

Point Mugu Naval Airstrip

The runway is located at the Point Mugu Naval Air Station in Southern California. Economy, durability, low shrinkage and high strength were accomplished by reducing the amount of portland cement used in the concrete while utilizing large volumes of fly ash. In addition to field performance, this approach provided the added environmental goal of reducing the CO₂ released into the air through cement production by replacing as much cement as possible with fly ash. The high Class F ash content could improve the durability by mitigating the alkali-silica-reactive aggregates in the region, and provide the needed workability for the low slump, low shrinkage, low permeability concrete mix.

The 200 touch-and-go landings performed nightly by 25-ton FA-18 and E-5 fighter bombers required the concrete to not only hold up to the repetitive impact loads, but to also maintain surface durability and not deteriorate and crack excessively. Deterioration of the surface would allow surface materials to be dislodged and pulled into the engine, risking the safety of the plane and the pilot.

Doug Burke of the Naval Facilities Engineering Service Center (NFESC) concluded from his investigation that a 30% to 50% fly ash content could meet the design strength needs, but more importantly high ash contents could provide the workability needed in the low slump, low shrinkage concrete mix.



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The United States Navy chose a concrete mix with 30% Class F fly ash for construction of a high-durability runway used to simulate aircraft carrier landings.

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Headwaters Resources had already been working with the Calmat Division of Vulcan Materials on high volume fly ash concrete. With the Navy's performance criteria in hand, Calmat proposed a mix with 490 pounds of Type 2 cement and 212 pounds of Class F fly ash from Headwaters' Delta, Utah plant.

The Class F ash provided the workability needed to pump the 2½-inch slump mix for the 14-inch-thick, 50-foot wide by 565-foot long non-jointed pour. The fly ash, along with the Type 2 cement, also helped moderate the heat of hydration and any possible thermal cracking. The mix performance, along with number 8 bar in the top mat, has controlled shrinkage-induced cracking to a single .007-inch transverse crack at the middle of the 565 foot long runway.

Designing for quality and durability also paid off in strength performance. At 28 days, the concrete compressive strength averaged 5,000 PSI and beams broke above 650 PSI flexural.

As a continuation of this first project, the Naval Facilities Engineering Service Center is currently seeking interested Navy Activities who would like to construct additional concrete projects with high volumes of fly ash.



Point Mugu Naval Air Station required a 565 foot long non-jointed pour of 30% Class F fly ash concrete.

For more information or answers to questions about the use of fly ash in specific applications, contact your nearest Headwaters Resources Technical Sales Representative or call 1-888-236-6236.

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