

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY  
DEPARTMENT OF QUALITY ASSURANCE

**QUALITY OVERSIGHT AUDIT REPORT**

AUDIT NO.:	CMA-072602-01	AUDIT DATES:	07/22/02 - 07/26/02
AUDITED PROGRAM:	Breda Overhaul Program	PROGRAM:	Contract FK 0154/TGB
AUDIT LOCATION:	Contractor's Hornell, NY Facility	PROJ / PROG MANAGER:	ENTS - Fred Brink
DATE OF AUDIT NOTIFICATION:	07/12/02	METHOD OF NOTIFICATION:	Email
ATTENDEES AT OPENING MEETING:	BAH ... [Redacted] - Lead Inspector	Alstom ... [Redacted] - Program Manager [Redacted] - Quality Manager [Redacted] - Lead Quality Inspector [Redacted] - Quality Inspector [Redacted] - Production Manager M [Redacted] - Manufacturing Supervisor	WMATA ... Barry McGuire - Lead Quality Auditor John Frye - Quality Auditor
ATTENDEES AT CLOSING MEETING:	BAH ... [Redacted] - Lead Inspector [Redacted] - Inspector	Alstom ... [Redacted] - Program Manager [Redacted] - Contract Administrator [Redacted] - Quality Manager [Redacted] - Site Quality Manager [Redacted] - Lead Quality Inspector [Redacted] - Manufacturing Supervisor	WMATA ... Barry McGuire - Lead Quality Auditor John Frye - Quality Auditor
STANDARD(S) AUDITED:	<ul style="list-style-type: none"> <li>▶ FTA QA/QC Guidelines.</li> <li>▶ WMATA's Contract FK 0154/TGB Technical Specifications.</li> <li>▶ WMATA's Breda Overhaul "Program Management Plan".</li> <li>▶ WMATA's Breda Overhaul "Quality Assurance Plan".</li> <li>▶ Contractor's "Quality Assurance Manual".</li> <li>▶ Contractor's "Program Quality Plan".</li> <li>▶ Contractor's "Material Review Board Plan".</li> <li>▶ ISO 9001 - 1994 Element(s) 1 - 15.</li> </ul>		

**SECTION I - AUDIT OBJECTIVE & SCOPE:**

The Department of Quality Assurance (QUAL) has completed an oversight audit of the Breda Overhaul Program to assess the program's compliance with the Federal Transit Administration's (FTA) fifteen (15) required quality elements as defined in FTA-MA-06-0189-92-1. The FTA's quality requirements correspond with WMATA's Program Management Plan and Program Quality Plan, and other supporting quality requirements listed in the "Standard(s) Audited" section above. Therefore, this audit designed to assess the Breda Overhaul Program's compliance with FTA requirements will also measure the total quality condition of the Program relevant to all supporting quality requirements.

This audit will identify procedures designed to fulfill quality system requirements and assess their implementation and effectiveness. Various auditing techniques will be employed including observations, interviews, and examination of quality records. This audit will provide the Authority with an objective assessment of the Program's compliance with FTA's fifteen (15) quality requirements, identifying nonconformances and recommending corrective actions as necessary.

The Breda Rail Car Overhaul Program is the single largest non-construction project in WMATA's history. Its engineering and quality assurance staffing requirements exceed that which can be supported by WMATA's existing in-house pool of qualified professionals. As a result, WMATA's Program Management (PM) has hired the consulting firm of Booze Allen & Hamilton (BAH) to assist with those requirements. WMATA's Department of Quality Assurance (QUAL) will provide quality oversight of the project to include audits of BAH and the Contractor's Quality System. This is the first such audit designed to assess how effectively these two groups have integrated their quality efforts.

This audit finds the Contractor's quality system is strong but would benefit from "project specific" improvements and additional supplier oversight. The Contractor's quality system provides for continuous quality improvement and outside auditing firms provide objective feedback that suggest that the overall system is effective. However, these audits are not project specific. It is in the best interest of both the Contractor and WMATA to have project specific audits developed, scheduled, and carried out.

The Contractor's supplier quality control efforts utilize qualification auditing and first article inspections (FAI). But their continued commitment to quality is not demonstrated through additional post FAI audits of their suppliers. 100% of FAIs are now completed and the Contractor has still not produced a schedule for supplier quality auditing.

On the WMATA Program Management side of the project we find that BAH has limited their quality efforts to loosely structured inspections with little documentation. BAH has no Project Quality Management System in place. This conflicts with the requirements of WMATA's Program Management Plan, WMATA's Quality Assurance Plan, and the FTA's QA/QC Guidelines upon which both Plans were based.

The BAH inspection team, consisting of a Lead and two other Inspectors, is in need of a "qualified" Quality Assurance Manager to develop a Quality Assurance System that will help organize, focus, and direct inspection and testing oversight efforts. That entire "Quality Team" must then have reporting responsibilities to WMATA's Department of Quality Assurance in accordance with Program Plans and FTA Guidelines.

Currently, Program Management assigns the BAH Lead Inspector to also carry out the duties of an On Site Engineer. This presents a quality system conflict. Engineering and Quality Assurance positions must be staffed with qualified personnel and work as a team but have separate reporting paths. This helps assure that quality is never compromised by production goals or delivery schedules.

As part of this audit QUAL inspected rail cars in various stages of the overhaul process. We found the Contractor is required to carry out portions of the overhaul in a manner that may have a negative effect on quality. These requirements were against the recommendations of the Contractor.

[REDACTED]

QUAL found deficiencies in WMATA's approach to quality management and believes time is of the essence to take appropriate corrective action. We believe successes in the project's quality thus far can be attributed in large part to the Contractor's commitment to quality and customer service.

[REDACTED]

SECTION III - FINDINGS:

- A WMATA Project Quality Manager has not been appointed to the Breda Rail Car Overhaul Program. This conflicts with the requirements of WMATA's Program Management Plan, WMATA's Quality Assurance Plan, and the FTA's QA/QC Guidelines upon which both Plans were based.
- The BAH Lead Inspector doubles as WMATA's On Site Engineer. This is a quality conflict. Engineering and Quality Assurance must have separate reporting paths so quality is never compromised by production goals or delivery schedules.  
WMATA QUAL Auditors asked who is acting as the WMATA engineering consultant when contract engineering issues arise, such as the replacement or re-use of HVAC tubing or increasing the size of the Huck Bolts on the end underframes. The answer was that [REDACTED] is tasked with making those decisions. Alstom was asked who they consult with if engineering decisions are to be made, their response was Mr. Hill. Therefore the statement that Mr. Hill is the on scene engineer for WMATA is not an opinion, it is supported by official response to QUAL Auditor questions.
- BAH quality representatives maintain no line of communication with WMATA's Manager of Quality Assurance. This conflicts with WMATA's Project Quality Assurance Plan.  
WMATA QUAL Auditors found no evidence of communication between on site BAH inspectors and WMATA Quality Management. No Organizational Charts were produced with even a dotted line reporting to WMATA QUAL, therefore the statement is accurate. Indeed no communication has been attempted or conducted prior to this Audit between the PM, BAH or Alstom with WMATA Quality. As of this writing, there are still no official Organization charts with this reporting responsibility noted.
- No project specific audits have been performed by either the Contractor or BAH.  
Alstom Quality performs audits of their contractors on a scheduled basis, however they do not perform Project specific audits for items being supplied for a specific contract
- No post FAI audits have been performed on suppliers by either the Contractor or BAH.  
WMATA QUAL Auditors asked for copies of any post FAI audits for this contract and were told that as of the time of this Audit, none had been done. The statement stands.
- BAH conducts loosely structured inspections with little documentation.  
At the time of this WMATA QUAL audit, documentation of inspections was confined to inspector notes in their personal files. No car specific sheets were being generated as is the standard in all rail car build or re-build contracts. BAH inspectors said they were restricted to doing joint hold point inspections with Alstom, and that Alstom documented the findings. WMATA QUAL's position is that BAH inspectors should write and document discrepancies as they are found, and that Alstom is required to address these findings prior to a hold point being passed. Based on this, the statement stands.
- BAH has never issued a Corrective Action Report to the Contractor. As a result, root cause and recurrence prevention steps are not formally documented.  
WMATA QUAL Auditors asked for CAR reports and were told that as of the time of this Audit, none had been written. The statement stands.
- BAH has no Master Audit Schedule.  
WMATA QUAL Auditors asked for a schedule of audits ( ref [REDACTED] ) and none were planned. The statement stands.
- The Contractor is being required to carry out portions of the overhaul in a manner that may have a negative effect on quality.  
On numerous occasions WMATA QUAL Auditors asked why certain contract specific items were not being done on the cars. For the purpose of this audit, only three areas will be discussed..  
The use of EMT conduit (which is not rated for outside use, or is not supplied with watertight connectors) instead

The above findings represent a breakdown in the quality management system. Therefore, the position of Project Quality Manager (PQM) should be filled in accordance with WMATA's Program Management Plan, WMATA's Quality Assurance Plan, and the FTA's QA/QC guidelines upon which both plans are based. The PQM should have reporting responsibilities to WMATA's Director of Quality Assurance (DQA). The PQM should draw direction from the DQA in developing and implementing an effective quality management system for the Breda Overhaul Program that integrates with the Contractors quality system.

**Audit Report Distribution:**

**SARP - Fred Goodine**

**RAIL - Lemuel Proctor  
Ben Baker**

**CENG - Patrick Porzillo  
Terry Consavage**

<b>LEAD AUDITOR SIGNATURE:</b>	<b>QUALITY DIRECTOR SIGNATURE:</b>	<b>PROGRAM MANGER SIGNATURE:</b>
QUAL - Barry McGuire	QUAL - Rich Buettner	ENTS - Fred Brink
<b>DATE:</b>	<b>DATE:</b>	<b>DATE:</b>

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY  
OFFICE OF QUALITY ASSURANCE

QUALITY AUDIT REPORT

AUDIT NO.	CMA001-29402	AUDIT DATES:	October 21 - 23, 2002
AUDITED PROGRAM:	2 & 3K Breda Rehabilitation Program	PROGRAM:	
AUDIT LOCATION:	ALSTOM Facility - Hornell, N.Y.	CMNT:	
DATE OF AUDIT NOTIFICATION:	October 16, 2002	METHOD OF NOTIFICATION:	E-mail
ATTENDEES AT OPENING MEETING:	Program Management [REDACTED]	WMATA John Frye Dave Morrow	
ATTENDEES AT CLOSING MEETING:	CMNT Kerry Hill Paul Eiben Fred Brink	WMATA John Frye Dave Morrow	
STANDARD(S) AUDITED:	Contract No. FK0154/TGB (Rev.04/02)		

**SECTION I - AUDIT OBJECTIVE & SCOPE:**

The Office of Quality Assurance (QUAL) will examine the 2 & 3K program documents authorizing deviations (waivers) from WMATA contractual requirements.

**SECTION II - EXECUTIVE SUMMARY:**

Following the review of the 2 & 3K Rehabilitation Inspection Report Log Open Item List, QUAL inspected both electronic and hard copy files for "Pilot" cars 3114/15. During the program document review, QUAL selected six (6) items that were found to be noncompliant with contract specifications. A search of documents associated with the "Pilot" cars produced no justification for deviating from contractual requirements.

The Office of Quality Assurance issued a request for the additional documents from the 2 & 3K Program Quality Manager through the Booze, Allen, Hamilton (BAH) contracted Program Manager, on 10/23/02. Documents presented to QUAL (Rational for WMATA allowing variance from contractual requirements), relative to our requests, specific to justifications for contract deviations, did not meet with the Breda Rehabilitation Program contract (FK0154/TGB) requirements found in *Section 1.3, Management Systems, page TP 1-17; under sub-section 1.3.4.4, Change Control; "This Specification identifies the procurement baseline for the transit vehicle. Changes to the procurement baseline shall be controlled by the processing of Engineering Change Proposals (ECPs).* QUAL received assurances from Program Management that additional supporting documentation (i.e., ECPs), addressing contract deviations, would be forthcoming. At the time of this report justification documents have not been received.

Additionally, QUAL requested wheel bearing and gearbox pressing records for the "Pilot" cars. A review of the pressing records indicated tracking and traceability issues due to the incorrect placement of the axle serial number and the axle heat number on the Mounting Record form. On one particular record, axle serial and heat numbers are crossed out and swapped. On another record, numbers appear to be swapped without an attempt to correct. Upon delivery of the "Pilot" cars, QUAL will examine the axles to determine the actual serial numbers.

Program Management was also asked to supply QUAL with a copy of planned Supplier audits. Mr. John Hare (TMSI) was assigned that responsibility and is currently assembling information for the 2 & 3 K Supplier audit schedule.

### SECTION III - FINDINGS:

- 1.) The 2 & 3K Program Management has not presented evidence of adherence to WMATA contract FK0154/TGB, Section 1.3, Management Systems, page TP 1-17; under sub-section 1.3.4.4, Change Control requirements. QUAL observed no documentation originating from the Contractor's organization (ALSTOM) requesting changes to the procurement baseline of the 2 & 3 K Series vehicle. Conversely, WMATA Program Management provided no documents describing the technical evaluations that were conducted which justified changes and granted approval for changes to contractual requirements.

Contract Refs.

Section 1.3, Management Systems, page TP 1-17; under sub-section 1.3.4.4, Change Control; "This Specification identifies the procurement baseline for the transit vehicle. Changes to the procurement baseline shall be controlled by the processing of Engineering Change Proposals (ECPs).

#### Noncompliant Conformed Specification Findings

Car # 3115

14-53 cc# 16.53 Raceways over filled per spec. 17.22. Full 40%.

Contract Refs.

Section 17, Material and Workmanship, page TP 17-48; under sub-section 17.22, Wireways; para. 7; "The sum of the cross-sectional areas of all conductors contained in any cross-section of a wireway shall not exceed 40% of the interior cross-section of the wireway."  
[Although wiring insulation is thicker, there are also concerns surrounding the amount of current carrying conductors in the wireway. Limited to 30. Reference 17.18.3.2].

Car # 3115

14-71 PB2 CC2, PA2 miss wired to connector

Contract Refs.

Section 17, Material and Workmanship, page TP 17-37; under sub-section 17.18.2 - , Wiring; para. 1; "All wiring shall be performed by qualified, experienced using appropriate tools .....attaching terminals, and other wire fabrication tasks."

Car # 3115

14-158 carbon steel p-clamps...do not conform to spec. 17.18 & 17.19

Contract Refs.

Section 17, Material and Workmanship, page TP 17-40; under sub-section 17.18.3.2, Wire Securement and Termination para. 7; "No wiring shall be secured directly to the car structure, equipment enclosures, or any metallic surface. Wiring securing devices shall be either completely non-metallic or metallic with a resilient, insulating member between the wiring and the metallic portion of the device."

Car # 3115

41.00.02 19 Couplers and fittings on conduit ....not same material

Contract Refs.

Section 17, Material and Workmanship, page TP 17-46; under sub-section 17.20 -17.20.1, Conduit - Types, para. 4;  
"Steel fittings shall be used to assemble steel conduit. Elbows, nipples, and couplings shall be made of the same grade of steel as that employed in the conduit. All fittings shall be treated, coated, and threaded according to the requirements for zinc-coated, rigid steel conduit and shall conform to Underwriters Laboratory Standard UL-6 Underwriters Laboratory Standard UL-6."

Car # 3114

21-6 Carbon steel p-clamps used to support conduit throughout U/C 17.18.3.3.

Contract Refs.

Section 17, Material and Workmanship, page TP 17-40; under sub-section 17.18.3.3.2, Wire Securement and Termination para. 7; "No wiring shall be secured directly to the car structure, equipment enclosures, or any metallic surface. Wiring securing devices shall be either completely non-metallic or metallic with a resilient, insulating member between the wiring and the metallic portion of the device."

Car # 3114

41.00.002 13 EMT vs. rigid conduit installed on car.

Contract Refs.

Section 17, Material and Workmanship, page TP 17-39; under sub-section 17.18.3.3, Wire and Cable Runs, para. 1;  
3<sup>rd</sup> sentence, "Wire ducts and conduits shall be of waterproof construction."  
Section 17, Material and Workmanship, page TP 17-46; under sub-section 17.20 -17.20.1, Conduit - Types para. 7;  
"All conduit and conduit couplings shall be of an ANSI-approved type. With the exception of truck areas, all conduit shall be of the Aluminum Association's recommended aluminum alloy or galvanized steel. Conduit installed on the trucks or in underfloor areas over the trucks shall be standard weight, galvanized steel with threaded fittings....."

Rigid aluminum conduit shall consist of seamless, rigid, aluminum alloy conforming to ANSI C-80.5ANSI C-80.5 and to the requirements of Underwriters Laboratory Standard UL-6Underwriters Laboratory Standard UL-6. All threads shall be covered with an oxidation-inhibiting compound. Aluminum fittings shall be used to assemble aluminum conduit and shall be made to the same grade and alloy as the conduit.

Steel conduit shall be mild steel in standard lengths with threaded ends and hot-dipped zinc-coated exterior and interior surfaces. It shall be free of burrs and projections, circular in cross-section, of uniform wall thickness and shall conform to the requirements of ANSI Standard C-80.1 ANSI Standard C-80.1. The threads per inch and length of threading shall conform to ANSI Standard B-20.1 ANSI Standard B-20.1 on Pipe Threads.

Steel fittings shall be used to assemble steel conduit. Elbows, nipples, and couplings shall be made of the same grade of steel as that employed in the conduit. All fittings shall be treated, coated, and threaded according to the requirements for zinc-coated, rigid steel conduit and shall conform to Underwriters laboratory Standard UL-6. Flexible conduit, if used, shall be watertight and interlocking steel strip-protected, with an approved rust resistive coating."

**SECTION IV - RECOMMENDATIONS:**

- Provide the WMATA Office of Quality Assurance with documentation allowing for variances from contractual requirements; along with any supporting documents attesting to each deviation's ability to meet or exceed the OEM or contract specification (technical evaluation). Furthermore, supporting documents must include ALSTOM's request for engineering changes to the procurement baseline of the 2 & 3 K Series vehicle.
- Strictly adhere to contract specifications. Where changes are expressed by the Contractor, WMATA Program Management must ensure that the Contractor:
  1. Follow mutually approved Engineering Change Proposal (ECP) performance requirements.
  2. Perform a total impact evaluation and submit findings to WMATA for review and approval.
  3. Provide WMATA with technical documentation used to evaluate the engineering change.
  4. [Upon WMATA approval] Revise configuration records and documents to identify engineering changes.
- Maintain records of Engineering Change Proposal requests from the Contractor and WMATA approval documents.

**SECTION V - FOLLOW UP**

The Office of Quality Assurance will continue to assess the Breda 2000/3000 Series Rehabilitation Program's ability to maintain acceptable industry overhaul standards and contractual performance requirements. Records of Engineering Change Proposals will be reviewed in 60 days.

**Audit Report Distribution:**

CENG - Fred Brink                      Rail - Lemuel Proctor                      CMNT - Ben Baker                      SARP - Fred Goodine  
 CENG - Patrick Porzillo                      CMNT - Kenneth Morford

<b>LEAD AUDITOR SIGNATURE:</b>  QUAL - John Frye <i>Original Signed By</i> _____	<b>QUALITY MANAGER SIGNATURE:</b>  QUAL - David A. Morrow <i>Original Signed By</i> _____	<b>DIRECTOR QUALITY ASSURANCE SIGNATURE:</b>  QUAL - Richard Buettner <i>Original Signed By</i> _____
<b>DATE:</b> 01/24/03	<b>DATE:</b> 01/24/03	<b>DATE:</b> 01/24/03