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Manufacture of Baronal

1. The manufacture of "standard" Baronal (50/35/15 barium nitrate - TNT aluminum) on a plant scale was described in detail in my memorandum on this subject to John Price on 6 January 1945.

2. Recently Dinerstein, Levy, and Wagers, working on the problem of determining how to cast high quality Baronal pads for the full scale charge, found that large castings of the standard Baronal composition lacked uniformity in density and composition because the barium nitrate and aluminum settle in the mold before the casting solidifies, even when extremely fine barium nitrate (10-micron) and aluminum (325 - mesh) are used.

3. Study of the problem showed that the difficulty can be overcome satisfactorily by modifying the composition in any one of several ways. The simplest and probably the most satisfactory modification from the point of view of functioning is that of increasing the aluminum content at the expense of the TNT content. Experiments indicated that a 50/31/19 composition made from "mikropulverzied" barium nitrate and 60/40 "aluminized TNT" is an optimum mixture for plant use.

4. The procedure recommended in my previous memorandum should therefore be amended as follows:

To prepare 1000 pounds of the modified Baronal composition, namely

50 parts barium nitrate
31 parts TNT
19 parts powdered aluminum

melt 183.3 pounds of flake TNT and heat the melt to 90° - 100° C. (194° - 212° F.). Then add 316.7 pounds of the "Aluminized TNT" pellets (60/40 Al-TNT) manufactured at Yorktown (RMD), in 25-pound portions, allowing each portion to become nearly completely melted before adding the next portion. Next add 500 pounds of "mikropulverized" (8-10 Microns) barium nitrate, which has been preheated to 70°-80° C. (158°- 176° F.), in small portions, sifting each portion in slowly from a scoop in such a way as to avoid its accumulating on the exposed portions of the agitator. Care and time spent during this part of the preparation will be well repaid, as a smooth, lump-free melt can thus be obtained with a minimum of cooking and handworking. Stirring and heating must be continued until all lumps have been worked out. Careful temperature control of the melt prior to adding the barium nitrate and of the barium nitrate added will result in a final mix having the desired pouring temperature, thus eliminating the time-consuming adjustment of temperature required when such a large melt is allowed to become too hot. The lowest practicable pouring temperature should be used. The temperature at which the melt can

be poured satisfactorily will vary between 80° and 85° C. (176° - 185° F.) depending on the viscosity, which may very somewhat from batch to batch because of variations in aluminum content resulting from the non-uniformity of composition of NWD "Aluminized TNT."

5. An alternate procedure which may offer the advantage of reducing the time required to produce a homogeneous melt, if suitable agitators can be provided, consists of adding three-fourths of the barium nitrate to the molten TNT to thicken it prior to the addition of the "aluminized TNT" pellets. In all other respects the procedure is identical with that outlined in Paragraph 4.

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