wells in accordance with COMAR;
- d. Abandon monitoring wells in accordance with COMAR;
- e. Complete reports required under GSFC's Water Appropriation and Use Permit; and
- f. Complete Water Appropriation and Use Permit renewals when necessary;
- g. Maintain records of well construction and well abandonment.

FMD shall be responsible for the following:

- a. Maintain the integrity of the production and geothermal wells at GSFC in accordance with COMAR, including flow and water level measurement devices as indicated in the Water Appropriation and Use Permit for the production wells;
- b. Complete any maintenance or repairs of production and geothermal wells in accordance with COMAR, including those identified by MEMD during the well inspections;
- c. Keep a record of all maintenance performed on the production and geothermal wells;
- d. Provide and submit to MEMD monthly groundwater use amounts using a flow measurement method approved by MDE; and
- e. Maintain all well survey data points in GSFC's Geographical Information System.

4.0 Instructions

MEMD shall conduct the inspections in accordance with the following procedures:

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Prior to beginning inspection activities, review this procedure and guideline, review COMAR Title 26.04.04.33, Well Owners' Responsibilities and COMAR 26.04.04.25, Maintenance and Repair.

For each well, field inspectors should note the date, well ID, noteworthy observations about the condition of the well, any maintenance or repairs completed and any follow-up actions required. The security inspection will record observations relating to the following well items and their condition (not all items will be applicable to each well):

- a. Concrete pad;
- b. Protective steel casing, steel cap, and hinge (riser-mount wells only);
- c. Well cover plate and bolts (flush-mount wells only);
- d. Padlock (monitoring wells only);
- e. Well cap;
- f. Water inside casing or under well cover plate;
- g. Riser;
- h. MDE well permit tag;
- i. NASA well identification; and
- j. Integrity of bollards (where applicable).

Items associated with the wells that are cracked, broken, or not working properly will be recorded as to the exact description of the problem. A picture should be taken of the well to visually document the problem. If possible, immediately correct the damaged or malfunctioning well part. If replacement parts are not immediately available and need to be ordered, record the part manufacturer and as much information as available (e.g., size, shape, material, part number, etc.). Recommendations for improvements, and maintenance or repairs completed shall be provided in each inspection report.

4.1 Concrete Pad

The inspection of concrete pads shall include the following:

- a. Check that a concrete pad exists at the well;
- b. Check that the pad is properly constructed (e.g., size - minimum of two feet by two feet);
- c. Check that the concrete is free of significant cracks;
- d. Check that the soil surrounding the pad is not eroded; and
- e. Check that the pad is not buried under soil.

If a problem is identified with a pad, this shall be indicated on the Well Maintenance Inspection Checklist for the associated well. A note will be included explaining the specific problem.

4.2 Protective Steel Casing, Steel Cap, and Hinge (Riser-Mount Wells)

The inspection of protective casings, steel caps, and hinges of the riser-mount (stick up) of the wells shall involve the following:

- a. Check that the casing is firmly mounted by gently trying to move the casing side to side;
- b. Note the existence of significant rust on the cap or hinges or damage to the steel casing;

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- c. Remove the lock and open steel cap (be careful to look for insects and nests when opening the steel cap);
- d. Remove insects and nests from inside the steel cap and casing manually, or using chemical free methods such as a CO₂ extinguisher or liquid nitrogen.
- e. Check casing for presence of drain hole and check screen (screen used to prevent insects from entering casing); and
- f. Check to verify information on the checklist matches the well description.

If a problem with the protective casing, steel cap, and/or hinge of the stick up wells is identified, this shall be indicated on the Well Maintenance Inspection Checklist for the associated well. A note will be included explaining the specific problem.

If the protective casing around the well is in need of painting, it must be indicated whether or not the structural integrity is sound. It should be noted in the comments block that the casing needs painting.

4.3 Well Cover Plate and Bolts (Flush-Mount Wells)

The inspection of cover plate and bolts of the flush-mount outer portion of wells shall involve the following:

- a. Remove any dirt or debris from top of plate;
- b. Remove bolts and cover plate;
- c. Check that the well cover plate adequately seals the well;
- d. Check that the gasket and/or o-ring is still in place and in good condition;
- e. Check that the bolts are not rusted or stripped;
- f. Check that the washers are not rusted or worn;
- g. Check that the holes the bolts screw into are free of debris and not stripped; and
- h. Clean dirt and debris off the gasket and/or o-ring and the ledge onto which the gasket/o-ring fits to enhance the seal when bolts are tightened.

If a problem with the well cover plate or bolts of the flush-mount wells is identified, this shall be indicated on the Well Maintenance Inspection Checklist for the associated well. A note will be included explaining the specific problem.

4.4 Padlock

The inspection of padlocks should involve the following:

- a. Check that a padlock exists at the monitoring well, and that it is closed and locked;
- b. Check that the padlock is not damaged;
- c. Ensure that the padlock opens and closes freely; and
- d. Ensure that the rubber protective cover is still intact.

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If the lock is not functional and cannot be fixed with lubricant, replace the lock and return the broken padlock to the locksmith (Code 240) for repair. If a problem with the padlock is identified, this shall be indicated on the Well Maintenance Inspection Checklist for the associated well. A note will be included explaining the specific problem.

4.5 Well Padlock and Hinge Maintenance

Some GSFC groundwater monitoring wells are secured using padlocks and steel casing lids that are openly exposed to weather events. To prolong the life of the padlocks, moving metal parts will be thoroughly lubricated. **A corrosion inhibiting, greaseless lubricant intended for this application will be used.** The lubrication procedure is as follows:

- a. **Do not** perform the padlock lubrication if a water sample or water level data will be collected that day;
- b. Ensure the well cap and casing are protected from lubricant;
- c. Undo the rubber weather cover from the keyhole;
- d. Open the lock using the padlock key;
- e. Remove the padlock and move the padlock away from the well;
- f. Apply lubricant into padlock lubrication hole, next to keyhole;
- g. Apply lubricant into open lock making certain ball bearing is lubricated;
- h. Apply lubricant into keyhole;
- i. Apply lubricant into shackle/padlock joint of lock;
- j. Open and close padlock several times to ensure adequate coverage of lubricant;
- k. Make sure the cap on the internal well riser is securely in place before lubricating any parts within the well housing or on the steel cap;
- l. Carefully lubricate the casing hinge (if necessary) so as to not apply excessive lubricant;
- m. Open and close the steel cap several times to ensure adequate lubricant coverage;
- n. Reapply lubricant to the hinge as necessary to ensure joint moves freely; and
- o. Secure the padlock and replace the rubber cover over the keyhole after completing the lubrication.

Indicate on the Well Maintenance Inspection Checklist that the lubrication was performed for the associated well.

4.6 Well Cap

The well cap should never be touched with gloves or hands that have an oily residue on them. Ensure that your hands are clean before touching the well cap. Inspection of the well cap involves the following:

- a. Before removing, check that the well cap is creating a tight seal by gently tugging on it;
- b. Check that the polyvinyl chloride (PVC) well riser pipe is relatively smoothly and evenly cut at the well opening; and
- c. Ensure that the well cap can be removed and re-tightened.

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If the well cap is not functioning properly, replace immediately. If a problem with the well cap is identified, this shall be indicated on the Well Maintenance Inspection Checklist for the associated well. A note will be included explaining the specific problem.

4.7 Water Inside Casing or Under Well Cap

The inspection of the wells for water inside the interstitial space between the outer steel casing and monitoring well shall involve the following:

- a. Check to see if water exists in the space between the steel casing and the PVC riser, or under the steel cover plate;
- b. Remove water with a bilge pump; and
- c. Recommend a solution to the problem, if any is evident.

If water is found inside the casing or under the well cover plate, this shall be indicated on the Well Maintenance Inspection Checklist for the associated well. A note will be included explaining the specific problem and recommended resolution.

4.8 Riser

The inspection of the PVC riser involves the following:

- a. Check that the riser has not shifted or become loose by gently applying pressure to try to move it side to side and by twisting it gently counter-clockwise, and
- b. With a flashlight, check that the grouting is not significantly cracked.

If a problem with the PVC riser is identified, this shall be indicated on the Well Maintenance Inspection Checklist for the associated well. A note will be included explaining the specific problem.

4.9 MDE Permit Tag

A metal MDE well permit tag shall be affixed to each of the wells at GSFC. The inspector ensures that the MDE tag is affixed to the outside of the protective casing or under the cover plate of a flush-mount well, and that it has not been damaged or rendered illegible with dirt build-up. Geothermal well tag will be located at the distribution head in building 25.

If a problem with the MDE tag is identified, this shall be indicated on the Well Maintenance Inspection Checklist for the associated well. A note will be included explaining the specific problem.

If a well tag has fallen off, affix it to the well. If a well tag is lost, arrangements with the Prince George's County Well Permitting Department or MDE shall be made to obtain a replacement permit tag. If a tag does not currently exist, seek resolution or document why the permit tag cannot be acquired.

4.10 Well Identification

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The well identification number should be painted onto the outer casing or cover plate and shall involve the following:

- a. The well name or ID is clearly painted on the protective casing;
- b. The well is identified correctly;
- c. The paint has not begun to peel or chip; and
- d. Repaint the well ID, if necessary.

If a problem with well identification is identified, this shall be indicated on the Well Maintenance Inspection Checklist for the associated well. A note will be included explaining the specific problem and recommendation.

4.11 Bollards

Some riser-mount wells have bollards installed around the well for protection. Inspection of the bollards shall include the following:

- a. Ensure that bollards are securely in the ground by trying to move them;
- b. Check to make sure that there is no structural damage (i.e., significant cracks);
- c. Make recommendation to install bollards for wells that do not have them but may require them; and
- d. Check that the paint on the bollards is intact.

If a problem with the bollards is identified, this shall be indicated on the Well Maintenance Inspection Checklist for the associated well. A note will be included explaining the specific problem and recommendation.

5.0 Reporting

After the well inspections, MEMD generates a Well Maintenance Inspection Report that details the current condition of each well. The Well Maintenance Inspection Checklist shall be included as an appendix of the report.

6.0 Recordkeeping

MEMD and FMD shall maintain records as indicated in P.8, Records.

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Appendix A – Definitions

None.

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Appendix B – Acronyms

COMAR – Code of Maryland Annotated Regulations
FMD – Facilities Management Division
GSFC – Goddard Space Flight Center
MDE – Maryland Department of the Environment
PG – Procedures and Guidelines
MEMD – Medical and Environmental Management Division
PVC – polyvinyl chloride (piping)

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Appendix C – Well Maintenance Inspection Checklist

Field Inspectors:														Observations / Comments				
NASA Well Name	MDE Permit ID	Flush Mount / Stick Up / Production	Well Diameter (in.)	Survey Date	Inspector Initials	NASA Well ID Legible	MDE Permit Tag Legible	Concrete Pad	Padlock	Casing / Steel Cap / Hinge	Well Cap	PVC Riser	Inside of Casing or Plate Dry		Seep Hole / Check Screen	Bollards	Steel Cover Plates / Bolts	Performed Lube on Lock

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CHANGE HISTORY LOG

Revision	Effective Date	Description of Changes
Baseline	1/24/2007	Initial Release
A	1/16/2010	<ul style="list-style-type: none"> ▪ Changed Safety and Environmental Division to Medical and Environmental Management Division. ▪ Updated list of equipment. Clarified instructions in section 4.0
B	3/21/2012	<ul style="list-style-type: none"> ▪ Clarified summary in section 1.0. ▪ Updated list of equipment. Updated to the 2009 template.
C	3/13/2013	<ul style="list-style-type: none"> ▪ Removed all references to GSFC Form 23-85 and changed to inspection checklist throughout the document. ▪ Added checklist to Appendix C and added references where needed. ▪ Updated retention of records in P.8. ▪ Added wells located on Beltsville Agricultural Center property to section 1.0. ▪ Added clarification regarding responsibilities for production wells in section 1.0, ▪ Changed necessary to recommended in section 2.0. ▪ Removed or changed “on center” in section 1.0 and 3.0. ▪ Added clarification that padlocks are used on monitoring wells only in sections 2.0, 4.0, and 4.4. ▪ Changed type of lubricant in section 2.0 and 4.5. ▪ Added level measurement to FMD requirements in section 3.0 per Water Appropriation and Use Permit requirements. ▪ Added maintenance and repair of production wells to FMD responsibilities in section 3.0 and clarified MEMD responsibilities regarding production wells. ▪ Added method for determining withdrawal numbers must be approved by MDE to FMD requirements in section 3.0. ▪ Added “any maintenance or repairs completed” to field notes and report in section 4.0. ▪ Changed the order of sentence in section 4.4 so that you are replacing the lock before taking the broken lock to the locksmith. Moved padlock and hinge maintenance up to section 4.5 and renumbered accordingly.
D	8/7/2014	<ul style="list-style-type: none"> ▪ Changed section P.7 to indicate there is no formal training requirement. Added “Prior to beginning inspection activities, review this procedure and guideline, review COMAR Title 26.04.04.10, Well Owners’ Responsibilities and COMAR 26.04.04.07.O, Maintenance and Repair” to section 4.0.

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E	10/17/2016	<ul style="list-style-type: none">▪ Updated COMAR references throughout the document to coincide with adoption of new COMAR effective 01/19/15.▪ Updated records (P.8) and equipment list in 2.0.▪ Added requirements associated with geothermal wells in 1.0 and 3.0.▪ Made some minor editorial changes in 4.0.▪ Changed the name of the work instruction to Well Management to be all inclusive.▪ Updated template.
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