

# RECYCLING METALS FROM INDUSTRIAL WASTE

A Short Course and Workshop  
with Emphasis on Plant Practice

June 23-25, 2020  
Golden, Colorado  
28th Year

Sponsored by the Colorado School of Mines  
Course Organizer: Paul B. Queneau - Adjunct Professor

June 23-25, 2020

RECYCLING  
METALS FROM  
INDUSTRIAL  
WASTE



Colorado School of Mines  
1500 Illinois Street  
Golden, CO 80401

## COURSE PURPOSE AND SCOPE

This program focuses on current plant practices to convert metal-containing wastes to products. Processors, raw materials, and markets are identified and quantified. Speakers with decades of hands-on experience detail multiple approaches to recycling metals and associated materials - backed up by slides, videos, and the syllabus.

Particular emphasis is given to combinations of physical, hydrometallurgical, and pyrometallurgical processing, along with associated regulations, to facilitate economical recycling. The presentations are on a practical level, focusing on plant operations, with ample opportunity for interaction by the course participants.

## PROGRAM OUTLINE AND SCHEDULE

### Tuesday Morning, June 23

7:45 Registration

8:30 *Recycling: Changing Economics of Scale to the Economics of Scope*

Gerardo Alvear, President, Gerardo Alvear & Associates, Hamburg, Germany

9:30 Break

9:45 *Finally, a U.S. Secondary Copper Smelter*

Michael Hyman, Director of Materials Recovery, Cohen Recycling, Jeffersonville, OH

10:15 *Metals Recycling Partnerships at The Heritage Group*

Nigel Morrison, President, PIZO Technologies, The Heritage Group, Indianapolis IN

10:45 Break

11:00 *Recovery and Refining of Precious Metals: 75th Anniversary*

Brad Cook, Vice President, Sabin Metal, Scottsville, NY

11:30 *Networking Time, Followed by Lunch*  
Colorado School of Mines

### Tuesday Afternoon, June 23

1:00 *Zinc From Here to Eternity*

Steve James, Consulting Engineer: Non-Ferrous Metals Recovery and Recycling, Clarksville, TN

1:30 *Recycling Innovation and Technology at Harsco*

Chris Byrne, Director – Innovation and Technology, Harsco Environmental, Kingston upon Thames, UK

2:00 Break

2:15 *Refinery Operations*

Phil Elbaz, V.P. of Supply Chain and Strategic Initiatives, Hussey Copper, Leetsdale, PA

2:45 *How a CSM Graduate is Creating Wealth from Waste*

Haley Salzwedel, Business Development Contractor, Commodity Recycling Solutions, Fort Worth, TX

3:15 Break

3:30 *A Day in the Life of a Scrap Metal Recycler*

Bob Schneider, Account Manager/Buyer, J. Solotken & Co., Indianapolis, IN

4:00 *Social at the Colorado School of Mines*  
Coolbaugh Hall Atrium

### Wednesday Morning, June 24

8:30 *Lead Recycling: New Ways of Doing an Old Thing*

Joe Grogan, Vice President, R&D, Gopher Resource, Eagan, MN

9:30 Break

9:45 *Metals Recycling/Focus at Apple*

Joe Lessard, Recycling Design Engineer, Environmental Technologies, Apple, Cupertino, CA

10:15 *Tin Technology & Refining*

Ara Aposhian, General Manager, Tin Technology & Refining, West Chester, PA

10:45 Break

11:00 *Pitard's Sampling Check List*

Francis Pitard, President, Francis Pitard Sampling Consultants, Broomfield, CO

11:30 *Networking Time, Followed by Lunch*  
Colorado School of Mines

# PROGRAM OUTLINE & SCHEDULE

## Wednesday Afternoon, June 24

- 1:00** *Recycling Aluminum: Value Chain Perspective*  
Anne Kvithyd, Senior Research Scientist, SINTF, Trondheim, Norway
- 1:30** *Production of Critical Materials as Byproducts*  
Philip Keller (Ph.D. Candidate) and Corby Anderson, Harrison Western, Professor, Kroll Institute for Extractive Metallurgy, Colorado School of Mines, Golden, CO
- 2:00** **Break**
- 2:15** *E-Scrap and Catalytic Converter Recycling*  
Motohiro Kowaka, Treasurer & Secretary, DOWA International, New York, NY
- 2:45** *Spent Catalyst Reuse or Metal Reclamation at Porocel*  
Shawn Thibodeaux, Metal Reclaim/Logistics Manager, Porocel Industries, Houston, TX
- 3:15** **Break**
- 3:30** *Precious Metal Recovery from Spent Catalyst*  
Laura Jackson, Category Manager, Precious Metals Shell Downstream, Houston, TX
- 4:00** **Social at the Colorado School of Mines Geology Museum**

## Thursday Morning, June 25

- 8:30** *Battery Recycling, Focusing on Cobalt and Nickel*  
Jeroen Heulens, Director Pyrometallurgy (Recycling and Extraction Technologies), Umicore, Antwerp, Belgium
- 9:00** *Selective Extraction of Lithium from Spent Lithium Batteries*  
Francois Larouche, Metallurgist, PhD Candidate Hydro-Quebec, Varennes, Quebec
- 9:30** **Break**
- 9:45** *KBI & Lithium-Ion Batteries*  
Todd Coy, Executive Vice President, Kinburski Brothers International (KBI), Anaheim, CA
- 10:15** *New Challenges and Approaches to Recycling Automobile Catalyst*  
Austin Hickman, Lab Manager, PGM of Texas, Dripping Springs, TX
- 10:45** *25 Years Processing, Refining, & Trading Spent Automobile Catalyst*  
Becky Berube, President, United Catalyst, Greenville, SC
- 11:15** **Adjourn**

## REPRESENTATIVE LIST OF PAST ATTENDEES

Agmet ♦ Air Products ♦ Aleris ♦ Alpha Omega Recycling  
ALS ♦ AMAG Austria Metall ♦ AMG Aluminum  
AMG Vanadium ♦ Apple ♦ Asahi Refining  
Atlantic Metals & Alloys ♦ Aurubis ♦ Battery Solutions  
Bear Group ♦ BHS-Sonthofen ♦ BioteQ ♦ Blue Line  
Boliden ♦ Brick Recycling ♦ CAF Innovative Shapecasting  
Cal-Chem Metals ♦ Caterpillar ♦ Catalytic Innovations  
Chevron Energy ♦ Colt Refining ♦ CONECSUS  
CRI Metal Products ♦ CSM/Kroll Institute ♦ CUPROSA  
Deelo & Associates ♦ Delft University ♦ Deltamet Consultants  
Doe Run ♦ Dowa International ♦ East Penn Manufacturing  
E.I. DuPont ♦ ELG Haniel Metals ♦ Energy Fuel Resources  
Engitec Technologies ♦ Erachem Comilog ♦ EVRAZ Stratcor  
Exotech ♦ 5N Plus Semiconductors ♦ F.A. Stuart Consulting  
Fenix Metals ♦ Francis Pitard Sampling  
Franklin Pierce University ♦ Freeport-McMoRan  
Gannon & Scott ♦ Garrison Minerals ♦ Genesis Recycling Tech  
GFE Metalle und Materials ♦ GF Industries ♦ Glencore  
Global Steel Dust ♦ Global Tungsten ♦ Globe Metal Recycling  
Gopher Resource ♦ Greenville Metals ♦ Harsco ♦ Hatch  
Hazen Research ♦ Hobre Instruments ♦ H.C. Starck  
Heraeus Precious Metals ♦ Heritage Environmental  
Huron Valley Steel ♦ Hydrometal ♦ HydroProc Consultants  
IBM ♦ Indium Corporation ♦ INMETCO  
International Applied Tech. ♦ IPM Services ♦ IPMI ♦ Itronics  
Jean Goldschmidt Intl. ♦ J.E. Litz & Associates ♦ Kalumetals  
KBI/RTI ♦ KGHM Matraco ♦ Kingston Process Metallurgy  
Korea Inst GeoSci & MinRes ♦ Kunming University  
Langeloth Metallurgical ♦ Libertas/Hussey ♦ Masterloy Products  
Material Sampling Tech. ♦ Mayoeran Somanathan  
Metal & Catalyst Resources ♦ Metallica Commodities  
Metallo Belgium ♦ Metal Processing Institute ♦ Metal Solutions  
Metal Tech University ♦ Metso Minerals Copper  
M&M Metals International ♦ Montana Tech  
Morganite Industries ♦ Multimetco ♦ Music City Group  
Natural Resources Canada ♦ Network Environmental Services  
Nickelhuette Aue ♦ Ocean Partners ♦ OmniSource  
OPTI ♦ Outotec ♦ Paul Wurth ♦ Penoles  
Phoenix Automotive Cores ♦ Pillar Induction  
P.J. Mackey Technology ♦ P. Kay Metal ♦ PM Recovery  
Porocel/Catalyst Recovery ♦ Praxair ♦ Precision Cast Parts  
Queens University ♦ RHI AG ♦ RSR Technologies  
Sabin Metal ♦ SAFAGA ♦ Saltire Services  
Sanguinetti Engineering ♦ Scan Arc Plasma Technology  
Shell Global Solutions ♦ ShoreMet ♦ Silver Anvil Engineering  
SINTEF ♦ Sipi Metals ♦ Southeastern Minerals  
Stillwater Mining ♦ Stoller ♦ Sumitomo ♦ Teck Metals  
Terrapure Environmental ♦ Thomas Battle & Associates  
Tianqi Lithium ♦ Tin Technology & Refining  
Torma Sorting Solutions ♦ Treibacher Industrie  
TTM Technologies ♦ Umicore ♦ Unicat Catalyst ♦ U. of Leoben  
University of Minnesota ♦ US Ecology ♦ US EPA ♦ US Steel  
US Zinc ♦ Vale Inco ♦ Veolia ♦ Vital Materials  
Wasatch Back Consulting ♦ WPI ♦ Zinc Nacional

## COMMENTS FROM PAST PARTICIPANTS

*Consistently the best metal recycling conference anywhere. It provided good contacts, good balance of industry and academia, and was global. I particularly enjoyed the plant operations presentations.*

Norman Wilson, Technical Sales and Purchasing,  
Greenville Metals, Transfer, PA

*I was amazed at the knowledge contained within this group. Such a balance of experts in all fields. It was great to talk with shop folks of similar industries having enlightened perspectives and experiences.*

Rebecca Kozar, Libertas/Hussey Copper,  
Supply Chain Specialist, Leetsdale, PA

*I have enjoyed this meeting very much, and found it incredibly interesting and useful. It is without a doubt one of the best specialist meetings that I have ever attended in my career.*

Herman Potgieter, Professor, Manchester  
Metropolitan University, Manchester, UK

*This short course's most significant strengths are the variety of topics, the variety of participants, lots of time for socializing and interacting, in Golden...What a magnificent setting!*

Charles Geenen, Director Technology, Metallo-  
Chimique, Nieuwe, Belgium

*I found this short course very interesting, extremely well organized, and a great opportunity to meet people in the field. And what a treat for my wife and I to discover the beautiful sceneries of Colorado.*

Richard Kiesel, Strategic Projects Manager,  
University of Minnesota – Natural Resources  
Research, Coleraine, MN

*I'll be back next year, and continue to recommend this short course to colleagues. What I liked best was the variety of speakers, on many different topics, fitting within the general topic.*

Thomas Battle, Senior Engineering Consultant,  
Thomas Battle and Associates, Charlotte, NC

*This is THE conference that I look forward to attending again each year. Such diversity in expertise...I learn something in each lecture.*

Dennis Rodal, Director R&D,  
ELG Haniel Metals, McKeesport, PA

## REGISTRATION INFORMATION

### ■ Registration Fee

\$1530 if registering by April 24  
\$1630 after April 24 and by May 22  
\$1730 after May 22

Included are the syllabus, continental breakfasts, luncheons, and socials. Assistance may be available to self-employed sole consultants, retired, or unemployed attendees.

Contact [Learn@mines.edu](mailto:Learn@mines.edu) for details.

### ■ Cancellations and Attendee Substitution Policy

Modification, including cancellation, of your registration requires written notice either by email ([Learn@mines.edu](mailto:Learn@mines.edu)) or fax (303-384-2695) to Continuing & Professional Education Services (CPES).

- ◆ Attendee substitutions may be made without cost penalty at any time up to the date of the start of the event.
- ◆ Cancellations will be accepted if notice of cancellation is received by CPES at least five (5) working days prior to the date of the start of the event. Registrants who cancel within this period will be charged a \$275 service fee.
- ◆ No refunds will be made to registrants who fail to cancel within the specified cancellation period.

### ■ Credits

CSM awards two Continuing Education units for this course.

### ■ Location and Attire

Golden and the Colorado School of Mines (CSM) are located at the foot of the Rockies 15 miles west of Denver. The area is steeped in western history. Mountain hiking and biking trails begin in town along Clear Creek and the Whitewater Park. Attire is casual.

### ■ Accommodations, if blocks are not full

Blocks of rooms in Golden are at the Table Mountain Inn (Tel: 303-277-9898; Fax: 303-271-0298) by May 22, and the Golden Hotel (Tel: 303-279-0100; Fax: 303-215-1010) by April 22, under the designation "Recycling Short Course." The Dove Inn B&B (Tel: 720-608-1714; Fax: 303-273-5272) is also close by; it is super for couples; the best rooms fill quickly. Golden is a popular summer destination, so book your reservation early.

### ■ Course Content Details

Contact Paul Queneau at The Bear Group: 303-854-2036, fax 303-273-0494, e-mail: [pqueneau@mines.edu](mailto:pqueneau@mines.edu)

### ■ Registration Information

Continuing and Professional Education Services (CPES) at  
Mines: phone: 303-384-2690 ♦ fax: 303-384-2685  
e-mail: [Learn@mines.edu](mailto:Learn@mines.edu) ♦ website: [www.csmSPACE.com](http://www.csmSPACE.com)