

UNITED STATES DEPARTMENT OF COMMERCE  
WASHINGTON 25, D.C.

# National Bureau of Standards

## Certificate of Analyses

### Standard Sample 671, Nickel Oxide, No. 1<sup>a</sup>

Percent of the element in nickel oxide <sup>b</sup>

| LABORATORY             | Co          | Cu          | Fe          | Mg           | Mn          | Si           | Ti           | Al           | Cr           |
|------------------------|-------------|-------------|-------------|--------------|-------------|--------------|--------------|--------------|--------------|
| Chemical:              |             |             |             |              |             |              |              |              |              |
| 1.....                 | 0.29        | 0.196       | 0.39        |              | 0.129       | 0.048        | 0.024        |              | 0.026        |
| 2.....                 | .30         | .199        | .40         |              | .133        |              | .024         |              |              |
| 3.....                 | .29         | .190        | .40         |              | .118        | .048         | .024         |              | .023         |
| 4.....                 | .29         | .190        | .40         |              | .134        |              | .025         | 0.0088       | .022         |
| 5.....                 | .32         | .198        | .38         |              | .129        |              | .023         |              |              |
| 6.....                 |             |             |             | 0.029        |             | .047         |              |              |              |
| 7.....                 | .32         | .202        | .40         | .031         | .129        | .045         | .025         |              |              |
| 8.....                 | .32         |             | .35         | .028         | .12         |              | .024         | .0094        | .024         |
| 9.....                 | .30         | .21         | .40         |              | .13         | .048         | .023         |              |              |
| Spectrochemical:       |             |             |             |              |             |              |              |              |              |
| 10.....                | 0.32        | 0.20        | 0.38        | 0.031        | 0.130       |              | 0.025        | 0.0092       |              |
| 11.....                | .32         |             | .39         | .032         | .115        |              | .026         | .011         | 0.024        |
| 12.....                | .32         | .198        | .42         | .031         | .134        | 0.052        | .023         | .0092        | .030         |
| 13.....                | .32         | .165        | .40         | .026         | .123        | .044         | .024         | .0084        | .025         |
| 14.....                |             |             | .39         |              | .13         |              |              |              |              |
| Recommended value..... | <b>0.31</b> | <b>0.20</b> | <b>0.39</b> | <b>0.030</b> | <b>0.13</b> | <b>0.047</b> | <b>0.024</b> | <b>0.009</b> | <b>0.025</b> |

<sup>a</sup> *Intended use.*—While this standard is suitable for general use, it was prepared primarily for application in the spectrographic analysis of nickel by Tentative Method E129-57T (Methods for Emission Spectrochemical Analysis, ASTM, 1957). When the standard is applied in this method, it is recommended that 0.3 g or more of the standard be dissolved and converted to oxide by the same procedure used for the sample to be analyzed, and preferably at the same time.

<sup>b</sup> *Nickel content.*—The approximate nickel content of Standard 671 is 76.6 percent. To convert the concentration values in the table from the basis of percent element in nickel oxide to the basis of percent element in total metal present, multiply the values by 1.28.

### List of Cooperating Laboratories

#### Chemical:

1. National Bureau of Standards, Washington, D.C.
2. Western Electric Co., Hawthorne Works, Chicago, Ill.
3. Sylvania Electric Products, Inc., Towanda, Pa.
4. Sylvania Electric Products, Inc., Kew Gardens, N.Y.
5. United States Metals Refining Co., Carteret, N.J.
6. Bell Telephone Laboratories, Murray Hill, N.J.
7. Wilbur B. Driver Co., Newark, N.J.
8. Raytheon Manufacturing Co., Newton, Mass.
9. Driver-Harris Co., Harrison, N.J.

#### Spectrochemical:

10. National Bureau of Standards, Washington, D.C.
11. W. B. Coleman and Co., Philadelphia, Pa.
12. Bell Telephone Laboratories, Murray Hill, N.J.
13. Raytheon Manufacturing Co., Newton, Mass.
14. Westinghouse Electric Co., Elmira, N.Y.

The nickel oxide was prepared from the metal by the J. T. Baker Chemical Co., Phillipsburg, N.J.

WASHINGTON 25, D.C., September 12, 1960

A. V. ASTIN, *Director.*

Addendum to

**National Bureau of Standards**

**Certificate of Analysis**

**Standard Reference Material 671**

**Nickel Oxide No. 1**

(In Cooperation with the American Society for Testing and Materials)

Certified Values

| <u>Element</u> | <u>Concentration, <math>\mu\text{g/g}</math><sup>1</sup></u> |
|----------------|--------------------------------------------------------------|
| Bismuth        | $0.07 \pm 0.01$                                              |
| Lead           | $16 \pm 2$                                                   |
| Selenium       | $2.0 \pm 0.3$                                                |

<sup>1</sup>The certified value listed for a constituent is the present best estimate of the "true" value based on the results of the cooperative program for certification. The estimated uncertainty listed for a constituent is based on judgment and represents an evaluation of the combined effects of method imprecision, possible systematic errors among methods, and material variability for samples 0.3 g or more. (No attempt was made to derive exact statistical measures of imprecision because several methods were involved in the determination of most constituents.)

Non-certified values appear on the back of this addendum.

Washington, D.C. 20234  
June 29, 1979

George A. Uriano, Chief  
Office of Standard Reference Materials

(over)

#### Non-Certified Values

The following elements are *not certified*, but are given as additional information on the composition.

| <u>Element</u> | <u>Concentration, <math>\mu\text{g/g}</math></u> | <u>Element</u> | <u>Concentration, <math>\mu\text{g/g}</math></u> |
|----------------|--------------------------------------------------|----------------|--------------------------------------------------|
| Antimony       | (0.4)                                            | Tellurium      | (<0.2)                                           |
| Arsenic        | (59 <sup>a</sup> )<br>(45 <sup>b</sup> )         | Thallium       | (<0.1)                                           |
| Cadmium        | (0.7)                                            | Tin            | ( 2.7)                                           |
| Gallium        | (0.8)                                            | Zinc           | (160 )                                           |
| Silver         | (0.5)                                            |                |                                                  |

<sup>a</sup> Average of atomic absorption methods.

<sup>b</sup> Average of extraction-photometric and distillation-photometric procedures.

Analyses leading to the values in this addendum were performed in the following laboratories:

Falconbridge Nickel Mines Ltd., Thornhill, Ontario, Canada, W.L. Ott.

Inco Limited, Sheridan Park, Mississauga, Ontario, Canada, S.H. Blakeley.

International Nickel Co., Sterling Forest, Suffern, N.Y., M. Yanak.

National Bureau of Standards, Inorganic Analytical Research Division, Washington, D.C., E.J. Maienthal.

Pratt and Whitney Aircraft Group, Plant M, Middletown, Conn., J.Y. Marks.

The overall coordination of the technical measurements leading to this certification was performed under the direction of J.I. Shultz, Research Associate, ASTM/NBS Research Associate Program.