




# Operating Staff Concept

## CO<sub>2</sub> Capture Facility

Kårstø, Norway

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## Operating Staff Concept

### 1.0 PURPOSE

The purpose of this document is to outline the recommended operating staff concept for the Karsto CCC project facility.

### 2.0 DESCRIPTION

The Karsto CCC Project is located adjacent to the Karsto gas terminal and the combined cycle power plant (CCPP) owned and operated by Naturkraft AS. The CCC plant is owned by Gassnova SF. The CCC project's technology is based on the use of amine for the bulk removal of CO<sub>2</sub> from a flue gas stream by liquid chemical absorbents. The amine plant mainly consists of flue gas ducting and blowers, direct contact coolers, absorption columns, a stripper column, reboilers, reclaimers, and CO<sub>2</sub> compression and drying, along with other equipment such as pumps, filters, and heat exchangers.

### 3.0 SCOPE

This document specifies the roles and responsibilities of facility management, operations, and maintenance organizations subsequent to turnover of the facility or systems thereof to the Owner.

### 4.0 DEFINITIONS

SOP's	Standard Operating Procedures
LOTO	Lock-Out-Tag-Out – Plant safety and clearance system
CRO	Control Room Operator
Startup Organization	Contractor commissioning team personnel
Owner's Organization	Owner's management and operations team personnel

### 5.0 RESPONSIBILITIES

#### 5.1 Startup Organization.

5.1.1 The Contractor's Startup organization (Startup) has the responsibility to receive turnover of systems from Contractor's construction organization, until all systems have been turned over to Startup. Startup then performs system checkout, and commissioning, places the systems into service, conducts required plant operational tests, and maintains care custody and control of the systems until plant operation has been achieved and the plant has been turned over to the Owner's organization. The startup team will be responsible for the turnover process as well, walking systems down with the Owner, preparing punchlists, completing punchlists, and then preparing turnover packages for the Owner's review and acceptance.

## 5.2 Owner's Organization

5.2.1 The Owner's organization has the responsibility to receive system turnover packages Contractor's startup organization, until all packages have been turned over to the Owner. Once the contract turnover mile stone is achieved (such as substantial completion), the Owner will accept the physical plant as documented by the turnover packages. Systems may turnover with the packages, depending on the independence of the system and Owner preference. The Owner's operation and maintenance group will then operate the plant according to plant design specifications.

5.2.2 During the period of commissioning and startup, the Owner's operators shall support the Contractor's startup organization by operating equipment and systems, as well as performing minor or routine maintenance activities. During this period, the Contractor's startup team will provide direction with regard to these activities, and will maintain responsibility for such activities during this phase, until the plant has been accepted by the Owner.

5.2.3 Once the plant has been accepted by the Owner, plant operators shall operate the equipment in accordance with provided guidelines, instructions, and supplier information as available to the operator. Additional direction from the Contractor will be provided only as mutually agreed to by the Owner and Contractor as a revision to scope of services.

5.2.4 The plant engineer will provide assistance in interpreting supplier information, specifications, operating procedures, additional instructions to the operators where deficiencies in such are found, as well technical guidance in resolution of identified problems. The plant engineer will also provide guidance with respect to process details such as required chemicals, solvent conditions, as well as information on handling of various chemicals and materials involved.

## 6.0 OPERATIONS

### 6.1 Shift Operators

6.1.1 Shift operators shall be responsible for operation of the physical plant equipment, including system line-ups (verification of valve positions for operation), verifying readiness of equipment, placing local control equipment in and out of service, as well as taking direction from the control room operator for placement of large equipment and systems in and out of service.

6.1.2 The shift operators shall assist the control room operator in maintaining detailed operations log, as well as make special note of equipment conditions when

problems are observed to assist others in determining cause and correction if the solution of such is not determinable by the operator.

6.1.3 The shift operators shall coordinate with the shift supervisor in maintaining plant stocks (operational chemicals, consumables, etc.).

6.1.4 The shift operators shall also be responsible for performing routine and operational maintenance on the plant equipment, including, but not limited to, the following;

1. Support to the mechanical and instrumentation/controls/electrical maintenance technicians
2. Maintain equipment maintenance logs
3. Collection of equipment operating data - pressure/temps/service hours/vibration spectra, etc.
4. Routine maintenance activity such as:
  - i. Lubricant maintenance (lubricant change/replenishment)
  - ii. Repair of minor leaks
  - iii. Small pump repair/seal/coupling replacement
  - iv. Cleaning of strainers
  - v. Changing of gaskets
  - vi. Minor valve maintenance/seal replacements
  - vii. General plant housekeeping

6.1.5 The backup shift operator shall provide relief or fill in for absent shift operators.

## 6.2 Control Room Operator

6.2.1 The control room operator (CRO) will be responsible for operation and control of the overall plant. The CRO may be a degreed engineer or have equivalent related operations experience in a similar position.

6.2.2 The CRO will place equipment and systems in and out of service via the plant DCS, provide direction to the operator mechanics with regard to systems operation, and maintain the detail plant operations log.

6.2.3 The CRO will monitor the overall operation of the plant from the central control room (CCR), monitoring system condition and alarms, taking corrective action as necessary to maintain safe and efficient plant operation.

6.2.4 The CRO will be responsible for coordination of the CCC plant operation with the Naturkraft CCPP, both advising the CCPP of CCC plant conditions, and logging in CCPP plant conditions, taking appropriate actions as necessary.

6.2.5 The CRO shall be capable of performing the duties of the operator mechanics.

6.2.6 The CRO shall provide assistance to the plant engineer in preparation of SOP's.

6.27 The CRO shall be responsible for administration of the plant LOTO and safety system, issuing work authorizations and system lockout tags and lock (clearances)

### 6.3 Shift Supervisor

6.3.1 The shift supervisor will manage both the CRO and the operator mechanics, along with management and administration of day to day plant activities, including schedule management, procurement of materials, daily reports, log approvals, etc.

6.3.2 Day to day plant operation and condition will be the responsibility of the shift supervisor

6.3.2 The shift supervisor shall be capable of performing the duties of the CRO and the operator mechanics, and shall fill in for such duties when the need arises.

6.3.3 The backup shift supervisor shall provide relief or fill in for absent shift supervisors or absent CRO's

## 7.0 PLANT ENGINEERING

### 7.1 Plant Engineering Staff

7.1.1 The plant engineering staff will be comprised of two degreed engineers, one with a chemical/mechanical background, the other with an electrical background. Each will provide assistance in interpreting supplier information, specifications, operating procedures, additional instructions to the operators where deficiencies in such are found, as well technical guidance in resolution of identified problems. The plant engineers will also provide guidance with respect to process details such as required chemicals, solvent conditions, as well as information on handling of various chemicals and materials involved.

7.1.2 The plant engineers shall also coordinate the plant equipment maintenance program, maintaining the Maintenance List (see Operation and Maintenance Philosophy), and issuing work orders for required maintenance.

7.1.3 The plant engineer shall also prepare and maintain plant Owner unique procedures with input from the shift operators if applicable.

7.1.4 In addition to the duties described above, the plant engineer shall also perform the following:

1. Support the mechanical and ICE technicians with routine maintenance of mechanical equipment, instruments and electrical components, performing cleaning, calibration, etc., and provide backup during call-off days or vacations.

2. Scheduling of contract maintenance for those activities plant personnel are not qualified or equipped to perform.
3. Scheduling and planning for major maintenance during planned outages

### 7.3 Plant Maintenance Contractor(s)

7.3.1 It shall be the plant engineer's responsibility to contract technicians for maintenance of items outside the skill set of the plant engineer or operator mechanics. Such personnel shall fall under Plant Maintenance Contractors. The plant engineer shall verify the qualifications of Plant Maintenance Contractors.

## 8.0 PLANT MAINTENANCE TECHNICIANS

8.1 The plant maintenance staff will be comprised of a mechanical and an instrumentation/controls/electrical technician (ICET).

8.1.1 The mechanical maintenance technician (MT) will be responsible for routine and medium maintenance of plant mechanical and physical plant equipment. The MT shall report to the plant engineer, and shall assist the plant engineer with maintenance (input and update) of the plant maintenance program. Technician duties include:

1. Routine maintenance of mechanical equipment, instruments and electrical components, performing cleaning, calibration, etc.
2. Support to plant engineers
3. Input to plant maintenance program
4. Support of contract maintenance when required

## 9.0 PLANT LABORATORY STAFF

9.1 The plant laboratory staff will consist of a plant chemist and two chemical technicians.

9.2 The plant chemist will be a degreed professional, preferably at the graduate level, or with combination of baccalaureate degree and relevant experience. The plant chemist will be responsible for maintaining and administering the laboratory budget, maintaining quality assurance program, maintaining (adoption of standard) testing procedures, training of technicians, and general upkeep of the plant laboratory in addition to physical analysis of operating plant samples.

9.3 The plant chemical technicians shall have minimum 2 year technical school training. The plant chemical technicians shall be responsible to collection of samples, maintenance of samples, analysis in accordance with procedures, and preparation of test reports for approval by the plant chemist.

## 10.0 WAREHOUSE STAFF

10.1 Warehouse staff will be comprise of a warehouse supervisor and a warehouse clerk.

10.2 The warehouse supervisor shall be responsible for maintaining warehouse stock, maintaining accurate and up to date inventory, coordinating with the plant engineer and plant manager for purchase of replacement stock, and systematic storage of stock to allow orderly withdrawal. Additionally, the supervisor shall maintain all required records such as bills of lading, and over/understock and damage reports.

10.3 The warehouse clerk shall be responsible for receiving and stocking of materials, operating warehouse forklift and documentation and delivery of materials requested by plant personnel.

## 11.0 PLANT SUPPORT STAFF

11.0 Plant support staff will include a plant accountant, plant purchasing agent, plant book keeper, human resources administrator, public relations officer, loss prevention specialist, and a environmental-safety-health (ES&H) specialist.

11.1 The plant accountant will be a degreed accountant responsible for maintaining plant accounts, payment of invoices, preparation of financial reports, and maintaining plant expenditure and applicable revenues records.

11.2 The plant purchasing agent shall be responsible for acquisition of material, preparation of sub-contracts, maintenance of material sources and supplier contacts, qualification of suppliers, review and approval of invoices to be processed by accounting, enforcing terms and commercial terms and conditions of purchases and or subcontracts.

11.3 The plant book keeper shall be responsible for maintenance of plant books (financial transactions), preparation of plant payroll, and general coordination with the plant accountant.

11.4 The human resources administrator will be responsible for employee processing, employee records, administration of general labor policy, annual reviews, and training coordination.

11.5 The public relations officer will be responsible for coordinating information to the general public about the plant, conduct plant tours, and act as liaison to local government officials.

11.6 The loss prevention specialist shall generally be a degreed professional responsible for administration of plant loss control, safety, and plant assessments performing inspections and investigation of accidents and equipment damage.

11.7 The environmental/safety/health ES&H specialist will in general be a degreed professional or person with relevant experience. The ES&H specialist will be responsible for assessing plant safety performance, injury reduction/elimination,



maintenance of plant protective equipment (personal protective equipment, spill kits, breathing apparatus, eyewash stations, etc.), as well as maintenance of local first aid kits/stations.

## **12.0 MANAGEMENT**

### **12.1 Plant Manager**

**12.1.1** The plant manager is a degreed engineer, preferably chemical, who shall hold the overall responsibility for plant operation and condition, management of budgets, human resources management, approval of all operation and maintenance procedures, approval of expenditures, interfacing with government and other outside agencies, and act as Owner's representative in public relations issues.

### **12.2 Plant Administration**

**12.2.1** The plant administrator shall assist the plant manager and be responsible for plant office management, management of office supplies, preparing letters, correspondence, and other communication documents for the plant manager, receiving visitors, organizing meetings, , and general secretarial duties.

