Emergency Preparedness and Hazard Mitigation in Renewable Natural Gas Facilities

Operating a renewable natural gas (RNG) facility on a landfill presents a wide array of hazards and risks, making emergency preparedness a critical component of Waga Energy's operations. These hazards range from highly flammable and explosive gases to toxic and asphyxiation risks, pressure-related vessel explosions, cryogenic leaks, and environmental threats from spills of hazardous materials such as oil, ignitable waste, or solvents. Being in close proximity to or directly on landfills also presents dangerous hazards. There are five key components to our emergency preparedness, including:

- Hazard Identification and Risk Assessment
- Safety Monitoring Equipment
- Site-Specific Emergency Plans
- Training and Education
- Continuous Preventative Maintenance

Hazard Identification and Risk Assessment

Before breaking ground on a project, Waga Energy conducts a comprehensive Hazard and Operability Study (HAZOP). This administrative control identifies potential risks, evaluates their severity, and determines appropriate mitigation measures. The process involves communication with and contributions from multiple stakeholders to ensure thoroughness and accuracy.

By leveraging the expertise of all parties involved, Waga Energy thoroughly analyzes process deviations, equipment vulnerabilities, and site-specific risks. The HAZOP study also facilitates compliance with regulatory requirements and industry best practices, reinforcing the company's commitment to safety and environmental responsibility.

The following items break down the Waga Energy HAZOP process in more specific detail:

Key Participants

- **Internal Teams**: Waga Energy's engineers, safety specialists, and project managers collaborate to identify site-specific hazards and assess risks. Regular internal meetings provide a platform for discussing potential issues, reviewing past incidents, and brainstorming mitigation strategies.
- **Landfill Owners and Operators**: Coordination with landfill personnel is critical to understand site-specific conditions, existing safety measures, and operational challenges. These discussions help integrate the biogas facility's plans seamlessly with the landfill's processes.
- **Additionally Involved Entities**: Engagement with additionally involved entities, such as gas companies or vendors, ensures alignment on pipeline safety, gas quality standards, and emergency response protocols. These companies provide valuable insights into best practices for managing potential site-related hazards.

Steps in the Risk Assessment Process

1. **Identifying High-Risk Scenarios**: Potential hazards such as explosive atmospheres, toxic gas exposure, and equipment malfunctions are systematically identified.
2. **Analyzing Site Conditions**: Evaluating environmental factors, operational workflows, and potential points of failure to determine risk severity.
3. **Consulting Stakeholders**: Input from landfill operators, gas companies, and emergency responders enriches the risk assessment process with diverse perspectives.
4. **Developing Mitigation Strategies**: Detailed plans are created to address identified risks, such as installing specialized safety equipment, enhancing monitoring systems, or implementing procedural safeguards.
5. **Re-evaluation**: Any newly developed mitigation strategy is placed back into the assessment and re-evaluated using the same criteria as before. If the mitigation effort successfully lowers the risk to an acceptable level, then that strategy is complete. If it does not, the cycle continues until an acceptable level is reached.

Outcomes of the HAZOP Process

- **Customized Safety Measures**: Implementation of controls tailored to the specific risks of each facility.
- **Enhanced Communication**: Clear protocols for sharing information between internal teams, landfill operators, and external partners.
- **Continuous Improvement**: Lessons learned from previous projects are integrated into future risk assessments to refine safety practices.

This collaborative and iterative approach ensures that all potential hazards are addressed comprehensively, fostering a safer operational environment for all involved, both directly and indirectly.

Safety Monitoring Equipment

Continuously monitoring the atmosphere onsite for explosive, toxic, or asphyxiation hazards, is critical for onsite personnel safety, and emergency notification.

Collective Protection Equipment: Fixed Gas Analyzers

- **Purpose**: Continuous monitoring of gas concentrations in critical areas throughout the inside of the WAGABOX®.
- **Features**: Real-time alerts for hazardous levels of methane, hydrogen sulfide, and carbon dioxide.
- **Integration**: Automated systems that trigger ventilation and alarms, and unit shutdown with biogas rerouting, when dangerous conditions are detected.

Personal Protective Equipment: Personal Gas Monitors

- **Use**: Portable devices mandated to be worn by workers onsite when the plant is operational, to detect exposure to harmful gases in real-time. Specialized lone worker monitors are also used when employees are onsite alone.
- **Capabilities**: Multi-gas detection, audible and visual alarms, and vibratory alerts for immediate action. The lone worker monitors also include GPS monitoring, real time alerts to internal monitoring personnel in the event of alarms, falls, lack of movement, and more, allowing remote help to send emergency personnel as necessary.
- **Advantages**: Direct protection for workers, particularly in confined or high-risk areas. The lone worker monitors also allow for remote safety monitoring, ensuring all employees are safeguarded.

Site-Specific Emergency Plans

While hazard mitigation and emergency preparedness begins with the HAZOP process, it is essential to have a contingency plan in place in the event that things go wrong. Each Waga Energy site has a Site-Specific Emergency Plan. These plans are developed well before construction begins, ensuring readiness from the outset. The process involves coordination with landfill operators, local fire departments and emergency response teams to incorporate site-specific considerations.

Each plan includes critical components such as:

- **Incident Response Procedures**: General instructions and detailed steps for addressing specific emergencies such as uncontrolled fire events, significant gas leaks, explosion of a vessel, gas leaks, asphyxiation risks, hazardous material spills, inclement weather, and more.
- **Designated Muster Points and Shelters**: Coordination takes place with the landfill owner to use locations that they have either already designated, or that they approve of. These clearly marked locations allow for personnel to gather during emergencies, including inclement weather shelters, are added to the plan, and communicated to all applicable personnel.
- **Contact Information**: Detailed lists of key personnel, local emergency responders, medical facilities, poison control, relevant onsite vendors, and environmental protection agencies are not only added to the plan but are posted throughout the facility in various locations. This helps ensure that no matter who is onsite, they know who to reach out to in the event of an onsite emergency.

Personnel onsite are thoroughly trained on these plans, ensuring they understand their roles and responsibilities in mitigating risks and responding to incidents. To be a resource and assist visitors, emergency posters are strategically placed throughout the facility. These provide quick-reference guides that outline steps to take and who to contact in the event of injuries, gas leaks, or other emergencies.

Plans are reviewed periodically and updated as necessary to ensure accurate information.

Collaboration with Emergency Responders

A critical aspect of Waga Energy's emergency preparedness is the collaboration with local fire departments and emergency responders. Usually in conjunction with the landfill, initial and periodic safety presentations are conducted to help familiarize these community stakeholders with site-specific hazards and controls. These presentations include:

- **General Site Information**: Overview of the facility's operations, hazard potential, equipment locations, and safety features.
- **Emergency Stops and Alarms**: Location and functionality of these key systems.
- **Site Layout**: Maps and diagrams to aid emergency responders in navigating the facility.

By fostering clear communication and coordination, these efforts ensure that first responders are well-informed and prepared to act efficiently during emergencies on Waga sites. This collaboration extends to regular meetings with gas companies and other relevant entities to maintain alignment on safety protocols and responsibilities.

Environmental and Community Safety

Emergency planning at Waga Energy facilities extends beyond protecting personnel to include safeguarding the environment and surrounding communities. Uncontrolled emissions or spills can have devastating consequences, making environmental protection a top priority. Measures to address these concerns include:

- **Environmental Response Plans**: There are many regulations regarding environmental protection and contingency plans. Waga Energy maintains compliance with these regulatory requirements, creating the appropriate plans and procedures well in advance of a unit becoming operational, and maintaining and updating those plans accordingly, throughout the operational lifetime of the facility.
- **Spill Containment and Response**: Systems and procedures to prevent and manage leaks or spills of hazardous materials.
- **Air Quality Monitoring**: Continuous tracking of emissions to ensure compliance with environmental regulations.
- **Community Engagement**: Open communication with local communities to build trust and awareness of safety measures.

Training and Education

Training is a cornerstone of Waga Energy's safety culture. Employees undergo extensive training to familiarize themselves with the hazards and controls specific to their site. Training programs include:

- **Hazard Awareness**: Understanding the properties and risks associated with gases and materials on-site.

- **Emergency Response Procedures**: Step-by-step guidance on how to act during various emergency scenarios.
- **Equipment Operation**: Proper use of safety technology and PPE to mitigate risks.
- **Consistency Across Sites**: Standardized our units and training ensures uniformity and reliability of safety practices across all facilities.

Ongoing education keeps personnel informed about new safety technologies, updated procedures, and evolving regulatory requirements. This continual improvement helps maintain a high standard of safety and preparedness.

Continuous Preventative Maintenance

The last component in our ongoing effort regarding emergency planning is continuous preventative maintenance. Utilizing online maintenance programs that send reminders and provide informational references, our maintenance team keeps our WAGABOX® equipment running smoothly and safely. This not only minimizes down-time, but also ensures that the equipment is operationally safe, contributing to mitigating risks of equipment failure, lowering the possibility of emergency situations onsite.

Conclusion

Emergency preparedness and hazard mitigation are foundational to Waga Energy's operations at landfill renewable natural gas facilities. By developing comprehensive site-specific plans, leveraging advanced safety technologies, fostering collaboration with emergency responders, training, and continuous maintenance, the company ensures a proactive approach to safety. While proactive measures require time and effort, they ultimately save significant resources and prevent avoidable harm.

These efforts not only protect personnel and the environment but also enhance operational reliability and community confidence. By prioritizing prevention and preparedness, Waga Energy aims to set a high standard for safety in the renewable energy industry.