1. **SCOPE**

1.1. **Description of Test**

This method describes the procedure for accepting or rejecting materials such as base course, asphalt mixes and concrete produced for construction purposes.

2. **PROCEDURE**

2.1. **Test Procedure**

The method shown below is based on a statistical formula known as Poissons distribution which is described in the Added Information section.

**Method of Control**

Samples are tested in sequence as normal and compared to required specifications. These samples must be declared "in" or "out" of spec.

Plot a Poissons distribution curve on 10 x 10 division graph paper using the numbers shown in the table.

<table>
<thead>
<tr>
<th>No. of Tests in a Series (Horizontal Axis)</th>
<th>Max. Allowable No. of Tests Out of Spec in Series (Vertical Axis)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>11</td>
<td>7</td>
</tr>
<tr>
<td>15</td>
<td>8</td>
</tr>
<tr>
<td>25</td>
<td>11</td>
</tr>
<tr>
<td>50</td>
<td>18</td>
</tr>
<tr>
<td>100</td>
<td>32</td>
</tr>
</tbody>
</table>

The resulting curve shown in Figure 1 represents the maximum number of defectives allowed in a series of tests. The curve is not used directly in accepting...
or rejecting materials but allows the inspector to judge when the limit is being approached.

Plot actual test results as either defective or not defective as shown in Figure 1. In this example, tests 1, 2, 5, 6, and 7 meet the specifications while tests 3, 4, 8, 9, 10, and 11 fail in some manner.

Warn the contractor each time a sample does not meet the specifications but allow production to continue.

Refer the test values to the table to determine whether production is satisfactory. When the number of defectives equals the "allowable" shown in the table, reject the material. For example, production would continue until test 10 when production would cease because 3 defectives in a sample of 3 consecutive tests occur.

Draw a new acceptance curve with the origin at the point where the previous last test met specifications (Test No. 7 in the example).
The contractor must adjust his operation before sample No. 11 is taken and if it does not meet specs, another adjustment is required before sample No. 12 is taken.

If sample No. 12 meets all requirements the plotted value is still above the new acceptance curve (4 out of the last 5 samples are defective). Therefore haul cannot begin.

Another sample (13), is taken and if it meets the specification, the plotted value will now be below the acceptance line (4 out of 6 defective). The contractor can resume hauling to the road.

Continue with the procedure until another series of tests is out of specification, then draw a new acceptance curve with a new origin.

As shown in Figure 1, no material went to road between samples 10 and 13 and would stop at test 32 and resume at test 37 where only 5 out of 8 tests were defective.

3. ADDED INFORMATION

3.1. References

Basic Asphalt Course (1976).

3.2. General

In the production of any material, the product must be monitored and decisions made as to whether the product is acceptable and meets the desired specs.

Random errors will occur in sampling and testing procedures and therefore complete confidence cannot be placed in any one test. Therefore, when do you accept or reject the materials, based on continuous production.

A simple procedure has been developed based on Poisson distribution which aids in deciding when a particular operation should be shut down based on a reasonably sound basis. The method of control is described by the following formula.

\[ D = NP + 3\sqrt{NP(1 - P)} \]

Where \( D \) = maximum permissable number of defective tests in a series of tests.
\( N \) = the number of samples in the series.
\( P \) = maximum allowable percentages of tests deviating from the
specification limit before the operation is shut down.

From past experience, a value of $P = 20\%$ appears reasonable. This means that if less than 80\% of the material is meeting the required spec in a series then the material would be rejected until the problem is corrected.

The material would continue to be rejected until a new series of tests showed that at least 80\% of the material then meets the required specifications. At this point the material being produced would again be acceptable.

The above procedure does not address the severity of the defects. All components of the test must be in or out of the required specification.
INTERPRETATION OF RESULTS                             POISSON DISTRIBUTION METHOD

APPROVAL SHEET

New __  Revision X  Date of Previous Document 85-12-05

Effective Date: __-__-__

Description of Revision (Reason for Revision):
Format of test procedure updated.

Review/Implementation Process:
Reviewed by the Materials Section of the Technical Standards and Policies Branch.

Other Manuals/Policies Affected:
Nil

Follow Up/Training Required:
Nil

Comments/Concerns/Implications (Budget/Environment/Stakeholders):

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Electronic File Updated  - -

Update Mailed  - -