Acme Lab Visit

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Report By: Lauren Greenlaw and Alfonso Rodriguez .

The UBC-SEG student chapter's Acme Lab visit was held on November 15th, 2011. The visit consisted of a walk through of all the major operations at the lab including sample receiving, clay separation, separate soil and rock sample preparation rooms, fire assay, vegetation ashing furnaces, wet and classic digest facilities, XRF pressed pellet and fusion instrumentation, as well as ICP OES and ICP MS instruments.

Acme Labs is equipped to prepare and analyze many different sample media including core, rock, soil, till, clay and plants with prices ranging from around $20 to $60 for prep and analysis.

Upon being received samples are immediately entered into the Acme LIMS system as jobs which consist of up to 300 samples (all from the same shipment and client). These jobs are further broken down into racks which contain 36 samples and 4 lab QC samples each. These racks allow for easy tracking through the prep, digestion and analysis in order to assure good quality results.

After samples have been received and given job numbers they are then dried and sent for preparation. Acme has large soil driers (40C) and rock driers (60C) on site to expedite sample drying. There are separate rooms devoted to the preparation of soils/vegetation and rock/core. These media can not be prepped in the same room as the rocks have higher concentrations than the soils and pose a serious threat for cross contamination between sample media. Soils generally do not undergo much preparation; however there is the option of having the soils screened, clay separated or pulverized. Vegetation can be washed, dried, ashed or milled prior to analysis. Rocks, on the other hand, must be crushed and pulverized prior to analysis to maximize digestion. The rock prep facility contains numerous terminator crushers which produce a crush of approximately 2mm fragments. This crush is then split using a riffle splitter (rotary splitting is available upon request at an extra charge) down to a 250g split of the sample, which is then pulverized using puck and ring pulverizers.


Terminator Crusher


Riffle Splitter

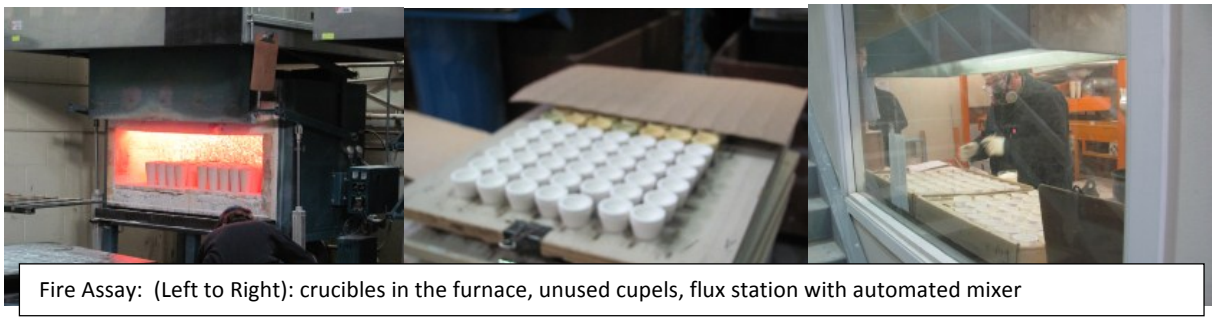

Pulverizing Disks

It is beneficial for everyone involved if it is communicated to the lab that your samples are high in sulfur, carbon, or any analyse of interest. This will yield better results as high sulfur or carbon samples require more attention during digestion and fire assay and samples with high concentrations of anything being run on an ICP MS can cause damage to the instrument as well as give lower accuracy results.

The Fire Assay section consists of 3 crucible furnaces, 3 cupellation furnaces and a flux mixing station. A lead lux is added to the sample in a crucible which is then aggressively mixed by an automated mixer. The flux is adjusted for every sample separately depending on the sample's characteristics. After sufficient mixing the crucibles are placed in the large crucible furnaces and heated for 1 hour. The purpose of the lead flux is to scavenge the precious metals in the samples. The resultant molten liquid will be comprised of a siliceous slag component and a heavy lead component which contains the PGEs and gold. When the melting is complete the content of the crucibles is poured out into metal moulds where the lead portion of the molten solution will sink to the bottom. Upon cooling the lead portion is separated mechanically by smashing the siliceous glass slag off of the lead bead.

These lead beads are then placed into white, bone ash crucibles and heated in crucible ovens. The crucibles serve to remove the lead that is holding the precious metals in the bead. The crucibles absorb the lead which stains the crucibles yellow. What is remaining is the prill containing all of the precious metals. The flux is often spiked with silver so that the resultant prill is large enough to see and digest. For this reason many fire assay packages cannot analyze for silver. Not all flux contains silver, however, if specifically requested fire assay can be performed on silver using a different flux.

This prill is either digested and run on an ICP MS or AA to determine the Au & PGE content, or the gold content is determined gravimetrically.

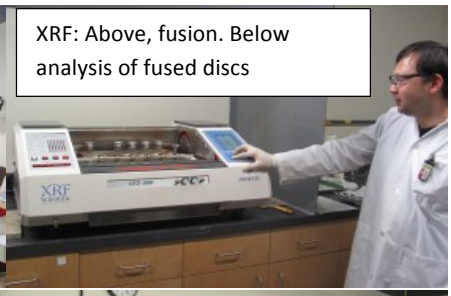


Fire Assay: (Left to Right): crucibles in the furnace, unused cupels, flux station with automated mixer

The wet chemistry, classic digest, analyses, and XRF facilities are all located in a separate building which was visited next. Acme is capable of completing a number of different digests, titrations and sequential leaches. They have numerous ICP OES and MS instruments which are dedicated to specific sample media to reduce the chances of sample cross contamination. They also have pressed pellet and fusion XRF capability.

Bill Mac Farlane Showing ICP MS

Wet Lab Facilities



XRF: Above, fusion. Below analysis of fused discs

It is recommended that you discuss your sample type and survey goals with the lab prior to choosing a digest and analytical finishes they can assist in making the right decision. Digestion and instrumentation choices should be made based on elements of interest as well as expected/desired detection limits.