QUALITY ASSURANCE PLAN

FOR THE

SAFENIGHT TECHNOLOGY

SMOKE DETECTOR

PREPARED BY:

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1 INTRODUCTION

This preliminary plan has been constructed to reflect a quality program that meets the requirements of the SCI corporate quality manual and ISO 9002/EN290002 specifications.

2 ORGANIZATION

The Quality Assurance Program is administered by the Quality Assurance Manager. The Quality Assurance manager reports directly to the Plant Vice President, thus assuring that the quality requirements are not compromised or influenced by other contract related functional departments. The Quality Assurance Program is based on a total inspection effort of each phase of the program from product design through delivery. During contract performance, the Quality Assurance Manager is responsible for ensuring adherence to the program plan and shall periodically review the status and adequacy of the plan. This effort will be accomplished by management action outlined in the following paragraphs. Quality management, organization, and responsibilities are shown in the organizational chart (figure 1).

3 PERSONNEL

Management and engineering training includes seminars and formal education to embrace SCI philosophy of quality which is outlined in this quality plan. Each prospective employee is interviewed to assess skills, intellect, and motivation. Selected candidates are given appropriate training before being allowed to work independently, and undergo further evaluation during a 90-day probationary period.

SCI uses trained and proficiency certified personnel to implement the Quality Assurance Technical Training Program. The training program defines the procedures for:

- Certification of Personnel

  Examples of processes requiring training and certification are: soldering, welded circuitry, cleaning, plastics applications (potting, molding, foaming, etc.), and x-ray. Personnel certification and testing are described in the SCI Training Program Manual. Qualified/certified personnel are issued a certification card in the appropriate classification category.

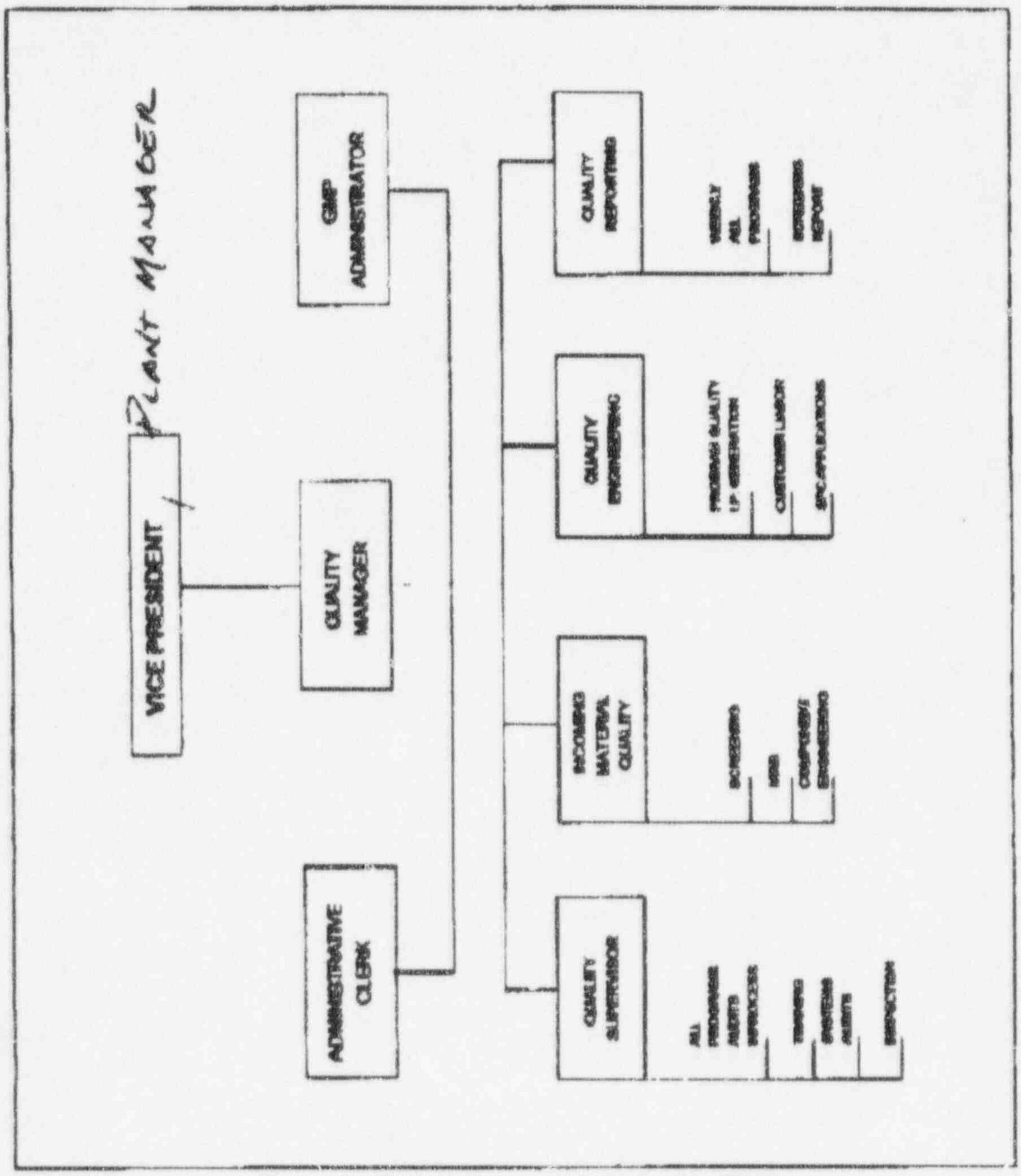

Figure 1. Quality Assurance Organization Chart

3 PERSONNEL (Cont'd)

- Recertification of Personnel

  Recertification is performed in accordance with the SCI Training Program Manual on an annual basis as a minimum, or for any of the following conditions:

  - Interruption of work period exceeding specified time;
  - Techniques introduced which require new skills;
  - Reasonable doubt as to proficiency or workmanship.

- Record Maintenance

  Records are maintained on training, testing, and certification status of personnel. Records are audited by Quality Assurance to ensure the status of all personnel. Recertification and retraining are required should performance become substandard.

4 EQUIPMENT

Quality Assurance is responsible for certification, calibration, and maintenance of test and inspection equipment. The calibration program ensures that all equipment and devices used for measurement and testing are properly calibrated. Calibration will be performed only by personnel certified to do calibration. Calibration records will be maintained on all electrical equipment in the central calibration lab. A complete inventory of gauges, testing, and measuring equipment used to ensure the product meets technical requirements is maintained by the Quality Department Calibration Laboratory.

Each piece of equipment is identified by label or color code to indicate the last calibration date, the person who performed calibration, and the next calibration due date. Recall intervals are determined by equipment history data. The calibration lab will issue a monthly report of equipment due calibration. Operators are instructed not to use out-of-calibration tools and equipment. Supervisors are responsible to ensure that equipment in their area is not used when it is out of calibration. Equipment for which calibration has expired or become void is identified, tagged, and removed from service.

4 EQUIPMENT (Cont'd)

All calibration standards are traceable to the National Bureau of Standards. Any equipment that does not meet the requirements of state-of-the-art or a required accuracy will be controlled so that repeatability and reproducibility within specified tolerances are known at all times. Supplier requirements for measuring and testing equipment are imposed by the use of quality and reliability terms on the purchase orders. Measuring and test equipment will be modified, as specified in the contract, to ensure compatibility with engineering changes to articles to be delivered to the customer. Measuring and test equipment will be used and stored in an environment suitable to ensure equipment protection and maintenance for required accuracy.

5 DESIGN AND DOCUMENT CONTROL

The adequacy of engineering drawings is initially determined during the Preliminary Design Review. All necessary changes to drawings and specifications are approved by Quality Engineering prior to final release of the articles to ensure that SCI quality policies and procedures have not been compromised. Quality Engineering will assure that all changes are within contractual limits and that customer notification/approval is provided as required. Procedures will be changed or issued, as required by contract, to assure that drawings and related data are legible and are prepared in accordance with applicable specifications. Quality Engineering will be responsible for drawings and changes provided by subcontractors and vendors.

Customer changes must go through program management. Program management initiates the change process through documentation control and Manufacturing Engineering. Manufacturing Engineering issues an engineering change order or a manufacturing engineering order, as appropriate and updates process specifications, as necessary.

6 MATERIAL AND SERVICE PROCUREMENT

6.1 Control of Purchases.

All supplies, processes, and services are procured from previously approved sources. The suppliers are recorded in the Approved Suppliers List (ASL), maintained by Procurement Quality Assurance. The selection of the suppliers must assure that the products and services meet contract requirements. This is achieved by evaluation of the following:

6.1 Control of Purchases (Cont'd)

- Vendor performance rating;
- Source inspection;
- Review of suppliers' test and inspection data;
- Receiving inspection of suppliers' products.

Source inspection is performed on subcontract items of a critical nature or where special processes are required. Periodic audits are performed subsequent to initial surveys to ensure maintenance of standards. Certification and attributes data requirements are specified on the purchase orders to SCI suppliers. A comprehensive supplier audit checklist is utilized to evaluate a supplier's capability to conform to the required quality system. The receiving inspection function is provided with all documentation and equipment required to verify product quality. Receiving inspection data is recorded on machine records and provided to Quality Engineering for evaluation of supplier performance. Acceptance ratings falling below an established percentage require corrective action, which is transmitted to the supplier.

6.2 Purchasing Data.

Prior to release, Quality Assurance reviews each purchase order to verify the following:

- Applicable quality and reliability requirements have been imposed;
- Adequacy of drawings and specification callouts;
- Proper source inspection requirements have been included;
- Inclusion of raw material testing, as well as any applicable special instructions.

Procurement specifications do not permit design changes without prior notification/approval.

6.3 Incoming Inspection.

Purchased material is subject to incoming inspection to ensure that all material conforms to product specifications, drawings, and technical contract requirements. Inspection samples will be determined by Component Engineering or Quality Engineering. Variable data is taken on critical parameters to determine process capability of suppliers to repeatedly meet requirements. Data collected leads to vendor rating and determines suppliers certification status. Suppliers are evaluated on an ongoing basis and information is fed back to both the suppliers and the SCI purchasing organization.

6.4 Consigned Material.

Consigned material received having a certificate of compliance attached will not normally require an incoming inspection. However, materials will be verified for quantity, identity, transit damage, and quality level. SCI reserves the right to reject this material if deemed substandard.

6.5 Handling, Storage, and Delivery.

Special handling procedures will be utilized to preclude damage, loss, or deterioration during handling, storage, and shipping. Articles and materials that are required to be stored will be adequately protected against deterioration and damage. Critical and sensitive articles will be given special attention. A first-in-first-out stock policy is utilized to minimize material time in storage. A monthly audit is performed to preclude the use of any materials subject to age deterioration.

7 INVENTORY

SCI quality maintains an ongoing presence in the stockroom and conducts an audit program to evaluate and measure conformance to establish good stockroom practices. All materials will be handled in such a way as to prevent damage or deterioration.

All materials are subject to a receiving inspection. The material will be physically separated into the following categories:

- Articles awaiting inspection and test results;
- Articles conforming to purchase order requirements;
- Articles rejected because of nonconformance.

Product complexity and criticality will determine the extent of inspection. A receiving inspection instruction and characteristic card will be issued for each part type by Quality Engineering. The characteristic card will detail the methods for testing and the inspection level for each part type. These instructions, along with the purchase order, drawings, specification, and inspection tools are used by the inspector for verification and acceptance.

Raw materials are forwarded to Process Engineering for verification, as required, for physical, chemical, and other technical requirements prior to acceptance. Raw material control requirements for suppliers are imposed in the purchase order. All accepted raw materials are identified and segregated. Non-conforming material is identified on a Reject Disposition Tag Form and placed in a hold area pending disposition.

Acceptable articles are identified by stamping the container, package, or identification label. Part number, sources of procurement, purchase order numbers, certifications, and test reports will be retained in the appropriate file. The articles will be routed to production stores.

8 PRODUCTION PROCEDURES AND PROCESSES

A sample product flow chart is shown in figure 3 illustrating relationships among normal manufacturing processing and inspection points where quality checks are performed and statistical data generated.

All work affecting quality, from receipt of raw materials through delivery to the customer, will be documented in clear and complete instructions appropriate to the circumstances. All specified limits and tolerances are considered absolute and will not be rounded off to meet requirements. These instructions, which also provide standards, are contained in details on drawings, Quality Assurance Procedure/Quality Assurance Instructions, Manufacturing Planning Procedures, Procurement Manuals, Process Specifications, Drafting Procedures, Reliability Procedures, and Acceptance Testing Procedures. These procedures, processes, and instructions are contained in the data list established at configuration baseline. Each work area will be assigned a controlled set of procedures appropriate to the area. The procedures are reviewed and approved by Quality Assurance prior to release to assure compatibility with associated inspection and testing. Timely implementation of change is provided using procedure change notices, subsequent to approval by Quality Assurance.

All production processes will be as specified in the contract/purchase order. Inspection stations will verify compliance to standards and Quality Engineering will be responsible for identification and correction of deficiencies in each process area. The product is routed through the build cycle through the use of a manufacturing route sheet. All operations/inspections are recorded on the route sheet. Each assembly/subassembly route sheet becomes a part of the final build record data package retained by Quality Assurance.

All specialized processes are performed in controlled environment areas. Inspection personnel, as well as operators performing special processes, are certified to that process. Quality Assurance will be responsible for assuring certification of all special processes.

9 INSPECTION AND TESTING

Inspection procedures and inspection plans are developed and maintained by Quality Engineering and Components Engineering, respectively. Standards for mechanical measurements and workmanship evaluations are generated by Quality Engineering and are included in the inspection procedures and workmanship standards. Component Engineering develops and maintains the inspection plans for all electrical and mechanical measurements at component level.

9 INSPECTION AND TESTING (Cont'd)

All end items will receive a complete inspection and test to verify compliance with product specifications as specified by the purchase order. These inspections and tests, which are demonstrated by life, environment, endurance, use, and qualification testing, are designed to assure the end item will perform as intended. All deficiencies detected during end-item inspection and testing are recorded on Assembly Failure Reports. These reports are forwarded to engineering and reliability for failure analysis and corrective action recommendations. All rework, repair, or modifications on end item products require reinspection and retest.

9.1 Test/Repair/Inspection.

Test failures that require repair are inspected by Quality to ensure they meet the SCI workmanship standards before they are allowed to reenter the manufacturing process. Adequate controls are in place to ensure that repaired boards are subjected to test.

9.2 Final Board Inspection.

The final inspection is much the same as the in-process inspection, but also checks for successful completion of testing and any subsequent operations, as required. Inspectors work from inspection procedures and have access to process specifications. Products that fail this Quality Assurance check are returned to manufacturing for corrective action and repair/rework/retest. Quality assurance checks documentation, corrective action, and route sheets ensure they are complete and accurate.

10 NONCONFORMING MATERIALS

10.1 Control.

Nonconforming materials are those found to deviate from engineering or customer specifications, drawings, or workmanship standards. Incoming inspection is responsible for ensuring that only conforming material enters the system. Any material that does not meet incoming inspection specifications is sent to the Material Review Board. Material within the system that becomes obsolete is purged from the system by Quality Assurance and is sent to the Material Review Board for disposition.

Material within the system that becomes damaged or otherwise unusable is evaluated by the supervisor for repairability and usability. If the supervisor deems it non-repairable or unusable, it is forwarded to the Material Review Board. Quality Engineering is responsible for monitoring the decision-making process by the respective supervisors.

10.2 Disposition.

A positive control system is presently in effect for nonconforming material. All detected nonconformances are immediately identified in detail on Reject Disposition Forms. The material is then placed in holding areas pending disposition. All repairs and rework operations are controlled by procedures which have prior approval. All Standard Repair Procedures (SRP) used as Material Review Board action will be identified on the Reject Disposition Form and have Quality Assurance, government, and/or customer representative's approval prior to repair of the hardware.

11 PACKAGING AND TRANSPORTATION

Shipping instructions along with packaging specifications are utilized for all shipments. A packing and shipping audit is performed on units that are being prepared for shipment or movement to stock. Based on customer requirements, SCI performs out-of-box audits to provide ship-to-customer assurances.

12 DEVIATIONS AND CUSTOMER COMPLAINTS

Any employee receiving a potential customer complaint, whether written or oral, shall submit all information concerning the complaint to Program Administration or Quality Engineering. The complaint will be documented, reviewed, and evaluated. When necessary, the Quality Engineer will initiate a corrective action request to monitor the complaint investigation. The individual(s) assigned to the investigation will be given a suspense date for completion of the investigation and/or corrective action. The investigators will determine cause and effect, conclusions, and recommendations for corrective action. A follow-up communication will be made with the customer concerning the investigation results, if required.

13 AUDITS

Auditing is used to assure that quality goals are met. The audit teams will audit the systems and equipment used in the manufacture of subassemblies and final assemblies.

SCI's Quality department conducts both process control and quality assurance inspections. The audits consist of documentation cross-checks and first article verification using inspection plans. Process control checks consist of periodic audits and part change/restock verification and approval. Process control also audits incoming kits for compliance.

13.1 Kitting.

The kitting audit program audits randomly selected parts on each kit to a (c = o plan). If a kit is rejected, it must be 100% rechecked and/or reworked by stockroom personnel and resubmitted to Quality Assurance for approval prior to being released for production.

13.2 MANUFACTURING AUDIT .

A manufacturing audit team under the control of a quality supervisor audits on a continual basis on the manufacturing floor. The team is responsible for:

- Auditing equipment setup and maintenance;
- Auditing equipment operation;
- Verifying workmanship;
- Checking the ESD program;
- Ensuring housekeeping duties are performed satisfactorily;
- Audit outgoing units for workmanship, documentation, and packaging.

14 RECORDS AND DOCUMENTATION

Records of all activities relating to product quality are maintained by Quality Assurance. Records include purchase orders, traceability data, part screening data, vendor performance, in-process inspection and test records, monthly shop performance and evaluation, certification of test equipment and test method, equipment calibration, corrective actions, operator training and certification, material review and/or Material Review Board Actions, and acceptance test data, as a minimum. These records are available for customer on-site review throughout the performance life of the contract. Rejection notices include all pertinent data required to effect corrective action. Reference to reject notices is included on the inspection records to indicate disposition. Records are retained for three years after the date of the contract close, unless otherwise directed by the contract.

All records of compliance should be available through USA headquarters, Huntsville, AL.

APPENDIX A

The following flowchart and text represent the specifications deemed appropriate for the manufacture and distribution of smoke detectors. Using this approach, SCI's quality program ensures that each production lot meets the design standards approved by the U.S. Nuclear Regulatory Commission.

Quality Assurance Plan

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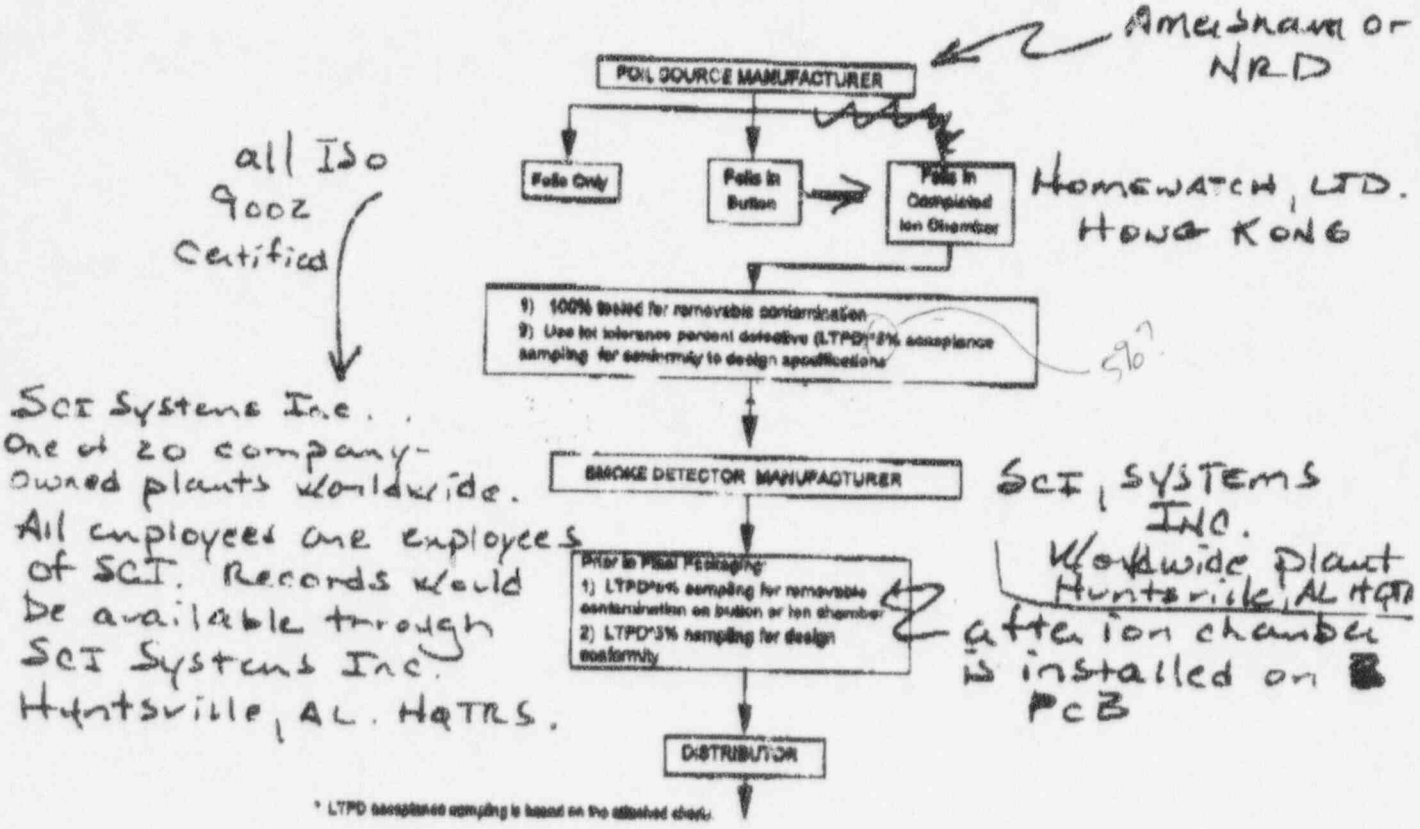

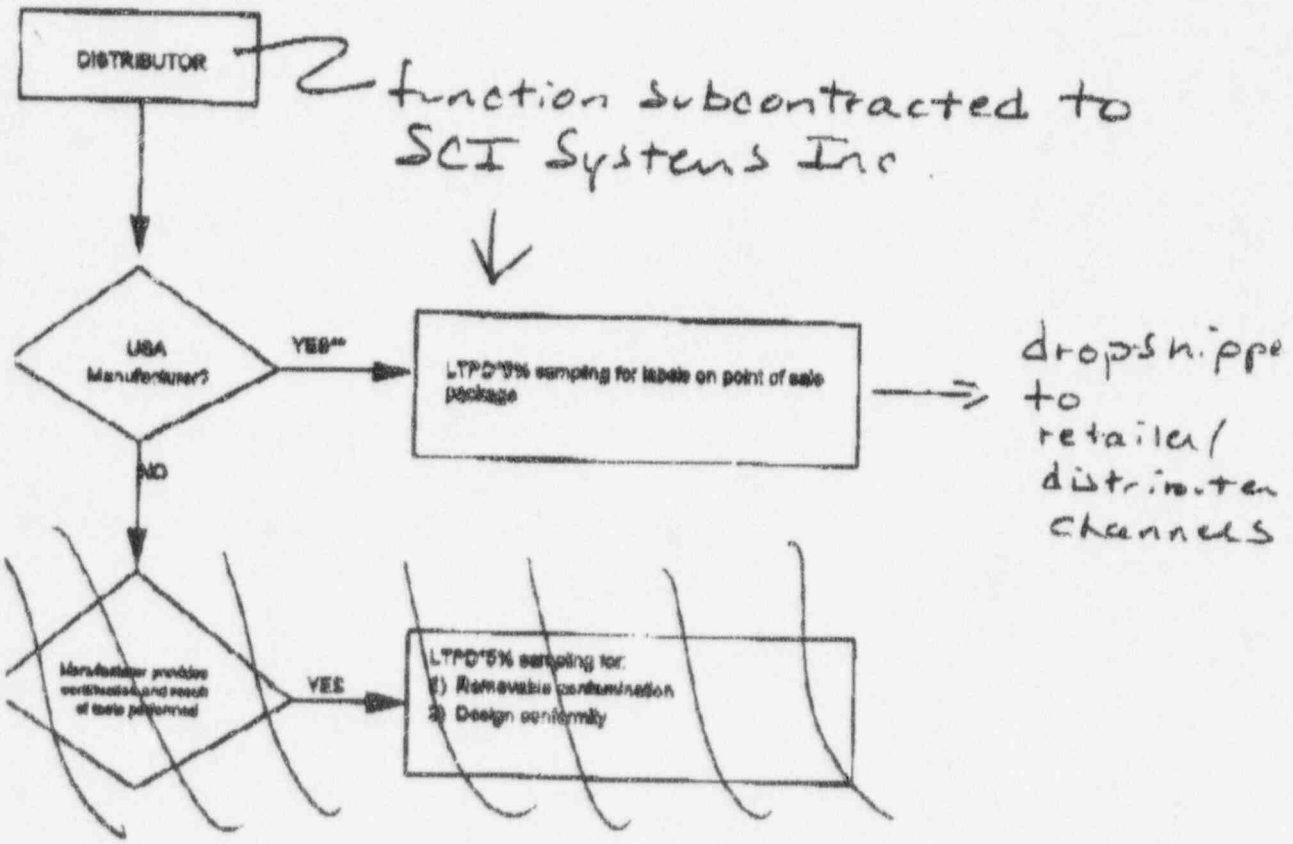

* LTPD acceptance sampling is based on the attached charts

**Based on reliability/inspectability of USA fabrication records and facilities

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The LTPD tables found in 10 CFR 32.110 and Regulatory Guide 6.6 have been modified, whereby the acceptance number for all lot sizes is zero (0). This is due to the fact that from a health and safety standpoint, the entire lot shall either be rejected, or inspected for conformance to the quality characteristic(s) in which the sample unit were found to be defective. All units found to be defective must conform to the quality characteristic(s) before release, or be rejected entirely. The following are modified 3% LTPD and 5% LTPD tables.

LTPD = 3%

LOT SIZE	n	c
1 - 40	All	0
41 - 55	40	0
56 - 100	55	0
101 - 200	65	0
201 - 500	70	0
501 - 3000	75	0
3001 - 100,000	130	0

LTPD = 5%

LOT SIZE	n	c
1 - 30	All	0
31 - 50	30	0
51 - 100	37	0
101 - 200	40	0
201 - 300	43	0
301 - 400	44	0
401 - 2000	45	0
2001 - 100,000	75	0