Department of Mines and Mineral Resources

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ASSAYERS AND ASSAY OFFICES IN ARIZONA

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by Nyal J. Niemuth, Mining Engineer

The listed companies have informed this department that they do custom assaying for the general public. All assays are performed by or under the supervision of an assayer registered by the State of Arizona, Board of Technical Registration, as required by law. For information on the registration status of specific assayers, contact the Arizona Board of Technical Registration, 5060 N. 19th Ave., Suite 306, Phoenix, Arizona 85015 phone (602) 255-4053.

Samples for assay are usually delivered or mailed to an assay office. However, the assay office chosen should be contacted prior to shipping samples.

There are many additional registered assayers in Arizona, many of whom are employed by the major mining companies, who do not do assay work for the general public.

For additional information on mining, prospecting and mineral resources in Arizona, contact the Arizona Department of Mines and Mineral Resources, 1502 W. Washington, Phoenix, Arizona 85007 (602) 255-3791 or Department of Mines and Mineral Resources, 416 W. Congress, Room 162, Tucson, Arizona 85701 (602) 628-6340.

FIRE ASSAYING

The Arizona Department of Mines and Mineral Resources is often asked by prospectors how to determine the precious metal content of their samples. We recommend analysis by the fire assay method. The following is a brief summary of this method.

Fire assaying is a 3-step process:

1. Fusion - The sample is mixed with flux, then heated to 1850 °F. A slag containing the unwanted elements and a lead button containing the gold and silver are formed.

2. Cupeling - The lead button is heated and oxidized in a bone ash cupel that adsorbs the lead oxide, leaving a precious metal bead in the cupel.

3. Parting and Weighing - In this part of the process, the gold is separated from the silver. Two weighing steps are involved.

Fire assaying is a series of chemical steps that takes advantage of the precious metal's chemical behavior. Those who claim they have non-fire assayable gold are saying they have a substance that chemically does not behave like gold. Arguments used to explain why fire assay is not applicable to their "Colloidal" or "Micron" gold generally fall into one of the three categories discussed below.

"The particles are so small they vaporize and so are not in the button."

1850° is below the melting point of gold. Even if the temperature goes above 1850° the vapor pressure of gold is small, so very little is lost. H_2O, for example, has vapor pressure 6 orders of magnitude higher.

"Small particles of gold float on the surface of water so they float on the slag."

This ignores the process that goes on. It is not dependent on gravity. The PbO_2, now Pb, dissolves the gold. It is the Pb that collects at the bottom of the crucible.

"Interfering elements mask the gold."

The London Mint ran an assay of 1000 mg tellurium, 1 g Au, 25 g Pb and skipped the fusion step! Even so the "worst" they could do was to lose about half the gold. These conditions are highly unlikely in a rock sample. What about

the platinum group metals? These, if present, report with the gold in the bead.

CONCLUSION
Fire assaying, in use for thousands of years, still stands the test of time.

ARIZONA ASSAY OFFICES

AA = Atomic Absorption Analysis
ICP = Inductively Coupled Plasma Emission Spectrometry

DOUGLAS
Rochin Assay Office, Inc.
Rt. 1, Box 214-H
Douglas, Arizona 85607
Carlos Rochin, Registered Assayer
Telephone: 602-364-8092
Speciality: Assaying

HUMBOLDT
Iron King Assay Office
Iron King Mine
P O Box 56
Humboldt, Arizona 86329
Jim Weatherby, Registered Assayer
Telephone: 602-632-7410
Speciality: Fire assay Au and Ag, geochemical analysis, mobile sample preparation lab

PHOENIX
Arizona Testing Laboratories
810 E. Hammond Lane
Phoenix, Arizona 85034
Claude E. McLean Jr., Regisistered Assayer
Telephone: 602-254-6181
Speciality: AA, cyanide solution testing

OCM Inc.
9236 N. 10th Avenue
Phoenix, Arizona 85021
John Sickafoose, Registered Assayer
Telephone: 602-943-3573
Specialty: Fire Assay, AA, wet chemistry, hydrometallurgical process development

MESA
OMAC Inc.
521 E. Broadway Road
Mesa, Arizona 85204
Telephone: 602-962-5999
Craig McGhan, Registered Assayer
Specialty: Fire assay Au and Ag, AA, wet chemistry, amalgamation, cyanide bottle test

TUCSON
Copper State Analytical Labs Inc.
710 East Evans Boulevard
Tucson, Arizona 85713
D. A. Shaw, Registered Assayer
Telephone: 602-884-5811
Mailing Address: P O Box 7517
Tucson, Arizona 85725
Specialty: Mineral & water analysis

Jacobs Assay Office
1435 South 10th Avenue
Tucson, Arizona 85713
Ben Jacobs, Registered Assayer
Mike Jacobs, Registered Assayer
Manuel Vida, Registered Assayer
Telephone: 602-622-0813
Specialty: Fire assay Au and Ag, wet chemical assays, AA, preliminary metallurgical tests

Mountain States Research & Development
P O Box 310
I-10 at Vail Road
Vail, Arizona 85641
Marvin Schloatman, Registered Assayer
Telephone: 602-792-2800, Ext. 220
Specialty: Fire assay, AA, ICP

Skyline Labs, Inc.
1775 W. Saguaro Dr.
P O Box 50106
Tucson, Arizona 85603
Charles Thompson, Registered Assyer
Wm. Lehmbeck, Registered Assayer
James A. Martin, Registered Assayer
Telephone: 602-622-4836
Specialty: Assaying, geochemical analysis

American Assay Laboratories Inc.
3431 E. Hemisphere Loop
Tucson, Arizona 85706
Donald Macaulay, Registered Assayer
Telephone: 602-294-8078
Specialty: Fire assay ■