



ARPA Presents The NRMCA Level 2 Concrete Technologist Certification Program

The NRMCA Level 2 Concrete Technologist Certification Program is based on the popular NRMCA Technical Short Course. The program has been modularized to be conducted at the regional level by state sponsoring groups. Course content includes concrete materials and production practices plus basic mixture proportioning methods and data evaluation procedures. Relevant ACI and ASTM standards are also covered.

To become certified, the applicant must pass the 90 minute written examination that covers the course material. The required passing score is 75 percent. The passing rate is about 60% of those who attempt the exam. NRMCA Level 2 certification expires 5 years from the date of the exam.

<u>When:</u>	April 28 – May 1, 2009
<u>Registration Deadline:</u>	April 14, 2009
<u>Where:</u>	ARPA Office
<u>Prerequisites:</u>	ACI Grade 1 Field Testing Technician
<u>Cost:</u>	ARPA Members - \$450.00 ARPA Non-Members - \$550.00

This cost includes lunch and breaks for the three days of instruction plus a comprehensive set of reference materials for each lecture, review problems and solutions, several NRMCA publications and the NRMCA Compilation of ASTM Standards Consisting of 43 standards for concrete and aggregates.



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Tuesday, April 28, 2009

- 8:00 – 8:15 a.m. Introduction
– Manny Mungaray, Salt River Materials Group
- 8:15 – 9:30 a.m. Fundamentals of Quality Concrete
– Frank Kozeliski, Consulting Engineer Gallup, NM
- 9:30 – 10:30 a.m. Portland and Blended Cement
- Jeff Hearne, Salt River Materials Group
- 10:30 – 10:45 a.m. Break
- 10:45 – 11:30 a.m. Fly Ash
– Jeff Hearne, Salt River Materials Group
- 11:30 – 12:15 a.m. Slag and Silica Fume
– Jeff Hearne, Salt River Materials Group
- 12:15 – 1:00 p.m. Lunch
- 1:00 – 2:00 p.m. Aggregates – Quality Requirements and ASTM C33
– Robert Barkley, Hanson Aggregates
- 2:00 – 5:00 p.m. Aggregate Test Methods and Calculations
– Robert Barkley, Hanson Aggregates

Wednesday, April 29, 2009

- 8:00 – 9:00 a.m. Chemical Admixture
– Angelo Trujillo, BASF Admixtures
- 9:00 – 10:00 a.m. Batching, Mixing, and Delivery and ASTM C94
- Robert Barkley, Hanson Aggregates
- 10:00 – 10:15 a.m. Break

- 10:15 – 11:00 a.m. Quality Control Procedures
– Frank Kozeliski, Consulting Engineer Gallup, NM
/Don Bain, Maricopa Ready Mix
- 11:00 – 12:00 p.m. Hot and Cold Weather Concrete
– Don Bain, Maricopa Ready Mix
- 12:00 – 1:00 p.m. Lunch
- 1:00 – 4:00 p.m. Mix Proportioning, Calculations
– Frank Kozeliski, Consulting Engineer Gallup, NM

Thursday, April 30, 2009

- 8:00 - 8:30 a.m. Basic Statistical Concepts
– Luke Snell, Arizona State University
- 8:30 – 9:15 a.m. ACI Requirements
– Luke Snell, Arizona State University
- 9:15 – 10:00 a.m. Practice Problems on above
– Luke Snell, Arizona State University/
Frank Kozeliski, Consulting Engineer Gallup, NM
- 10:00 – 10:15 a.m. Break
- 10:15 – 11:00 a.m. Review of State Specifications
- 11:00 – 12:00 a.m. Testing Hardened Concrete
– Mike Kohout, CEMEX
- 12:00 – 1:00 p.m. Lunch - Optional Overview of Fresh Concrete Tests (Film)
- 1:00 – 3:00 p.m. Practice Calculations and Answer Questions
– Mike Kohout, CEMEX/
Luke Snell, Arizona State University
- 3:00 – 3:15 p.m. Break
- 3:15 – 4:00 p.m. Review for Exam

Friday, May 1, 2009

- 8:00 – 9:30 a.m. **Exam**

Concrete Technologist Level 2

Course Outline

1. Concrete Fundamentals
 - 1.1 Brief History
 - 1.2 Terminology
 - 1.3 Ingredient Materials
 - 1.4 Basic Characteristics of Fresh Concrete
 - 1.5 Basic Characteristics of Hardened Concrete; curing, strength, and durability
 - 1.6 Concepts for Proportioning Concrete
2. Portland and Blended Cement
 - 2.1 Manufacture of Portland Cement
 - 2.2 Cement Composition Phases
 - 2.3 Types of Cement and their Uses
 - 2.4 ASTM C150 Requirements and Related Tests
 - 2.5 QC of Cement and ASTM C917 Reports
 - 2.6 Blended Cements in ASTM C595 and C1157
3. Fly Ash and Natural Pozzolans
 - 3.1 Sources, Characteristics, and Uses
 - 3.2 Specification Requirements of ASTM C618
 - 3.3 Fresh and Hardened Concrete Properties
 - 3.4 Quality Control and Mix Proportioning
 - 3.5 Natural Pozzolans
4. Ground Granulated Blast Furnace Slag
 - 4.1 Sources, Manufacture, and Characteristics
 - 4.2 Requirements of Specification ASTM C989
 - 4.3 Fresh and Hardened Concrete Properties
 - 4.4 Quality Control and Mix Proportioning
5. Silica Fume
 - 5.1 Sources and Available Forms
 - 5.2 Requirements of Specification ASTM C1240
 - 5.3 Fresh and Hardened Concrete Properties
 - 5.4 Quality Control and Mix Proportioning
6. Aggregates
 - 6.1 Types of Aggregates
 - 6.2 Requirements for aggregates – ASTM C33
 - 6.3 Stockpiling and Sampling
 - 6.4 Effects of aggregates on Concrete Properties
 - 6.5 Quality Control for Aggregates
 - 6.6 Lightweight Aggregates
 - 6.7 Heavyweight Aggregates
7. Aggregate Tests and Calculations
 - 7.1 Sampling, Field and Lab
 - 7.2 Moisture

- 7.3 Grading and Fineness modules
- 7.4 Specific Gravity and Absolute Volume
- 7.5 Bulk Density
- 7.6 Other Tests

- 8. Chemical Admixtures
 - 8.1 Requirements in Specification ASTM C494
 - 8.2 Air-entraining Admixtures – ASTM C260
 - 8.3 Effective Use of Admixtures
 - 8.4 Cement-Admixture Compatibility
 - 8.5 Special Admixtures and their uses
 - 8.6 Fibers

- 9. Batching, Mixing, and Delivery & ASTM C94
 - 9.1 Overview of Concrete Production
 - 9.2 Requirements of ASTM C94
 - 9.3 Requirements for Mixing Water
 - 9.4 Weighing and Batching Equipment and Tolerances
 - 9.5 Mixing Concrete – Batching Sequence, Mixing Concrete, Evaluating Mix Uniformity
 - 9.6 Plant Recorders, Records, and Delivery
 - 9.7 Delivery Requirements – Jobsite Adjustments

- 10. Quality Control Procedures
 - 10.1 Review of Quality Control Program
 - 10.2 Material Handling and Storage
 - 10.3 Quality Control Monitoring Charts

- 11. Concrete in Extreme Weather
 - 11.1 Conditions and Effects on Concrete
 - 11.2 Estimating Concrete Temperatures
 - 11.3 Plastic Shrinkage Cracking
 - 11.4 Delivery and Jobsite Precautions

- 12. Proportioning Concrete Mixtures
 - 12.1 Selecting Mixture Characteristics
 - 12.2 Required Information on Material Properties
 - 12.3 Proportioning by absolute Volume Method
 - 12.4 Adjustments to Trial Batches
 - 12.5 Proportioning with Pozzolans and Slag
 - 12.6 Yield, Calculated Batch Quantities

- 13. Basic Statistical Computations
 - 13.1 Average
 - 13.2 Standard Deviation and Coefficient of Variation
 - 13.3 Normal Distribution and Properties
 - 13.4 Statistical Concepts for Mixture Overdesign and Strength Test Results

- 14. Requirements of ACI 318, 301
 - 14.1 Strength Overdesign
 - 14.2 Mixture Submittals

14.3 Evaluation and Acceptance of Concrete

14.4 Investigation of Low Strength Results

15. Overview of Fresh Concrete Tests

15.1 Sampling, Slump, Unit Weight (density), Air Content, Temperature, Making and Curing of Cylinders.

16. Testing Hardened Concrete

16.1 Compressive and Flexural Strength Tests

16.2 Factors Effecting Strength

16.3 Precision of Strength Tests

16.4 Core Testing

16.5 Nondestructive Testing



The NRMCA
 Level 2 Concrete Technologist
 Certification Program

April 28 – May 1, 2009

Registration Form

Name	E-Mail Address	Contact Phone #
_____	_____	_____
_____	_____	_____
_____	_____	_____

Company Name _____
 Address _____

 Telephone _____

Registration is on a first come, first serve basis at a cost of \$450.00 per person for ARPA members and \$550.00 per person for non-members. There is limited space available. Questions? Call Crystal (602) 271-0346

Registration deadline is April 14, 2009.

Mail Your Registration Form and Check to: **Check is in the mail**
 Arizona Rock Products Association
 916 W. Adams St.
 Phoenix, AZ 85007

CREDIT CARD PAYMENT INFORMATION: **Total Due:** _____

Visa or MasterCard **Number** _____ **Exp.** _____
Verification code: _____ *(3 digit number on back of credit card.)*

Billing Address: _____

City: _____ **State:** _____ **Zip:** _____