

Section 1.1

CONSTRUCTION AGGREGATES

1.1.1 PURPOSE

To establish procedures within the Department for monitoring Construction Aggregate sources to ensure the quality of aggregates used on Department projects.

1.1.2 AUTHORITY

Title X Public Officers, Employees and Records.
Chapter 120 Administrative Procedure Act Section 120.53, Adoption of rules of procedure and public inspection.

Title XXVI Public Transportation
Chapter 334 Transportation Administration
Section 334.044 Powers and duties of the Department (2), (4), (10)(a).
Section 334.24 Compilation; maintenance, and provision of information relating to roads, road building and repair
Chapter 14-103 (*Construction Aggregates*) Florida Administrative Code (FAC)
United States Code of Federal Regulations, Title 23 Part 637 Subpart B

1.1.3 SCOPE

Principal users of this document include District Materials Office (DMO) and District Construction Offices (DCO), as well as the State Materials Office (SMO).

1.1.4 PROCEDURE

Chapter 14-103 FAC establishes a standardized method of evaluation, approval, and control of construction aggregates sources through a producer Quality Control Plan (QCP) as the initial part of the Department's method of accepting aggregates. QC requires the producers and distributors of construction aggregates to be responsible for their product; to establish, maintain and employ their own process control system and certify to the Department compliance of their product with

applicable quality requirements and/or specifications. This section describes the Department responsibilities and duties, authority, and standardization of monitoring methods for validating the effectiveness of the QCP and encouraging the source to produce excellent quality material.

1.1.4.1 GENERAL ROLES AND RESPONSIBILITIES

When a source is approved, the SMO will concurrently send copies of each source's QCP to the appropriate District Materials and Research Engineer's(DMREs) Aggregate Acceptance Unit contact.

The DMRE's have administrative and supervisory responsibilities for Mine Inspectors and/or Branch Labs in their respective Districts and through them the monitoring of construction aggregate sources, i.e. Type I Mines and Redistribution Terminals. The State Materials Office shall inspect Type II Mines quarterly and Type III Mines on an annual basis. Refer to **Rule 14-103.004 (6), FAC** for Mine Type definitions.

The Second District shall assume responsibility for monitoring material compliance from sources located in Georgia and the States to the north and east of Georgia, and the Third District shall assume responsibility for monitoring material compliance from sources located in Alabama and the States to the north and west of Alabama. However, the DMRE for the District into which the material is transported will assume responsibility for obtaining appropriate Verification samples from the Redistribution Terminal or the point-of-use as appropriate.

1.1.4.1.1 SMO Responsibilities

The State Materials Office is specifically responsible for:

- (A) Source Approval Process to include:
 - (1) Initial source evaluation.
 - (2) Quality Control Program evaluation and update approval.
 - (3) Source inspection as to compliance with **Chapter 14-103, the Construction Aggregate Manual**, and the source's Quality Control Program.
 - (4) Material evaluation to determine aggregate properties and characteristics.
 - (5) Evaluate obtained and submitted aggregate test results

- to determine specification compliance and reliability of results.
- (B) Approval, disapproval, suspension or other actions applying to sources' Approval or disapproval of source Quality Control Programs.
 - (C) Establishment and monitoring of minimum Quality Control and Quality Assurance requirements.
 - (D) Technical and problem assistance.
 - (E) Inspection of Type II and Type III out-of-state sources.
 - (F) Overall administration and coordination of **Chapter 14-103** and QA operations.

1.1.4.1.2 District Responsibilities

The District Materials Offices are specifically responsible for:

- (A) Mine Inspecting to monitor and document each source's compliance with **Chapter 14-103**, their approved QCPs and applicable aggregate specifications.
- (B) Recommendations to the Source and the SMO when QCP needs to be updated.
- (C) Review of all District source data in system database for compliance.
- (D) Investigating breakdowns in the source's Quality Control Program, with recommendations to the Director, Office of Materials in accordance with **Section 1.1.4.6.2**.
- (E) Establishing or approving Certification system
- (F) Determination of the disposition of defective aggregates at the source.
- (G) Adding or deleting specific products from a source's approved products list.
- (H) Recommending to project engineers to reject or suspend the use of defective aggregate at the point-of-use.
- (I) Liaison with design, construction and maintenance personnel, and Project Engineers.
- (J) Technical assistance for construction projects.
- (K) Maintaining source data files under their supervision including input of data into the Aggregate System computer database.

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- (L) Communicating and coordinating with other Department personnel regarding materials shipped across District borders.

1.1.4.2 MINE INSPECTION

The Department performs mine inspections to review the administration of the QCP, aggregate shipping controls and aggregate certification with emphasis placed on specific areas of concern. This includes processing techniques, sampling and testing procedures, personnel and equipment. Review the source's worksheets, test data, QC charts and corrective actions (if any). The relationships established, observations made, and information obtained in these inspections will assist in determining courses of action to take when:

- (1) The Source's Certification System is in question,
- (2) Technical problems arise,
- (3) Resolution issues come up, and
- (4) Material disposition investigations occur.

1.1.4.2.1 Inspection Activities

As a suggested minimum, visit each approved construction aggregate source once per week (except for Type II and Type III sources). Visit sources using the Conditional Certification System more frequently than once per week; visit suspended sources once per month to determine status and progress toward problem correction pursuant to Department status change. The DMRE may modify inspection frequencies temporarily to direct attention to problem sources or areas.

Mine inspectors should have the necessary tools (e.g. thermometer, calipers, weights, and a tape measure) to check testing equipment at the aggregate source's on-site laboratory. Check all equipment used for process control and acceptance testing. If additional assistance is needed, notify the laboratory inspection section at the DMO or SMO for assistance. Review portions of the QCP at each inspection such that some aspect of each QC area is reviewed at a minimum of once per month with a complete inspection of all aspects completed within a three month period. Direct attention toward problem areas as the inspector becomes familiar with each operation. Document routine inspection findings in the ***Aggregate Source Inspection Report*** found in

Appendix A1 (Form No. 675-020-01). Initiate a dialogue with the QC personnel that encourage them to find the root causes of problems and to make long-lasting solutions. Solicit responses from QC personnel regarding your observations and have them sign the report.

Districts may add more information than is minimally required on the **Inspection Report**. For a guide to these activities, see the **Mine Inspection Flow Chart, F1** at the end of this chapter. If in the opinion of the District, the issue is escalating with no clear sign of early resolution, complete the **Notice of Deficiency (Appendix A2)**.

1.1.4.2.2 Certification

Each shipment (truck, railcar, ship, barge, etc.) of aggregate intended for use on Department projects must be certified by the producer as having been produced under their QCP and meeting all applicable specifications in accordance with **Chapter 14- 103.004(3)**. The mine inspector should determine:

- (A) Are certifications filled out accurately?
- (B) Are the materials being certified produced under the approved QCP?
- (C) Can QC test data be directly tied to specific materials (for example, pretested stockpiles, or for material disposition investigations)?
- (D) Are materials being handled properly during loading?
- (E) Are you being notified prior to shipment of aggregate materials to a Department project (for example, upon source approval, for pretested stockpiles, base, or after periods of non-production for FDOT)?

1.1.4.2.3 Source Records

Each source must maintain adequate records of all samples, tests and other actions to substantiate aggregate conformance to Department requirements. The mine inspector should review those records to determine the following:

Availability of test results.

The type and number of tests made.

(C) The type and number of deficiencies found.

(D) The quantities approved and rejected by the producer.

- (E) The nature of corrective actions taken.
- (F) Accuracy and completeness.
- (G) The tracking of the sample through the sampling and testing process.

1.1.4.2.4 Sampling

Sample Size

Each sample (composite) shall be made up of at least three equal size sub-samples. The sub-samples should be separated from each other by time, volume of production or location, as applicable. The composite sample should be properly blended and split before testing is carried out. The appropriate testing method of dictates the sample size.

Sample Methods

Sources are required to use sampling methods meeting approved Department standards which are then incorporated into the source's QCP.

1.1.4.3 Verification and analysis activities

1.1.4.3.1 Sampling and Testing

During each inspection take at least one Verification sample to validate current QC data. Randomly select a product from the Source's top four products by quantity before you arrive at the mine. Obtain Verification samples (at a rate of one randomly-chosen sample per shipment) at the point-of-use if a Type II shipment did not pass through a Terminal. For a guide to these activities, see the **Verification Inspection (F2)**, **Verification Sampling (F3)**, **Base Sampling (F4)**, **Evaluation of Data For Base Material (F5)** flow charts at the end of this chapter.

Select the location, timing and type of product sampled independent of any influence from QC personnel. Obtain assistance from QC personnel as needed in taking the sample. The producer may split this sample with the Department, but must enter the data as an "Information Only" result in the Department's database. Transport the Verification sample to the Lab for testing. As space permits, endeavor to store the

remainder of the Verification sample until the QC data are validated.

Calculate the mean and standard deviation of the last 30 QC from the Verification. Consider the QC validated if the Verification result falls within the range identified by the mean plus or minus two times the standard deviation. If two consecutive Verification results fail to valid the QC, proceed to Accelerated Verification as outlined in **Section 1.1.4.3.4**.

Collect computer coded data sheets (code sheets) and other records for files and input into the Aggregate System computer database. Data submitted electronically will not require code sheets.

Collect and test additional Independent Verification samples at any time to document rejectable material.

1.1.4.3.2 Control Charts

Control charts are important because they provide a simple and effective visual representation of the source's performance. Producers should create average and range charts. Review control charts at each visit to the source and check for the following:

- (A) Availability to source and Department personnel.
- (B) Up-to-date data (*Section 1.3 of the Construction Aggregate Manual*).
- (C) Accurate and up-to-date control charts.
- (D) Adequate coverage. As a minimum, control charts are to be kept for L. A. abrasion, gradation, -200, specific gravity, Limerock Bearing Ratio etc..., as applicable, for each grade of construction aggregate.
- (E) Divide the Control chart into six equal horizontal bands as shown in **Figure 1**.

Data trends or other indicators of problems such as:

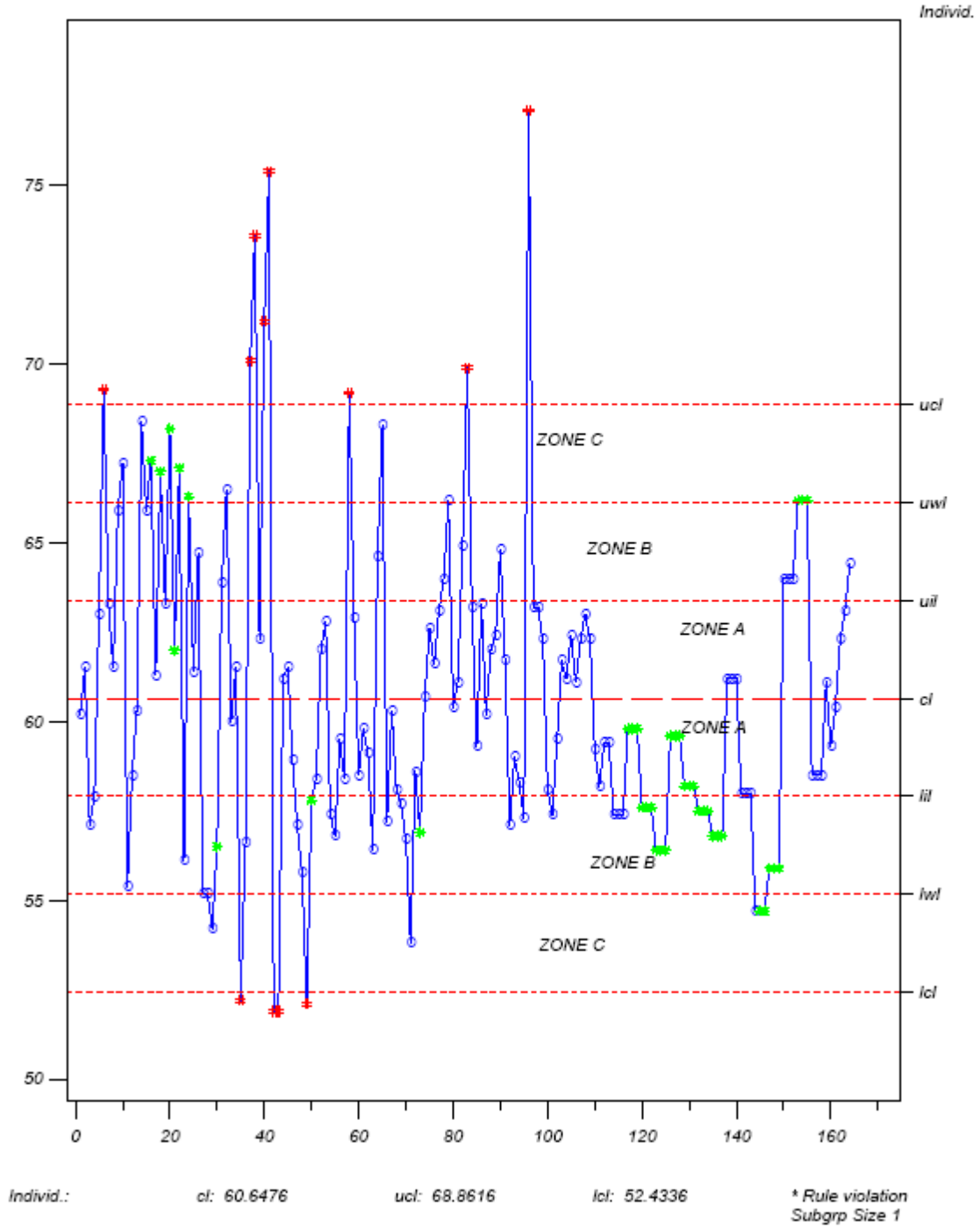
- (1) Sustained or irregular shift in average with a constant range.
- (2) Steady trend of six or more points (increasing or decreasing) in average with constant range.
- (3) Change in range, but no change in average.
- (4) Irregular change in both average and range.
- (5) Recurring cycles.

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- (6) Out-of-control Runs identified by:
 - (a) Zone A, B or C - 8 or more on the same side of the central line, CL
 - (b) Zone B - 4 out of 5 consecutive points
 - (c) Zone C - 2 out of 3 consecutive points

 - (7) Out of control point, above the Upper Control Limit, UCL or below the Lower Control Limit, LCL
 - (8) Stratification or lack of variability of test data.
 - (9) QC/V data does not compare per **Section 1.1.4.3.1**.

If any problem indicators exist, review the associated QC results with the Verification results. Discuss findings with the responsible source personnel. Document the actions the source has taken or takes to address problems.

Figure 1. Example Control Chart
 3/8 inch sieve



1.1.4.3.3 Data Evaluation

Evaluate the QC and Verification data to determine source's compliance and the validity of QC data. For a guide to these activities, see the **Data Evaluation Flow Chart, F7** at the end of this chapter. Re-initialize data for statistical compliance only when you are reasonably sure that the producer's corrective action can reasonably be expected to prevent reoccurrence of the control failure and assure continued compliance with **Section 2.2** of the **Construction Aggregates Manual**.

1.1.4.3.4 Accelerated Verification

Conduct Accelerated Verification when the Department is unable to validate the source's QC data. For a guide to these activities, see the **Accelerated Verification Flow Chart, F8** at the end of this chapter.

1.1.4.4 RESOLUTION

Conduct Resolution activities when the QC personnel dispute the accuracy of an individual Verification result from a sample split, or not split, with the Department. Use an AASHTO-accredited lab to determine whether the QC result or the Verification result stands. For a guide to these activities, see the **Resolution Flow Chart, F9**, at the end of this chapter. Refer repeated instances of Resolution to the SMO for possible Source Approval reconsideration

1.1.4.5 Independent Assurance (IA)

IA activities are as defined for Technicians in **Section 5.5** of the **Materials Manual (MM)** and for **Laboratories and Equipment in Section 5.7** of the **MM**.

1.1.4.6 QCP FAILURES AND ACTIONS

1.1.4.6.1 FAILURES

Consider the QCP to have failed when one or more of the situations listed in **Rules 14-103.0071 and 14-103.009** occur. For example:

- (A) Out-of-date and improper records kept or test data not available to Department inspectors.

- (B) Improper sampling and testing of materials.
- (C) Improper certification of materials.
- (D) Variation from accepted Quality Control Program without prior Department approval.
- (E) Three or more control failures related to the same cause for the same product during any 365-day period
- (F) Quality of products falls below 95% probability of meeting Department requirements.

1.1.4.6.2 ACTIONS

In the event that any one of the above occurs, the following is a guide to minimum actions to be taken. Never use the Rule to punish aggregate producers. Use the Rule to ensure that the Department gets material in specification.

- (A) If the mine inspector is aware that any of the first five items listed in **Section 1.1.4.6.1 (A through E)** have occurred, then the following actions shall be taken:
 - (1) The mine inspector shall immediately document the Exceptions in the Aggregate Source Inspection Report and obtain an acknowledgment signature from the available QC personnel. Leave a copy with the Source to alert the person responsible for the QC Program that the QC Program is not functioning properly and also notify the DMRE. If the item does not represent a continuing deficiency in the QCP operation and does not affect material quality, specify a reasonable completion date in the report.
 - (2) If, after the specified completion date, the source has not corrected the deficiency or provided a corrective-action plan, or if the deficiency affects material quality, then unacceptable conditions exist at that source. The mine inspector shall consult with the District Aggregate Section and the DMRE to develop a **Notice of Deficiency (Form No. 675-020-05)**
 - (3) Commensurate with the severity of the problem, the DMRE may allow the source time to correct the deficiency, but in no case allow longer than ten (10) working days.

- (4) Deliver the Notice of Deficiency Form to the source via Certified Mail/ Return Receipt Acknowledged. Send copy by email, Fax or hand-delivery.
 - (5) If, at the end of this period (or earlier, if the severity of the problem dictates prompt action) the deficiency has not been corrected, the DMRE shall recommend in writing further action to the State Materials Office with a copy to the producer.
 - (6) The State Materials Office shall review the situation in consultation with the DMRE and take the appropriate action(s) in accordance with **Chapter 14-103** and this Section.
- (B) Actions on **subsection 1.1.4.6.1 (F)**, shall be based on statistical analysis of Quality Control and Verification data. These actions shall be taken by the State Materials Office after review of data with source, Branch Laboratory/mine inspector and the DMRE.

1.1.4.7 TECHNICAL ASSISTANCE

District Materials staff are expected to provide technical assistance to Aggregate Source and Project personnel. Make recommendations to Project personnel to reject or suspend the use of defective aggregate at the point-of-use. Get together with design, construction and maintenance personnel, regarding aggregate issues, e.g., availability, production and scheduling concerns.

1.1.4.8 DISTRICT MATERIALS ADMINISTRATION

Maintain data files for sources including input of data into the Aggregate System computer database and follow-up on data entry problems, .e.g., generated by error logs from data uploading.

Communicate and coordinate with other Department personnel regarding materials shipped across District borders.

Maintain up-to-date logs and files on each source showing each inspection date, sample location, observations, instructions issued, problems, etc.

1.1.4.9 PROJECT ADMINISTRATION

The Project Administrator's (PA's) responsibility is to be familiar with the Department's policy of acceptance of aggregates for usage based on **Chapter 14-103** and this chapter, especially the certification of aggregate as a basis for acceptance. The PA also has the authority and responsibility, in accordance with **Sections 5 and 6 of the Florida Department of Transportation Standard Specifications**, for rejecting or suspending the use of obviously defective materials, regardless of the approval status or certification of those materials by the source. This should be coordinated through the DMRE.

1.1.5 TRAINING

All FDOT personnel who are involved in sampling, testing, and inspections outlined in this procedure are required to hold Construction Training Qualification Program (CTQP) Aggregate Field Testing Technician and/ or Aggregate Laboratory Testing Technician Qualifications as needed. These qualifications ensure that these personnel have a thorough knowledge of the basics of aggregate testing.

1.1.6 FORMS

The following forms are available from the Departments Forms Library:

<http://www2.dot.state.fl.us/proceduraldocuments/forms/ByNumber.asp?index=6>

FORM NO.	ITEM
675-020-01	AGGREGATE SOURCE INSPECTION REPORT
675-020-07	NOTICE OF DEFICIENCY
675-020-02*	FINE AGGREGATE CODE FORM
675-020-03	BASE AGGREGATE CODE FORM
675-020-04*	COARSE AGGREGATE CODE FORM

* Note: These forms are incorporated by reference in **Rule 14-103.003 FAC** and revisions will not be released until the rulemaking process is complete, unless otherwise approved by the Office of the General Counsel.

A1. AGGREGATE SOURCE INSPECTION REPORT

Source: _____ Date: _____
Inspector: _____ Time Arrival: _____
Weather Condition: _____ Time Departed: _____
Week: _____

1. Product

A. Materials Production (List of products being produced at time of the visit, oversize material)

Bill of Lading / Shipping Tickets _____

B. Stockpiling Operation (Signs, Contamination, Segregation, Equipment on Stockpiles, Stacker Position)

Signs _____

Stockpile Condition _____

Stockpile Location _____

C. Loading & Shipping (Loading 90° to belt and across the entire stockpile face. Inspection of shipping units)

2. Testing

A. Technician (Designated by producer and available)

B. Test Methods Observed

3. Data – Control Charts, Worksheets and Code Sheets (Available, Accurate, Current, (up-to-date), Corrective Actions, Received on Time)

4. Material Certification (Date, Load [Tonnage], Source Number, Department Code, "Certified for FDOT" statement, Notified of Shipments)

SAMPLE

A1. AGGREGATE SOURCE INSPECTION REPORT (Cont)

5. Operation Of Quality Control Program (Including Quality Systems Manual)

- Observations indicate no deficiencies – No action required at this time.
- Observations indicate deficiencies found – Corrective actions to be taken.

6. Exception(s)

Direct violation of written authority? YES NO

Written authority cited: _____ (Authority) _____ (Section) _____ (Page)

- Item was fixed at time of visit.
- This item does not represent a continuing deficiency in the operation of the QCP and will not be reflected in the monthly report.

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- Instructions Issued:
 - Correct in accordance with written authority
 - Material Quality may be Questionable
 - Fix or Replace
 - QC review and advise DOT
 - _____

Date to be resolved or provide a corrective-action plan: _____ (within two (2) working days upon receipt of this notice)

QC Person Notified _____
Title _____ (Signature) _____ (Date)

Date item resolved: _____ Initials: _____

A.2 Notice of Deficiency

(Date)

(QC Manager)

(Source)

(Street Address)

(Location)

(City, State, Zip)

Re: Notification of Unacceptable Conditions at Source

Attached find a copy of an Aggregate Source Inspection Report with noted exception(s) for the above referenced source. This represents a documented deficiency in the operation of your company's Quality Control Plan. Please take the necessary actions to correct the deficiency within ____ () working days of receipt of this notice, not to exceed ten (10) working days.

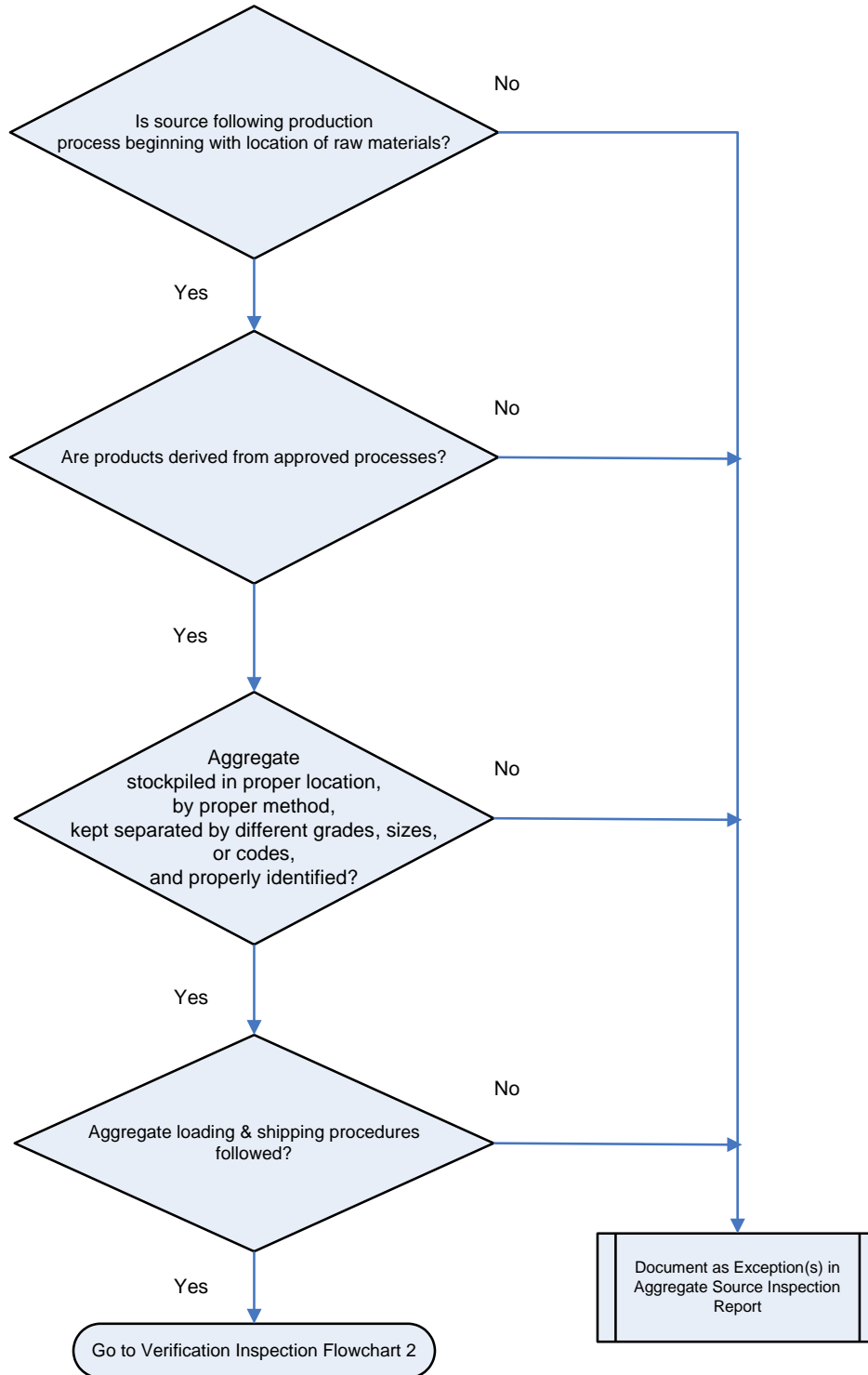
If you have any questions, please contact me at:

() _____
(Phone)

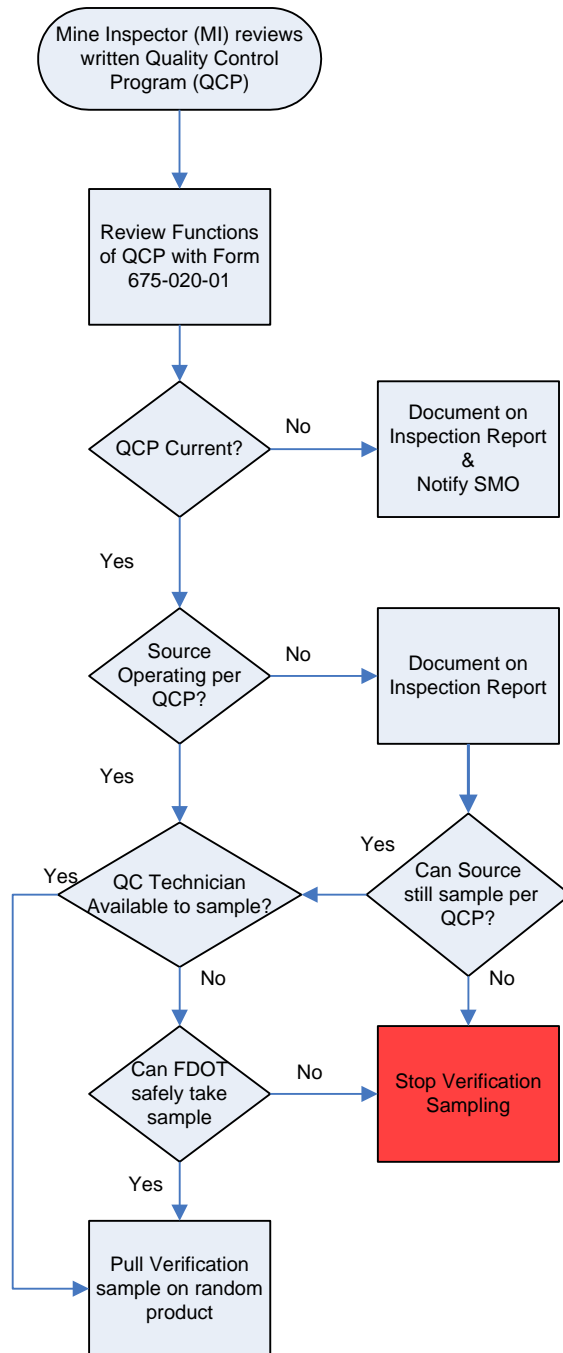
(Mine Inspector)

Copy: District Mine Inspector
District Materials and Research Engineer
State Materials Office
File

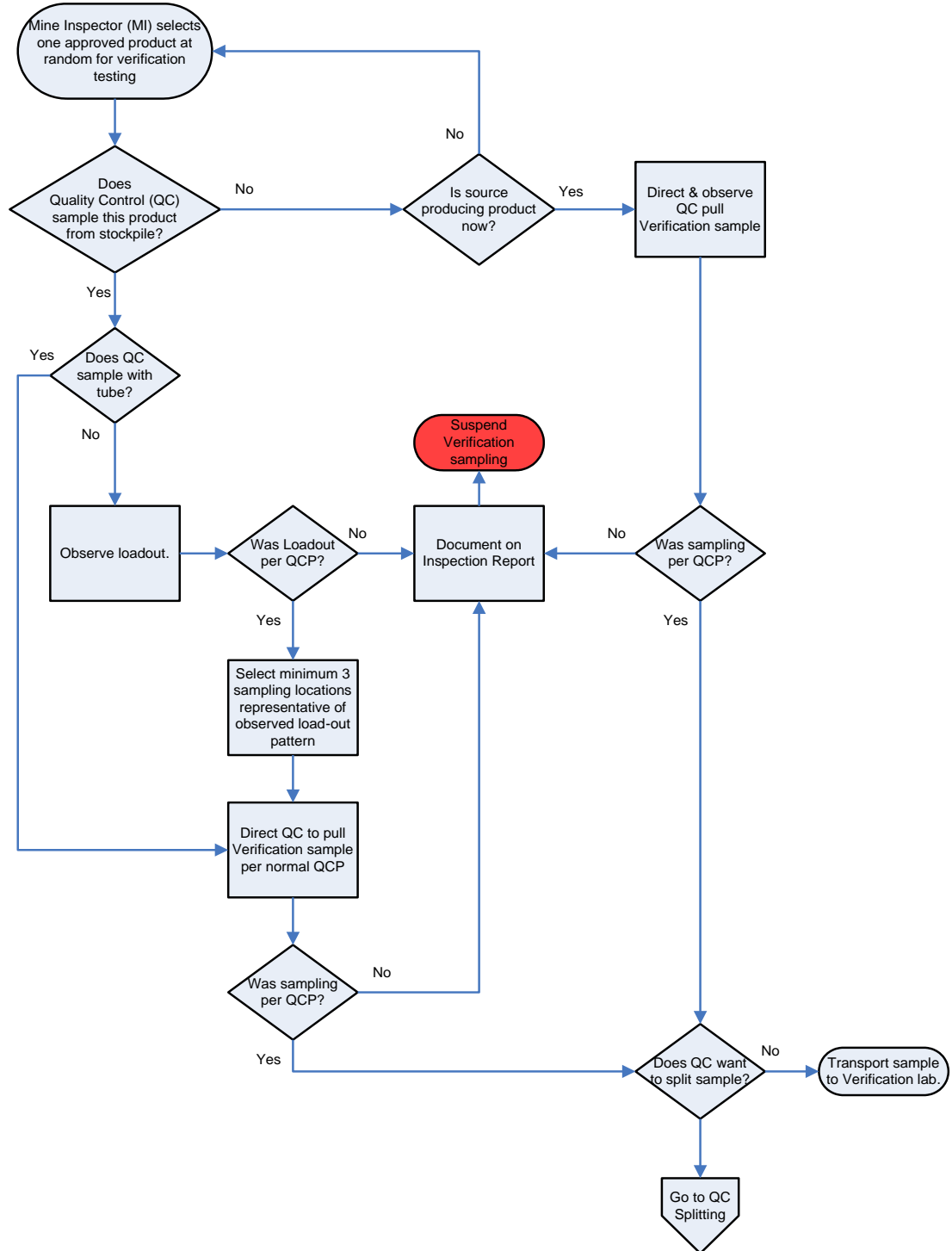
F1. MINE INSPECTION FLOW CHART



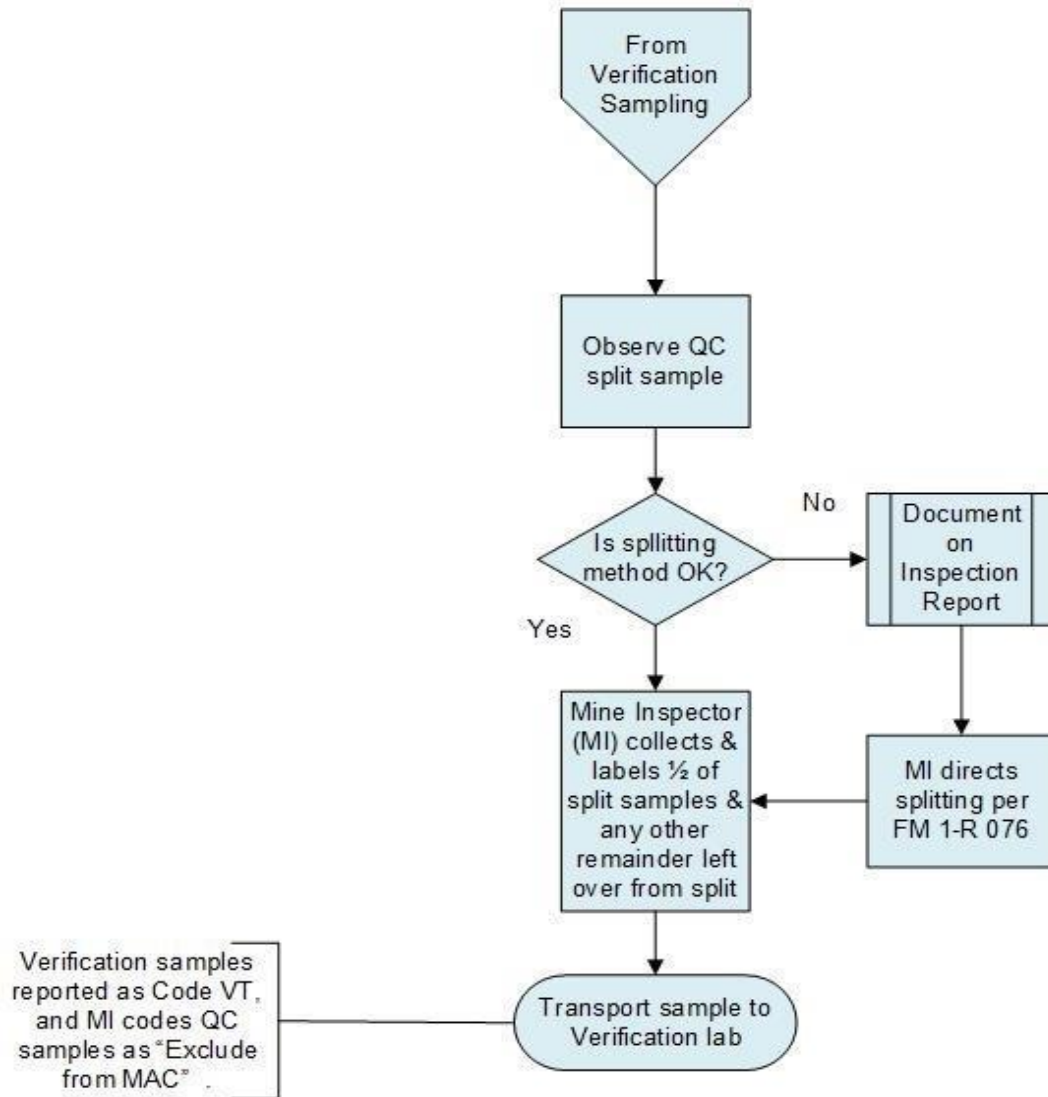
F2. VERIFICATION INSPECTION FLOW CHART



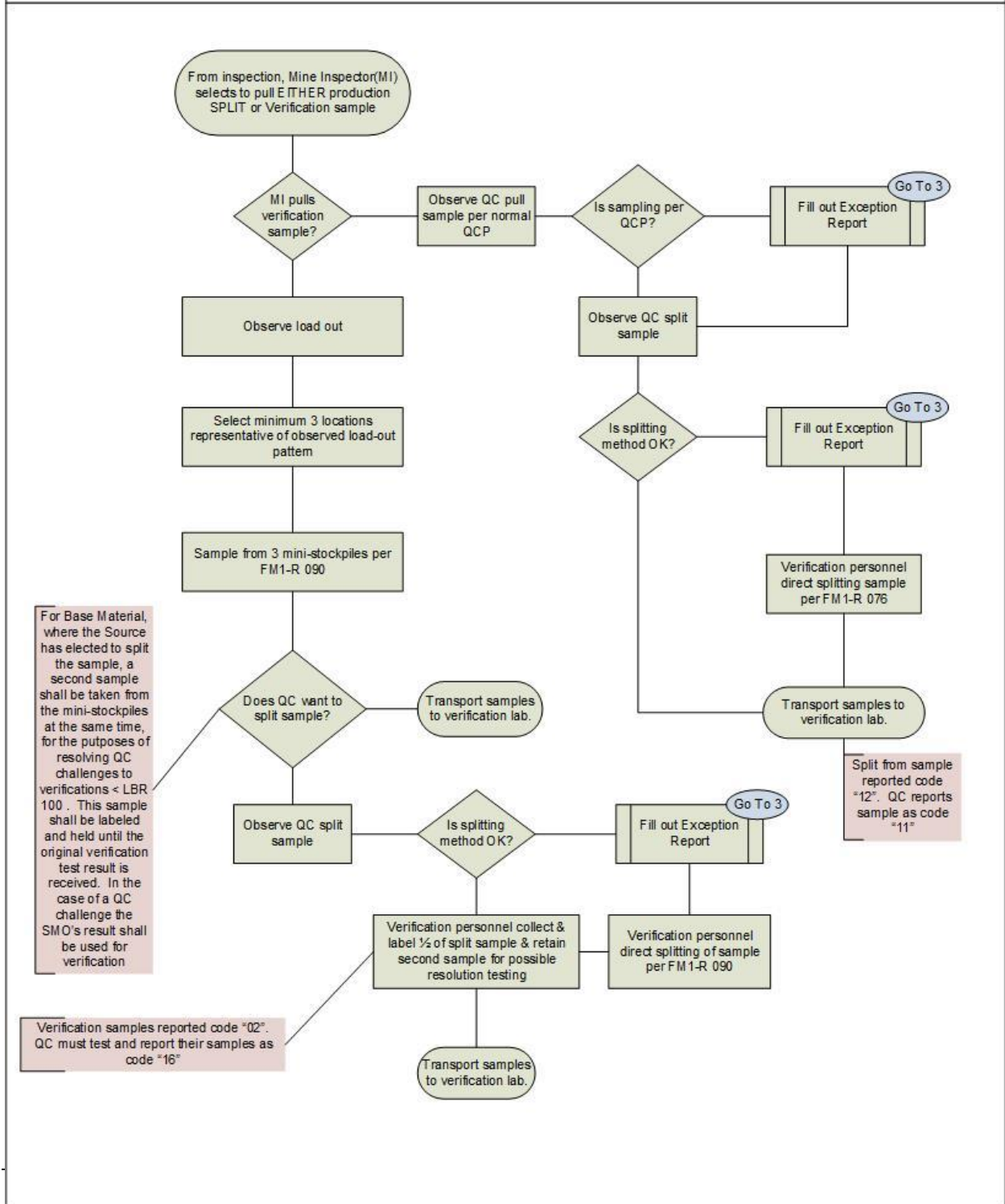
F3 VERIFICATION SAMPLING



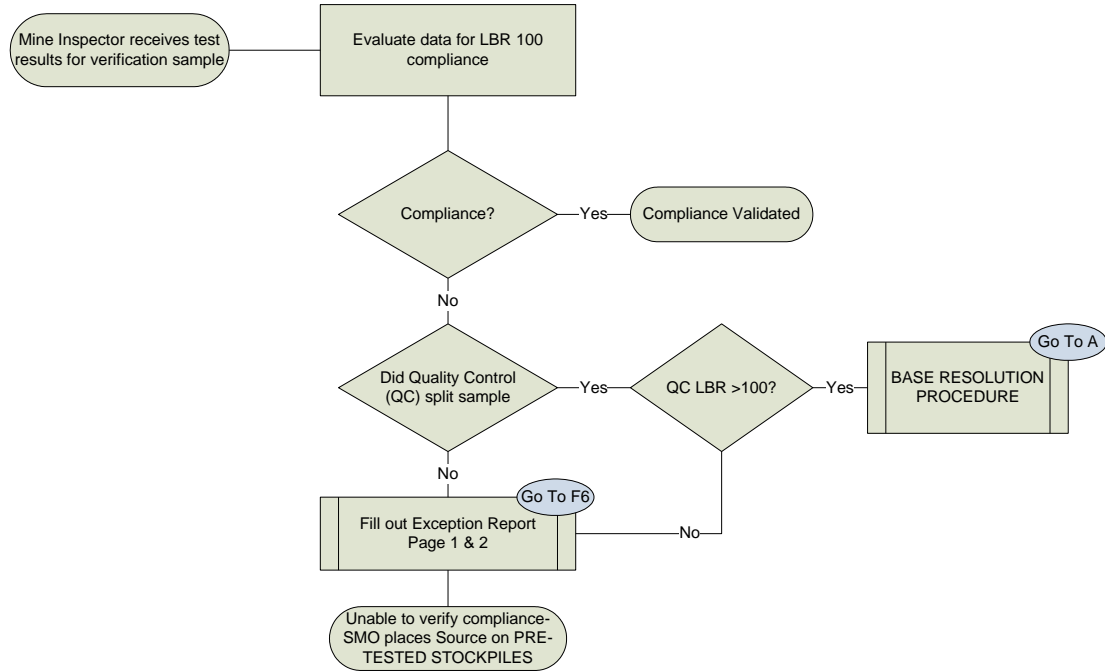
F3 Verification Sampling (cont.)



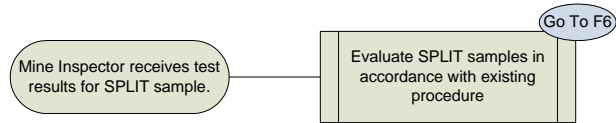
F4. BASE SAMPLING FLOW CHART



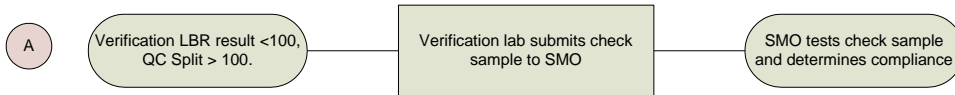
F5. EVALUATION OF DATA FOR BASE MATERIAL FLOW CHART



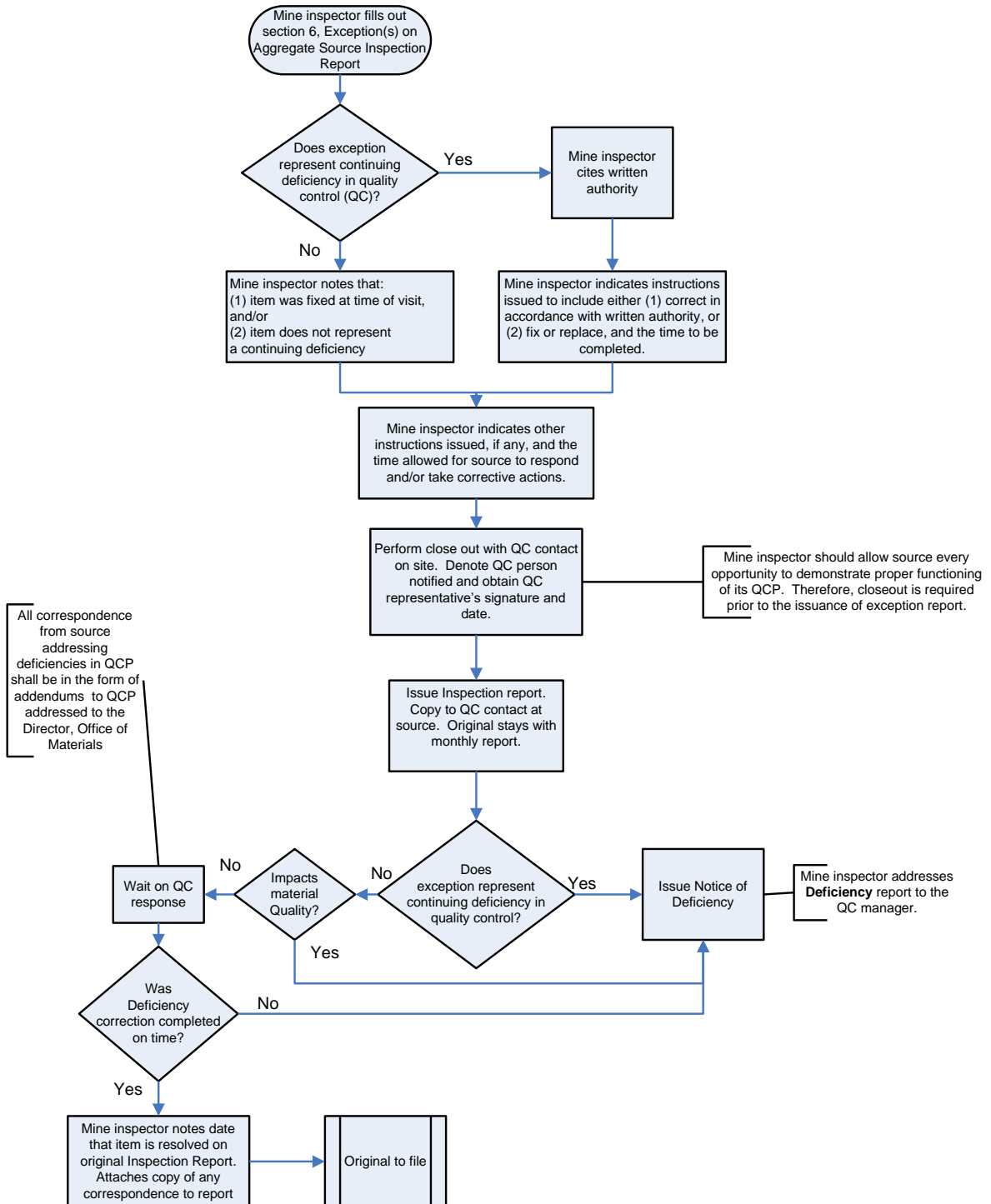
Evaluation of Base Split Samples



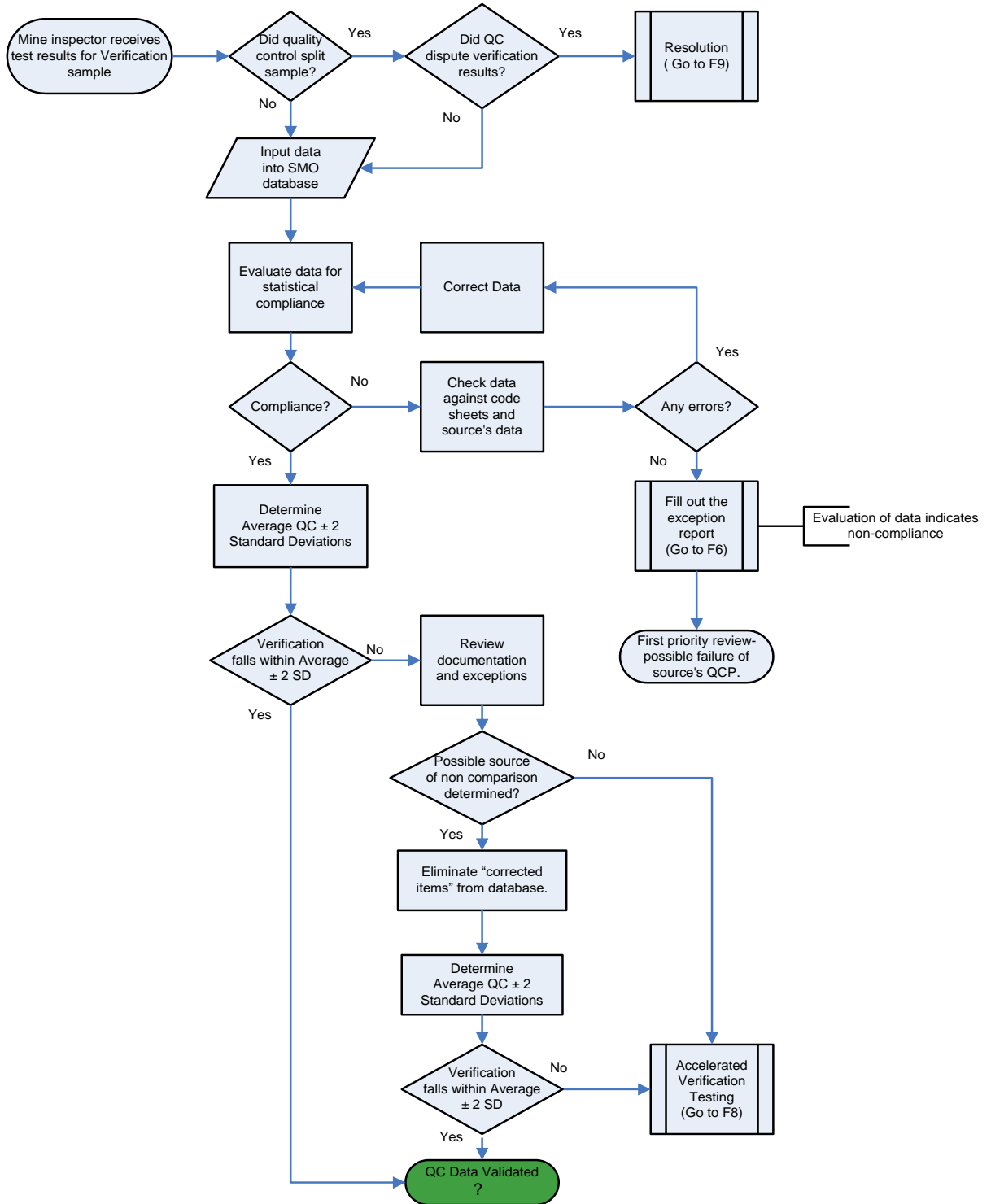
Base Resolution Procedure



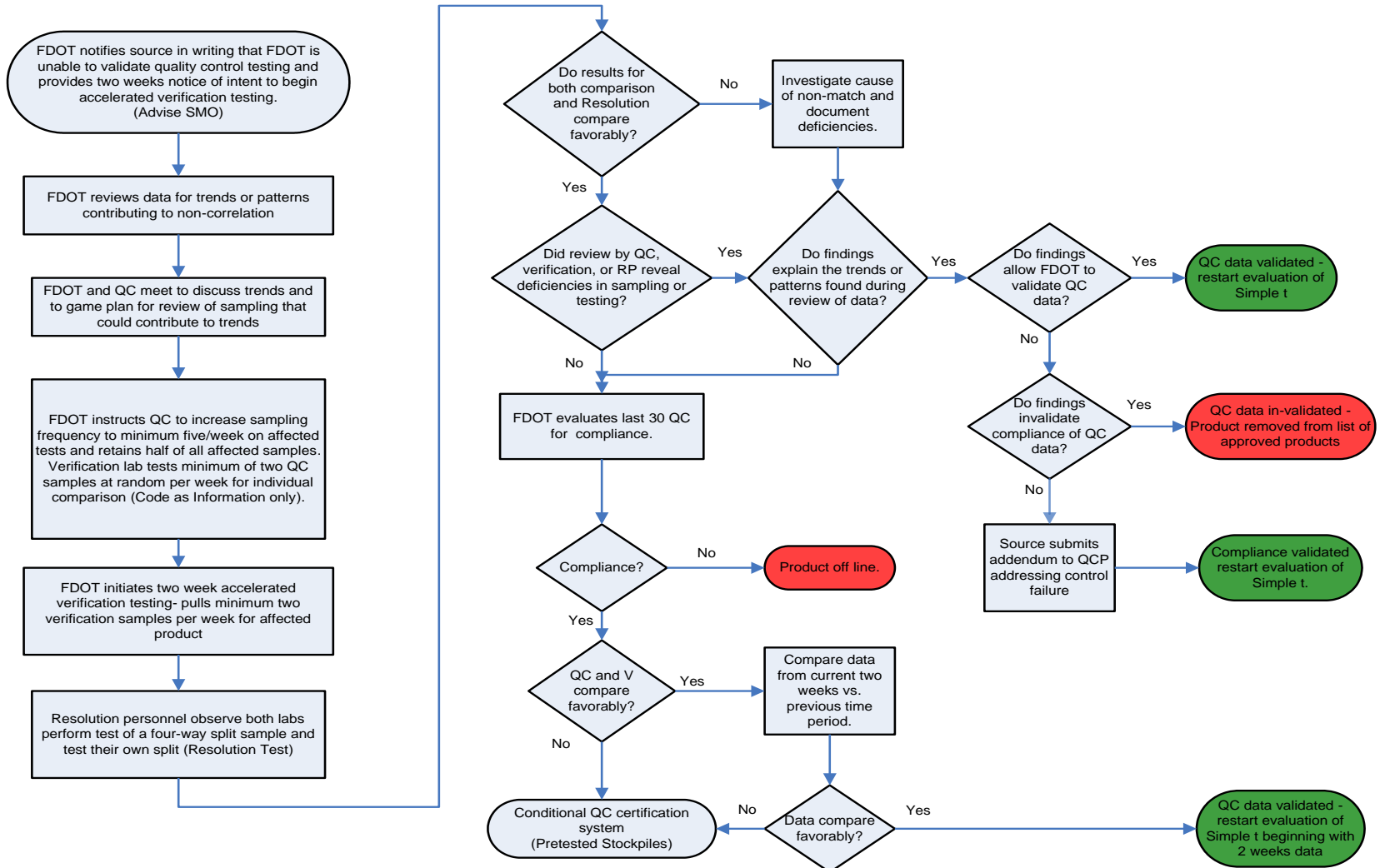
F6. Exception Reports and Notice of Deficiency Flow Chart



F7. EVALUATION OF DATA



F8. ACCELERATED VERIFICATION TESTING



F9. RESOLUTION

