Table 21 - Aluminum Melt Furnace Comparisons							
	Melt		Tapped				Ship**
	Gross Btu/pound	Melt Loss	Btu/pound	Btu(10^6)/Ton	Tacit Btu/pound	Tacit Btu(10^6)/Ton	Tacit Btu(10^6)/Ton
Reverberatory Gas Furnace AFS Article (25)	1,975	5.5%	2,090	4.18	2,142	4.28	6.59
Reverberatory Gas Furnace Actual*	**2,418**	**5.5%**	**2,559**	**5.12**	**2,623**	**5.25**	**8.07**
Stack Melter, Die Cast Facility(26)	703	1.25%	712	1.42	730	1.46	2.25
Stack Melter Actual	**861**	**1.25%**	**872**	**1.74**	**893**	**1.79**	**2.75**

* "Actual" is the total energy usage including downshifts and weekends based on running at 50% of rated capacities. (Actual data on die casting operation stack melter.) Reverberatory "Actual" using the same ratio of energy differences as stack melter.

**Tons shipped considered 65% of melt. (Yield)

Table 21 also shows that the tacit energy requirements to melt aluminum in a reverberatory furnace are 8.07 (10^6) Btu per ton shipped while the best practice stack melter melts at 2.75 (10^6) Btu per ton shipped, both at 65 percent yield. This analysis also takes into consideration the melt loss differences between these two furnaces, since the differences are significant. The melt loss for the reverberatory furnace was estimated at 5.5 percent, and for the stack melter it was estimated at 1.25 percent. Actual melt loss numbers can vary and some of the stack melter sources reported less than 1.0 percent losses, while some reverberatory furnace users reported higher and lower losses. In reverberatory furnace melting, the high oxygen content over the bath and immersion of aluminum scrap into molten aluminum oxidizes the aluminum, forming dross that contains a high amount of aluminum metal. Certain fluxing methods can assist in releasing aluminum from the dross in the furnace. The losses are always higher than in a stack melter, however, where the aluminum is preheated by the low oxygen air stream and melted over the dry hearth.

Table 22 shows that an energy reduction of 10.84 10^{12} Btu of tacit energy would result from using well-maintained stack melters in all aluminum casting facilities.

Table 22 - Best Practice Aluminum Melting Energy Reductions			
Item	Tacit Estimated 10^6 Btu/Ton	Estimated Ship Tons	Tacit 10^{12} Btu
Reverberatory Gas Furnace Actual (90%)	8.07	2,036,700	16.44
Stack Melter Actual (10%)	2.75	226,300	0.62
Average	7.54		
Total-Estimated Energy			17.06
Stack Melter Actual (100%)	2.75	2,263,000	6.22
Difference per Year			**10.84**

RECOMMENDATIONS – ALUMINUM MELTING

Literature reviews and interviews conducted for this study yielded the following general work practices, which can assist steel aluminum casting facilities in improving existing furnace energy usage:

1) Use clean scrap – a pound of sand is worth 1.6 pounds of aluminum not melted. Sand also increases dross production.
2) Keep the furnace interior clean.
3) Ensure that refractory types used have the lowest thermal conductivities without compromising maintenance costs.