RECYCLING METALS FROM INDUSTRIAL WASTE

A Short Course and Workshop with Emphasis on Plant Practice

June 23-25, 2015
Golden, Colorado
23rd Year

Sponsored by the Colorado School of Mines
Office of Special Programs and Continuing Education
Course Organizer: Paul B. Queneau - Adjunct Professor

June 23-25, 2015

RECYCLING METALS FROM INDUSTRIAL WASTE

Office of Special Programs and Continuing Education (SPACE)
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.

**COURSE PURPOSE AND SCOPE**

**PROGRAM OUTLINE AND SCHEDULE**

**Tuesday Morning, June 23**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Speaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:45</td>
<td>Registration</td>
<td></td>
</tr>
<tr>
<td>8:30</td>
<td>Metal Recycling: Opportunities, Limits, Infrastructure</td>
<td>Markus Reuter, Director - Technology Management, Outotec, Espoo, Finland</td>
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<tr>
<td>9:30</td>
<td>Break</td>
<td></td>
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<tr>
<td>10:45</td>
<td>Break</td>
<td></td>
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<tr>
<td>11:00</td>
<td>Critical Materials 2015</td>
<td>Rod Eggert, Professor, Colorado School of Mines, Golden, CO and Deputy Director, Critical Materials Institute (U.S. Department of Energy)</td>
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<tr>
<td>11:30</td>
<td>Networking Time, Followed by Lunch</td>
<td>Colorado School of Mines Green Center</td>
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**Tuesday Afternoon, June 23**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Speaker</th>
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<tbody>
<tr>
<td>1:00</td>
<td>Secondary Lead at Gopher Resource</td>
<td>Rob Jablonski, VP of Engineering, Gopher Resource, Eagan, MN</td>
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<tr>
<td>1:30</td>
<td>Methods for Recovering Vanadium from Steel Slag</td>
<td>Mike Woolery, Director of Technology, EVRAZ Stratcor, Hot Springs, AR</td>
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<tr>
<td>2:00</td>
<td>Break</td>
<td></td>
</tr>
<tr>
<td>2:15</td>
<td>Happenings at Conecsus LLC</td>
<td>Peter Ruth, North American Business Manager, Conecsus LLC, Independence, KY</td>
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**Wednesday Morning, June 24**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Speaker</th>
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</thead>
<tbody>
<tr>
<td>8:30</td>
<td>The Good, the Bad and the Ugly - Project Experiences and the Lessons to be Learned</td>
<td>J.P. Rosso, President, International Precious Metals Institute, Pensacola, FL</td>
</tr>
<tr>
<td>9:45</td>
<td>Recycling PM Scrap to Dore Metal, Fundamentals and Practice</td>
<td>Patrick Weerts, Director, Patrick Weerts Consulting, Mortsel, Belgium</td>
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<tr>
<td>10:45</td>
<td>Break</td>
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PROGRAM OUTLINE & SCHEDULE

Wednesday Afternoon, June 24

1:00  **Kiem's Recycling Successes**
Pat Taylor, Ansell Chair and Distinguished Professor, Colorado School of Mines, Golden, CO

1:30  **Copper Slag to Gold in a Few Easy Steps**
John Googins, Applications Engineer, Aggregate & Mining Consultants LLC, Littleton, CO

2:00  Break

2:15  **Happenings at Network Environmental**
Mike Aston, General Manager, Network Environmental Services, Toronto, Ontario

2:45  **Economic Challenges of Recycling Rare Earth Materials**
Jon Blumenthal, President & CEO, Blue Line Corporation, San Antonio, TX

3:15  Break

3:30  **Around the World in 20 Minutes - Recycling Zinc from EAF Dust: Status, New Technologies**
Larry Southwick, Consulting Chemical Engineer, L.M. Southwick & Associates, Cincinnati, OH

4:00  Social at the Colorado School of Mines

Geology Museum

Thursday Morning, June 25

8:30  **Examples of Sampling Misfortunes**
Francis Pitard, President, Francis Pitard Sampling Consultants, Broomfield, CO

9:00  **Rare Earth Recycling Plant Practice**
Joe Ferron, President, HydroProc Consultants, Peterborough, Ontario

9:30  Break

9:45  **Recycling Rare Earths at Hydrometal**
Philippe Henry, Director, Jean Goldschmidt International, Brussels, Belgium

10:15 **Recycling High-Chrome Nickel**
Fred Koch, Manufacturing Manager, Patriot Forge, Brantford, Ontario

10:45 **Recycling of Strategic Metals in the European Union, Research and Networks**
Wolfgang Kummer, Consulting Metallurgical Engineer: Mo-Re-W, Refractory Metals Consulting, Goslar, Germany

11:30 Adjourn

REPRESENTATIVE LIST OF PAST ATTENDEES

5N Plus • Agmet • Air Products • Aleris • Alpha AMG Vanadium • Apex Materials Technologies
Atlantic Metals & Alloys • Aurubis AG • Ausmelt • Batrec Bear Group • Befesa Steel • BioteQ • Blue Line • Boliden Brunswick Smelting • Cal-Chem Metals • Catalytic Innovations CDL Heavy Metal Recycling • CDTECH • Chevron Energy
Christian Doppler Lab • Colonial Metals • Colt Refining CONECSUS • Cri Metal Products • CSM/Kroll Institute
CUPROSA • Delft University • DH Catalyst • Doe Run Dowa International • Eastern Alloys • ECS Refining
E.I. DuPont • ELG Haniel Metals • Energy Fuel Resources Engitec Technologies • EQ Ohio • Erachem Comilog EVRAZ Stratcor • Exotech • Franklin Pierce University Freepart MacMoRan • Gannon & Scott • Garrison Minerals Genesis Recycling Technologies • GF Industries GFE Metalle und Materialien • Global Steel Dust
Greenville Metals • Gulf Chemical & Metallurgical
Hansen Consultants • Harso Metals • Hazen Research H.C. Stark GmbH • Heraeus Precious Metals Heritage Environmental • Hillah Consultants Huron Valley Steel • Hussey Copper • Hydrometal • IBM Industrial Mondelo • INMETCO
Integrated Resource Management • Jean Goldschmidt Intl.
Johnson Matthey • Kalumetals • Kemiron • KGHM Matraco S.A.
Kinsbursky Brothers • Langeloth Metallurgical • Lanxess Sybron LithChem Energy • M&M Metals Intl.
Manchester Metro. University • Marcuson & Associates
Masterloy Products • Metallo-Chimique • Metal Solutions
Metal Tech • Micronutrients/Heritage • MK Reverse Logistics
Molycorp Minerals • Morris Equipment Sales • MSE Consulting
Natural Resources Canada • Neo Performance Materials
Network Environmental Services • Nickellhuette Aue
Ocean Partners • Olin Brass • OmniSource
Omnium Dodge City • Paul Wurth S.A. • Penoles
Philip Services • Phoenix Automotive Cores • Piller Induction
PIZO Technologies • P.J. Mackey Technology • PM Recovery
Porocel/Catalyst Recovery • Power Systems Group • Powmet
Praxair • Precision Cast Parts • Queens University • Redimet
RSR • RHI AG • Sabin Metal • Salitre Services • Scan Arc PT
Shell • Silver Anvil Engineering • SINTEF • Sipimet Metals
S.M. Stoller • Solumet • Southeastern Minerals
Stillwater Mining • Sumitomo • Teck Metals • Tetra Tech
Tin Technology & Refining • Titan Metal Powders
Tonolli Canada • Treibacher Industrie • TRICAT • Umicore
U. of Alabama • U. of Leoben • U.S. EPA • USGS • U.S. Steel
U.S. Zinc • Vale Inco • Veolia ES Tech Services
Verdant Holdings • Vital Specialty Materials
Wilmingtin Iron & Metal • Wil Swanson & Associates
Winfield Solutions • WM Mercury Waste • WRC • Zinc Nacional
**Comments from Past Participants**

*In my opinion, probably the best short course of this kind on earth, allowing the chance to test your knowledge and to generate new ideas.*

Patrick Weerts, Director,
Patrick Weerts Consulting, Mortsel, Belgium

*What I particularly enjoyed are the world perspectives, the high quality of the attendees, the fascinating presentations, and the excellent discussions.*

Tom Ondrejko, Manager of Metallurgical Development, Langeloth Metallurgical, Langeloth, PA

*This conference is the most efficient meeting place for entrepreneurs and managers I have attended. We always pick up leads that have generated projects and income resulting from the trip to beautiful Golden, CO.*

Bror Heegaard, CEO, ScanArc Plasma Technologies, Hofors, Sweden

*Content and contacts are excellent, with a good balance between commercial and technical. A better metals recycling conference does not exist.*

Nigel Morrison, President, Pizo Technologies, Indianapolis, IN

*A very useful conference, one of the best...a must to attend. What I liked most was the networking, and particularly the knowledge and experience of the experts.*

Max Cossette, Director of Recycling - North America, 5N Plus, Saint-Laurent, Quebec

*Program content and presentations were excellent! The good networking opportunities were much appreciated, as was the warm hospitality.*

Jason Evens, General Manager, EQ Ohio, Canton, Ohio

*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

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**Registration Information**

- **Cost**
  
  The registration fee is $1495 if registering by April 20, $1595 after April 20 and by May 18, $1695 after May 18. Included are the syllabus, continental breakfasts, luncheons, and socials.

- **Cancellations and Attendee Substitution Policy**
  
  Any modification, including cancellation, of your registration requires written notice that must be emailed (space@mines.edu) or faxed (303-277-8683) to the SPACE Office. The following information applies:
  - 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 at the SPACE Office 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**
  
  Two Continuing Education units are awarded for this course by the Colorado School of Mines.

- **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 white-water park. Attire is casual.

- **Accommodations (available until May 24, if blocks are not full)**
  
  Blocks of rooms in Golden are at the Dove Inn (Tel: 303-278-2209; Fax: 303-273-5272), Table Mountain Inn (Tel: 303-277-9898; Fax: 303-271-0298), and the Golden Hotel (Tel: 303-279-0100; Fax: 303-215-1010). The rooms are under the designation "Recycling Short Course." 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

- **Registration Information**
  
  Contact the Office of Special Programs and Continuing Education at CSM:
  
  phone: 303-279-5563  
  fax: 303-277-8683  
  e-mail: space@mines.edu  
  website: www.csmspace.com