Urea Synthesis & HP Recovery Section – Abnormal Operation, Troubleshooting & Field Operations

8 – 12 March 2027
Amsterdam (Netherlands)



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Introduction

This practical training course provides a comprehensive walk-through of the key operational aspects of **Urea Synthesis and the High-Pressure HP Recovery Section**, with particular emphasis on the daily responsibilities of Senior Field Operators.

The course focuses on practical field knowledge rather than extensive theoretical concepts. It covers normal operation, process monitoring, equipment behavior, abnormal operating conditions, troubleshooting, process upsets, corrective actions and safe operator response.

Participants will work through realistic operating situations and **three practical case studies** to develop a systematic approach to identifying abnormalities, analyzing possible causes and taking appropriate corrective actions.

Course Objectives

By the end of the course, participants will be able to:

- Understand the main process flow and operating principles of the Urea Synthesis and HP Recovery sections.
- Identify major equipment and understand their operational functions and interactions.
- Monitor critical pressure, temperature, level, flow and process trends.
- Recognize abnormal operating conditions and their possible causes.
- Apply systematic troubleshooting techniques to process and equipment problems.
- Improve field response during process upsets and operating deviations.
- Determine appropriate corrective and recovery actions.
- Apply safe operating practices during abnormal and emergency situations.

Course Outlines

Day 1 - Urea Synthesis Process & Field Operations

- Walk-through of the Urea Synthesis process, process flow and main operating stages.
- Practical functions of the reactor, stripper, HP carbamate condenser and associated equipment.
- Ammonia and CO_2 feed systems and their effect on stable synthesis operation.
- Monitoring critical pressure, temperature, level and flow parameters from the field.
- Practical field checks, operating observations and early identification of abnormal conditions.

Day 2 - HP Recovery Section Operations & Monitoring



- Walk-through of the HP Recovery section and its major equipment.
- Practical operation of the HP stripper and HP carbamate condenser.
- Decomposition, condensation and recovery processes from an operator's perspective.
- Identification of abnormal pressure, temperature, level and flow conditions in HP recovery.
- **Case Study 1: HP Recovery Performance Problem** - identifying symptoms, possible causes and appropriate operator actions.

Day 3 - Abnormal Operations & Process Troubleshooting

- High and low pressure/temperature deviations and their operational impact.
- Abnormal level and flow conditions and methods of field identification.
- Poor stripping, condensation and carbamate circulation problems.
- Ammonia/CO_2 balance deviations and their effect on process stability.
- Practical troubleshooting methodology using operating symptoms, process trends and plant scenarios.

Day 4 - Equipment Problems, Process Upsets & Operator Response

- Practical operating problems involving pumps, compressors, valves and heat exchangers.
- Identification of leaks, blockages, vibration and abnormal equipment performance.
- Synthesis loop instability and common process upsets.
- Start-up, shutdown and transition-related abnormalities and field response.
- **Case Study 2: Process Upset & Equipment Abnormality** - analyzing symptoms, determining possible causes and developing the operator response.

Day 5 - Integrated Troubleshooting & Safe Field Operations

- Integrated review of Urea Synthesis and HP Recovery operating conditions.
- Interpreting process trends and connecting field observations with process abnormalities.
- Corrective actions, recovery strategies and safe operating decisions.
- **Case Study 3: Integrated Urea Plant Abnormal Operation** - identifying the problem, determining root causes and developing a safe recovery sequence.
- Final practical review, lessons learned and operator knowledge assessment.

Why Attend This Course? - Wins & Losses!

Wins

- Develop stronger practical knowledge of Urea Synthesis and HP Recovery operations.
- Improve early identification of abnormal operating conditions.
- Strengthen field troubleshooting and corrective-action skills.
- Better understand the interaction between process conditions and equipment performance.
- Improve confidence when responding to process upsets.
- Enhance safe and effective field-operation practices.

Losses



- Delayed recognition of abnormal process conditions.
- Incorrect or delayed operator response.
- Increased process instability and potential production losses.
- Greater risk of equipment problems and unplanned shutdowns.
- Difficulty identifying the causes of recurring operational problems.

Conclusion

This course provides a **comprehensive and practical walk-through of Urea Synthesis and HP Recovery operations**, specifically aligned with the requirements of Senior Field Operators.

The programme balances essential process understanding with practical field knowledge, focusing on **operational monitoring, abnormal conditions, troubleshooting, equipment behavior, corrective actions and safe operator response**.

Three realistic case studies are incorporated to enable participants to apply the concepts to typical urea plant operating situations and develop a structured troubleshooting approach.

Frequently Asked Questions FAQ

1. Who is this course designed for?
The course is specifically designed for Senior Field Operators and personnel working within the Urea Department.

2. Can the course be delivered in 4 hours per day?
Yes. The programme is structured as **1 week × 4 hours per day**, with practical discussions, troubleshooting scenarios and case studies integrated throughout the training.

3. Does the course cover both Urea Synthesis and HP Recovery?
Yes. The programme provides a structured walk-through of both sections, including their major equipment, operating parameters, field monitoring and common operational problems.

4. Is the course more practical than theoretical?
Yes. The training emphasizes field operations, process monitoring, abnormal conditions, troubleshooting, equipment behavior and operator response rather than extensive theoretical concepts.

5. Can the training be customized to the client's actual plant?
Yes. Where available, the content can be further customized using the client's PFDs, P&IDs, operating procedures, equipment information and specific plant operating challenges.

