QUALITATIVE ANALYSIS OF NORTH CAROLINA MINERAL INDUSTRY'S TAILINGS

EHB Project No. 9

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ABSTRACT

In an effort to identify and conserve the mineral resources of North Carolina, a State-supported project was undertaken to qualitatively analyze the tailings of the mineral industries of this State. This work was done using a Vreeland Spectrex visual comparison spectroscope. In the one year of this project, only two mineral producers sought to take advantage of this project. The project is terminated due to lack of interest by industry.

OBJECTIVE

The general objective of this project was to spectroscopically examine tailings samples from the mineral processing plants in North Carolina.

PROCEDURE

After a spectroscope had been acquired for the Minerals Research Laboratory by the Division of Mineral Resources, a form letter (Figure 1) was sent to fourteen mineral producers. Table I is a list of those people receiving the letter.

In the past, the Laboratory's efforts to compile a tailings inventory had met with little interest and poor response. Correspondence during the inventory project was inclined toward having the companies help the Laboratory. In this project, the correspondence was worded in such a manner as to offer a beneficial free service to those companies contacted.

When a sample was received, it was examined under the microscope to determine bulk mineralogy and then analyzed with a spectroscope. The analysis of the sample was then forwarded to the company along with any suggestions or recommendations we might have.

EQUIPMENT

The instrument used was a Vreeland, Model 6A spectroscope, made by Spectrex Company, 3594 Haven Avenue, Redwood City, California 94063. The operating specifications are shown in Table II.

ANALYTICAL TESTING

A sample is taken, in an amount of about 25 milligrams, powdered in a mortar and placed in a carbon cup. The carbon cup is then placed in the hearth on the arc assembly. The hearth is placed in the lowered position and the power switch is turned on. The carbon electrodes are then brought into contact, then separated, thereby drawing the arc. The hearth and sample are then raised gradually until spectrum lines are seen through the eyepiece. This gradual heating of the sample is a valuable feature, since several elements vary greatly in their response to excitation. Applying the heat gradually by raising the sample slowly into the arc makes it possible to develop the spectra of the several components successively and pick them out one by one without confusion. When a pattern of spectrum lines appears, if it is not recognized by the observer, reference is made to an index chart on which all the spectra of the master standards are recorded. When the desired pattern is found on the chart, the corresponding master film is rolled into place, and its lines matched against the lines of the spectrum. The identification of that element is then complete and positive. Other components are

likewise identified one by one, as they appear, by their line patterns.

No two elements have the same spectral pattern. Their patterns are distinctive in arrangement and in color, and once learned they can usually be identified by inspection. The comparison of the observed pattern with its master film makes the identification complete. It is like fitting a key into a lock. Each coincidence of a line of the spectrum with an immediately adjacent standard line is highly accurate in itself. When such coincidences are multiplied, the possibility of error is eliminated.

RESULTS

A sample was received from Mr. Paul Lancaster of Kings Mountain Mica Company. This sample was examined under the microscope and by use of the spectroscope. The results of this work were forwarded to Mr. Lancaster.

Three samples of tailings were received from Mr. Ray Wiseman of Northwest International. These samples were examined under the microscope and by use of the spectroscope. The results of this work were forwarded to Mr. Wiseman.

CONCLUSIONS

The Spectrex visual comparison spectroscope can be used to determine major, minor, and certain trace elements present in tailings samples.

FIGURE 1

(Date)

(Company name)
(Company Address)
" "
" "

Dear Sir:

In the light of recent efforts of the State and Federal government to locate, identify, and conserve the natural resources of the States, the Minerals Research Laboratory is increasing its efforts to help the mineral processors of North Carolina to conserve their valuable resources.

In order to accomplish this the Minerals Research Laboratory has recently acquired a Vreeland direct reading Spectrex spectroscope. We would like to use this instrument to help you!

If you will send a representative sample (about 5 lbs.) of your tailings, we will examine it and return a qualitative chemical analysis to you. We would prefer a sample of each process stream before it has been combined with other tailings streams. This will assist in determining if there is a potential by-product.

Make this year a profitable one: TAKE A TAILINGS PRODUCT TO MARKET WITH YOU!

Sincerely yours,

MINERALS RESEARCH LABORATORY

Edwin H. Bentzen, III
Mineral Dressing Engineer

EHB:jl

Table I - List of Companies Contacted

Mr. George R. Schaefer
Ranchers Exploration & Development Co.

Powhatan Mining Co.
Baltimore, Maryland

Mr. Dean Van Dyk
Foote Mineral Company

Mr. Dewey Hall
International Minerals & Chem. Corp.

Mr. Paul Lancaster
Kings Mountain Mica Co.

Mr. Tom Lawson
Lawson United Feldspar & Mineral Co.

Mr. Richard Barber
The Feldspar Corporation

Mr. James Tanner
Harris Mining Company

Mr. Theodore Arthur
Lithium Corporation of America

Deneen Mica Company, Inc.
Newdale, N. C.

Mr. Earl C. VanHorn
Diamond Mica Company

Franklin Mineral Products Co.
Franklin, N. C.

Mr. Ray Wiseman
Northwest International

Mr. Ben E. Warner
Hitchcock Corporation

Table II - Spectrex Spectroscope Specifications

Dimensions:	Height - 16" Width - 18" Length - 24"
Weight:	35 pounds
Power Requirements:	115 volts A.C. 13 amps.
Optical System:	Paschen mounting of a concave diffraction grating.
Grating:	Grade A replica. Focal Length - 42.5 cm Lines Per Inch - 15,000 Size of Surface - 20 x 25 mm
Resolution:	Adequate to clearly identify the nickel line at 5892.8 A^{o} between Sodium D lines at 5889.95 A^{o} & 5895.9 A^{o}.
Dispersion:	40.5 A^{o}/mm
Wave Length Region:	3900 to 7000 A^{o}