CASE STUDY

Media Filter Audit, Re-Bedding, & Performance Recovery

Prepared by Sepratech | 2026

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Horizontal Filters Audited	Filter Successfully Re-Bedded (A)	Filters Pending Re-Bed (B, C, D)

1. Background & Scope of Work

A Louisiana facility operates four horizontal pressure media filters as part of the water treatment unit, each designed to treat up to 1,367gpm of service flow. The facility contacted Sepratech after experiencing higher than expected turbidity levels in the filtered water outlet, impacting overall water treatment performance.

Sepratech was engaged to perform a comprehensive site audit of all four filters, identify root causes, and develop a remediation plan. Following the audit, Sepratech executed a full media re-bed on Filter A (the most severely impacted unit) and witnessed the initial backwash. The findings from Filter A directly inform the planned re-bed scope for Filters B, C, and D.

Phase 1 – Site Audit (All Filters)	Phase 2 – Filter A Re-Bed (Completed)
• Observed backwash sequence on all 4 filters	• Full media removal using vacuum equipment
• Measured inlet/outlet turbidity under service flow	• Lateral removal, off-site cleaning, reinstallation
• Inspected sight glasses and media bed levels	• Vessel internal inspection
• Identified root cause of media loss	• New media recipe loaded (added garnet layer)
• Documented mechanical deficiencies per filter	• Witnessed initial backwash and rinse sequence

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2. Site Audit Findings – All Filters

Sepratech conducted a detailed backwash sequence observation and performance review for each filter during the site audit. The following summarizes key findings across all four units.

2.1 Performance Overview

Filter	Service Flow	Inlet Turbidity	Outlet Turbidity	Turbidity Reduction	Diff. Pressure	Status
Filter A	~980 gpm	0.75 NTU	**0.92 NTU**	**No reduction**	0.16 psi	**CRITICAL – Re-Bedded**
Filter B	~1,035 gpm	0.83 NTU	0.40 NTU	~52% reduction	1.5 psi	**Action Required**
Filter C	~1,030 gpm	0.82 NTU	0.46 NTU	~44% reduction	1.3 psi	**Action Required**
Filter D	~1,000 gpm	0.85 NTU	0.37 NTU	~56% reduction	1.9 psi	**Action Required**

KEY FINDING *Filter A was the only filter producing outlet turbidity higher than its inlet — a direct result of severely depleted media allowing unfiltered water to bypass the media bed entirely. Filters B, C, and D, while performing better than A, are all operating below design specifications due to low media levels and mechanical deficiencies.*

2.2 Systematic Issues Identified Across All Filters

The site audit revealed that all four filters share a common set of mechanical and operational deficiencies. The issues below were observed on every unit:

Issue	Observation	Impact	Recommendation
Low Media Bed Levels	Bottom header visible in Filter A; bed depth below design spec on B, C, D	Reduced filtration depth; potential media bypass	Full media change-out on each filter
Air Scour Inlet Valves (2009A–D)	All four valves seating hard; slow/delayed opening	Air scour may start inconsistently; potential for air scour to be missed	Replace all four air scour inlet valves
Drain Down Too Short (10 min)	Water within 1" of top header after 10 min on Filter A	Air scour drives media into top header and waste sump	Extend drain down to >15 minutes on all filters
Fill Step Too Short (3 min)	Filters B, C, D did not fully displace air; vent manually opened	Air pockets reduce backwash efficiency	Extend fill step to 5 minutes per design spec
Fast Rinse Too Short (3 min)	Outlet turbidity still elevated at end of rinse on all filters	Elevated turbidity passed to common filtrate header	Extend rinse to 5 minutes per original design spec
Pressure Gauges Non-Functional	Local inlet gauges not working on A & D; neither gauge functional on C	Cannot accurately monitor differential pressure locally	Replace all local inlet/outlet gauges; 0–100 psi range

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3. Filter A – Root Cause Analysis

Filter A was identified during the audit as the most severely impacted filter. The media level had dropped so critically low that the bottom laterals were visible from the top sight glass. Under normal conditions, the header should be fully covered by media.

3.1 What Was Observed

- During the drain down step, the bottom header was clearly visible from the top sight glass — under normal conditions, the header should be fully covered by media.
- Media was found in the waste sump. Plant personnel confirmed the sump had been cleaned prior to a previous media addition, indicating the sump media likely originated from Filter A.
- Filter A was producing outlet turbidity of 0.92–0.98 NTU against an inlet of 0.72–0.78 NTU.
- Differential pressure across Filter A was only 0.16 psi, far below Filters B–D (1.3–1.9 psi). This low DP is consistent with having very little filter media.

3.2 Root Cause: Air Scour with Insufficient Drain Down

After reviewing the audit observations, backwash sequence timing, and internal inspection findings, Sepratech identified the root cause of Filter A's media loss:

ROOT CAUSE	*The air scour step was initiated while the water level inside the vessel was too high. With insufficient drain down time, the water level remained too near to the top of the inlet header. When air scour was applied, the turbulent action drove media upward into the top inlet header. The subsequent backwash step then flushed the captured media from the header into the waste sump. This cycle repeated over time, progressively depleting the media bed.*

This finding was further supported by the condition of the bottom laterals. When Sepratech removed the wedge wire screened laterals during the re-bed, they were inspected and found to have no defects. A faulty lateral assembly would have been the other likely cause of media loss — its intact condition confirmed the top-header mechanism as the primary route of media loss.

IMPORTANT NOTE	*The media loss mechanism identified in Filter A is not unique to this unit. All four filters share the same design, the same backwash sequence timing, and the same slow-opening air scour valves. Filters B, C, and D show low media levels consistent with partial media loss through the same mechanism, making re-bedding all remaining filters a priority.*

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4. Filter A – Re-Bed & Performance Recovery

Following the site audit, Sepratech performed a full media replacement on Filter A. The scope included media removal, lateral inspection and cleaning, vessel inspection, and loading of an improved media recipe designed to enhance filtration performance.

4.1 Media Removal & Internal Inspection

- Sepratech mobilized vacuum equipment to remove all spent media from the vessel.
- Bottom wedge wire screen laterals were removed for off-site cleaning at Sepratech's shop; pressure washed to remove surface contaminants.
- Upon inspection, the wedge wire screen laterals showed no defects — confirming media loss was not caused by lateral failure.
- The inlet and outlet headers were inspected and found to have no defects.
- Following cleaning, laterals were returned to the facility, reinstalled, and a final inspection of all vessel internals was completed prior to media loading.

4.2 Improved Media Recipe – Addition of Garnet Layer

Sepratech modified the original media recipe for Filter A by introducing a 50 mesh garnet layer between the sand and the fine gravel. This provides a tighter filtration pore size, improving particle removal capability. To accommodate the garnet layer, an equivalent volume was removed from the anthracite layer.

Layer	Previous Media Recipe	Layer	New Media Recipe (Installed)
1st	203 ft^3 of 1.5" x 3/4" Gravel	1st	203 ft^3 of 1.5" x 3/4" Gravel
2nd	101 ft^3 of 3/4" x 1/2" Gravel	2nd	101 ft^3 of 3/4" x 1/2" Gravel
3rd	101 ft^3 of 1/2" x 1/4" Gravel	3rd	101 ft^3 of 1/2" x 1/4" Gravel
4th	101 ft^3 of 1/4" x 1/8" Gravel	4th	101 ft^3 of 1/4" x 1/8" Gravel
5th	101 ft^3 of #6 x #12 Gravel	5th	101 ft^3 of #6 x #12 Gravel
—	(no garnet layer)	**6th ★ NEW**	**101 ft^3 of 50 Mesh Garnet — added for enhanced particle removal**
6th	375 ft^3 of 20 x 40 Sand	7th	375 ft^3 of 20 x 40 Sand
7th	657 ft^3 of 0.85-0.95mm Anthracite	8th	557 ft^3 of 0.85-0.95mm Anthracite (reduced by 100 ft^3)

Each layer was loaded individually using bulk bags and a crane, with every layer manually leveled before loading the next. The facility was advised to soak the media for a minimum of 24 hours prior to the initial backwash.

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4.3 Initial Backwash Results

Sepratech personnel were present for the initial backwash following the 24-hour soak period:

Backwash Step	Duration	Key Observations & Results
Drain Down	~22 minutes	Extended time required to achieve >12" air space below top header. Recommended monitoring and adjusting over next several backwash cycles as media settles.
Air Scour	Not initiated	Intentionally skipped during initial backwash to protect the freshly loaded media bed.
Backwash	~2x normal duration	Backwash discharge reached ~24 NTU. Feed water turbidity was <1 NTU. Extended duration used to ensure thorough initial rinse of the new media.
Fast Rinse	5 minutes	Filter effluent turbidity reached ~12 NTU. Plant personnel advised to complete additional rinse cycles.
Final Result	N/A	Plant personnel completed subsequent rinse cycles until filter effluent turbidity reached the targeted specification for return to service.

RESULT *Filter A was successfully returned to service following the re-bed and initial backwash sequence. The new media recipe, combined with corrected backwash timing (extended drain down), positions Filter A to perform at or above its original design specification.*

5. Filters B, C & D – Current Status & Findings

While all three remaining filters are currently performing better than the pre-remediation state of Filter A, each shares the same root cause of media loss and several common mechanical deficiencies.

5.1 Filter B

Service Flow	~1,035 gpm	**Backwash Outlet (start)**	214 NTU
Differential Pressure	1.5 psi	**Backwash Outlet (end)**	23 NTU (~89% reduction)
Inlet Turbidity (avg)	0.83 NTU	**Fast Rinse Outlet (final)**	4.1 NTU
Outlet Turbidity (avg)	0.40 NTU	**Turbidity Reduction**	~52%

- Air scour inlet valve is seating hard and delayed in opening — replacement required.
- Fill step (3 min) did not fully displace air from vessel. Extend to 5 minutes.
- Drain down at approximately halfway up upper sight glass at 10-minute mark. Recommend extending to 15 minutes.
- Final rinse turbidity of 4.1 NTU — additional rinse time would be beneficial.

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5.2 Filter C

Service Flow	~1,030 gpm	**Backwash Outlet (start)**	222 NTU
Differential Pressure	1.3 psi	**Backwash Outlet (end)**	34 NTU (~85% reduction)
Inlet Turbidity (avg)	0.82 NTU	**Fast Rinse Outlet (final)**	11.8 NTU
Outlet Turbidity (avg)	0.46 NTU	**Turbidity Reduction**	~44%

- Air scour inlet valve is seating hard and delayed in opening — replacement required.
- Fill step (3 min) did not fully displace air from vessel. Extend to 5 minutes.
- Drain down at approximately 2/3 up upper sight glass at 10-minute mark. Recommend extending to 15 minutes.
- Final rinse turbidity of 11.8 NTU
- Neither local pressure gauge was functional — both require replacement.

5.3 Filter D

Service Flow	~1,000 gpm	**Backwash Outlet (start)**	185 NTU
Differential Pressure	1.9 psi	**Backwash Outlet (end)**	19 NTU (~90% reduction)
Inlet Turbidity (avg)	0.85 NTU	**Fast Rinse**	Unreliable – outlet valve poor flow
Outlet Turbidity (avg)	0.37 NTU	**Turbidity Reduction**	~56%

- Air scour inlet valve is seating hard and delayed in opening — replacement required.
- Fill step (3 min) did not fully displace air from vessel. Extend to 5 minutes.
- Drain down at approximately 2/3 up upper sight glass at 10-minute mark; dropped to ~8" below top header at 15 minutes. Maintain 15-minute drain down.
- Outlet sample valve on Filter D does not flow adequately — representative rinse turbidity could not be obtained. Replace outlet sample valve.
- Local inlet pressure gauge does not function. Outlet gauge showed 30 psi — both gauges require replacement.

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6. Path Forward – Re-Bedding Filters B, C & D

The successful re-bed of Filter A has validated Sepratech's approach and confirmed the media recipe modification. Sepratech recommended proceeding with full media change-outs on Filters B, C, and D following the same proven process.

6.1 Recommended Re-Bed Scope (Per Filter)

Activity	Description
Media Removal	Full media vacuum removal from vessel
Lateral Removal & Cleaning	Remove wedge wire screen laterals; off-site pressure wash at Sepratech shop; inspect for defects
Vessel Internal Inspection	Inspect header, laterals, and vessel internals for wear, damage, or corrosion
New Media Loading	Load improved 8-layer media recipe (including garnet layer) per Filter A recipe
Witness Initial Backwash	Plant personnel closely monitor initial backwash; verify drain down time, monitor turbidity reduction

6.2 Recommended Operational Changes (All Filters)

The following operational changes should be implemented on all filters to prevent recurrence and optimize backwash performance:

Parameter	Current	Recommended	Reason
Drain Down Step	10 min	15-20 min	Ensure sufficient water level drop before air scour to prevent media from being driven into top header
Fill Step	3 min	5 min	Ensure full air displacement from vessel before backwash; confirm by water exiting vent line
Fast Rinse Step	3 min	5 min	Allow filter effluent turbidity to fully recover to spec before returning to service
Air Scour Valves	All sticky/slow	Replace all four	Reliable valve actuation is critical to consistent air scour timing
Pressure Gauges	Multiple non-functional	Replace all; 0–100 psi	Accurate local DP monitoring needed for day-to-day oversight
Filter D Outlet Sample Valve	Poor flow	Replace valve	Representative rinse turbidity sampling is required to verify filter performance
Common Outlet Turbidimeter	Not installed	Install downstream of filters	Real-time turbidity monitoring across all four filters

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7. Summary

The media filters were experiencing higher-than-expected outlet turbidity as a result of media loss, mechanical deficiencies, and suboptimal backwash sequencing. Sepratech's site audit identified a clear root cause: air scour being initiated with insufficient drain down time was progressively driving media into the top header and flushing it into the waste sump.

Filter A — the most critically impacted unit — was successfully re-bedded using an improved 8-layer media recipe that introduced a 50 mesh garnet layer for enhanced particle removal. Backwash results confirm the filter is on track to meet design performance specifications.

The same issues driving Filter A's media loss are present — to varying degrees — in Filters B, C, and D. Proceeding with re-beds on the remaining three filters, combined with the operational changes outlined in this report, will restore all four units to full design performance and prevent recurrence.

Filter	Pre-Audit Condition	Action Taken	Next Step
Filter A	Critical – outlet turbidity higher than inlet; bottom laterals visible; near-zero media remaining	**Full media re-bed completed with improved 8-layer recipe (incl. garnet); initial backwash witnessed**	Implement operational timing changes; replace pressure gauges & air scour valve
Filter B	Partial media loss; below design bed depth; multiple mechanical deficiencies	Site audit completed; issues documented; filter remains in service pending re-bed	**Full media re-bed per Filter A scope; implement all operational changes**
Filter C	Partial media loss; below design bed depth; multiple mechanical deficiencies	Site audit completed; issues documented; filter remains in service pending re-bed	**Full media re-bed per Filter A scope; implement all operational changes**
Filter D	Partial media loss; below design bed depth; multiple mechanical deficiencies	Site audit completed; issues documented; filter remains in service pending re-bed	**Full media re-bed per Filter A scope; implement all operational changes**

Sepratech is committed to supporting the facility through the re-bed of Filters B, C, and D, applying the same proven approach used successfully on Filter A.

For questions or to schedule upcoming filter work, please contact your Sepratech representative.

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