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Report No. 2010308
April 8, 2010

Mr. Eric Willis
EPRI Repair & Replacement Application Center
3420 Hillview Ave.
Palo Alto, Ca. 94304

Re: Chemical Analysis, Tensile Testing and Hardness Testing of SA508 Material
(Reference P.O. No. EP501-0000035587)

Dear Mr. Willis:

A sample of SA508 steel was received for chemical analysis, tensile testing, and hardness testing.

Spectrographic chemical composition analysis was performed using an optical emission spectrometer in general accordance with ASTM E415. The sample met the compositional requirements for ASTM SA508, Grade 2, alloy steel. Results of the chemical composition analysis are provided in Table 1.

Table 1
Chemical Composition Analysis Results
(wt. %)

Element	SA508 Sample	ASTM SA508, Grade 2 Specification
Carbon	0.23	0.27 max
Manganese	0.74	0.50 - 1.00
Phosphorous	0.008	0.025 max
Sulfur	0.002	0.025 max
Silicon	0.31	0.15 – 0.40
Nickel	0.89	0.50 – 1.00
Chromium	0.37	0.25 – 0.45
Molybdenum	0.61	0.55 – 0.70
Vanadium	0.01*	0.05 max
Copper	0.05	Not Specified
Aluminum	0.02*	Not Specified
Tin	0.01*	Not Specified
Niobium	<0.001*	Not Specified
Titanium	0.002*	Not Specified
Tungsten	0.06*	Not Specified
Lead	0.02*	Not Specified
Arsenic	0.06*	Not Specified
Zirconium	0.004*	Not Specified
Cesium	0.03*	Not Specified
Boron	0.001*	Not Specified
Zinc	0.03*	Not Specified
Lanthanum	0.008*	Not Specified

* These elements are not standardized and are provided for informational purposes only.

A 0.505-in. round tensile specimen was prepared and tested per ASTM A370. The mechanical properties indicated the material met specification for ASTM SA508, Grade 2, Class 2, alloy steel. Results are presented in Table 2.

Table 2
Tensile Properties

Sample	Diameter (in)	CS Area (in^2)	Yield Strength * (ksi)	Ultimate Strength (ksi)	Elongation 2-inch Gage (%)	Reduction in Area (%)
A	0.505	0.1987	68.6	91.9	25.2	62.0
ASTM SA508, Grade 2, Class 2 Requirements			65 min	90 - 115	16 min	35 min

* Yield Strength at 0.2% offset

Rockwell hardness testing was performed in accordance with ASTM E18. Four separate readings were taken for an average hardness value of 90 Rockwell B (HRBW). (W indicates a tungsten ball was used in HRB testing).

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