



# AERO GEAR, INC. SUPPLIER QUALITY MANUAL

## REVISION HISTORY

REVISION	EFFECTIVE DATE	SUMMARY OF CHANGES
A	30-JAN-1998	Original Issue
B	17-OCT-2002	Added note re: subcontractors may not subcontract to another subcontractor without Aero Gear permission
C	31-AUG-2007	Completely revised. See record copy for previous revision.
D	27-AUG-2009	Supplier Performance Monitoring requirements revised to meet Aero Gear's current business needs.
E	09-FEB-2010	Corrected numbering sequence in sections 13.4 thru 13.8.
F	13-JUN-2011	Added para. 4.2.1 and 4.2.2
G	13 JAN-2015	Complete Rewrite
H	18-DEC-2017	Added para 4.2.3 Control of Records
J	08-MAR-2018	Added para 8.1.4 Prevention of Counterfeit Parts

08-MAR-2018

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## 1. Purpose

This Supplier Quality Manual establishes general product assurance requirements and is intended to define the requirements for the Supplier to assure that all goods and services delivered to Aero Gear, Inc. (Aero Gear) conform to specified requirements for quality. This Manual constitutes an extension of the contract between the Supplier and Aero Gear covering the goods or services as described in the Purchase Order. The Supplier's acceptance of the Purchase Order shall constitute agreement to the requirements stated herein. In the event of any discrepancy between the Purchase Order and the requirements of this document, the terms and conditions of the Purchase Order shall take precedence.

## 2. Definitions

- 2.1. Approved Supplier – Supplier who is approved to supply materials, parts, processing or testing to Aero Gear. Approved Suppliers are listed in the Aero Gear Approved Supplier List. Approved Suppliers may also be listed on Aero Gear's Customer's Approved Supplier List.
- 2.2. Preferred Supplier – Supplier who consistently meets high levels of Quality Performance Rating.
- 2.3. Acceptable Supplier – Supplier who meets acceptable Quality Performance Rating levels.
- 2.4. Probationary Supplier – Supplier who has fallen below acceptable Quality Performance Ratings.
- 2.5. Disapproved Supplier – Supplier who has fallen below probationary Quality Performance Ratings.
- 2.6. Corrective Action – Action taken to eliminate the cause of actual nonconformances in order to prevent recurrence.
- 2.7. Customer Complaints – Incidents of complaints made by Aero Gear customers on supplier provided product.
- 2.8. Defect – A nonconformance of a quality characteristic to its specification.
- 2.9. First Piece Inspection – A complete, documented inspection to verify that prescribed production methods have produced an acceptable product as specified by product drawings, Purchase Order, specification and/or other applicable design documents.
- 2.10. Key Characteristic – The features of a material, process, or part whose variation has a significant influence on product fit, performance, service life, or manufacturability.
- 2.11. Nonconforming Material – Any material, part or product with one or more characteristics which deviate from the requirements in the contract, specifications, drawings, and/or other product description.
- 2.12. Nonconforming Material Corrective Action Report (NMCAR) – Form used to document nonconforming materials, parts, or processing. Root Cause, Corrective Action and associated review and disposition of material are recorded on this document.
- 2.13. Off-Load – Machining operations (normally done in-house) off-loaded to suppliers when requirements exceed Aero Gear in-house capacity on a temporary basis.
- 2.14. Operation Sheet – Document which indicates the sequence of operations for part/assembly fabrication for a designated item.

- 2.15. Preventive Action – Action taken to eliminate the cause of potential nonconformances in order to prevent their occurrence.
- 2.16. Source Inspection - Inspection at supplier facilities by Aero Gear, Aero Gear Customer or Government Source Inspectors.
- 2.17. Special Process – Process where the resulting output cannot be verified by subsequent monitoring or measurement.
- 2.18. Supplier – Subcontractor/Vendor who supplies product, processing, or services to Aero Gear.
- 2.19. Supplier Quality Performance Rating System – System whereby supplier’s quality performance is monitored to define qualification level and ascertain the need for corrective action.
- 2.20. Supplier Survey – Survey used to evaluate the Quality Assurance capabilities of an existing or potential Supplier. This survey may be completed by the supplier, or used as an audit checklist for audits performed by Aero Gear. Form F 307-04-02-01.
- 2.21. Vendor Offload Checklist – Checklist used by Offload suppliers with each part lot submission stating that parts meet minimum requirements. This form also allows the reporting of non-conforming product, with associated root cause and corrective action. Form F-307-04-02-05.

### 3. References

AS9100	QMS – Requirements for Aviation, Space and Defense Organizations
F-307-04-02-05	Vendor Offload Checklist
F-307-04-02-01	Supplier Survey
RR-9000	Rolls Royce SABRe Source Change Process

### 4. Quality Management System

#### 4.1 General Requirements

The Supplier shall establish and maintain a quality management system and shall monitor and continually improve this system.

The extent and complexity of the quality management system will be based on the size of the organization and type of activities, the complexity of its processes and their interactions, and the competency of personnel.

#### 4.2 Document Requirements

The supplier shall establish and maintain a quality manual. Documents required by the Quality Management System shall be controlled.

This control shall ensure that:

- Documents are approved for completeness and adequacy prior to use
- Relevant versions of applicable documents are available at all points of use
- Obsolete documents are prevented from unintended use

Aero Gear issues a copy of the most current revisions of the Aero Gear Operation Sheet, drawing, or work instructions specified on the Purchase Order. The Supplier shall ensure that all documents supplied by Aero Gear are identified and controlled so that only the most current revisions are used. Specifications stated on the Aero Gear Purchase Order shall be to the most current revision, as specified in the Standard Notes on the Purchase Order.

#### 4.3 Control of Records

All electronic records shall be retained, retrievable and readable on storage media capable of maintaining the data integrity for the full retention period.

Where original records are maintained on paper, especially during work in process in the manufacturing area, paper records shall be protected from becoming dirty or soiled and shall be legible.

Retention Periods for Records Pertaining to the Following Part Types:

Time Period (from time of manufacture)	Description
40 years	Flight Safety Parts, Safety Parts, Flight Critical Parts, ESA parts, Frozen Process Parts
30 years	Manned Space Program Hardware
10 years	All other parts

## 5 Management Responsibility

### 5.1 Management Commitment

Top management shall assure the quality objectives and the importance of meeting customer and regulatory requirements are communicated to all levels of the organization through periodic publications, employee meetings, and accessibility of the documented quality system and policies as well as other communications tools.

Customer Focus: Top Management shall ensure that customer requirements are determined and are met with the aim of enhancing customer satisfaction. Product conformity and on time delivery is measured and appropriate action is taken if planned results are not, or will not be achieved.

## 6 Resource Management

### 6.1 Provision of Resources

Supplier shall have sufficient resources to maintain the quality management system, improve its effectiveness, and to meet all requirements.

### 6.2 Human Resources

Personnel performing work affecting conformity to product requirements shall be competent on the basis of appropriate education, training, skills and experience. Appropriate records of education, training, skills and experience shall be maintained.

### 6.3 Infrastructure

Buildings, workspace, process equipment, supporting services shall be appropriate to achieve conformity to product requirements.

### 6.4 Work environment

The physical environment (noise, temperature, humidity, lighting, etc.) shall be appropriate to achieve conformity to product requirements.

## 7 Product Realization

### 7.1 Planning of Product Realization

The Supplier shall plan and control all manufacturing and process operations. The plan should include at a minimum:

- Sequence of operations

- Establishment of controls and the development of control plans where key characteristics have been selected by the Supplier or specified by Aero Gear
- Identification of in-process inspection verification points
- Selection, identification and use of required equipment, tools, fixturing and measuring and test equipment
- Provision of all required information that describes the characteristics of the product
- Provision of documented work instructions, as necessary
- Provision for the elimination of tool marks and handling damage
- Provision for the prevention, detection, and removal of foreign objects and debris

The Supplier shall not subcontract Aero Gear work to another subcontractor without written approval from Aero Gear.

When specified on the Purchase Order, the manufacturing plan must be submitted to Aero Gear for approval. Subsequent to Aero Gear approval (including approval by Aero Gear's customer, if required), the Supplier shall not make any changes to the plan without first obtaining written approval of Aero Gear Quality Assurance.

## **7.2 Customer-Related Processes**

### **7.2.1 Determination of Requirements Related to Product**

The Supplier shall determine requirements are adequately defined, understood, and agreed to.

Prior to quoting or accepting a Purchase Order, the Supplier shall assure a complete understanding of all applicable requirements. The Supplier shall ensure the equipment capability and capacity to perform the work required. Close attention shall be directed to the details of specifications so that issues relating to specific requirements of these specifications will not surface after the fact.

### **7.2.2 Review of Requirements Related to the Product**

That supplier shall review the requirements related to the product prior to commitment to supply the product.

The Supplier shall comply with all specifications stated or referenced on the Purchase Order, including applicable engineering drawings, process sheets, and end customer and industry specifications. The supplier shall ensure compliance to the latest revision in effect at the time of the placement of the Purchase Order unless otherwise specifically stated therein.

All discrepancies shall be resolved prior to submission of a quotation or acceptance of an order.

Verbal changes or deviations from the requirements of the Purchase Order are not acceptable. The Supplier shall meet all requirements of the Purchase Order as written and accepted by the supplier or obtain a written deviation approved by Aero Gear. Any request for deviation shall be submitted at the earliest possible time. Aero Gear Quality Assurance and/or Engineering must approve deviation to product specification requirements.

Where designated critical product or processes require formal documented approval of facility, procedure or personnel, the Supplier will be so informed and arrangements made for such approval. In such cases, the Supplier shall follow all approval requirements and may not deviate from the approved methods, unless a documented deviation is received.

It is the responsibility of Aero Gear to flow down customer requirements from the Aero Gear customer (Prime).

### **7.2.3 Customer Communication**

The supplier shall determine and implement effective arrangements for communicating product information, enquiries, contracts, including amendments, and feedback, including response to complaints.

**Notification:**

The Supplier shall immediately notify Aero Gear of any significant changes in ownership, management, location, processing, equipment, personnel, Quality System registration status, strikes, lockouts, etc. that could affect product quality or delivery.

The Supplier shall immediately notify Aero Gear of any suspected or know issues with received material, process or design which may affect quality or performance of the product, safety or customer satisfaction.

The Supplier shall immediately notify Aero Gear of any shipment which contains (or contained) suspected or known nonconforming product

**7.3 Design and Development**

The Supplier shall not use or disclose to any third parties any Aero Gear or Aero Gear customer design documents or data for any purpose without approval. Such design documents or data may only be disclosed for the support of products and services supplied to Aero Gear.

**7.4 Purchasing**

**7.4.1 Purchasing Process**

The Supplier **shall not** subcontract Aero Gear work to another subcontractor without written approval from Aero Gear.

The Supplier, as specified in their Quality System, shall evaluate and select suppliers based on their ability to supply products or services which meet specified requirements.

The Supplier, based on their Quality System, shall maintain a listing of approved suppliers.

The Supplier shall ensure that purchased product conforms to specified Purchase Order requirements.

The Supplier shall establish and maintain a system to fully describe the product or service to be purchased, including the “flow-down” of requirements specified by Aero Gear. When requested by Aero Gear, the Supplier shall submit a copy of the Purchase Order to the sub-supplier for review of the flow-down requirements.

The Supplier who subcontracts NDT requirements shall assure that the NDT source is approved by Aero Gear and shall supply all applicable documents to the NDT source and shall assure that the NDT process is performed at the proper sequences on the items.

**How Aero Gear selects suppliers**

**Supplier Selection and Surveillance (REF: PU-207-04-02)**

Aero Gear shall select, survey, and monitor the performance of suppliers to assure conformance to requirements.

Initial supplier surveys (Form F307-04-02-01) shall be conducted prior to issuance of a Purchase Order. This initial survey is to ascertain the capabilities of the potential Supplier and the existence of a documented quality system. The Supplier’s Quality Management System shall meet the requirements of MIL-I-45208, ISO-9001, AS9100, NADCAP GQS or an equivalent approved by Aero Gear.

If a supplier is AS9100 and/or NADCAP registered, the supplier will only need to fill out the first two pages of the Aero Gear Supplier Survey F-307-04-02-01.

Aero Gear will verify certifications / accreditations via the following website portals:

**AS9100:** I.A.Q.G. OASIS [http://www.sae.org/?PORTAL\\_CODE=IAQG](http://www.sae.org/?PORTAL_CODE=IAQG)

**NADCAP:** PRI eAuditNet <https://www.eauditnet.com>

Following initial survey, an on-site survey/audit may be conducted to further determine the capabilities of the Supplier. This includes facility and special process and testing sources where on-site reviews and periodic re-visits may be required to assure conformance with contractual requirements.

By accepting the Purchase Order, the Supplier agrees that Aero Gear and Aero Gear customer and/or other regulatory agency, as required, may audit or review the Supplier's facilities and procedures.

#### **7.4.2 Purchasing Information**

Purchase orders clearly and adequately describe quality-related requirements including reference to applicable Aero Gear Inc. or customer drawings, specifications, instructions, and other requirements.

#### **7.4.3 Verification of Purchased Product**

The supplier shall establish and implement the inspection or other activities necessary for ensuring that purchased product meets the specified purchase requirements.

### **7.5 Production**

#### **7.5.1 Control of Production**

The Supplier shall plan and carry out production under controlled conditions using drawings, parts lists, materials, process specification, work instructions suitable equipment and gages as appropriate.

##### **7.5.1.1 Production Process Verification**

**First Article Inspection** in accordance with AS9102 shall be performed on finished product or purchased details.

When specified on the Purchase Order, the manufacturing plan must be submitted to Aero Gear for approval. Subsequent to Aero Gear approval (including approval by Aero Gear's customer, if required), the Supplier shall not make any changes to the plan without first obtaining written approval of Aero Gear Quality Assurance.

##### **7.5.1.2 First Piece Inspection**

First Piece Inspection requirements apply to all "Off-Load" machining operations.

The Supplier shall perform a first piece inspection upon initial set-up and after any subsequent set-up, machine change, etc.

First Piece Inspection data shall be recorded directly on a copy of the applicable operation sheet or drawing. The alternative is to "bubble" the operation sheet or product drawing so that each characteristic is clearly identifiable to an attached data sheet.

First Piece Inspection Data shall be submitted to Aero Gear for approval prior to running the remainder of the lot.

The "first piece" must be 100% inspected by the Supplier and accepted before being presented to Aero Gear Inspection for concurrence. The actual dimensions must be recorded and presented.

Production shall not continue until the Aero Gear inspector accepts the "first piece". Any unacceptable conditions must be remedied before the remainder of the production run continues. Aero Gear Purchasing or Quality Assurance will communicate "first piece acceptance".

Suppliers who consistently meet high levels of Quality Performance Rating may be exempted from submissions of first article. First Article verification must still be performed at the Supplier, with associated records maintained, but submission for approval at Aero Gear is not required. Suppliers who are exempted from First Piece submission will be notified of this exemption.

### **7.5.2 Validation of Processes for Production**

When customer approval and/or regulatory authority are required, qualification shall be approved as required by the customer/regulatory authority.

### **7.5.3 Identification and Traceability**

The Supplier shall maintain a system for product identification and traceability from receipt of material and during all stages of production and delivery.

Identification of the configuration of the product shall be maintained in order to identify any differences between the actual configuration and the agreed configuration

### **7.5.4 Aero Gear Property**

The supplier shall exercise care with Aero Gear property. If any Aero Gear property is lost, damaged or otherwise found to be unsuitable for use, the supplier shall report this to Aero Gear and maintain records.

### **7.5.5 Preservation of Product**

The Supplier shall maintain a system that will provide effective preservation, packaging, and shipping and is responsible for assuring that all items shipped to Aero Gear are preserved, packaged and marked in accordance with applicable specification and/or Purchase Order requirements.

Items shall be adequately protected against corrosion, contamination, and damage during shipment and handling.

The Supplier shall ensure that all necessary documents are enclosed with the shipment, i.e. Nonconforming Material Corrective Action Reports, certifications, etc.

Offload shipments shall include the Vendor Offload Checklist, Form F-307-04-02-05, with the parts.

### **7.6 Control of Monitoring and Measuring Equipment**

The Supplier shall establish and maintain a system for the maintenance and calibration control of measuring and test equipment (M&TE), and standards to sufficient accuracy to assure conformance of products and services to design requirements and specifications.

The system shall include, but not be limited to, the following:

- Unique identification of M&TE
- Location of M&TE
- Frequency of checks
- Check method and acceptance criteria
- Required accuracy
- Traceability of measurement standards to national or international standards
- Recall system
- Recall intervals including basis for establishment of interval and adjustment of interval
- Environment test condition (where applicable)
- Records of calibrations, including certifications from outside calibration sources
- Disposition of obsolete and inaccurate equipment

All equipment or devices that are used to measure, gage, test, or otherwise examine the product to determine compliance to requirements, whether owned by the Supplier, the Supplier's employee, or any outside agency, including Aero Gear must be included.



Records shall be maintained in accordance with the control procedures which indicate the status of the individual test and measuring equipment, calibration date, and due date for calibration and by who it was calibrated. The equipment shall also be labeled with this same information. If size limits labeling, the equipment container shall be labeled.

A controlled area shall be used for the storage of all tools and gages which are portable. Obsolete or inaccurate equipment shall be segregated. Obsolete or inaccurate stationary equipment, which cannot be readily segregated, shall be suitably labeled and safeguarded to prevent use.

## 8. Measurement, Analysis and Improvement

### 8.1 General

The Supplier must deliver product which conforms to all requirements and specifications. In order to assure this, all characteristics must be 100% final inspected unless a specific instruction or specification provided by, or approved by, Aero Gear Quality Assurance directs otherwise.

The use of Statistical Process Control (SPC) techniques may be permissible in lieu of 100% inspection if process capability can be demonstrated and Aero Gear Quality Assurance has granted written approval for the process control scheme.

#### 8.1.4 Prevention of Counterfeit Parts

Aero Gear’s suppliers shall plan, implement, and control processes as appropriate for the prevention of counterfeit or suspect counterfeit part use and their inclusion in product(s) delivered to Aero Gear, Inc. or our customers.

### 8.2 Monitoring and Measurement

#### 8.2.1 Customer Satisfaction

##### Supplier Performance Monitoring (PU-207-04-02)

Aero Gear monitors Supplier quality performance by means of the Quality Performance Rating System.

Following submission and acceptance of the initial Quality Assurance Supplier Survey, new Suppliers put into an Approved status, permitting orders to be placed with the Supplier. Initial Ratings will be set at 100%. As product is delivered, this rating will be adjusted based on actual performance.

Supplier Surveys shall occur at a minimum of 3 year intervals or per customer requirements, whichever is less. Rolls Royce suppliers shall be audited every 2 years.

Ratings are based on quality performance of parts received, using a rolling 6-month evaluation period. Scoring is based on a percentage calculation.

$$\text{Score} = 1 - (\text{Total Deviated Qty by Supplier} / \text{Total Qty of Parts on P/O's to Supplier})$$

Performance Rating

Status	Score
Preferred	95 to 100%
Acceptable	75 to 94%
Probationary	60 to 74%
Disapproved	Score < 60%

The goal is for all suppliers to meet at least the acceptable category.

Formal Root Cause Corrective Action, focusing on system breakdown, is required if the Quality Rating falls below an Acceptable level.

If the Supplier fails to correct nonconforming conditions, or low Quality Ratings are repetitive, the Supplier may be required to meet with Aero Gear Quality Assurance to develop an action plan and/or may be disapproved.

Aero Gear Quality Assurance reserves the right to adjust the Supplier Quality Performance Rating based on response to corrective actions and/or business reasons.

Suppliers not on the Approved Supplier List (ASL) may only be used if approved by the Quality Manager or delegate.

### **8.2.2 Internal Audit**

The supplier shall conduct internal audits at planned intervals to evaluate the quality management system

### **8.2.3 Monitoring and Measurement of Processes**

The supplier shall apply suitable methods for monitoring and, where applicable, measurement of the quality management system processes. These methods shall demonstrate the ability of the processes to achieve planned results. When planned results are not achieved, correction and corrective action shall be taken, as appropriate.

### **8.2.4 Monitoring and Measurement of Product**

The product shall be measured to verify that the requirements have been met. This shall be carried out at appropriate stages of the process as planned. Evidence of conformity with the acceptance criteria shall be maintained.

#### **In-process Inspection:**

The Supplier will check subsequent pieces at defined intervals to ensure that the product continues to meet all specified requirements. Aero Gear may require the recording of designated actual in-process measurements. Such requirements shall be specified on the Purchase Order.

#### **Final Inspection:**

The Supplier must deliver product which conforms to all requirements and specifications. In order to assure this, all characteristics must be 100% final inspected unless a specific instruction or specification provided by, or approved by, Aero Gear Quality Assurance directs otherwise.

The use of Statistical Process Control (SPC) techniques may be permissible in lieu of 100% inspection if process capability can be demonstrated and Aero Gear Quality Assurance has granted written approval for the process control scheme.

#### **Source Inspection:**

The Purchase Order may indicate the requirement for Source Inspection.

Where Source Inspection is required, the facility must have an adequate area specifically set aside for Source Inspection. The area shall be well lighted, neat and clean with all the necessary equipment for the required inspections immediately available and currently calibrated.

Requests for Source Inspection must be submitted to Aero Gear Purchasing. This request shall include the Supplier, plant location, type of inspection required (detail or final), part number and name, quantity, and a firm date and time when the parts will be ready for source inspection.

Items presented for Source Inspection must be 100% inspected (unless the Supplier has been specifically approved for sample inspection) and must meet all applicable requirements and specifications.

The following documents, as applicable, shall be presented with the items to be source inspected:

- Purchase order/supplements
- Complete set of operation sheets noted on Purchase Order

- Specifications
- Special process, test, and material certifications
- Supplier's inspection data
- Nonconforming material/corrective action reports.

Acceptance of product through Source Inspection does not relieve the supplier of its contractual obligations.

### **8.3 Control of Nonconforming Product**

The Supplier shall establish and maintain a system for the identification and segregation of nonconforming product. Aero Gear does not permit Suppliers to perform material review functions; therefore, Aero Gear Engineering must disposition any nonconforming product.

Product or material found to be nonconforming shall be conspicuously tagged and controlled to prevent unintended use or delivery or from becoming intermingled with conforming material.

All reports of nonconforming products or process shall include a documented Root Cause, Corrective Action plan. This may be documented on an Aero Gear NMCAR, or the Supplier's own nonconformance corrective action document, provided this includes true Root Cause evaluation and Corrective Action. Nonconformities for Offload product shall be documented on the Vendor Offload Checklist.

Nonconformities will be documented at Aero Gear through the Nonconforming Material Corrective Action Report (NMCAR) system. All nonconformances will be documented with a Root Cause and Corrective Action.

If the supplier did not previously submit a Root Cause and Corrective Action plan with the nonconforming product, Aero Gear Quality Assurance or Purchasing shall send the NMCAR to the supplier requesting this information. The supplier will be given two weeks for the Root Cause and Corrective Action response.

All Root Cause and corrective action plans are subject to review and approval by Aero Gear Quality Assurance.

Cognizant Aero Gear personnel shall examine nonconforming material to determine if the nonconformance can be reworked to conform to the drawing or specification requirements.

Suppliers may request review of any nonconformances reported against them if they feel Aero Gear has incorrectly assigned the responsibility.

Serialized parts shall have the serial numbers noted on all correspondence.

Data obtained from the NMCAR system may be used in the Supplier Quality Performance Rating.

### **8.4 Analysis of Data**

Appropriate data is determined, collected and analyzed to demonstrate the suitability and effectiveness of the Quality Management System and to evaluate where continual improvement of the effectiveness of the Quality Management System can be made. This shall include data generated as a result of monitoring and measurement and from other relevant sources.

The analysis of data shall provide information relating to customer satisfaction, conformity to product requirements, characteristics and trends of processes and products including opportunities for preventive action

### **8.5 Improvement**

#### **8.5.1 Continual Improvement**

The Supplier shall continuously improve the effectiveness of the Quality Management System through the use of quality objectives, audit results, customer satisfaction data, analysis of internal data, corrective and preventive actions.

#### **8.5.2 Corrective Action**

The Supplier shall maintain a system to address corrective and preventive actions.

The Corrective and Preventive Action system shall:

- Review nonconformances
- Determine the cause of nonconformances
- Evaluate the need for action to ensure that nonconformances do not recur
- Determine the implementing action needed
- Document the results of the action taken
- Review the effectiveness of the corrective action taken
- Require Containment action where timely and/or effective corrective actions are not achieved
- Determine if additional nonconforming product exists based on the causes of the nonconformities and take further action when required

#### **8.5.3 Preventive Action**

The supplier shall determine action to eliminate the causes of potential nonconformities in order to prevent their occurrence. Preventive action shall be appropriate to the effects of the potential problems.