

## Section 1012 – Technician Independent Assurance

### 1012.1 Overview

The Independent Assurance (IA) program is an independent verification of sampling and testing procedures and provides continuity to the Quality Assurance (QA) program; in accordance with 23 CFR (Code of Federal Regulations) Part 637.207. Technician Independent Assurance involves an evaluation of technicians. (testing personnel).

The IA program is system based and managed by central QA personnel as part of an independent system-level assurance that includes technician training and qualification as outlined in Section 1014, laboratory qualification as outlined in Section 1013, and equipment certification as outlined in AASHTO R-18 and Section 1013.

The Independent Assurance Inspector(s) (IAI) will be the designated UDOT IAI personnel or an AASHTO accredited lab manager of a UDOT qualified laboratory who will conduct Independent Assurance activities. Exceptions must be approved in writing by the Quality Systems Engineer.

All TTQP qualified technicians will have their performance evaluated in each area of qualification a minimum of twice per calendar year.

**All TTQP qualified sampling and testing personnel employed on UDOT projects must meet the Independent Assurance requirements.**

Failure to participate in the Independent Assurance program will result in forfeiture of the technician's TTQP qualification in that qualification area. **Reinstatement will require re-qualification.**

**Consultant laboratories are expected to work with the Region IA Inspectors (IAI) and should be prepared to perform IA testing at anytime at the request of the IAI.**

IA testing does not alleviate responsibility for obtaining and testing samples required under project specifications.

### 1012.2 TTQP Qualifications and the IA Program

It is the responsibility of the qualified technician to seek Technician Independent Assurance.

Failure by any TTQP qualified technician to participate in the Independent Assurance program will result in forfeiture of the technicians TTQP qualification in that qualification area. **Reinstatement will require re-qualification.**

When a technician has not satisfied all of the evaluation requirements at the end of the evaluation period (calendar year), the qualification for the area is forfeited.

If, through IA activities, a TTQP qualified technician is identified as unable or unwilling to perform sampling and testing according to procedures, the IA representative will forward documentation to the UDOT Qualification Committee for review under the UDOT Revocation, Suspension or Denial policy as outlined in the Registration, Policies, and Information Handbook (RP&IH).

#### 1012.2.1 IA Program Variance

The technician (or supervisor) requesting a variance from IA requirements must submit written documentation for review. The UDOT Qualification Committee will review the documentation and provide a decision for requested variance.

Submit written documentation to: Quality Assurance Engineer – Materials Division 4501 S.  
2700 W. Salt Lake City, Utah 84114-145950

## 1012.3 Independent Assurance Frequency

### 1012.3.1 Independent Assurance Frequency for Technicians

For each certification listed under Section 1012.5, Technician Independent Assurance must be performed at least twice per calendar year. Each verification will be separated by at least 30 days or as determined by the RME. See *Schedule for Independent Assurance Sampling and Testing*, Section 1012.5. Independent Assurance may also be performed upon request by, or for, a technician or laboratory.

Technicians who receive original qualifications after October 1<sup>st</sup> will not be required to perform IA's until the next evaluation period (after January 1).

If split sampling identifies equipment deviations, corrective action will be documented in the Quality Systems Manual.

## 1012.4 Verification Options

Options for performing Technician Independent Assurance sampling and testing are:

- Proficiency samples (Maximum of one per calendar year per qualification)
- Limited observation (Maximum of one per calendar year per qualification)
- Split samples (Must be done with another TTQP qualified technician holding the certification for the test procedures being performed)

Testing conducted as part of the TTQP Qualification courses is not accepted as Independent Assurance. At least one split sample per test procedure is required per evaluation period.

### 1012.4.1 Proficiency Samples

AASHTO RE:SOURCE and/or CCRL proficiency samples may be accepted for Independent Assurance. One proficiency sample set, may be used for one IA per year, for one technician, provided that the scores have ratings of three, four, or five.

When individual results of proficiency samples of zero, one, or two are encountered the IAI must immediately notify the Engineer for the participating laboratory and forward any test results and associated documentation. The participating laboratory and IAI will determine and document the cause of the deviations and the steps taken to rectify the unacceptable results. Both the IAI and participating laboratory will keep documentation of the corrective action taken.

When the corrective measures have been completed, split samples, as outlined in 1012.4.3 must be obtained to verify correction of the problem.

### 1012.4.2 Limited observation

Limited observation may be conducted by the IAI, the UDOT IA representative, or an AASHTO accredited lab manager. Limited Observation may include, but is not limited to, efforts to meet personnel requirements of section 1013, TTQP qualification, and training demonstrations. (see 1012 Forms Appendix.) Limited observation evaluations may be used for one IA per year, for one technician, provided that the evaluation is successful.

When unacceptable deviations from the test procedures are encountered, the IAI will immediately notify the Engineer for the participating laboratory. The participating laboratory and IAI will determine and document the cause of the deviations and the steps taken to rectify the unacceptable results. Both the IAI and participating laboratory will keep documentation of the corrective action taken.

When the corrective measures have been completed, split samples must be tested and evaluated to verify correction of the problem.

### 1012.4.3 Split Samples

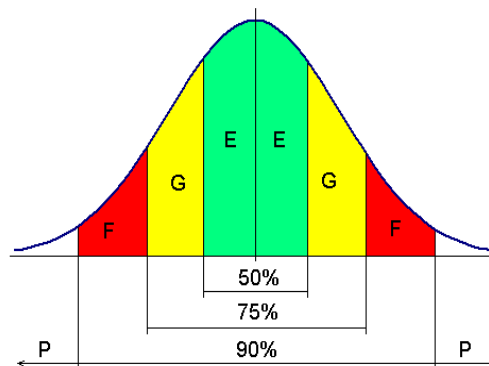
The IAI, the UDOT IA representative, or an AASHTO accredited lab manager, and the participating technician(s) will obtain a split sample. The test procedures, as well as the equipment used, are evaluated and documented. The samples are tested independently and results from the samples are documented and reported. The technicians performing the split sample may not use the same equipment to compare results.

#### 1012.1.3.1 Evaluating SRD TT Split Samples

At the option of the technician the following method may be used for SRD TT Split Samples. The IA may be split into two parts. Visual observation of site preparation and reported as Pass or Fail. The second portion is a split sample using the back scatter method. When this optional procedure is followed the IA Observer must observe both portions of the IA. Clearly report all results like example form in Appendix or similar. This method will count as a Split Sample but treated as a Limited Observation until there are enough results to create confidence intervals for the direct transmission method.

#### 1012.4.3.2 Evaluating Split Samples

Confidence Limits, Section 1012.6, provide a target for, and a means of, evaluating split sample tests between two labs. Confidence limits are produced through the use of interpretive statistics with the primary statistical tools being the standard deviation and the z-score or standard score. The limits have been set by establishing confidence intervals using the assumption of a normal population. The Confidence Limits have been set so that 50% of the tests performed will be “excellent”, 25% will be “good”, 15% will be “fair” and only 10% of the tests will be “poor.”



The first step in the split sample evaluation procedure is to calculate the difference between the test results. This difference is then noted and compared to the appropriate Confidence Limit. It is not the purpose of the IA program to compare the results from these tests to specification requirements.

### **1012.3.3.2 Documentation of Results**

Split Sample testing is documented on the applicable form in 1012 Forms Appendix.

Whenever deviations from acceptable test procedures and/or individual results of split samples of “poor” are encountered, the IAI will immediately notify the Engineer for the participating laboratory and will forward test results and associated documentation. The participating laboratory and IAI will determine and document the cause of the deviations and the steps taken to rectify the unacceptable results. The IAI, the participating laboratory, and the UDOT Quality Assurance Section will keep documentation of the corrective action taken.

After corrective measures have been completed, additional split samples will be obtained to verify correction of the problem for split samples with “poor” results or at anytime deemed necessary by the IAI.

## **1012.5 Schedule for Independent Assurance Sampling and Testing**

Each technician must be successfully evaluated twice per calendar year for each qualification as outlined below. Each verification will be separated by at least 30 days or as determined by the RME. Split samples and proficiency samples will include the following test procedure(s):

### **Embankment and Base Testing Technician Qualification**

- AASHTO T 99/T 180 - Moisture-Density Relations of Soils

### **Aggregate Testing Technician Qualification**

- AASHTO T 27/T11 - Sieve Analysis of Fine and Coarse Aggregate in conjunction with Materials Finer than 75  $\mu\text{m}$  (No. 200) Sieve in Mineral Aggregates by Washing **OR** AASHTO T 30 - Mechanical Analysis of Extracted Aggregates

### **Concrete Testing Technician Qualification**

- AASHTO T 119 - Slump of Hydraulic Cement Concrete
- AASHTO T 152 - Air Content of Freshly Mixed Concrete by the Pressure Method
- AASHTO T 23 - Making and Curing Concrete Tests Specimens in the Field (Average of 3 cylinders)

### **Sampling, Reduction & Density Gauge Testing Technician Qualification**

- AASHTO T 310 - In-Place Density and Moisture Content of Soils and Soil Aggregates by Nuclear Methods

### **Asphalt Testing Technician Qualification**

- AASHTO T 30 - Mechanical Analysis of Extracted Aggregates **OR** AASHTO T 27/T11 - Sieve Analysis of Fine and Coarse Aggregate in conjunction with Materials Finer than 75  $\mu\text{m}$  (No. 200) Sieve in Mineral Aggregates by Washing
- AASHTO T 308 Determining the Asphalt Binder Content of Hot Mix Asphalt by the Ignition Method
- AASHTO T 166 Bulk Specific Gravity of Compacted Bituminous Mixtures Using Saturated-Surface Dry Specimens
- AASHTO T 209 Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures
- AASHTO T 312 Preparing and Determining the Density of HMA Specimens by Means of the Gyratory Compactor

Schedules for Limited Observation must include all sampling and reduction test methods that pertain to the qualification, as well as the test methods scheduled for split samples and proficiency samples.

Verification requires successful evaluation utilizing one of the Verification Options listed in 1012.3. A successful evaluation is a result of “fair,” “good” or “excellent” for proficiency or split samples or an acceptable rating for Limited Observation. Additional split samples performed due to results of “poor” on proficiency or split samples, or an unacceptable rating on Limited Observation are to be considered a subsequent step in the original verification and not a separate verification.

The Limited Observation verification option is not to be used in conjunction with a split or proficiency sample to satisfy two separate verifications.

## 1012.6 Confidence Intervals for Split Samples

<b>Embankment and Base Testing Technician Qualification</b>				
<b>AASHTO T99/T180</b>				
	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>
<b>Optimum Moisture (%)</b>	≤ 1.0	≤ 1.5	≤ 2.2	> 2.2
<b>Maximum Density (lb/ft<sup>3</sup>)</b>	≤ 1.0	≤ 1.6	≤ 2.3	> 2.3

<b>Density Testing Technician Qualification</b>				
<b>AASHTO T310 – Density and Moisture Content of Soils and Soil Agg. By Nuclear Method</b>				
	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>
<b>Moisture Content (%)</b>	≤ 0.5	≤ 0.8	≤ 1.1	> 1.1
<b>Nuclear Density (wet – lb/ft<sup>3</sup>)</b>	≤ 0.8	≤ 1.3	≤ 1.9	> 1.9

<b>Concrete Testing Technician Qualification</b>				
<b>AASHTO T152 Air Content</b>				
	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>
<b>Air Content (%)</b>	≤ 0.2	≤ 0.4	≤ 0.5	> 0.5
<b>AASHTO T119 Slump</b>				
	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>
<b>Slump (in.)</b>	≤ 0.25	≤ 0.50	≤ 0.75	> 0.75
<b>AASHTO T23 Concrete Cylinder Breaks</b>				
	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>
<b>7 or 28-Day Break (psi)*</b>	≤ 330	≤ 560	≤ 800	> 800

\*The average of 7-Day break results are for IA use only.

### Aggregate Testing Technician Qualification

#### AASHTO T27 Coarse Aggregate and Fine Aggregate

Total % Passing a Sieve		Excellent	Good	Fair	Poor
< 100	≥ 95	≤ 1.3	≤ 2.2	≤ 3.2	> 3.2
< 95	≥ 85	≤ 1.3	≤ 2.2	≤ 3.2	> 3.2
< 85	≥ 80	≤ 1.8	≤ 3.1	≤ 4.4	> 4.4
< 80	≥ 60	≤ 2.7	≤ 4.6	≤ 6.6	> 6.6
< 60	≥ 20	≤ 1.9	≤ 3.2	≤ 4.6	> 4.6
< 20	≥ 15	≤ 1.5	≤ 2.6	≤ 3.7	> 3.7
< 15	≥ 10	≤ 1.4	≤ 2.4	≤ 3.5	> 3.5
< 10	≥ 5	≤ 1.1	≤ 2.0	≤ 2.8	> 2.8
< 5	≥ 2	≤ 1.0	≤ 1.7	≤ 2.5	> 2.5
< 2	≥ 0	≤ 0.4	≤ 0.7	≤ 1.1	> 1.1

#### AASHTO T27 Fine Aggregate (-3/8")

Total % Passing a Sieve		Excellent	Good	Fair	Poor
< 100	≥ 95	≤ 0.7	≤ 1.3	≤ 1.8	> 1.8
< 95	≥ 60	≤ 0.7	≤ 1.3	≤ 1.8	> 1.8
< 60	≥ 20	≤ 1.3	≤ 2.3	≤ 3.3	> 3.3
< 20	≥ 15	≤ 1.0	≤ 1.8	≤ 2.5	> 2.5
< 15	≥ 10	≤ 0.7	≤ 1.2	≤ 1.7	> 1.7
< 10	≥ 2	≤ 0.6	≤ 1.0	≤ 1.5	> 1.5
< 2	≥ 0	≤ 0.3	≤ 0.5	≤ 0.7	> 0.7

### Asphalt Testing Technician Qualification

#### AASHTO T308 – Asphalt Binder Content of HMA by the Ignition Oven

	Excellent	Good	Fair	Poor
% Asphalt	≤ 0.17	≤ 0.29	≤ 0.42	> 0.42

#### AASHTO T166 – Bulk Specific Gravity of Compacted HMA Using SSD Specimens

	Excellent	Good	Fair	Poor
$G_{mb}$	≤ 0.021	≤ 0.036	≤ 0.063	> 0.063

#### AASHTO T209 – Theoretical Specific Gravity of Compacted HMA Using SSD Specimens

	Excellent	Good	Fair	Poor
$G_{mm}$	≤ 0.011	≤ 0.017	≤ 0.024	> 0.024

AASHTO T30 Mechanical Analysis of Extracted Aggregate					
Total % Passing a Sieve		Excellent	Good	Fair	Poor
< 100	≥ 95	≤ 1.2	≤ 2.0	≤ 2.9	> 2.9
< 95	≥ 40	≤ 1.2	≤ 2.0	≤ 2.9	> 2.9
< 40	≥ 25	≤ 0.8	≤ 1.4	≤ 2.0	> 2.0
< 25	≥ 10	≤ 0.8	≤ 1.3	≤ 1.9	> 1.9
< 10	≥ 5	≤ 0.5	≤ 0.9	≤ 1.3	> 1.3
< 5	≥ 2	≤ 0.4	≤ 0.7	≤ 1.0	> 1.0
< 2	≥ 0	≤ 0.3	≤ 0.5	≤ 0.7	> 0.7

### 1012.7 IA Results Submittals

**Submit all IA test results.** Include observations where the technician missed procedures or performed poorly, proficiency samples with low scores, and split samples with poor ratings. Low scores for split samples are required for confidence interval analysis.

UDOT Region personnel must submit IA results and coordinate with, the Region IAI. The Region IAI must submit all results to the UDOT Quality Assurance Section.

Private consultant laboratories and contactors must submit results to the UDOT Quality Assurance Section.

### 1012.8 IA Annual Report of Program Results

The Region, Central Laboratories, and AASHTO accredited lab managers will submit an annual report to the Quality Assurance Section summarizing the results of the IA efforts.

The Quality Assurance Engineer will submit an annual report to FHWA summarizing the results of the systems based IA program. The report will identify:

- The number of sampling and testing personnel evaluated including:
  - A percentage of IA testing complete for DOT personnel
  - A percentage for contractor personnel
  - A percentage for consultant personnel
- The personnel evaluated
- The frequency of evaluations
- The specific tests evaluated
- The evaluation results (the number of excellent, good, and poor results) for UDOT, contractors, and consultants
- A discussion of significant problems with testing procedures or equipment and results outside the tolerance limits
- A summary of any significant system-wide corrective actions taken.