

Addendum to CA1323 9-8-05

This is to supplement and report our progress on this corrective action.

As previously committed, samples from A-1, C-4 and C-5 were sent to Wisconsin Centrifugal, our parent company, for independent analysis of all reported elements. The results indicated a discrepancy in the level of manganese in the results of the analyses performed by the two labs. Consistently, the Pevely lab measured Mn about 0.4 to 0.5% higher than WC measured. To confirm this information we sent three samples to an outside laboratory for wet chemistry analysis. The results correlated well with the results achieved at Wisconsin Centrifugal. See attached report.

In follow-up, samples from C-1, C-2 and C-3 were also sent for verification, with similar outcome. We then located and tested a sample from a test heat #21424 of CF8MNMNMOD made in January 2004. Testing indicated similar results.

It can be stated that, for at least the period of time comprising the Prototype and the Production to the repair of the Spectrometer, that our analysis of Manganese levels has been higher than the level actually present in the alloy. Typically, this deviation is on the order of 0.4-0.5%.

The spectrometer received the preventive maintenance on August 29, 2005. The report was submitted on September 2, 2005. The repair made to the optical card was determined to have rectified the previously reported issue with P and S reporting. No other mechanical or software problem that would affect Mn was determined at the time of the preventative maintenance.

In follow up to the Manganese discrepancy, the same samples were analyzed on the Pevely spectrometer. The levels reported after PM now correlate with the results from WC and the independent laboratory. Further investigation indicates that the BS180 standard used for type standardization may be sufficiently outside the range of Mn and inducing error. No other root cause has been determined, but the investigation continues.

In consideration of the erroneous Mn and other elemental readings, the following actions are proposed:

Create a type standard that closely matches the Mn in CF8MNMNMOD. (In process)
Request a revision to the chemistry range for Mn. (propose widening of Manganese since it has been proven to be effective at much lower concentrations than previously thought).
Have each heat of CF8MNMNMOD verified independently for balance of program.

C. Ruud

CC: Jim Galaske, Barry Craig, Joe Edwards, E.J. Kubick

| West | Chemist | y Check | Chemistry Check with WISCO | | | | | | | | | |
|--|--------------|--------------------|----------------------------|----------|--------|----------|--|------|----------------|------|----------|--|
| C-5, Sample C-5, Button #1 C-5, Button #2 C-5, Button | | • | | c | ö | 1 | ځ | 2 | (24) | 2 | ٥ | 0 |
| C-5,-1 Button #1 | Fab | <u>.</u> | Sample | ا ئاد | 5 | E 0 | ֓֞֞֝֞֜֝֞֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֟֝֓֓֓֡֡֝֡֓֓֡֓֡֝֡֓֓֡֡֡֝ | 2 | 2 7 | 2 0 | - 000 | 0000 |
| C-5,1-1 Button #2 | CAF | C-5,1-1 | Button #1 | 0.05 | 0.3 | 5.6 | 78.1 | 13.4 | 4.7 | 0.70 | 0.023 | 0.011 |
| C-5,1-1 Button #2 | CAF | 0-5,-1 | Button #2 | 0.05 | 0.4 | 5.6 | 18.0 | 13.4 | 5.6 | 0.20 | 0.026 | 0.013 |
| C-5,1-1 Button #1 | WC | 0-5,1-1 | Button #2 | 0.02 | 0.3 | 7.7 | 18.2 | 13.5 | 7.4 | 0.25 | 0.025 | 0.010 |
| C-5,-1 Button #1 | STL Wet | 5,-1 | Button #1 | | į | 2.2 | 1 | | | | | I |
| C-5,1-3 Button #1 0.05 0.4 2.2 17.9 13.4 2.5 | CAF | C-5,I-1 | Button #1 | * | 0.3 | 2.3 | 18.3 | 13.4 | 2.4 | * | 0.029 | 0.012 re-run after PM |
| Color Sample | 1 | 1 | 1 | | | : | | | | | ſ | |
| C-5,1-3 Button #1 0.05 0.4 2.2 17.9 13.5 2.5 C-5,1-3 Button #2 0.05 0.4 2.2 17.9 13.2 2.4 C-5,1-3 Button #2 0.05 0.4 1.8 18.3 13.3 2.5 C-5,1-3 Button #1 | Lab | <u></u> | Sample | اد | 2 | Z. | ָל | Z | No. | z | L | 2 |
| C-5,13 Button #2 0.05 0.4 22 17,9 13.2 2.4 C-5,1-3 Button #1 * 0.04 1.8 18.2 13.4 2.5 C-5,1-3 Button #1 * 0.04 1.8 18.2 13.4 2.5 C-5,1-6 Button #1 0.05 0.3 2.4 18.1 13.2 2.4 C-5,1-6 Button #2 0.05 0.3 2.4 18.1 13.2 2.4 C-5,1-6 Button #2 0.05 0.3 2.4 18.1 13.2 2.4 C-5,1-6 Button #7 0.04 0.3 2.0 18.4 13.3 2.4 C-5,1-6 Button #7 * 0.3 2.0 18.4 13.2 2.4 A-1 Reported 0.04 0.4 2.4 18.2 13.2 2.4 A-1 Cast on sample * 0.5 1.7 18.2 13.2 2.4 A-1 Cast on sample <td>CAF</td> <td>C-5,1-3</td> <td>Button #1</td> <td>0.05</td> <td>0.4</td> <td>2.2</td> <td>17.9</td> <td>13.4</td> <td>2.5</td> <td>0.24</td> <td>0.033</td> <td>0.012</td> | CAF | C-5,1-3 | Button #1 | 0.05 | 0.4 | 2.2 | 17.9 | 13.4 | 2.5 | 0.24 | 0.033 | 0.012 |
| C.5,1-3 Button #2 0.05 0.4 1.8 18.2 13.4 2.5 C.5,1-3 Button #1 * 0.4 1.8 18.3 13.3 2.5 C.5,1-6 Button #1 * 0.4 1.8 18.3 13.3 2.4 C.5,1-6 Button #1 0.05 0.3 2.4 18.1 13.2 2.4 C.5,1-6 Button #2 0.04 0.3 2.4 18.1 13.2 2.4 C.5,1-6 Button #1 * 0.3 2.4 18.1 13.2 2.4 C.5,1-6 Button #7 * 0.3 2.4 18.1 13.2 2.4 C.5,1-6 Button #7 * 0.3 2.4 18.1 13.2 2.4 C.5,1-6 Button #7 * 0.3 2.4 18.1 13.2 2.4 A-1 Cast on sample * 0.5 1.6 1.8 18.2 13.2 2.4 C-4 C | CAF | C-5,1:3 | Button #2 | 0.05 | 0.4 | 2.5 | 17.9 | 13.2 | 2.4 | 0.24 | 0.033 | 0.012 |
| C-5,1-3 Button #1 * 0.4 1.8 18.3 13.3 2.5 C-5,1-3 Button #1 * 0.4 1.8 18.3 13.3 2.5 C-5,1-6 Button #2 0.05 0.3 2.4 18.1 13.2 2.4 C-5,1-6 Button #2 0.05 0.3 2.4 18.1 13.2 2.4 C-5,1-6 Button #1 0.05 0.3 2.4 18.1 13.2 2.4 C-5,1-6 Button #1 * 0.04 0.3 2.4 18.1 13.2 2.4 A-1 Cast on sample * 0.5 1.6 18.2 13.3 2.4 A-1 Cast on sample * 0.5 1.6 18.2 13.2 2.4 A-1 Cast on sample * 0.6 1.5 17.8 18.2 13.2 2.4 C-1 Cast on sample * 0.6 1.5 18.3 18.3 2.4 | MC | C-5 | Button #2 | 0.05 | 0.4 | 1.8 | 18.2 | 13.4 | 2.5 | 0.23 | 0.034 | 0.018 |
| C.5.1-3 Button #1 | CTI Wet | ָ ק ק ק | Button #1 | | | 18 | | | | | | THE RESIDENCE AND ADDRESS OF THE PERSON NAMED AND ADDRESS OF T |
| LD Sample C Si | 0 IL Wal | 2 - | Dutton #1 | * | 70 | α τ | 12,2 | 12.2 | 2.5 | * | 0.034 | 0.012 re-rin after PM |
| LD. Sample C Si Mn Cr Ni Mo C5, -6 Button #1 0.05 0.3 2.4 18.1 13.2 2.4 C5, -6 Button #2 0.05 0.3 2.4 18.1 13.2 2.4 13.2 2.4 13.3 2.4 13.3 2.4 13.3 2.4 13.3 2.4 13.3 2.4 13.3 2.4 13.3 2.4 13.3 2.4 13.3 2.4 13.3 2.4 13.3 2.4 13.3 2.4 13.3 2.4 14.1 2.4 13.3 2.4 14.1 2.4 13.3 2.4 14.1 2.4 | ₹ 5 | ? ? | - # IIOIIna | | • | 5 | 2 | 2 | 5 | | 5 | 5 |
| C.5.1-6 Button #1 0.05 0.3 2.4 18.1 13.2 2.4 C.5.1-6 Button #2 0.04 0.3 2.4 18.1 13.2 2.4 C.5.1-6 Button #2 0.04 0.3 2.4 18.1 13.2 2.4 C.5.1-6 Button #1 * 0.3 2.0 18.4 13.3 2.4 C.5.1-6 Button #1 * 0.3 2.0 18.4 13.2 2.4 A-1 Reported 0.04 0.4 2.4 18.2 13.2 2.4 A-1 Cast on sample * 0.5 2.1 18.0 13.4 2.4 A-1 Cast on sample * 0.6 1.6 1.8 18.3 13.4 2.2 C-4 Cast on sample * 0.6 1.9 1.7 13.5 2.3 C-1 Cast on sample * 0.6 1.4 18.2 13.5 2.3 C-1 S | 40 | 2 | Sample | ٥ | Ü | M | ئ | Ž | O _M | z | ۵ | 8 |
| C.5.1-6 Button #2 0.05 0.3 2.4 18.1 13.2 2.4 C.5.1-6 Button #2 0.04 0.3 2.4 18.1 13.2 2.4 C.5.1-6 Button #1 | Lab | . u | Duffon #1 | 0.05 | 5 6 | - 2 4 | 18.1 | 13.2 | 2.4 | 0.25 | 0.030 | 0.012 |
| C-5, I-6 Button #1 Button Button Sample C-5, I-6 Button Button C-5, I-6 Button Button C-6, I-6 Button Button C-7 Button C-7 Button Button C-7 Button C-7 Button C-7 Button C-7 Button C-7 Button Button C-7 Button C-7 Button Button C-7 Button C-7 | L L | ף נ הָ נ | | 20.0 | 2 0 | 1.10 | 0 | 12.0 | 1.7 | 0.25 | 0000 | 0.011 |
| C-5 -b Button #1 19 C-5 -b Button #1 C-5 | <u></u> | <u>م</u> م م | Button #2 | 0.00 | 0.0 | 4.7 | - 0 | 10.6 | 4.4 | 0.43 | 0.023 | 0.011 |
| C-5, -6 Button #1 * 0.3 2.0 1.9 1.9 1.9 1.9 2.4 1.3.3 2.4 1.0. Sample C Si Mn Cr Ni Mo No No No No No No No | MC | 9 2-2-19 | Button #2 | 0.04 | 0.3 | 7 | 18.3 | 13.3 | 4.7 | 0.24 | 0.00 | 0.010 |
| LD. Sample C Si Mn Cr Ni Mo | STL Wet | C-5,1-6 | Button #1 | + | | 5. | | 0 | | - | 000 | - 1 |
| I.D. Sample | CAF | 0-2-9 | Button #1 | • | 0.3 | 2.0 | 18.4 | 13.3 | 7.4 | | 0.033 | U.U.Z re-run aner PINI |
| LD Sample C Si Mn Cr Ni Mo | | 4 | - | c | ö | S N | ځ | 12 | QN. | Z | ٥ | Y |
| A-1 Reported 0.04 0.4 2.4 18.2 13.5 2.4 A-1 Cast on sample * 0.6 1.6 18.1 13.7 2.4 A-1 Cast on sample * 0.6 1.6 18.2 13.5 2.4 A-1 Cast on sample * 0.6 1.6 18.2 13.5 2.4 C-4 Cast on sample * 0.04 0.6 1.5 17.8 13.6 2.4 C-4 Cast on sample * 0.06 1.5 17.8 13.6 2.4 C-4 Cast on sample * 0.07 0.5 1.8 13.1 2.2 C-1 Cast on sample * 0.7 1.8 18.3 13.4 2.4 C-1 Cast on sample * 0.7 1.8 18.3 13.4 2.4 C-2 Cast on sample * 0.07 0.9 1.6 18.2 13.7 2.2 C-2 Cast on sample * 0.08 0.7 1.8 18.3 13.4 2.4 C-2 Cast on sample * 0.07 0.9 1.6 18.2 13.7 2.2 C-2 Cast on sample * 0.07 0.9 1.6 18.2 13.7 2.2 C-2 Cast on sample * 0.07 0.9 1.6 18.2 13.7 2.2 C-3 Cast on sample * 0.06 0.1 18.2 13.7 2.4 C-4 Cast on sample * 0.07 0.9 1.6 18.2 13.7 2.2 C-5 Cast on sample * 0.06 0.1 18.2 13.7 2.4 C-6 Cast on sample * 0.06 0.1 18.2 13.7 2.4 C-7 Cast on sample * 0.06 0.1 18.2 13.7 2.4 C-8 Cast on sample * 0.06 0.1 18.2 13.7 2.4 C-9 Cast on sample * 0.06 0.1 18.3 13.7 2.4 C-1 Cast on sample * 0.06 0.1 18.3 13.7 2.4 C-2 Cast on sample * 0.06 0.1 18.3 13.7 2.4 C-3 Cast on sample * 0.06 0.1 18.3 13.7 2.4 C-3 Cast on sample * 0.06 0.1 18.3 13.7 2.4 C-3 Cast on sample * 0.06 0.1 18.3 13.7 2.4 C-3 Cast on sample * 0.06 0.1 18.3 13.7 2.4 C-3 Cast on sample * 0.06 0.1 18.3 13.7 2.4 C-3 Cast on sample * 0.06 0.1 18.3 13.7 2.4 C-3 Cast on sample * 0.06 0.1 18.3 13.7 2.4 C-3 Cast on sample * 0.06 0.1 18.3 13.7 2.4 C-3 Cast on sample * 0.06 0.1 18.3 13.7 2.4 C-3 Cast on sample * 0.06 0.1 18.3 13.7 2.4 C-3 Cast on sample * 0.06 0.1 18.3 13.7 2.4 C-3 Cast on sample * 0.06 0.1 18.3 13.7 2.4 C-3 Cast on sample * 0.06 0.1 18.3 13.7 2.4 C-3 Cast on sample * 0.06 0.1 18.3 13.7 2.4 C-3 Cast on sample * 0.06 0.1 18.3 13.7 2.4 C-3 Cast on sample * 0.06 0.1 18.3 13.7 2.4 C-4 Cast on sample * 0.06 0.1 18.3 13.7 2.4 C-5 Cast on sample * 0.06 0.1 18.3 18.1 13.5 2.3 C-7 Cast on sample * 0.06 0.1 18.1 18.1 13.5 2.3 C-8 Cast on sample * 0.06 0.1 18.1 18.1 13.5 2.4 C-9 Cast on sample * 0.06 0.1 18.1 18.1 18.1 18.1 18.1 18.1 18.1 | Lab | ָרָי. ביוי | Sample | ٥ | ō 3 | | 5 5 | 200 | 2 2 | | - * | |
| A-1 Cast on sample | CAF | A-1 | Keported | 0.04 | 4.0 | 7.4 | 18.2 | 13.3 | 4.7 | 0.20 | 700 | 0000 |
| A-1 Cast on sample 0.06 0.6 1.6 18.1 13.7 2.4 A-1 Cast on sample 0.06 0.6 1.6 18.2 13.5 2.4 LD Sample 0.04 0.4 2.5 18.2 13.2 2.2 C-4 Cast on sample 0.04 0.6 1.9 17.9 13.5 2.3 C-4 Cast on sample 0.04 0.6 1.5 17.8 13.6 2.4 C-4 Cast on sample 0.06 0.5 2.7 18.1 13.1 2.2 C-1 Cast on sample 0.06 0.7 18 18.3 13.4 2.4 C-1 Cast on sample 0.06 0.7 1.9 18.3 13.2 2.4 C-2 Cast on sample 0.07 0.9 1.6 18.2 13.7 2.2 C-2 Cast on sample 0.07 0.9 1.6 18.2 13.7 2.2 C-2 Cast on sample 0.07 0.9 1.6 18.2 13.7 2.2 C-3 Cast on sample 0.04 0.4 2.5 18.2 13.3 2.3 C-3 Cast on sample 0.06 0.6 1.9 18.0 13.2 2.4 C-3 Cast on sample 0.07 0.9 1.6 18.2 13.7 2.2 C-4 Cast on sample 0.04 0.4 2.5 18.2 13.3 2.3 C-5 Cast on sample 0.06 0.6 1.9 18.0 13.3 2.4 C-7 Cast on sample 0.06 0.6 1.6 18.3 13.7 2.4 C-8 Cast on sample 0.06 0.6 1.6 18.3 13.7 2.4 C-9 Cast on sample 0.06 0.0 1.0 18.3 13.7 2.4 C-1 Cast on sample 0.00 0.0 1.0 18.3 13.7 2.4 C-2 Cast on sample 0.00 0.0 1.0 18.3 13.7 2.4 C-3 Cast on sample 0.00 0.0 1.0 18.3 13.7 2.4 C-3 Cast on sample 0.00 0.0 1.0 18.3 13.7 2.4 C-3 Cast on sample 0.00 0.0 1.6 18.3 13.7 2.4 C-3 Cast on sample 0.00 0.0 1.0 18.3 13.7 2.4 C-3 Cast on sample 0.00 0.0 1.0 18.3 13.7 2.4 C-3 Cast on sample 0.00 0.0 1.0 18.3 13.7 2.4 C-3 Cast on sample 0.00 0.0 1.0 18.3 13.7 2.4 C-3 Cast on sample 0.00 0.0 1.0 18.3 13.7 2.4 C-3 Cast on sample 0.00 0.0 1.0 18.3 13.7 2.4 C-3 Cast on sample 0.00 0.0 1.0 18.3 13.7 2.4 C-3 Cast on sample 0.00 0.0 1.0 18.3 13.7 2.4 C-3 Cast on sample 0.00 0.0 1.0 18.3 13.7 2.4 C-3 Cast on sample 0.00 0.0 1.0 18.3 13.7 2.4 C-3 Cast on sample 0.00 0.0 1.0 18.3 13.7 2.4 C-4 Cast on sample 0.00 0.0 1.0 18.3 13.7 2.4 C-5 Cast on sample 0.00 0.0 1.0 18.3 13.7 2.4 C-7 Cast on sample 0.00 0.0 1.0 18.3 13.7 2.4 C-8 Cast on sample 0.00 0.0 1.0 18.3 13.7 2.4 C-9 Cast on sample 0.00 0.0 1.0 18.3 13.7 2.4 C-9 Cast on sample 0.0 18.0 18.1 12.9 18.1 12.9 18.1 12.9 18.1 | CAF | A-1 | Cast on sample | ĸ | 0.5 | 2.1 | 18.0 | 13.4 | 7.4 | | 0.034 | 9000 |
| LD Sample C Si Mn Cr Ni Mo | MC | A-1 | Cast on sample | 90.0 | 9.0 | 9. | 18.1 | 13.7 | 2.4 | 0.25 | 0.027 | 0.009 |
| I.D. Sample C Si Mn Cr Ni Mo | CAF | A-1 | Cast on sample | * | 9.0 | 1.6 | 18.2 | 13.5 | 2.4 | * | 0.028 | 0.009 re-run atter PM |
| I.D. Sample C-4 Reported C-4 Cast on sample C-1 Cast on sample C-1 Cast on sample C-1 Cast on sample C-2 Cast on sample C-3 Cast | | | | c | ï | 284 | 3 | 12 | M | 2 | ٥ | |
| C-4 Reported 0.04 0.4 2.5 10.2 13.5 2.3 Cast on sample 0.04 0.6 1.5 17.8 13.6 2.4 C.4 Cast on sample 0.04 0.6 1.5 17.8 13.6 2.4 C.4 Cast on sample 0.06 0.5 2.7 18.1 13.1 2.2 C.1 Cast on sample 0.06 0.5 2.7 18.1 13.1 2.2 C.2 Cast on sample 0.07 0.8 18.3 13.4 2.4 C.2 Cast on sample 0.07 0.9 1.6 18.2 13.5 2.3 C.2 Cast on sample 0.07 0.9 1.6 18.2 13.5 2.3 C.2 Cast on sample 0.07 0.9 1.6 18.2 13.5 2.3 C.2 Cast on sample 0.07 0.9 1.6 18.2 13.5 2.3 C.2 Cast on sample 0.07 0.9 1.6 18.2 13.5 2.4 C.2 Cast on sample 0.07 0.9 1.6 18.2 13.5 2.4 C.2 Cast on sample 0.07 0.9 1.6 18.2 13.5 2.4 C.2 Cast on sample 0.07 0.9 1.6 18.2 13.5 2.4 C.3 Cast on sample 0.06 0.6 1.9 18.0 13.5 2.4 C.3 Cast on sample 0.06 0.6 1.9 18.0 13.5 2.4 C.3 Cast on sample 0.06 0.6 1.6 18.1 13.5 2.4 C.3 Cast on sample 0.06 0.6 1.6 18.1 13.5 2.4 C.3 Cast on sample 0.06 0.6 1.6 18.1 13.5 2.4 C.3 Cast on sample 0.06 0.6 1.6 18.1 13.5 2.4 C.3 Cast on sample 0.06 0.6 1.6 18.1 13.5 2.4 C.3 Cast on sample 0.06 0.6 1.6 18.1 13.5 2.4 C.3 Cast on sample 0.06 0.6 1.6 18.1 13.5 2.4 C.3 Cast on sample 0.06 0.6 1.6 18.1 13.5 2.4 C.3 Cast on sample 0.06 0.6 1.6 18.1 13.5 2.4 C.3 Cast on sample 0.06 0.6 1.6 18.1 13.5 2.4 C.3 Cast on sample 0.06 0.6 1.6 1.6 18.1 13.5 2.4 C.3 Cast on sample 0.06 0.6 1.6 18.1 13.5 2.4 C.3 Cast on sample 0.06 0.6 0.6 1.6 18.1 13.5 2.4 C.3 Cast on sample 0.06 0.6 0.6 1.6 18.1 13.5 2.4 C.3 Cast on sample 0.06 0.06 0.06 0.06 0.06 0.06 0.06 0.0 | Lab | | Sample | ٥ | 5 | | 5 5 | 2 00 | | 200 | **000 | Ċ |
| C-4 Cast on sample | CAF | 2 | Reported | 0.04 | 4.0 | 2.5 | 18.2 | 13.2 | 7:7 | 07.0 | 050 | |
| C-4 Cast on sample 0.04 0.0 1.5 17.6 13.0 2.4 I.D. Sample | CAF | 5 | Cast on sample | | 0.0 | 20 1 | 7 .0 | 0.0 | 0.7 | 30.0 | 70.00 | |
| C-4 Cast on sample | MC | 5 4 | Cast on sample | 0.04 | 0.0 | 0. | 0.7 | 0.5 | 4.7 | 0.20 | 0.030 | 0.012 |
| 1.D. Sample C Si Mn Cr Ni Mo | CAF | 4 | Cast on sample | * | 0.6 | 1.4 | 18.2 | 13.6 | 7.4 | | 0.031 | 0.009 re-run anter PM |
| 1.D. Sample C Si Win Cr 18.1 18.1 2.2 C-1 Cast on sample * 0.7 2.2 18.1 13.1 2.2 C-1 Cast on sample * 0.7 1.9 18.3 13.2 2.4 C-1 Cast on sample * 0.7 1.9 18.3 13.2 2.4 C-2 Cast on sample * 0.8 2.2 18.1 13.4 2.2 C-2 Cast on sample * 0.8 2.2 18.1 13.4 2.2 C-2 Cast on sample * 0.8 2.2 18.1 13.4 2.2 C-2 Cast on sample * 0.8 1.6 18.2 13.7 2.2 C-3 Cast on sample * 0.04 0.4 2.5 18.2 13.5 2.3 C-3 Cast on sample * 0.06 1.6 18.2 13.5 2.4 C-3 Cast on sample * 0.06 1.6 18.3 13.7 2.4 C-3 Cast on sample * 0.06 1.6 18.1 13.5 2.4 C-3 Cast on sample * 0.06 1.6 18.1 13.5 2.4 Heat pourred 1/14/04 * 0.05 0.4 2.8 18.1 12.9 2.2 LD. Sample C Si Mn Cr Ni Mo LD. Sample C Si Mn Cr Ni Mo LD. Sample C Si Mn Cr Ni Mo LD. Sample C Si Ni Cr Ni Ni C-1 Cast on sample C Si Ni Cr Ni Ni C-2 Cast on sample C Si Ni Cr Ni Ni C-3 Cast on sample C Si Ni Cr Ni Ni C-4 Cast on sample C Si Ni Cr Ni Ni C-5 Cast on sample C Si Ni Cr Ni Ni C-7 Cast on sample C Si Ni Cr Si Ni Cr Ni Ni C-8 Cast on sample C Si Ni Cr Ni Ni C-9 Cast on sample C Si Ni Cr Ni Ni C-9 Cast on sample C Si Ni Cr Ni Ni C-9 Cast on sample C Si Ni Cr Ni Ni C-9 Cast on sample C Si Ni Cr Ni Ni C-9 Cast on sample C Si Ni Cr Ni Ni C-9 Cast on sample C Cast on samp | | | | | ë | 7.7 | 3 | i N | M | 2 | ٥ | |
| C-1 Reported 0.0b 0.5 2.7 18.1 13.1 2.2 C-1 Cast on sample 0.06 0.7 1.8 18.3 13.4 2.4 C-2 Cast on sample 0.06 0.5 2.8 18.0 13.2 2.4 C-2 Cast on sample 0.07 0.9 1.6 18.2 13.7 2.2 C-2 Cast on sample 0.07 0.9 1.6 18.2 13.7 2.2 C-2 Cast on sample 0.07 0.9 1.6 18.2 13.7 2.2 C-2 Cast on sample 0.07 0.9 1.6 18.2 13.5 2.3 C-3 Cast on sample 0.04 2.5 18.2 13.5 2.3 C-3 Cast on sample 0.06 0.6 1.9 18.2 13.5 2.4 Heat pourred 1/14/04 LD. Sample 0.06 0.6 1.6 18.1 13.5 2.4 C-3 Cast on sample 0.06 0.6 1.6 18.1 13.5 2.4 Leat pourred 1/14/04 LD. Sample 0.06 0.6 1.6 18.1 13.5 2.4 LB. Sample 0.05 0.4 2.8 18.1 12.9 2.2 | Lab | j. j. | Sample | ٥ | ה ה | IMI O | ָב פֿ | 2 5 | 2 0 | | **0 | 0044** |
| C-1 Cast on sample | CAF | ડ | Reported | 0.00 | 0.5 | 7.7 | 10.7 | 2 5 | 7.7 | | | |
| C-1 Cast on sample 0.06 0.7 1.8 18.3 13.4 2.4 I.D. Sample 0.06 0.5 2.8 18.0 13.2 2.4 C-2 Reported 0.06 0.5 2.8 18.0 13.2 2.3 C-2 Cast on sample * 0.8 2.2 18.1 13.4 2.2 C-2 Cast on sample * 0.8 1.6 18.2 13.7 2.2 C-2 Cast on sample * 0.8 1.6 18.2 13.7 2.2 C-2 Cast on sample * 0.8 1.6 18.2 13.5 2.3 C-3 Cast on sample * 0.6 1.6 18.2 13.5 2.3 C-3 Cast on sample * 0.06 0.6 1.6 18.1 13.5 2.4 C-3 Cast on sample * 0.06 1.6 18.1 13.5 2.4 Heat pourred 1/14/04 C Si Mn Cr Ni Mo LD. Sample C Si Mn Cr Ni Mo C-4 Cast on sample * 0.06 1.6 18.1 13.5 2.4 C-5 Cast on sample * 0.06 1.6 18.1 13.5 2.4 C-6 Cast on sample * 0.05 0.4 2.8 18.1 12.9 2.2 C-7 Cast on sample C Si Mn Cr Ni Mo C-8 Cast on sample C Si Ni Cr Ni Ni C-9 Cast on sample C Si Ni Cr Ni Ni C-9 Cast on sample C Si Ni Cr Ni Ni C-9 Cast on sample C Si Ni Cr Ni Ni C-9 Cast on sample C Si Ni Cr Ni Ni C-9 Cast on sample C Si Ni Cr Ni Ni C-9 Cast on sample C Si Ni Cr Ni Ni C-9 Cast on sample C Si Ni Cr Ni Ni C-9 Cast on sample C Si Ni Cr Ni Ni C-9 Cast on sample C Si Ni Cr Ni Ni C-9 Cast on sample C Si Ni Cr Ni Ni C-9 Cast on sample C Cast on sample Cast on | CAF | ડ | Cast on sample | | 0.7 | 7.7 | 18.1 | 2.5 | 7.7 | | 0.021 | 0.010 |
| 1.D. Sample C Si Mn Cr Ni Mo | WC | 5 | Cast on sample | 0.06 | 0.7 | 1.8 | 18.3 | 4.5 | 4.7 | 47.0 | 0.021 | |
| 1.D. Sample C Si Mn Cr Ni Mo | CAF | 2 | Cast on sample | * | 0.7 | 1.9 | 18.3 | 13.2 | 7.4 | | 0.024 | 0.013 re-run aner PM |
| 1.D. Sample C Si Mil Cr Ni Mil | | | | | č | | j | | · N | . 2 | ٥ | |
| C-2 Reported 0.06 0.5 2.8 18.0 13.2 2.3 Cast on sample 0.07 0.9 1.6 18.2 18.1 13.4 2.2 C-2 Cast on sample 0.07 0.9 1.6 18.2 13.7 2.2 C-2 Cast on sample C-3 Reported 0.04 0.4 2.5 18.2 13.3 2.3 C-3 Cast on sample 0.06 0.6 1.9 18.0 13.3 2.4 C-3 Cast on sample 0.06 0.6 1.6 18.1 13.5 2.4 C-3 Cast on sample 0.06 0.6 1.6 18.1 13.5 2.4 C-3 Cast on sample 0.06 0.6 1.6 18.1 13.5 2.4 C-3 Cast on sample 0.06 0.6 1.6 18.1 13.5 2.4 C-3 Cast on sample 0.06 0.6 1.6 18.1 13.5 2.4 C-3 Cast on sample 0.06 0.6 1.6 18.1 13.5 2.4 C-3 Cast on sample 0.06 0.6 1.6 1.8 18.1 13.5 2.4 C-3 Cast on sample 0.06 0.6 1.6 1.8 18.1 13.5 2.4 C-3 Cast on sample 0.06 0.6 1.6 1.8 18.1 13.5 2.4 C-3 Cast on sample 0.06 0.6 1.6 1.8 18.1 13.5 2.4 C-3 Cast on sample 0.05 0.4 2.8 18.1 12.9 2.2 | Lab | | Sample | اد | 70 1 | MI | ָב פֿ | 2 | OM | | 1 | 6 |
| C-2 Cast on sample * 0.8 2.2 18.1 13.4 2.2 C-2 Cast on sample 0.07 0.9 1.6 18.2 13.7 2.2 C-2 Cast on sample * 0.8 1.6 18.2 13.7 2.2 C-3 Reported 0.04 0.4 2.5 18.2 13.3 2.3 C-3 Cast on sample * 0.6 1.6 18.3 13.7 2.4 C-3 Cast on sample * 0.6 1.6 18.1 13.5 2.4 Heat pourred 1//4/04 LD. Sample C Si Mn Gr Ni Ni LD. Sample C Si Mn Gr Ni Ni No LD. Sample C Si Mn Gr Ni Ni Ni Ni | CAF | C-5 | Reported | 0.06 | 0.5 | 2.8 | 18.0 | 13.2 | 2.3 | | | 0.018 |
| C-2 Cast on sample 0.07 0.9 1.6 18.2 13.7 2.2 C-2 Cast on sample * 0.8 1.6 18.2 13.7 2.3 I.D. Sample C-3 Reported 0.04 0.4 2.5 18.2 13.3 2.3 C-3 Cast on sample * 0.6 1.6 18.3 13.7 2.4 C-3 Cast on sample * 0.6 1.6 18.1 13.5 2.4 Heat pourred 1/14/04 Sample C Si Mn Gr Ni Mo LD. Sample C Si Mn Gr Ni Mo 24424 Button 0.05 0.4 2.8 18.1 12.9 2.2 | CAF | C-5 | Cast on sample | * | 0.8 | 2.2 | 78.1 | 13.4 | 7.7 | , | 0.030 | |
| C-2 Cast on sample * 0.8 1.6 18.2 13.5 2.3 I.D. Sample | ΛC | C-2 | Cast on sample | 0.07 | 0.9 | 9. | 18.2 | 13./ | 7.7 | 0.23 | 0.023 | 0.014 |
| 1.D. Sample C Si Mn Cr Ni Mo | CAF | C-2 | Cast on sample | * | 0.8 | 1.6 | 18.2 | 13.5 | 2.3 | * | 0.024 | 0.012 re-run after PM |
| 1.D. Sample C Si Min Cr Ni Mio | _ _ _ | | | (| ë | 1 | ز | 2 | SAC. | 2 | ٥ | U |
| C-3 Reported 0.04 0.4 2.5 18.2 13.3 2.3 C-3 Cast on sample * 0.6 1.9 18.0 13.3 2.4 C-3 Cast on sample * 0.6 1.6 18.1 13.7 2.4 C-3 Cast on sample * 0.6 1.6 18.1 13.5 2.4 Heat poured 1/14/04 LD. Sample C Si Mn Cr Ni Mo 24424 Button 0.05 0.4 2.8 18.1 12.9 2.2 | Lab | <u>.</u> | Sample | ٥ | ⊼ ; | E . | ָל כ | Z | Mo | 1 | **** | |
| C-3 Cast on sample * 0.6 1.9 18.0 13.3 2.4 C-3 Cast on sample * 0.06 0.6 1.6 18.3 13.7 2.4 C-3 Cast on sample * 0.6 1.6 18.1 13.5 2.4 Heat poured 1/14/04 I.D. Sample C Si Mn Cr Ni Mo 24424 Button 0.05 0.4 2.8 18.1 12.9 2.2 | CAF | ဗ | Reported | 0.04 | 0.4 | 2.5 | 18.2 | 13.3 | 2.3 | | 0.023 | |
| C-3 Cast on sample 0.06 0.6 1.6 18.3 13.7 2.4 C-3 Cast on sample * 0.6 1.6 18.1 13.5 2.4 Heat poured 1/14/04 I.D. Sample C Si Mn Cr Ni Mo 24424 Button 0.05 0.4 2.8 18.1 12.9 2.2 | CAF | 53 | Cast on sample | * | 0.6 | 6. | 18.0 | 13.3 | 2.4 | , | 0.027 | 0.010 |
| C-3 Cast on sample * 0.6 1.6 18.1 13.5 2.4 Heat poured 1/14/04 I.D. Sample C Si Mn Cr Ni Mo 24424 Button 0.05 0.4 2.8 18.1 12.9 2.2 | WC | ဗု | Cast on sample | 90.0 | 9.0 | 1.6 | 18.3 | 13.7 | 2.4 | .24 | 0.029 | 0.003 |
| Heat poured 1/14/04 I.D. Sample C Si Mn Cr Ni Mo 24424 Button 0.05 0.4 2.8 18.1 12.9 2.2 | CAF | ဗ္ | Cast on sample | * | 9.0 | 1.6 | 18.1 | 13.5 | 2.4 | * | 0.028 | 0.011 re-run after PM |
| L.D. Sample C Si Mn Cr Ni Mo 24424 Button 0.05 0.4 2.8 18.1 12.9 2.2 | Teef Heat | noured 1/ | 14104 | | | | | | | | | |
| 24424 Button 0.05 0.4 2.8 18.1 12.9 2.2 | ו באר ו זכמו | יי חפות כן | Comple | ر | Ü | M | 5 | ï. | 2 | 2 | ۵ | S |
| 24454 Datto 0:30 F.S. 0:30 | Lab | .U. | Sample 74 Buffon | ٥ ر | ō ∇ | ξ α α | <u>~</u> | 12.9 | 2 2 | 0.27 | 0.020 | |
| 04104 1/2-21 thought 120 00 | A 6 | 7447 | 24 button | | † 5 | 0.0 | ξα, | 2.0 | 1.0 | * | 0.020 | 0.010 re-rin after PM |
| 0.4 2.2 18.2 13.2 2.2 | CAF | 7447 | 24 Keel bar | : | D.4 | 7.7 | 7.01 | 13.4 | 7.7 | • | 2.0.0 | |
| | 5 | and hy en | analyzed by spectrometer. | | | | | | | | | |

^{*} not analyzed by spectrometer. ** analyzed by wet chemistry. For C-5 C and N were analyzed at CAF and at WC by Leco Analyzer, P+S analyzed on spectrometer.