Idaho Mining and Exploration, 2016

Virginia S. Gillerman, Ph.D.
Idaho Geological Survey

December 7, 2016
Reno, NV

American Exploration & Mining Association
2016 – a solid year for Idaho

- Commodity prices up
- Markets generally OK but not growing much?
- Industrial mineral demand stable
- Construction market – locally better
- Globally – solid but slow?
- Domestic – Totally overshadowed by THE election
- Projects – Few in number but some very exciting ones
- Permitting and federal land policies more uncertain
Idaho Non-fuel Mineral production (USGS)
2011 Record Production: $1.32 billion for Idaho

2013 Production:
- $980 million

2014 Estimate:
- $1.2 billion

2015 Estimate:
- $713 million, and zero Molybdenum

Without Mo, Industrial minerals lead in 2015: Phosphate, Sand and Gravel, Silver, Lead, Crushed Stone
Metal Prices – 1 year trends

Election Effect?

Au

Ag
Base Metals – 1 year trends

- Pb
- Zn
- Cu
Alloy Metals – 1 year trends

Mo oxide

Co

InfoMine.com
Idaho: Two “world class” districts – multiple decades of production
Coeur d’Alene District: Idaho’s Premier Silver Mining District

Over 1.24 billion tr. ounces (38,568 metric tons)
Hecla Mining Company: 125th Birthday

Lucky Friday: Positioned for Growth and Longevity

<table>
<thead>
<tr>
<th></th>
<th>Silver Production</th>
<th>Cost of Sales</th>
<th>Cash cost, after by-product credits, per silver oz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q3 2016</td>
<td>887 koz</td>
<td>$19.5 M</td>
<td>$9.07/oz</td>
</tr>
<tr>
<td>2016E</td>
<td>3.4 Moz</td>
<td>-</td>
<td>$9.00/oz</td>
</tr>
<tr>
<td>2016E Capital</td>
<td>$37 M (Including $20 M for #4 Shaft)</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>2P Reserves</td>
<td>78.7 Moz silver @ 15.5 oz/t Ag</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>M+I Resources</td>
<td>128.1 Moz silver @ 6.2 oz/t Ag</td>
<td>-</td>
<td></td>
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</tbody>
</table>
Lucky Friday #4 Shaft Project
Shaft Bottom Station 8620L
9,587 feet below the Surface
“The Bottom, on our way up!”
Lucky Friday mine: #4 Shaft

- Cementation installing shaft lining, hoists, etc.
- Expected completion and turnover to Hecla in January, 2017
- Higher grades at depth
- 4th Qtr. 2016 – renewed exploration drilling and resource upgrading
- 2016 mining below 5900, mostly 6250-6350 level of Gold Hunter vein system
Hecla: Deep ore and #4 shaft

30 vein, 5550 level, Lucky Friday
Mine hosted field trip for GSA Rocky Mountain Section Meeting (Moscow, May, 2016)

Cost reductions past few years very successful, metal prices helping this year.

THANK YOU!

Especially Sadae, Aaron, Dan and mine manager Corey
Galena Complex

GALENA COMPLEX - UPPER COUNTRY SILVER-LEAD PROJECT

LEGEND
- Ag - Pb Veins
- Ag - Cu Veins

Silver-Lead Veins in the Upper Country
#1, 2, 3, 5 and B Branch Veins

Coeur Shaft
No. 3 Shaft
Galena Shaft
Callowa Shaft
Galaday Shaft

See Level

Americas SEHR CORPORATION
Dan Hussey – Chief Geo
Retired in 2016

Galena mine:
May, 2016

4900 level

Christopher – overwhelmed by that much sparkly galena!
New Jersey Mining Company
Murray District – Golden Chest mine (Au)

May GSA Field Trip:
Thanks Fred and Grant Brackebusch and John Ettiene
Golden Chest mine – August, 2016
Golden Chest mine

Portal, May 2016

Mill at Kellogg
**Thompson Creek Mo mine – care and maintenance**

**2016**

- No active mining.
- Toll processing of Mo cons and shipping to PA roaster.
- ROD for Phase 8 signed by BLM, FS.
Phosphate District: Southeast Idaho

Permian Phosphoria Formation, Meade Peak Member

Economic Mainstay of Region
J.R. Simplot Co.: Smoky Canyon mine

Panel F, Smoky Canyon, May 2016, view to southwest
Smoky Canyon


Public road around mining in Panel G. Building viewing stand.
Monsanto (P4): Blackfoot Bridge mine

Looking north at North Pit
Deployment of GCLL cover on west slope of North Pit
Monsanto

Elemental Phosphorus Plant, Soda Springs

Corporate Merger of Monsanto with Bayer (the aspirin folks)

North Pit Lysimeter (2016) construction
Agrium (NuWest Industries): North Rasmussen Ridge mine

Mining in Panel B, phases 2 and 3

Backfilling Panel A

Agrium and Potash of Saskatchewan Merger Talks
Phosphate Mine Plan Proposals

- Simplot
  - Dairy Syncline – 2133 acres of FS land. Collected baseline data, DEIS underway (2017 release?)
  - East Smoky Panel revision to mine plan, EIS in preparation (2017 DEIS)

Reclaimed Drill Road, East Smoky, June 2016
Agrium – Rasmussen Valley mine and Reclamation Plan

- Final EIS released Sept. 9, 2016
- Preferred alternative minimizes groundwater and wetlands disturbance
- Place waste in Monsanto’s South Rasmussen mine pit.
- ROD out by end 2016.
- Lanes Creek Lease (private parcel) mining approved by State and underway.
Phosphate Exploration

- Agrium – Husky/Dry Ridge on hold
- Monsanto – Caldwell Canyon plan submitted
- Monsanto Drilling – North Caldwell Canyon area
- Fertoz USA – Dry Ridge, no change
- Paris Hills Agricom – little action on potential ug project; permitting discussions with state

“Phosphate Swale” at Rasmussen Valley site, looking northwest
Industrial Minerals

- Stable
- No change from 2015
- Some improvement on building stone markets – related to construction improvement
- Aggregate – slow in north Idaho and probably elsewhere, though lots of construction in Boise area.
- Sage grouse uncertainty in Owyhee County.
**i-minerals: Helmer-Bovill Project**

- Latah County Clay Pits
- **State Leases**
- Multi-commodity
- Working on Bankable Feasibility Study
- Submitted Operating and Reclamation Plan to IDL in May
  - 220,000 tons/year
  - 4 products: kaolin, halloysite, K-feldspar, quartz
  - Employ about 80-90 persons in mine and plant
  - Estimate > $3 million/yr. to state endowment fund

In Permitting Stage – on state land
Emerald Creek Garnet

- Owned by: Opta Minerals Inc.
- Mining leases along St. Maries River floodplain. Former areas on Emerald and Carpenter Creeks.
- Use jig system in field to concentrate garnets; send to jig plant to wash.
- Good Year in 2016. Water jet blasting media markets up.
- Excellent reclamation.
Oakley Stone Quarries

- Producers
  - Northern Stone Supply
  - Oakley Valley Stone
  - Sawtooth Stone
  - Scrivanich Stone
  - Other smaller ones
- Good Year, markets up
- Unique Product

Other Dimension Stone Producers:
- Idaho Travertine
- Table Rock Sandstone

Sawtooth Stone, 2013
Idaho Travertine
Idaho Falls
Ted Orchard, family and crew
August, 2016
E & S Mining and Trucking

Highway 20 pumice pit

- Near Fairfield, ID
- Gold-colored pumice
- E & S Mining (Gooding) acquired pit from Mtn. West Products (Rexburg)

Products
- Landscaping
- Diamond Dust – for baseball diamond infields

Terrible year, starting to pickup in past month. Blames the election!

“Moonstone Mine” Pumice
Hess Pumice Products

- Malad, Idaho
- 80-100 employees
- Wrights Creek mine
- Multiple Companies:
  - Hess Pumice
  - Idaho Minerals/Hess Perlite
  - US Grout
  - Hess Pozz
- Unique, high purity pumice
- Market research

Similar to past few years!

Ship Worldwide
Custom Specs
Bear River Zeolite

- Preston, Idaho
- Subsidiary of US Antimony
- Sales up in first part of year, slowing now
- Added second screening line
- Clinoptilolite
- Main markets
  - Water filtration
  - Agriculture
Energy

- Commercial Oil and Gas in Idaho? Yes
  - Western Snake River Plain Tertiary Basin
- Commercial Geothermal Power in Idaho? Definitely
  - Raft River
  - Other
US Geothermal – Raft River Plant

Walker Ranch - Geothermal Project – BLM approved plan for 17 additional wells and injection wells

- Power plant (30MW) on private
- Permits/discussions ongoing

Production Well 27-14, 2015
Over 150 wells have been drilled in Idaho since 1903; first in the Weiser-Payette Basin was in 1907. Majority were short-lived and uneconomic.

Weiser-Payette Basin is the only producing hydrocarbon field in Idaho’s History.

Exploration of basin began in 2008 by Bridge and Paramax Resources; production of wells began in 2014 by Alta Mesa and Snake River Oil and Gas (Weiser-Brown) making Idaho the 31st state producing oil and gas.

Idaho produced 2.6 billion cubic feet of natural gas in the past year, enough to heat about 25,000 homes (IDL). 81,000 barrels of condensate, propane, butane, pentane, and heavier hydrocarbons were also produced and 88,000 barrels of natural gas liquids including ethane, propane, butane, isobutane, and pentane. This amounts to an average of 7.5 million cubic feet of gas, 242 barrels of condensate, and 263 barrels of natural gas liquids per day.

Alta Mesa paid more than $70,000 in severance tax to Idaho last year.
Willow and Hamilton fields in production

Alta Mesa’s Hwy 30 Processing Plant (PP)

Langley Gulch 330 Mw Gas-Fired Power Plant (LG)
Source: Kerogen analysis

Kerogen Types and Source Rock Determination

<table>
<thead>
<tr>
<th>Kerogen Type</th>
<th>Characteristics</th>
<th>Source Rock Indication</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Almost entirely AOM</td>
<td>Highly oil-prone</td>
</tr>
<tr>
<td>II</td>
<td>Mainly AOM; minor other kerogen particles present</td>
<td>Oil-prone</td>
</tr>
<tr>
<td>III</td>
<td>Mainly phytoclasts; minor other kerogen particles present</td>
<td>Gas-prone</td>
</tr>
<tr>
<td>IV</td>
<td>Mainly opaques; minor other kerogen particles present</td>
<td>Inert material</td>
</tr>
</tbody>
</table>

*AOM=Amorphous Organic Matter

IGS research

Surficial Samples

15RLB031 15RLB030

Palynomorphs

15RLB010 15RLB012

Phytoclasts

15RLB011 15RLB030

Opaques

Type III: Gas-prone
Migration pathways

*Faults act as migration conduits

(From corporate presentation of Bridge Energy, Feb. 2011)
Correlation horizons across wells mark genetically related sedimentary packages; most lie on max shale baseline (flooding surfaces)
Oil and gas exploration in Idaho and region

- Weiser-Payette Basin
- Willow Field
- Hamilton Field

Greater area under exploration

- Halio Energy Leases
- Willow and Hamilton Fields

Greater area under exploration
Future work and ongoing studies

Play elements:
- **Source**: Payette or unknown older formation?
- **Maturation**: Type 3 (herbaceous-woody)?; gas to minor oil prone
- **Migration pathways**: unknown
- **Reservoir**: Chalk Hills and Glenns Ferry formations
- **Trap/Seal**: 3-way fault and stratigraphic?
- **Timing**: unknown

Ongoing Studies:
- XRD and analyses of well cuttings help delineate provenance, reservoir versus non-reservoir, and sealing clays. The dominant provenance source is from the nearby Idaho Batholith...more to come on clay analysis
- Ongoing studies with petrophysical logs will help identify other target intervals to apply to net to gross. Feldspathic sands skew original net to gross estimates.
- Depth-structure and isochore maps show a simplified version of the thickness and local highs in the basin’s subsurface
- We are in the preliminary stages of this research...stay tuned...
• Sage Grouse and Minerals Withdrawal Proposal from DOI and BLM

• Continued Regulatory Roadblocks in Court

• Commodity Prices Improving

• Election Year

• A few great projects, but overall very few had work on the ground
Idaho’s Sage Grouse Alternative

- IGS worked with Governor’s Office to develop Idaho Alternative
- Reviewed USGS mineral assessment
- Idaho suggested revisions to remove certain areas from proposed withdrawals of over 3.8 million acres in Idaho
- All should critically read and comment on DEIS when released
- Withdrawal and land use plans will have major impacts in southern Idaho public lands

Gray areas are SFAs proposed for withdrawal from mineral entry. Colored dots (mostly red) are IGS mines and prospects database.
Atlanta Gold

- No work in Atlanta District proper
- Neal District, Elmore County

Reclamation
Trenching
Sampling
Stockpile – 3 months in 2015, 8000-tons, average 0.147 oz./ton Au

Quartz-pyrite veins in silicified rock

Expansive Bentonite Clay used to help break rock – expands as it dries.
Many projects on hold; dredge and placer active?

- **Almaden – Terraco Gold**
- **South Mountain – Thunder Mtn. Gold** settled lawsuit; allows project to move forward.
- **Muscrove Creek** – optioned to Bravura Ventures who staked 38 more claims.
- **Black Pine** (aka **Mineral Gulch**) – acquired by Pilot Gold from Western Pacific in July. Past producer of 435,000 ounces, much exploration potential.
- **Rare earths**
Formation name change to: eCobalt Solutions, Inc. (Wed. PM talk)

Interest in Cobalt for Batteries

Co prices up 30% in last half year

eCobalt raising money to complete new Feasibility

Working with FS and maintaining site

2013 Aerial overview of completed ICP earthworks onsite.

Recent Co targets acquired: Scientific Metals at Iron Creek Cruz Capital at Idaho Star prospect
Cumó (Idaho CuMo Mining Corp.)

- Litigation over Sacajawea’s Bitteroot
- Pioneer Fire – 180,000 + acres, burned half of site
- No work on ground

Conservation groups challenge Idaho exploratory drilling plan

By Keith Ridler
Associated Press

BOISE — Three environmental groups have filed a lawsuit challenging the U.S. Forest Service’s approval of a mining company’s plan to do exploratory drilling about 56 miles north-east of Boise.

The Idaho Conservation League, Idaho Rivers United and Golden Eagle Audubon Society in the 28-page lawsuit filed Friday in U.S. District Court in Idaho say the federal agency violated environmental laws in approving Idaho CuMo Mining Corporation’s plan.

The groups say the project — which could lead to an open-pit mine — threatens groundwater in the area as well as a rare flower called Sacajawea’s bitterroot that the groups say grows only in about 30 locations in the mountains of central Idaho.

“This project site includes some of the best forest habitat remaining in the Boise Basin,” Pam Conley of the Golden Eagle Audubon Society said in a statement.
Midas Gold: Stibnite District: Au, Sb (Ag)
(aka Golden Meadows)

- **Submitted PRO** (Plan of Restoration and Operations) to state and federal agencies – Sept. 21, 2016.

- Infrastructure Improvements, Reclamation and Safety Closures
- Metallurgical Work

Yellow Pine Deposit
Bench 1750 Plan Map
100m Corridor

Hidden Fault Zone
Hennessey Fault

Detailed Inset

Yellow Pine Deposit
MGI-16-414
Detailed Inset

Au g/t

- 0.25 - 0.5
- 0.5 - 2.5
- > 2.5 g/t

Sb veins

MGI-16-414
2.25 g/t Au
0.13% Sb
200.3m
Stibnite 2016

- Metallurgical Work
  - Feasibility level
  - +14 tonne sample for pilot plant tests, flowsheet optimization, testing of variable rock assemblages, etc.
- Roadwork
  - Culverts, gabions, and surface aggregates over 5 miles of Stibnite-Yellow Pine road!!
Otis Gold: Kilgore Project

- Major Program in 2016
- 40 drillholes
  - 20 core
  - 20 Rc
- About $3 million spent
- 10,300 meters (34,000’)
- Cross-section compilation (geology works!)
Kilgore

See press releases on Otis’ website

Good potential in basement –
Cretaceous Aspen Formation (limey siltstone)

Basal Aspen Formation with epithermal veins
Otis Gold: Kilgore

Mitch Bernardi and others checking out core

Cleaning Wet Splitter on RC rig
2016 State Activities

Idaho Mineral Property File Scans
- Property Unscanned
- Property Entirely Scanned
- Property Partially Scanned

Preserving Minerals Information

Lemhi Pass Area Statemap: Coop with MT
Thanks.

Come explore Idaho next year.

Early morning at Kilgore’s Crabclaw Area
New constraints by USGS whose data we compile. Mining employment has also fallen in Idaho – from peak of about 2700 direct jobs in 2012 to 2352 in 2016 (October DFM, Idaho Economic Forecast). Decrease of about 350 jobs, largely from shuttering of Thompson Creek. Equals 12.8% drop.
2011 Idaho ranked 17th in nation.
2012 Idaho ranked 29th in nation.
2013:  $ 980 million
Idaho’s famous Coeur d’Alene District: hosted in PC Belt rocks; high grade siderite-quartz-sulfide veins. One of largest Silver Districts in world, with over 1.24 billion ounces of silver produced since 1884. Plus lead, zinc, and copper, and antimony. Lucky Friday and Galena mines at full production all year 2013-2016.
During year, Hecla which got its start in Idaho’s Silver Valley, showed its long-term commitment to silver and the region with acquisitions of Montanore and Rock Creek, two large silver-copper deposits in Belt stratigraphy in Montana. Lucky Friday mine at Mullan had an excellent year. Estimated production in 2016 of 3.4 million ounces, with substantial reserves.

This is what $220 million and a great mining crew buys – one of the deepest and the newest shafts in the hemisphere!! Completed at 8620 level, which is over 9500’ below ground. Collared on 4900 level. Reached final depth in May, 2016.

- Cementation installing
  - shaft lining, hats, etc.
- Expected completion and
turnover to Hecla in
January, 2017
- Higher grades at depth
- 3rd Qtr. 2016 – renewed
exploration drilling and
resource upgrading
- 2016 mining below
5900’, mostly 6250-
6350 level of
Gold Hunter vein system
Slide 13
Serious silver-rich galena veins showing up in deeper workings.

Slide 14
3rd quarter reported production increase of 13% over previous quarter. Cash costs down. 2015 production 1.5 million ounces Ag and 17 million pounds Pb.

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When not giving tours, mine geos busy – past 3 years work on modelling veins in Surpac and Leapfrog – inputting lots of historic data. Some targets in “upper country” levels – will be opening 3200 level. Also veins projecting up to 2800 level. Lots of country above that not seen in 50 years of mining. New Discoveries: 366 vein, argentiferous galena, near Caladay Pb zone, 4900 level.
Notable in Silver Valley was retirement in 2016 of Dan Hussey, Chief Geologist at Galena, and long-time familiar face around Silver Valley.

New Jersey gave tour in May at Golden Chest mine at Murray. Renewed mining the second half of year after securing 100% of stake after Juniper had done much of mining prep last year.

In 2016, NJMC will mine 7000 to 7500 tons from open pit, next to Idaho Fault. Mill about half that. Discovered “new” vein, the Stevens vein. Pyrite concentrate – send overseas Flotation mill at Kellogg Grade about 8.5 g/t See website for Blast video taken by drone.
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Currently dewatering underground. Will be able to access underground workings developed by Juniper.

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Reportedly processed 12 million pounds of molybdenum purchased from other mines that would not meet specs. Concentrate processed for Mo sulfide lubricant and mostly to produce cons to send to Langeloth, PA roaster to produce Mo oxide. site manager

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Smoky Canyon is largest mine. This year, 2016, mining Panel F (Manning Creek lease) and Panel G (Deer Creek). 8-mile haul road constructed between the two areas, starting 2013 and finished early 2016. Rerouted public road around mine operations at Panel G. Ore goes by slurry line to Don fertilizer plant in Pocatello.

Views of Panel G. Backfilling and reclamation are concurrent with mining. In November, completed earthen cover with bentonite barrier layer over 17 acres of Panel F backfill to decrease infiltration. BLM approved revised mine plan to add overburden disposal area in Panel G. Also conducted drilling and had East Smoky panel approved.

Mining North pit and Mid pit at Blackfoot Bridge mine. Couple years old. Backfilling North pit and external overburden pile, also reclaiming them.
May recall that due to potential infiltration and leaching near river, mine plan included deployment of special cover layer: **geosynthetic clay liner laminate** cover over disturbed areas. Multiple layered sandwich.

Using lysimeters installed on areas of cover, such as shown here, to judge cover effectiveness. 3 installed and data being monitored.

Agrrium reactivated mining at Rasmussen Ridge mine in 2009. Mining North Rasmussen Ridge and conducting additional reclamation in South and Central Rasmussen Ridge portions mined earlier (by FMC?) GCLL installed on 23 acres of South Ras EOP in 2011 and working with IDEQ on study of its impacts. Remedial action continuing. Ore goes to phosphoric acid fertilizer plant at Conda.
Phosphate Mine Plan Proposals
- Simplot
  - Dairy Syncline - 295 acres of FS land.
  - Collected baseline data, DEIS underway (07 release?)
  - East Smoky Panel revision to mine plan, EIS in preparation (2017 DEIS)

Phosphate Mine Plans - continued
- Agrium - Rasmussen Valley mine and Reclamation Plan
  - Final EIS released Sept. 9, 2016
  - Preferred alternative minimizes groundwater and wetlands disturbance
  - Place waste in Monsanto’s South Rasmussen mine
  - ROD out by end 2016.
  - Lanes Creek Lease (private parcel) approved for mine and ore processing.

Phosphate Exploration
- Agrium - Hasky/Dry Ridge on hold
- Monsanto - Caldwell Canyon plan submitted
- Monsanto Drilling - North Caldwell Canyon area
- Fertoz USA - Dry Ridge, no change
- Pure Silk Agricorp - little activity on potential ag products, partnering discussions with state

Phos markets down a bit. Corporate merger talks – Monsanto and Bayer (German pharma); Agrium and Potash of Saskatchewan.
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- Stable
- No change from 2015
- Some improvement on building stone markets related to reconstruction
- Aggregate – slow in north Idaho and probably elsewhere, though lots of construction in Boise area
- Sage grouse uncertainty in Owyhee County

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Working on Bankable Feasibility Study – improve products and reduce costs and environmental effects.

- Updating resource model with new drill results, including bulk density measurements.
- Increasing halloysite (clay with nanotube structure) yields by pilot plant work, reducing fresh water consumption by use of dry stacking, and other optimizations.
- Raising funds is hard.
- Had produced some tailings to send to pottery shop in Lewiston.

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Emerald Creek Garnet, Ltd.® (ECG) - an Opta Minerals Company, is a world leading supplier of industrial garnet abrasives, waterjet blast abrasives, and water filtration media. Emerald Creek Garnet, Ltd.® has been mining garnet in the Carpenter and Emerald Creek basins near Fernwood, Idaho since the 1930's. It is one of only two commercial garnet operations in North America.

Mid-2012, WGI Heavy Minerals Inc. was acquired by Opta Minerals, an international, vertically integrated
industrial minerals company based in Canada. Opta provides materials and process solutions for steel, foundry, abrasive and filtration industries. 2013 – Emerald Creek operated one wash plant on Emerald Creek to extract garnet sands. Reclaim ponds immediately. About 15-20 acres/year. Business good. Emerald Creek is first operating mine for Opta. USFS – operated tourist garnet digs. So popular, having to limit number of visitors. Open during summers only. Star garnets are prize.

Located on Middle Mountain, south of town of Oakley. Unique micaceous quartzite with dynamo-metamorphism. Splits into large but thin sheets. Very durable and attractive. Gold, gray, silver. Thicker units work as ledgestone. Facing stone, pavements, etc.

Idaho Travertine – cutting plant in Idaho Falls. Minor quarry work in Falls Creek area – Continental Buff Travertine Basalt Project – Quarrying Snake River Canyon basalt and cutting it into slabs for large custom house in Ketchum. Cabinet covers and floors, etc. Some polishing
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Idaho Travertine

Idaho Falls
Ted Orchard, family and crew
August, 2016

Capable of sawing and finishing large stone pieces.

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E & S Mining and Trucking

- Near Fairfield, ID
- Gold-colored pumice
- E & S Mining (Gosiute) acquired pit from Mtn. West Products (Rexburg)
- Products
  - Landscaping
  - Diamond Dust – for baseball diamond infield.

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Hess Pumice Products

- Malad, Idaho
- Re-use emphysema
- Wintles Creek mine
- Multiple Companies:
  - Hess Pumice
  - Idaho Minerals/Idaho Perlite
  - US Grout
  - Hess Pozz
- Unique, high purity pumice
- Market research

Same as before, down in perlite.
Pozzolan for oil field markets up some but hard bargainings.
Seeing slight slowdown due to economy but a good year. Status Quo.
Aggressively going forward to produce and test pozzolan. Meeting with ITD to get it certified as concrete additive.
US Grout business picked up significantly. Tunneling. To stop water influx.
Oil services markets increasing.
Downhole cement additive; also paint filler market
Started JV last year with Creative Mines – now a separate company.
which used Hess Pumice to manufacture cultured stone in Malad. Since 1958

**The Uses for Our Pumice**

Pumice is used for polishing and finishing, for lightweight insulating concrete, as an NCS paint filler, a soil conditioner, and a concrete pozzolan. And more. We produce over 300 spec grades of pumice for industry—from one-inch nuggets to the consistency of smoke—all made from pumice with a hardness and purity recognized as superior to any source worldwide. We know pumice: we’ll help you determine what you need.

More efficient and down to single shift. About 16 employees.
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Energy
- Commercial Oil and Gas in Idaho?
  - Yes
  - Western Snake River Plain Tertiary Basin
- Commercial Geothermal Power in Idaho?
  - Definitely
  - Kail River
  - Other

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Walker Ranch – Raft River geothermal project
- Walker Ranch
  - Raft River Plant
- Walker Ranch Geothermal Project
  - BLM approved plan for 17 additional wells and injection wells
  - Power plant (30MW) on private
  - Permits/discussions ongoing

Walker Ranch intends to develop full power plant. Their property adjoins US Geothermal’s field and power plant in Raft River Valley. Reservoir is in fractured metasediments below Tertiary Volcanics.

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Major challenges include: subsurface imaging, presence, maturation timing, and trapping mechanisms, and sustainable reserves.

Oil and gas in Idaho: Alta Mesa
- Alta Mesa
  - Production Well 27 - 14, 2015
  - Walker Ranch intends to develop full power plant. Their property adjoins US Geothermal’s field and power plant in Raft River Valley. Reservoir is in fractured metasediments below Tertiary Volcanics.
  - Walker Ranch – Raft River geothermal project
    - Walker Ranch
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- Alta Mesa paid more than $70,000 in severance tax to Idaho last year.
- Weiser-Payette Basin

From R. Breedlovestrout, IGS
• Correlation horizons across wells mark genetically related sedimentary packages; most lie on max shale baseline (flooding surfaces).

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Oil and gas exploration in Idaho and region

New Plymoth Willow Field Hamilton Field Weiser - Payette Basin

Greater area under exploration Boise

Greater area under exploration Halio Energy Leases Willow and Hamilton Fields

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Play elements:
• Source: Payette or unknown older formation?
• Maturation: Type 3 (herbaceous-woody); gas to minor oil prone
• Migration pathways: unknown
• Reservoir: Chalk Hills and Glenns Ferry formations
• Trap/Seal: 3-way fault and stratigraphic?
• Timing: unknown

Ongoing Studies:
• XRD and analyses of well cuttings help delineate provenance, reservoir versus non-reservoir, and sealing clays. The dominant provenance source is from the nearby Idaho Batholith…more to come on clay analysis
• Ongoing studies with petrophysical logs will help identify other target intervals to apply to net to gross. Feldspathic sands skew original net to gross estimates.
• Depth-structure and isochore maps show a simplified version of the thickness and local highs in the basin’s subsurface
• We are in the preliminary stages of this research…stay tuned...

From Renee Breedlovestrout, PhD, Idaho Geological Survey petroleum geologist

Check website for production as it becomes available.
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- Sage Grouse and Minerals Withdrawal Proposal from DOI and BLM
- Continued Regulatory Roadblocks in Court
- Commodity Prices Improving
- Election Year
- A few great projects, but overall very few had work on the ground

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- IGS worked with Governor's Office to develop Idaho Alternative
- Reviewed USGS mineral assessment
- Made significant revisions to
  - proposed withdrawal of
    - 3.8 million acres in Idaho
  - All should critically read and comment on DEIS when released.
- Withdrawal and land use plans will have major impacts in southern Idaho public lands.

Slide 50

- No work in Atlanta District proper
- Neal District, Elmore County
Complicated permitting situation. Can do exploration on 5-acres with “notice of motorized exploration” but not take ore off property.
2 guys with excavator. Reclamation, 2500' of drilling. Metallurgical tests on stockpile.

Black Pine: 435,000 ounces from Pegasus mine, run of mine, heap leach. Over 500 drillholes in database, some with unmined mineralized intercepts.
Thunder Mtn. Gold settled lawsuit with Idaho State Gold. Will be out raising money to put polymetallic vein and replacement deposit into production. Largely private and underground.
Litigation over Sacajawea’s Bitteroot
- Pioneer Fire: 180,000+ acres, burned half of site
- No work on ground

Submitted PRO (Plan of Restoration and Operations) to state and federal agencies - Sept. 21, 2016.
- Infrastructure Improvements, Reclamation and Safety Closures
- Metallurgical Work

Long anticipated submittal of plan of operations to open mine and conduct major site restoration in historic district. Filed in late September with Forest Service and Idaho Dept. of Lands. Significant employment and economic benefits to Valley County and state. Estimate over 15 years of construction and operation and over 1000 direct and indirect jobs during that time. Au, Ag, and by-product antimony – critical mineral. Restore Salmon migration into headwaters of East Fork of South Fork.
Slide 56

Also made improvements to core logging facility and warehouse in Cascade.

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Rather nice results recently released for hole MGI-16-414, and others drilled below Yellow Pine pit. 200 meters of over 2 g/t Au in MGI-16-414.

Midas geologists also working on compiling structure from historic maps and new mapping. Note enhanced structural detail on maps from press release of Nov. 30, 2016. Other good intercepts in news on their website. Major objective of this year’s drilling is to convert inferred resources identified in the 2014 PFS into reserves. Should assist economics and mine planning.
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Stibnite 2016
- Metallurgical Work
  - Feasibility level
  - +14 tonne sample for pilot plant tests, flowsheet optimization testing of variable rock assemblages, etc.
- Roadwork
  - Culverts, gabions, and surface aggregate over 5 miles of Stibnite - Yellow Pine road!!

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Otis Gold: Kilgore Project
- Major Program in 2016
  - 40 drill holes
  - 20 core
  - 20 RC
  - About $3 million spent
  - 10,300 meters (34,000')
  - Cross-section compilation (geology works!)

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Intercepts of 300 to 400 feet thick of mineralized material. Grades better – 2 g/t range over 300'. Young (5.3 Ma) epithermal system with lots of potassic alteration and silicification
Cleaning Wet Splitter on RC rig

Mitch Bernardi and others checking out core

Lemhi Pass Area Statemap: Coop with MT
Preserving Minerals Information

Statemap – Lemhi Pass and Agency Creek, near Lemhi Pass. Coops with Montana – Jeff Lonn and Russ Burmester – quartzite, quartzite and more quartzite. Also other areas.

Early morning at Kilgore’s Crabclaw Area

Come explore Idaho next year.

Thanks.