

GEOHERMAL RESOURCES
OPERATIONAL ORDERS

Issued under the Geothermal Steam Act of 1970

- GRO Order 6. Pipelines and Surface Production Facilities
GRO Order 7. Production and Royalty Measurement, Equipment,
and Testing Procedures



United States Department of Interior
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GRO Order No. 6: Pipelines and Surface Production Facilities

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
CONSERVATION DIVISION

GEOHERMAL RESOURCES OPERATIONAL ORDER NO. 6

Effective January 1, 1977

PIPELINES AND SURFACE PRODUCTION FACILITIES

This Order is established pursuant to the authority prescribed in 30 CFR 270.11. The design, operation, and testing of all pipelines and surface facilities will be conducted in accordance with the provisions of this Order. All variances from the requirements specified in this Order shall be subject to approval pursuant to 30 CFR 270.48. References in this Order to approvals, determinations, or requirements are to those given or made by the Area Geothermal Supervisor (Supervisor) or his delegated representative.

The design of all pipelines and surface facilities, including but not limited to, production, injection, and waste water disposal systems, shall be submitted with the Application for Permit to Drill or on a Sundry Notice to the Supervisor for approval prior to construction. In addition, a Plan of Operation with contents and approval according to 30 CFR 270.34, shall be required when surface or environmental disturbances are anticipated beyond those covered by a previously approved Plan of Operation.

1. Design and Construction Requirements. All geothermal pipelines and surface facilities shall be designed and constructed in accordance with the following:

A. General Design

(1) Thermal Expansion. All pipelines and production facilities shall be designed to prevent failure in tension or compression due to thermal stresses based on limitations specified in applicable piping codes. Pipelines shall be anchored to isolate or transfer stress to the ground or solid structure, and to prevent unsafe movement in case of line failure. Main anchor locations are to be predicated on the surface configuration of the area, and may be required at pipe ends, at changes in direction, at shut-off valves, at manifolds where lines are interconnected, or at other points as dictated by the expansion design adopted. Intermediate anchors may be required to divide the pipeline into separate expanding sections and to bear any unbalanced

thrust. Intermediate supports between anchors should allow free lateral and longitudinal movement. Vibration, expansion direction and magnitude, and internal turbulence as well as effects of mineral scaling should be considered before including slip joints or expansion bellows in the design.

(2) Two-Phase Flow. Submission of complete design criteria and calculations may be required for planned two-phase production pipelines and surface facilities to demonstrate that the design of such facilities has given consideration to the water hammer stresses that may be caused by two-phase flow. Example stress calculations for the pipeline shall be submitted.

(3) Environmental Considerations. All pipelines and surface facilities shall be designed and constructed in accordance with the environmental protection requirements of GRO Order No. 4 and other applicable laws and regulations.

B. Safety Control Devices

(1) Production Pipelines and Related Facilities. All steam and hot water production pipelines and related surface facilities shall be equipped with the following devices except as noted in 1.B.(1)(d) below:

(a) Each producing well shall be equipped with a low pressure sensing device to actuate a valve to shut in production to minimize safety or pollution hazards caused by pipeline or facility failure.

(b) Pipelines and related surface facilities shall be protected against pressure buildup in excess of the system's design limit by high pressure sensors which will actuate either (1) well shut-in valves, or (2) system or well pressure relief valves and/or rupture discs. If only pressure relief valves and/or rupture discs are installed, it must be demonstrated that such venting in an emergency will not result in exceeding applicable pollution standards; otherwise shut-in valves shall be installed. Vented production must be properly muffled so as to comply with provisions of GRO Order No. 4. A remote controlled shut-in or venting system may be required, in addition to pressure sensors.

(c) Check valves or other approved devices shall be required in the system to prevent uncontrolled crossflow from other parts of the system in case of a line or facility failure, or where a line failure may result in pollution due to line drainage.

(d) Exceptions to requirements 1.B.(1)(a) through (c) above may be made for systems or parts of systems where the lessee can demonstrate to the satisfaction of the Supervisor that lack of such controls will not result in danger of pollution or to public health

and safety. Information to be considered in an evaluation of a requested exception should include, but is not limited to, chemical analysis of the produced fluids, steam and gases; the rate, temperature and pressure of production; environmental conditions in the area; type of geothermal reservoir system; type of resource utilization; the number, hourly coverage, and supervision of personnel operating the facilities; and the type of manually operated controls installed.

(2) Injection Facilities. All injection pipelines and related surface facilities must be designed to safely accommodate maximum expected surface injection pressures and shall be equipped with the following devices, except as noted in I.B.(1)(d) above.

(a) Each injection well shall be equipped with a pressure sensing or other approved device to actuate a valve to shut in injection to minimize safety or pollution hazards caused by injection pipeline or facility failure.

(b) Injection pipelines and related surface injection facilities shall be protected against pressure buildup in excess of the system's design limit by pressure sensors which will actuate either (1) well shut-in valves, or wellhead or injection pipeline shut-in valves, or (2) a system of well pressure relief valves and/or rupture discs. If only pressure relief valves and/or rupture discs are installed, it must be demonstrated that such venting in an emergency will not result in exceeding applicable pollution standards; otherwise, shut-in valves shall be installed. A remote-controlled shut-in or venting system may be required, in addition to pressure sensors.

(c) Check valves or other approved devices shall be required to prevent uncontrolled backflow from injection wells in the system in case of a line or facility failure, or where a line failure may result in pollution due to line drainage.

C. Testing and Operation

(1) Pipeline Integrity Tests.

(a) Pipeline - steam. The pipes shall be joined and joints tested in accordance with appropriate piping codes for steam distribution systems. The pipeline shall be operationally tested in service with steam during the initial clean-out by pressure testing to the maximum anticipated working pressure for one hour. The Supervisor shall be notified at least 48 hours in advance of the estimated date and time of each test so that the test may be witnessed.

(b) Pipeline - water. The pipeline shall be hydrostatically tested to 1.25 times the design working pressure for a minimum of 2 hours prior to placing the line in service. Certain low pressure lines such as waste disposal drains and all piping designed for internal pressures

at or below 5 psig. regardless of temperature, may be exempted from this requirement, if authorized by the Supervisor. The Supervisor shall be notified at least 48 hours in advance of the estimated date and time of each test so that the test may be witnessed.

(2) Safety Device Tests. The automatic and remote control devices installed in accordance with 1.B.(1) and (2) above shall be tested semiannually or at more frequent intervals as required by the Supervisor. Advance notification of at least 48 hours shall be given so that the Supervisor may witness the test. The lessee shall maintain records on each device showing present status and past history, including dates and details of inspection, testing, repairing, adjustment, reinstallation or replacement, and will forward copies of these records to the Supervisor semiannually.

(3) Operator Monitoring. Production, injection, and other waste disposal systems which are not completely equipped with shut-in or relief devices, shall require 24-hour on-site monitoring by operator personnel unless it can be demonstrated to the satisfaction of the Supervisor that less frequent monitoring will not increase the danger of pollution or to human life and health. Supervisory control system monitoring by power plant or steam supply operators of steam turbine header pressure, water disposal liquid level and injection line pressure can be substituted for the above monitoring provision, if approved by the Supervisor.

2. Application for Construction of Pipeline and Related Surface Facilities. The operator shall submit the items listed below with the Application for Permit to Drill or on a Sundry Notice, in triplicate, to the Supervisor for approval. In addition, as appropriate, a Plan of Operation according to 30 CFR 270.34 items (a) through (i) may be required for submittal for joint approval by the Supervisor and the appropriate land management agency. Production and injection pipelines for wells may be included as a part of the Application for Permit to Drill and Plan of Operation required for drilling the well.

A. Maps. A plat(s) showing the major topographic features and other pertinent data including the proposed route, length, size, and location of the line(s), and any connecting facilities.

B. Equipment Plans. A schematic drawing showing the location of the following pipeline and facilities safety equipment and the manner in which the equipment functions:

- (1) high-low pressure sensor(s)
- (2) automatic shut-in valve(s)
- (3) check valve(s)
- (4) metering system(s)
- (5) pressure relief valve(s)
- (6) other manual or automatic valve(s) or equipment

C. Design Information. General information concerning the pipeline and facilities including the following:

- (1) Product(s) to be transported by the pipeline
- (2) Size, weight, and grade of the pipeline
- (3) Length of line(s)
- (4) Type(s) of corrosion protection
- (5) Description of protective coatings
- (6) Description of pipe insulation and the application of exterior color camouflage
- (7) Anticipated gravity or density of the product(s) and a chemical analysis
- (8) Design working pressure and capacity
- (9) Maximum working pressure and capacity
- (10) Pipeline integrity tests
Steam Pipeline - testing pressure and hold time to which the pipeline will be tested after installation.
Water Pipeline - hydrostatic pressure and hold time to which the pipeline will be tested after installation.
- (11) Other related information as required by the Supervisor

3. Completion Report. The operator shall submit a report to the Supervisor when installation of the pipeline is completed, accompanied by all hydrostatic test data, including procedure, test pressure, hold time, and results.

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