OUT-OF-SPECIFICATION INVESTIGATION REPORT

CONFIDENTIAL - QUALITY RECORDS

Field	Details
Investigation Number	**OOS-PAR-2026-0042**
Date Initiated	25-Feb-2026
Product Name	Paracetamol 500mg Tablets
Batch Number	P-BATCH-9988
Manufacturing Date	18-Feb-2026
Expiry Date	Feb-2028
Batch Size	500,000 tablets (250 kg)
Sample Type	Finished Product - Release Testing
Test Performed	Assay by HPLC (QC-SOP-PAR-001)
Analyst ID	Analyst 04 (Ms. Priya Verma)
HPLC System	HPLC #4 (Agilent 1260 Infinity II)

SECTION I: DETECTION AND INITIAL REPORTING

1.1 Description of OOS Event

During routine release testing of Batch P-BATCH-9988, the assay result for Paracetamol content by HPLC was determined to be **88.0%** of the labeled amount. This result falls below the acceptance criterion of 95.0% - 105.0% as specified in QC-SOP-PAR-001 and the British Pharmacopoeia monograph for Paracetamol Tablets.

Parameter	Specification	Observed Result	Status
Assay (Paracetamol)	95.0% - 105.0%	**88.0%**	**OOS - FAIL**

1.2 Initial Actions Taken

- Testing was immediately halted upon identification of the OOS result.
- Analyst 04 (Ms. Priya Verma) notified QC Supervisor 01 (Mr. Rajesh Kumar) within 15 minutes.
- All sample solutions, standard solutions, and HPLC vials were retained and secured (2-8°C).
- The remaining composite sample was secured under chain of custody.
- HPLC system #4 was placed on hold pending investigation review.
- OOS Notification Form (QC-FORM-OOS-01) was completed and submitted to QA.
- Batch P-BATCH-9988 was placed under QA HOLD status in the warehouse.

SECTION II: PHASE I - LABORATORY INVESTIGATION

A systematic benchtop audit was conducted by QC Supervisor 01 in the presence of Analyst 04 to identify any potential laboratory errors. The investigation followed QA-SOP-OOS-001.

2.1 Analyst Interview Summary

Analyst 04 was interviewed regarding the testing procedure. The analyst confirmed adherence to QC-SOP-PAR-001 throughout. No deviations from the standard procedure were reported.

2.2 Laboratory Investigation Checklist

Area	Item Checked	Finding	Status
Sample	Seal and container	Intact; no contamination observed	✓ OK
Sample	Storage conditions	Stored at controlled RT as per SOP	✓ OK
Glassware	Volumetric flask	100 mL Class A; Cal: 15-Sep-2025	✓ OK
Glassware	Pipette verification	Verified on 20-Feb-2026	✓ OK
Reagents	Methanol HPLC Grade	Batch #M12; Exp: 30-Jun-2027	✓ OK
Reagents	Mobile phase	Fresh prep 25-Feb-2026; pH verified	✓ OK
Standard	Paracetamol RS	USP RS Lot #R054820; Potency: 99.8%	✓ OK
Data	Integration	Default; no manual intervention	✓ OK
Data	Calculations	Manual verification matches LIMS	✓ OK
Instrument	HPLC qualification	Valid until 15-Aug-2026	✓ OK
Instrument	System suitability	TF: 1.4; Plates: 4521; RSD: 0.8%	✓ OK
Procedure	SOP compliance	QC-SOP-PAR-001 Rev 01 followed	✓ OK
Training	Analyst qualification	Trained and qualified 10-Jan-2026	✓ OK

PHASE I CONCLUSION: No assignable laboratory error identified. Root cause remains **UNKNOWN**. **RECOMMENDATION:** Proceed to Phase II.

SECTION III: PHASE II - MANUFACTURING INVESTIGATION

A cross-functional investigation team was assembled comprising QC, QA, Production, Engineering, and R&D; personnel for comprehensive manufacturing process review.

3.1 Investigation Team

Name	Department	Role
Dr. Ananya Sharma	Quality Control	Lead Investigator
Mr. Vikram Singh	Quality Assurance	Regulatory Compliance
Mr. Arun Mehta	Production	Manufacturing Review
Ms. Deepa Nair	Engineering	Equipment Investigation
Dr. Rahul Kapoor	R&D;	Technical Evaluation

3.2 Batch Manufacturing Record (BMR) Review

Step	Specification	Actual	Status
API Weight	125.00 kg ± 0.5%	125.02 kg	✓ Pass
Excipients	Per BOM	All within ± 1.0%	✓ Pass
Granulation Moisture	NMT 2.5%	1.8%	✓ Pass
Drying Time	30 minutes	30 minutes	✓ Pass
Blending Time	15 minutes	15 minutes	✓ Pass
Blender Speed	100 RPM	100 RPM	✓ Pass
Compression Force	15-20 kN	17.5 kN	✓ Pass

3.3 Equipment Investigation - V-Blender (BLD-02)

- **Visual Inspection:** Minor wear observed on agitator paddles (right side).
- **Maintenance Records:** Last PM on 15-Nov-2025 (overdue by 1 month).
- **Historical Data:** Two previous OOS results associated with BLD-02 in past 12 months.
- **CRITICAL FINDING:** A 'dead spot' identified in lower-left quadrant of blender drum.

3.4 Root Cause Analysis - 5 Whys

Level	Question	Answer
Why 1	Why was the assay result low?	Sample had lower Paracetamol content than average.
Why 2	Why did sample have lower content?	Sample taken from lower portion of blender discharge.
Why 3	Why was lower portion different?	Incomplete mixing caused non-uniform API distribution.
Why 4	Why was mixing incomplete?	Dead spot in V-Blender prevented adequate material movement.
Why 5	Why did the dead spot occur?	**ROOT CAUSE: Worn agitator + delayed PM.**

CONFIRMED ROOT CAUSE: Incomplete mixing due to mechanical dead spot in V-Blender (BLD-02) caused by worn agitator paddles and delayed preventive maintenance. This resulted in non-uniform API distribution, with sub-potent material discharged from lower blender portion.

SECTION IV: IMPACT ASSESSMENT

4.1 Risk Assessment

Risk Category	Assessment	Severity
Patient Safety	Sub-potent tablets may result in inadequate therapeutic effect	HIGH
Product Quality	Batch does not meet release specifications	HIGH
Other Batches	Review required for batches processed on BLD-02 since last PM	MEDIUM
Regulatory	Documentation required; no field alert (batch not released)	LOW

SECTION V: BATCH DISPOSITION

BATCH P-BATCH-9988 IS REJECTED

The batch shall be destroyed per SOP-WH-DEST-001. Destruction shall be witnessed by QA.

SECTION VI: CORRECTIVE AND PREVENTIVE ACTIONS (CAPA)

CAPA Reference: CAPA-2026-0089

#	Type	Description	Owner	Due Date
1	Corrective	Immediate maintenance of V-Blender BLD-02 agitator	Engineering	28-Feb-2026
2	Corrective	Review batches on BLD-02 since 15-Nov-2025	QC/QA	05-Mar-2026
3	Preventive	Revise SOP-MFG-05: increase blending to 20 min	Production	10-Mar-2026
4	Preventive	Conduct Blend Uniformity re-validation for BLD-02	R&D;/QA	30-Mar-2026
5	Preventive	Enhanced PM schedule with compliance tracking	Engineering	15-Mar-2026
6	Preventive	Add sampling stratification to QC-SOP-SAM-001	QC	20-Mar-2026

SECTION VII: INVESTIGATION CONCLUSION

This investigation conclusively determined that the OOS assay result (88.0%) for Batch P-BATCH-9988 was caused by incomplete mixing due to a mechanical failure (dead spot) in the V-Blender (BLD-02). Investigation conducted per 21 CFR 211.192 and FDA guidance. Batch rejected and will be destroyed. CAPAs initiated. Investigation status: **CLOSED**.

INVESTIGATION APPROVAL

Role	Name	Signature	Date
Prepared By	Mr. Rajesh Kumar (QC Supervisor)		25-Feb-2026
Reviewed By	Dr. Ananya Sharma (QC Manager)		25-Feb-2026

Mfg. Review	Mr. Arun Mehta (Production Mgr)		25-Feb-2026
Final Approval	Mr. Vikram Singh (QA Manager)		25-Feb-2026

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