Los Alamos NATIONAL LABORATORY EST. 1943

Conduct of Engineering
Request for Variance or Alternate Method

Assigned by SMPO or SMPOR: ☐ Alternate Method ☒ Variance Tracking number VAR-2012-139

1.0 Affected Document(s)

☐ Engineering Processes (e.g., P 341) ☒ Engineering Standards (e.g., P 342) ☐ Engineering Training & Qualification (e.g., P 343) If against P documents themselves, revision: ____n/a_____	Subordinate (Functional Series) document if applicable (ESM Chapter, Master Spec, AP, etc.): Document Title/Number: _IBC 2009; ACI 318-08; LMS 03 3001 r4 Reinforced Concrete___ Revision: ___see above____
Section/Para IBC Section 1903; ACI 318 Section 3.3.1; LMS 03 3001 2.4.B (pg 6)	
Specific Requirement(s) as Written in the Document(s) IBC 2009 invokes ACI 318-08. ACI 318-08, Section 3.3.1 requires LANL to use concrete that complies as follows: "Concrete aggregates shall conform to… (a) Normal weight: ASTM C33" ASTM C33 Table 3 stipulates that for size number 67 (nominal ¾"), that aggregate mass of 0 to 10% is specified to pass the No. 4 sieve.	

2.0 Request

Brief descriptive title: Exterior Concrete Strength and Durability per IBC 2009	
NCR required (work has occurred)? ☒ Yes ☐ No	If Yes, NCR Number (Will be issued at a later date)
TA-Bldg-(Room) and/or Project Affected All	System/Component Affected All
Proposal While new concrete mix designs are being developed and instituted, projects underway or getting underway may continue to use the LMS 03 3001 revision appropriate to their code of record date. Moreover, placement of concrete in compliance with LMS 03 3001 can continue as long as the design is based on 4,000 psi concrete. The pre-approved mix designs have a successful history of use in Los Alamos. These mixes consistently produce concrete with compressive strengths exceeding 5,000 psi. Since the non-compliance to the design mix stipulation of size 67 aggregate (per ASTM C33) has not affected concrete compressive strength, use of the four pre-approved concrete mixes will remain in effect until the end of calendar year 2012. This interim period of acceptance of non-compliant coarse aggregate gradation is needed to allow work to proceed, while providing a grace period for the concrete vendor to come into compliance with design mix requirements. This approach to qualify concrete with a history of successful use is contained in ACI 318-08, Section 3.3.1 exception – [Non-compliant] "aggregates that have been shown by test or actual service to produce concrete of adequate strength and durability and approved by the building official" [are acceptable].	
Justification/Compensatory Measures Although the coarse aggregate non-compliance with the design mix stipulation of size 67 aggregate (per ASTM C33) is now known to have covered most of the last 15 months, compressive strength tests for the concrete consistently meet mix objectives, and usually exceed 5,000 psi at 28 day breaks. Note that very few	

NCR's are issued due to low compressive strength. Furthermore, the design air content (5%), the water /cement ratio(less than or equal to 0.45), and the 20% fly ash content are all reliable parameters in the production of durable concrete. As long as designs are prepared to the requirements of the pre-approved mix criteria and in accordance with variance no. VAR 2012-066, use of the current pre-approved mix designs is allowed provided the amount of coarse aggregate passing the No. 4 sieve does not exceed 14%, which is 4% above the range for aggregate size 67. The coarse aggregate gradations will be verified by LANS initially and at 1 month intervals. During this interim period of approval (until the end of calendar year 2012), the concrete vendor will be required to produce or procure coarse aggregate that is compliant with that stipulated in the pre-approved mix designs 19, 20, 21, and 44.

Until new pre-approved concrete mix designs are available that comply with the 2009 IBC / 2008 ACI 318, use of existing pre-approved concrete mixes (with this variance on the fraction of coarse aggregate passing the No. 4 sieve) should continue in order to maintain project and construction efficiency, as well as to ensure consistency in concrete quality. Management Level (ML) of the existing pre-approved mix designs should remain as ML-3 (non defense-in-depth) and ML-4 work. Finally, the current practice of identification of concrete placements needs to continue.

The commercial grade dedication process should be used if concrete work is needed for higher levels of Management Level activities.

Duration of Request: Through December 31, 2012	Start Date: start of IBC 2009 use		End Date: see "duration" at left	☐ Lifetime
Requestor D. E. Volkman (for the institution)	Z Number 099106	Organization ES-DE	Signature Signature on file	Date 8/21/12
USQD/USID required (Nucl. High/Mod Hazard)? ☐ Yes ☒ No		If Yes, USQD/USID Number		
Design Authority Representative Lawrence K. Goen	Z Number 106351	Organization ES-DO	Signature Signature on file	Date 8/21/12
LANL Owning Manager (FOD or Programmatic) N/A	Z Number	Organization	Signature	Date

3.0 Safety Management Program Owner (SMPO) Representative (SMPOR/POC)

☐ Decline ☐ Accept ☒ Accept Labwide ☐ with Modification:			
POC D. E. Volkman, alternate Chap 5 POC	Z Number 099106	Signature Signature on file	Date 8/21/12

4.0 Additional Approval for P341 and APs; P342, ESM, Code, and Regulation Matters; and P343

☐ Accepted ☐ Accepted with comments ☐ Declined			
Comments:			
Safety or Security Management Program Owner Lawrence K. Goen	Z Number 106351	Signature Signature on file	Date 8/21/12