

Agrium

Kenai Nitrogen Operations

K00S54R1

Plants 3 & 6 Power Distribution Systems

Systems: 3 & 53

Process Hazards Analysis Revalidation

Final Report

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Prepared by:

Agrium

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

Project No.: K00S54R1

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1.0 ABOUT THIS STUDY

The Process Hazards Analysis, K00S0054 conducted between February 21, 1997 and February 24, 1997 was revalidated at Agrium's Kenai Nitrogen Operations January 22-23, 2002. The original PHA, as well as the revalidation, focused on the plants Power Distribution Systems (Systems 3 & 53)

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?

METHODOLOGIES

Baseline PHA

The original, or baseline, PHA was conducted primarily using the "WHAT-IF" technique.

WHAT-IF Technique

The "What-If" technique involves asking questions that require the team to analyze deviations from the procedure. An example is, "What-If" ...the drying step were left out of the procedure?" The team then develops consequences of this action (or inaction) and documents the safeguards in a manner similar to HAZOP. The "What-If" scenario is then ranked for risk, and recommendations are made if appropriate, similar to the HAZOP technique.

Revalidation

The PHA procedure used to revalidate Plants 3/6 Boiler Feed Water and Utility Steam Systems was the Guideword/Checklist PHA Revalidation Method. 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, 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 baseline PHA (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 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 the baseline PHA and complete the Initial PHA Content Checklist, see Attachment 2, and the Baseline PHA Screening Checklist, see Attachment 3. Evaluate the baseline PHA to ensure that off-site consequences were adequately discussed and addressed.
2. Review and verify the documented status of recommendations from the baseline PHA and any project PHAs affecting this unit.
3. Review all incidents occurring in the system since the baseline PHA, and develop a list of those pertinent to the revalidation process.
4. Develop a list of all changes that have occurred to the design or operation of the process since the baseline PHA, see Attachment 5. This is done by comparing the latest P&IDs with the P&IDs reviewed during the baseline PHA, and by reviewing those changes to the design or operation of the process that have been analyzed by the MOC process.
5. 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, and reviewed the completion of the Initial PHA Content Checklist and the Baseline PHA Screening Checklist. The group was then lead through the revalidation procedure, which included:

1. General discussion regarding the status of open recommendations from the baseline PHA, see Attachment 4;
2. Work through the Change Evaluation Checklist to identify undocumented changes, see Attachment 5;
3. Work through the Operations Change Evaluation and Wrap-up Checklist Issues, see Attachment 6;
4. Work through the Maintenance Change Evaluation and Wrap-up Checklist Issues, see

- Attachment 7;
5. Work through the Engineering Change Evaluation and Wrap-up Checklist Issues, see Attachment 8;
 6. Work through the Inspection Change Evaluation and Wrap-up Checklist Issues, see Attachment 9;
 7. Work through the Emergency Response Change Evaluation and Wrap-up Checklist Issues, see Attachment 10;
 8. Work through the Safety Group Change Evaluation and Wrap-up Checklist Issues, see Attachment 11;
 9. Work through the General Change and Wrap-up Checklist Issues, see Attachment 12;
 10. Review Human Factors Issues/Checklist, see Attachment 13;
 11. Discuss Previous Incident Reports, see Attachment 14;
 12. Evaluate Potential Off-Site Consequences, see Attachment 15;
 13. Discuss Additional Areas "What-If" Worksheets, see Attachment 16;
 14. Review Revalidation Guideword Checklist, see Attachment 17;
 15. Review Risk Ranking Matrix, see Attachment 18.

"What-If" - The team utilized the "What-If" technique to identify potential hazards and areas of concern when it was determined that those hazards or concerns were not adequately addressed by the baseline PHA, such as potential off-site consequences. The "What-If" technique was also utilized to evaluate potential hazards caused by new or modified equipment, as the review team deemed appropriate. OSHA recognizes the "What-If" as an acceptable method of evaluating process hazards. Those scenarios evaluated using the "What-If" technique can be found in Attachments 15 and 16.

The "What-If" technique involves asking questions that require the team to analyze deviations from the design intent. An example is: "What-If...the drying step were left out of the procedure?" The team then develops consequences of this action (or inaction) and documents the safeguards in a manner similar to HAZOP. The "What-If" scenario is then ranked for risk, and recommendations are made if appropriate, similar to the HAZOP technique. Attachment 18 shows the criteria for applying risk rankings to various scenarios.

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 between January 22 and January 23, 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
Keith Chilson	Plant 3/6 A Operator	9
America Dukowitz	PSM Assistant, PHA Scribe	4
Dwayne Goche	Inspector	17
Loran Maggi	Electric Shop Foreman	21
Michael Thompson	Mechanical Engineer	5
Steve Maltby	Environmental Specialist	10
Dana Bassel	Safety Specialist	31
Rick Warren	Emergency Response Coordinator	28

Process Description

The Kenai plants were designed to be self-sufficient in electrical power. The old and new plants are tied together electrically. They have separate distribution systems and can be powered by the HEA Turbine and a limited amount of power load on Solar Generators alone. Both sections of the plant have emergency backup systems, mostly for lighting and critical control circuits from Homer Electric Association (HEA).

The HEA Turbine is a 40 megawatt natural gas fired generator producing 13,800 volts of electricity letting down to 4160 volts for the Kenai Plant use. The electricity that is not used by the plant is distributed to the HEA Grid. The generator exhaust feeds the HRSG Boiler that also has supplemental gas firing. The HRSG boiler can produce 370,000 lb per hour.

When plants 1, 2 and 3 are at their normal production rates, our electrical load usually runs at 6,000 kW or 6.0 megawatts. The five Caterpillar (Solar) Centaur gas turbines are each rated at 2,500 kW 4,160 volt generators with horsepower ratings of 3,830. The total capacity is 12,500 kW or 12.3 megawatts. Depending upon ambient temperature conditions, these units are capable of producing between 2,700 and 3,200 kW each. When plants 4, 5 and 6 are running at normal rates, our electrical load usually runs between 8,000 kW to 9,000 kW. A waste heat boiler is attached to each solar gas turbine. The exhaust temperature from each turbine operates around 635° F. With this exhaust temperature and additional natural gas firing, we are able to produce 50,000 lbs per hour of 550 psi superheated steam from each of five waste heat boilers.

Study P&IDs

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

P&ID	DESCRIPTION	LATEST REVISION
R3I-3040	Fairbanks Morris Generator	8
R3I-3100	Air, Nitrogen and Gas	9
R4I-4001	PC System & Feed Gas – Process	17
R6I-6041	A-Solar Gen & Waste Heat Boiler – Process	11
R6I-6042	B-Solar Gen & Waste Heat Boiler – Process	5
R6I-6043	C-Solar Gen & Waste Heat Boiler – Process	6
R6I-6044	D-Solar Gen & Waste Heat Boiler – Process	6
R6I-6045	E-Solar Gen & Waste Heat Boiler – Process	6
R6I-6090	Air, Gas and Nitrogen	6
D3N-1036	Generator Control & Auxiliary	10

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.

2.0 RECOMMENDATIONS

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

The recommendations are numbered based on the attachment/worksheet in Section 3.0 where the cause/consequence scenario and the recommendations are documented. If there is more than one recommendation per worksheet, they are numbered chronologically. This list is to be used by management to resolve and document resolution of the suggested actions by the Process Hazards Analysis Revalidation team.

RECOMMENDATION: 5-1

The designation of “Temporary” should be removed from MOC #100088459. This change is permanent.

(Reference: Attachment 5)

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
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Attachment 7	Maintenance Change Evaluation and Wrap-up Checklist
Attachment 8	Engineering Change Evaluation and Wrap-up Checklist
Attachment 9	Inspection Change Evaluation and Wrap-up Checklist
Attachment 10	Emergency Response Change Evaluation and Wrap-up Checklist
Attachment 11	Safety Group Change Evaluation and Wrap-up Checklist
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