Agrium

Kenai Nitrogen Operations

K55S02R2
Plant 5 Chlorine & Cooling Water System
System: 55
Process Hazards Analysis Revalidation

Final Report

April 19, 2002

Prepared by:

Agrium

Kenai Nitrogen Operations
Mile 21 Kenai Spur Hwy
Kenai, Alaska 99611

Project No.: K55S02R2

TABLE OF CONTENTS

SECTION 1.0 – **ABOUT THIS STUDY**

The Process Hazards Analysis, K55S0002 conducted between May 3 and May 13, 1993 was initially revalidated at Agrium's Kenai Nitrogen Operations May 11 and May 14, 1998. This second revalidation was performed at Agrium's Kenai Nitrogen Operations on April 16, 2002. The original PHA, as well as both revalidations, focused on the Plant 5 Chlorine and Cooling Water System (System 55).

EPA RMP 40 CFR Part 68 Section 112 (7) and OSHA Rule 1910.119, "Process Safety Management of Highly Hazardous Chemicals" requires that the initial Process Hazard Analysis (PHA) for a covered process be updated and revalidated by a knowledgeable team at least every five years. The objective of PHA revalidation is to assure that the PHA is consistent with the current process. The PHA is revalidated, by evaluating and addressing the following questions:

- Have significant new hazards been created or introduced into the process?
- Has the possible occurrence of a catastrophic release in the process unit become significantly more likely?
- Have consequences of previously identified toxic or flammable material releases become more severe?
- Have consequences that could go "off-site" been identified?
- Have previously identified safeguards become compromised or challenged?

METHODOLODIES

Baseline PHA

The original, or baseline, PHA was conducted primarily using the "HAZOP" technique.

HAZOP Technique

HAZOP uses guidewords, in conjunction with key process parameters, prompt the Process Hazards Analysis team to brainstorm possible causes and potential consequences of deviations from expected operation. For example, the deviation of "NO FLOW" would prompt the leader to ask the team, "What could cause no flow in this section or line segment?" The "Possible Cause/Potential Consequence" scenarios were documented in the report worksheets along with "Existing Systems and Safeguards," that either reduce the likelihood of the cause occurring or reduce the potential consequences. For scenarios involving significant risk, "Recommendations," which the team believed, may further reduce the risk or improve the operability of the facility were also documented.

The specific steps of the HAZOP methodology used in the baseline PHA were:

- Choose study node
- Apply a deviation (parameter + guideword)
- Brainstorm causes of the deviation
- For each cause, identify ultimate global consequences

- Identify existing safeguards
- Qualitatively assess the risk of the scenario
- If warranted, make recommendation(s) to reduce risk and/or improve the operability of the facility

This process is repeated for each deviation and node until the entire process has been analyzed.

Revalidation

The PHA procedure used to revalidate Plant 5 Chlorine and Cooling Water System was the Guideword/Checklist PHA Revalidation Method, along with a node-by-node review of the original PHA. This methodology was organized into the following tasks, and are described below:

1. Collection of Information
2. Information Review
3. Revalidation Study Sessions (with PHA Team)

Collection of Information

The following information was collected prior to the Revalidation Study Sessions:

1. Baseline PHA and last revalidation, including worksheets, Action Item list, P&IDs reviewed, and status of recommendations.
2. Documented changes to the design or operation of the process since the last revalidation (including MOCs).
3. Documented incident reports from this unit.
4. Latest revision of Piping and Instrument Diagrams (P&IDs) that describe the process.
5. Other Process Safety Information, such as PRV design basis and data and Standard Operating Conditions and Limits (SOCLs).

Information Review

The collected information was reviewed by the Revalidation Team Leader and PSM Assistant prior to the study dates. The purpose of the Information Review is to screen the baseline PHA and latest revalidation for content and quality, and to identify concerns and issues that need to be reviewed by the Revalidation Team during the study sessions. This resulted in the generation of an agenda or work plan for the sessions. The Information Review included the following tasks required to identify items for discussion with the team:

1. Review and verify the documented status of recommendations from the baseline PHA, other revalidations, and any project PHAs affecting this unit.
2. Review all incidents occurring in the system since the last revalidation, and develop a list of those pertinent to the revalidation process.
3. Develop a list of all undocumented changes that have occurred to the design or operation of the process since the last revalidation, see Attachment 5. This is done by comparing

the latest P&IDs with the P&IDs reviewed during the last revalidation, and by reviewing those changes to the design or operation of the process with the ones that have been analyzed by the MOC process.

4. Develop an agenda, or work plan for the study sessions, see Attachment 1.

Revalidation Study Sessions (with PHA Team)

The revalidation study was discussed and prepared by a multi-disciplined team knowledgeable in the process and in the PHA method used. At the beginning of the session, the Team Leader reviewed the PHA revalidation scope and purpose. The group was then lead through the revalidation procedure, which included:

1. General discussion regarding the status of open recommendations from the baseline PHA, there were none for this study;
2. Work through the Change Evaluation Checklist to identify undocumented changes, there were none for this study;
3. Discuss Previous Incident Reports, see Attachment 14;
4. Perform a node-by-node review of the original baseline PHA.

Other Issues

Facility Siting – Agrium Kenai Nitrogen Operations has completed a plant-wide facility siting study, which adequately addresses those issues; therefore, the Facility/Plant Siting Issues checklist was not utilized.

Compliance with OSHA Rule 1910.119 and EPA RMP Rule

This study complies with OSHA rule 1910.119, "Process Safety Management of Highly Hazardous Chemicals" and EPA 40CFR Part 68 Section 112, "Risk Management Program."

In particular, this study complies with paragraph (e,6) of the OSHA rule that states; "At least every five years after the completion of the initial process hazard analysis. The process hazard analysis shall be updated and revalidated by a team, meeting the requirements in paragraph (e)(4) of this section to assure that the process hazard analysis is consistent with the current process." The study also complies with Subpart D (68.67) of the RMP Rule covering the same requirements as OSHA 1910.119 and potential off-site consequences.

The study was completed within five years of the baseline PHA. A multi-disciplined team, including at least one person with knowledge and experience in the process, discussed and prepared the study in a manner to ensure that the baseline PHA is consistent with the current process.

Process Hazards Analysis Team (e, 4)

The PHA Revalidation was discussed and prepared by a team with expertise in engineering and operations, with at least one employee having specific expertise in the process being evaluated. The Process Hazards Analysis Revalidation was conducted on April 16, 2002 at Agrium Kenai Nitrogen Operations in Kenai, Alaska.

The study team consisted of the following people:

Name	Title	Years of Experience
Ed Aisenbrey	PSM Coordinator, PHA Team Leader	24
Jerry Howell	Plant 5 Operator	10
America Dukowitz	PSM Assistant, PHA Scribe	4
Rob Ross	Maintenance Engineer	9
Michael Thompson	Mechanical Engineer	5
Michelle Grzybowski	Environmental Specialist	7
Chuck Bergonzini	Safety Specialist	20
Russell Peterson	Process Engineer	27

Process Description

The Cooling Tower (6E711) is a cross-flow cooling tower that utilizes induced draft, open circulation cooling. Since a large degree of evaporation is present in cooling towers of this design, constant make-up is required from the plant water header via Cooling Tower basin level control valve (5LCV785). Make-up comes from Water Wells #3 and #5. Evaporation also causes a solids concentration build-up that must be alleviated by a continuous manual blowdown, which has been set up in the Plant 3/6 Utility Building.

Cooling water is circulation is driven by any two of three Cooling Water Pumps (6G711A/B/C), two of which are electric driven and one steam turbine driven. Warm cooling water is returned to the top of the Cooling Tower, distributed for even flow down through the tower, and cooled by flowing down through inducted air. Air induction is provided by two cooling fans (6GB704A/B). Controls for varying speeds and direction of these fans are located on the control room board.

Due to the large volume of circulating water, pH control is a great concern for the prevention of corrosion and scale build-up. The pH control of the cooling water system is accomplished with 98% sulfuric acid (H2SO4). Acid flow rate is determined by pH controller/indicator (6AIT977), which controls a direct flow of acid from Plants 3/6 via acid valve (6FV977). A local acid storage day tank (6F724) has been provided for acid flow during short-term acid outages. Other chemical additives, supplied by a water treatment consulting company, are also injected into the cooling water.

Microorganism growth in the cooling water system is controlled by a chlorine injection system, which is housed in the Chlorine Building. Chlorine injected into the cooling water is provided from either of two one-ton containers. Flow rate is determined by Lab sample and is set by Lab personnel. Chlorinator (5GB796) feeds chlorine to the water via a venturi ejector driven by the cooling water return flow. Building is equipped with a chlorine alarm system, which displays on the control room board.

Study P&IDs

The following Process & Instrument Diagrams (P&IDs) were studied during the PHA:

P&ID	DESCRIPTION	LATEST REVISION
R5I-5060	Cooling Water Distribution	3
R5I-5160	Cooling Tower	4
R6I-6060	Waste Process Effluent Sump and Ponds	5
R6I-6080	Cooling, Plant and Potable Water	7

Due to the size of the P&IDs used for this study, the actual drawings will not be included in this report. The P&IDs used during the study have been retained by Agrium Kenai Nitrogen Operations, PSM Group, and will be maintained in the PHA Revalidation P&ID file drawer.

Other Available PSI

Operating Procedures, Standard Operating Conditions and Limits (SOCLs), and Material Safety Data Sheets were available for review by the revalidation team as needed. Included in the SOCLs are the consequences of deviating from established safe operating limits. Design criteria and maintenance history for relief devices in this system were available for review as necessary.

SECTION 2.0 - RECOMMENDATIONS

Along with appearing in the revalidation study sheets, suggested recommendations identified by the study team are documented below.

RECOMMENDATION: 1

EH&S to determine actual time requirements for personnel to avoid entry into cooling tower basin or cooling water pump building after slimicide addition and assure results are entered into SOP's.

(Reference: Page 30 of Node-by-Node Worksheet Report, numbered 46)

RECOMMENDATION: 2

Evaluate LTT for cooling tower entry with regard to lock out of exhaust fan breaker.

(Reference: Page 36 of Node-by-Node Worksheet Report, numbered 57)

SECTION 3.0 – STUDY WORKSHEETS & ATTACHMENTS

The following attachments were used throughout the PHA Revalidation and may be found on the following pages:

Attachment 1	Revalidation Agenda
Attachment 2	Initial PHA Content Checklist
Attachment 3	Baseline PHA Screening Checklist
Attachment 4	Discussion of Recommendations from Baseline PHA
Attachment 5	Change Evaluation Checklist to Identify Undocumented Changes
Attachment 14	Previous Incident Reports Checklist

Node-by-Node Worksheet created in PHA Pro, 36 pages.