

HARP



HAI Amine Reclamation Program

General Overview



HARP is a program delivering sustainability through reclaiming amines and providing performance and value to our customers.

HAI's Improved Program to utilize Scrubber Solution created in Phenolic Urethane Cold Box processing

- Three amines, DMIPA (Sigma Cat 2190), DMEA (Sigma Cat 2195), and DMPA (Sigma Cat 2198), can be reclaimed at a single location.
- An ecologically responsible option - HA-International supports minimizing the foundry's environmental impact. This is the basis of our EcoMission™ program.



Environmental Benefits



The HAI **HARP** program is the most ecologically and environmentally responsible option to handle the amine catalyst in the PUCB process.

HARP prevents harmful air pollutants from reaching the atmosphere and reduces a waste stream by allowing for the reclamation of the material used in the process.

HARP prevents disruptive issues caused by non-compliance with state and federal regulations and makes the foundry a better neighbor to the surrounding areas.

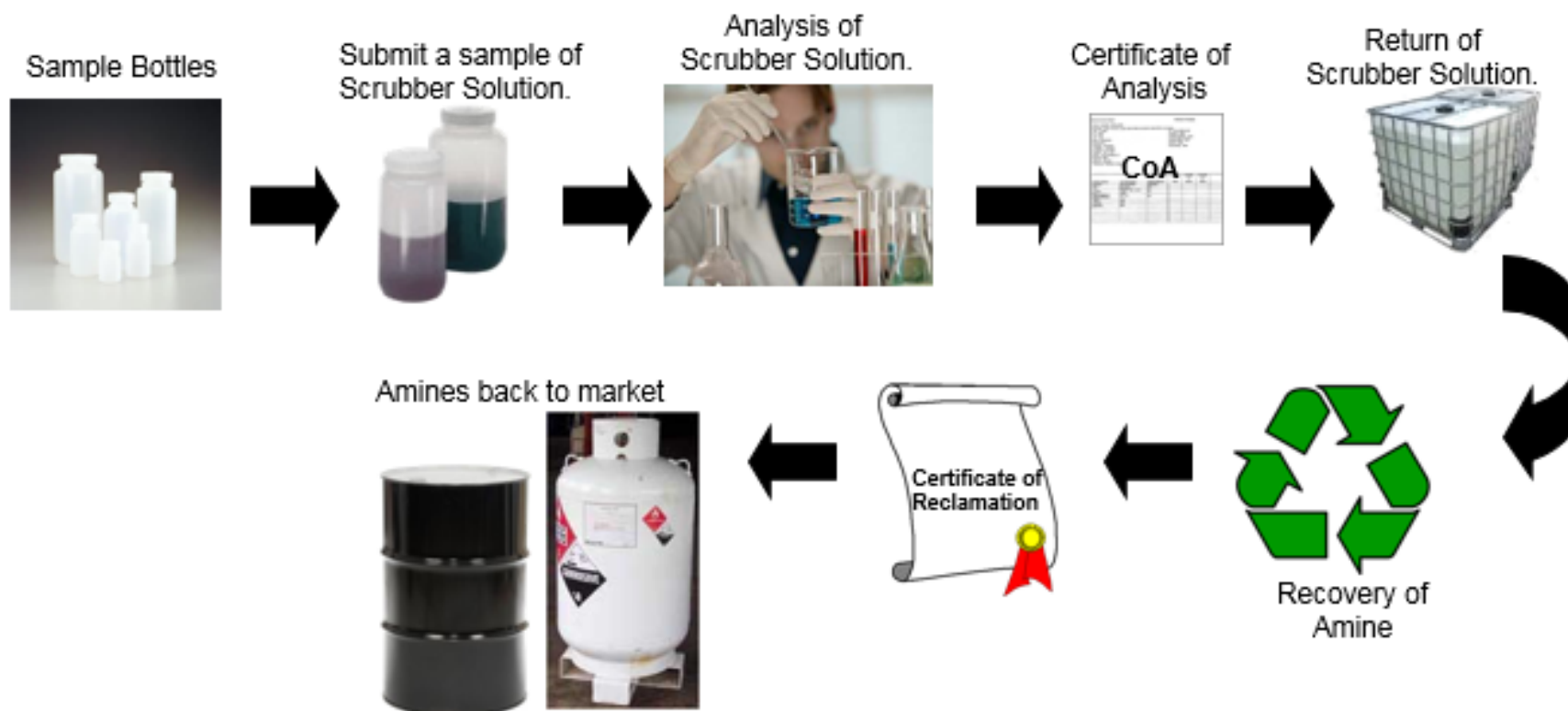


Amine Reclamation

- Amine sulfate scrubber solution can be sent to HAI's facility in Toledo.
- The reclaimed amine is chemically identical to virgin-produced material and has the same effectiveness in the PUCB process. We also DO NOT mix amines. We reclaim each amine separately.
- The by-product left after the amine is liberated is a salt solution. With proper permitting, this solution can be sent through the sewer onto standard water treatment.

Reclamation Process

Single source for reclamation of amine scrubber solution and distribution of purchased amines.



Online Tracking

Located on HA International's online customer portal:

A screenshot of the HA International LLC online customer portal. The top navigation bar includes links for "General Order Info", "My Contact Info", and "Amine Tracker", with a red arrow pointing to the "Amine Tracker" link. Below the navigation bar, the "Amine Reclamation Program" section is displayed. It includes a "Customer Amine Recovery Requests" table with columns for Requested On, Amine Type, Request ID, and Status. Below this is a "Supplies" table with columns for Requested On, # of Bottles, # of Totes, and Shipped Out On. Both tables have a "Submit" button next to them.

HA International LLC

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General Order Info My Contact Info **Amine Tracker**

Amine Reclamation Program

Customer Amine Recovery Requests

-- All Statuses --

Submit Recovery Request

| | Requested On | Amine Type | Request ID | Status |
|--|--------------|------------|------------|------------------------|
| | Oct 12, 2016 | DMPA | 1911 | Recovery Complete |
| | Sep 21, 2016 | DMEA | 1905 | Sample Request Created |
| | Sep 16, 2016 | DMPA | 1904 | Recovery Complete |
| | Sep 16, 2016 | DMEA | 1903 | Sample Approved |

Supplies

-- All Statuses --

Submit Bottle/Tote Request

| | Requested On | # of Bottles | # of Totes | Shipped Out On |
|--|--------------|--------------|------------|----------------|
| | Oct 12, 2016 | 0 | 4 | Oct 12, 2016 |
| | Oct 12, 2016 | 1 | 0 | Oct 12, 2016 |

- Submit Amine Recovery Requests
- Receive Sample Bottles and Totes
- Track Amine Recovery
- Receive email notifications
- Download the Certificate of Analysis and Certificate of Reclamation



Summary of Benefits



- ✓ Single source for reclamation of amine scrubber solution and distribution of purchased amines.
- ✓ Central Midwest location provides the best freight opportunities for most foundries.
- ✓ Online **HARP** Tracker program allows easy use when ordering supplies and tracking samples and reclamation status.
- ✓ Empty Totes and Empty Sample Bottles are provided free of charge. (Customer pays freight on returned scrubber solution)



How to Join



- ✓ Click on the Enroll Now button on our Amine Reclamation page on the HA-International website and fill out and submit our **HARP** enrollment form.
- ✓ A HAI representative will contact you to discuss **HARP** and set up your online account.
- ✓ Confirmation and **HARP** login credentials will be sent via email.
- ✓ Login using our online Customer Portal and select the Amine Tracker to begin your reclamation requests.



Questions?



✓ Detailed instructions on using the Amine Tracker as well as on the overall program can also be found in the **HARP** Amine Tracker Instruction Guide available on our website: www.ha-international.com

- OR -

✓ Contact your HAI Representative for more details.

- OR -

✓ Aaron Kaboff, Resins Product Manager
aaron.kaboff@ha-group.com, 630-575-5762



Frequently Asked Questions (FAQ)

Q: How long will it take to get results from submitted scrubber solution samples?

A: Typical turn-around time for sample analysis is 7-10 business days after receipt of the sample.

Q: Where do customers get appropriate shipping documents?

A: Sample Bottles and Totes will come pre-labeled with the necessary shipping documents. Customers can also download address labels and SDS from the **HARP** Tracker program. In case that placards are needed, they are available at: <http://www.labelmaster.com/store/scripts/view-product.cfm?product=ZEZ41760>

Q: What is the typical concentration of sulfuric acid to charge into a scrubber system?

A: Typically, customers should initially charge their scrubbers with 40% sulfuric acid solution to obtain the best results in amine reclamation. **NOTE:** *Scrubber systems vary; therefore, always follow the instructions from the manufacturer of your particular system.*

Q: How does a customer know if they have the appropriate concentration of amine in their scrubber solution?

A: Amine content can be tracked as a function of pH. The customer should measure the pH of their system on a regular basis to ensure that their scrubber solution is effective in removing free amine. Assuming the customer initially charges their scrubber solution with 40% sulfuric acid, the acid solution efficiency will begin to degrade after reaching a pH of 3.0 and require replacement. The target pH for exchanging scrubber solution is 4.0, giving the best yield during reclamation. See the information provided in the Amine Scrubber General Design & Operating Principles on our website.

Frequently Asked Questions (FAQ)



Q: How does the customer know that their scrubber solution is still actively binding amines?

A: Assuming the customer is initially charging their scrubber with 40% sulfuric acid by measuring pH, they can assume that when the pH rises to 3.0, the free sulfuric acid level is near 5% and, therefore, not as effective in capturing amine gas.

Q: What happens if the customer scrubber solution sample does not meet the requirements for reclamation?

A: There are still options if the sample analysis determines that the minimum requirements of pH, recoverable amines, and free sulfuric acid content are not met. We will work with the customer to decide what steps can be applied to bring the material into the specification and suggest other alternatives where applicable.

Q: What should a customer do if they experience any functional problems with their cylinders, such as damage or leaking?

A: If a customer has any issues with a cylinder, they should immediately contact HA International Environmental Health and Safety (Jeff Krause 630-575-5705) and John Brown (815-595-4268)

Q: Can a customer send in totes of scrubber solution without pre-approval?

A: No, a sample of scrubber solution from each batch is required to be sent for analysis and approval before shipping the scrubber solution in totes.



Frequently Asked Questions (FAQ)



Q: Do customers have to use the sample bottles provided through **HARP** for sending samples of spent scrubber solution for analysis?

A: Yes, customers need to use the pre-labeled sample bottles from the program, which are free of charge.

Q: Who pays for the freight on returning totes of spent scrubber solution?

A: The customer is responsible for freight charges on the spent scrubber solution.

Q: What are the Certificate of Analysis and Certificate of Reclamation?

A: The Certificate of Analysis is the customer record of their sample analysis. The Certificate of Reclamation is the customer's record and proof that their amine sulfate solution was reclaimed correctly.

