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Water Quality Management during Sediment Remediation at a Former Wood Treatment Facility

WEDA Pacific Chapter Meeting

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Wesley Thomas, P.E.
Genevieve Magdziuk
Barbara Orchard Aragon, P.E.
Daniel Bonner, P.E.

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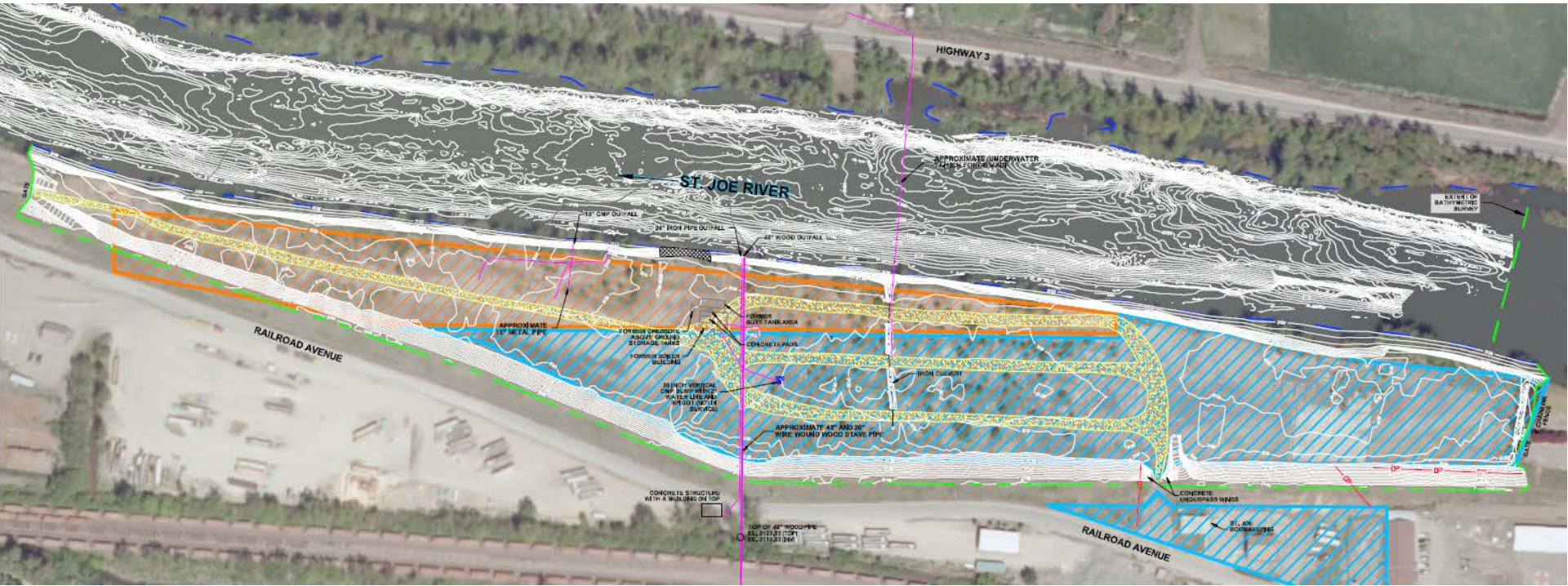
Presentation Outline

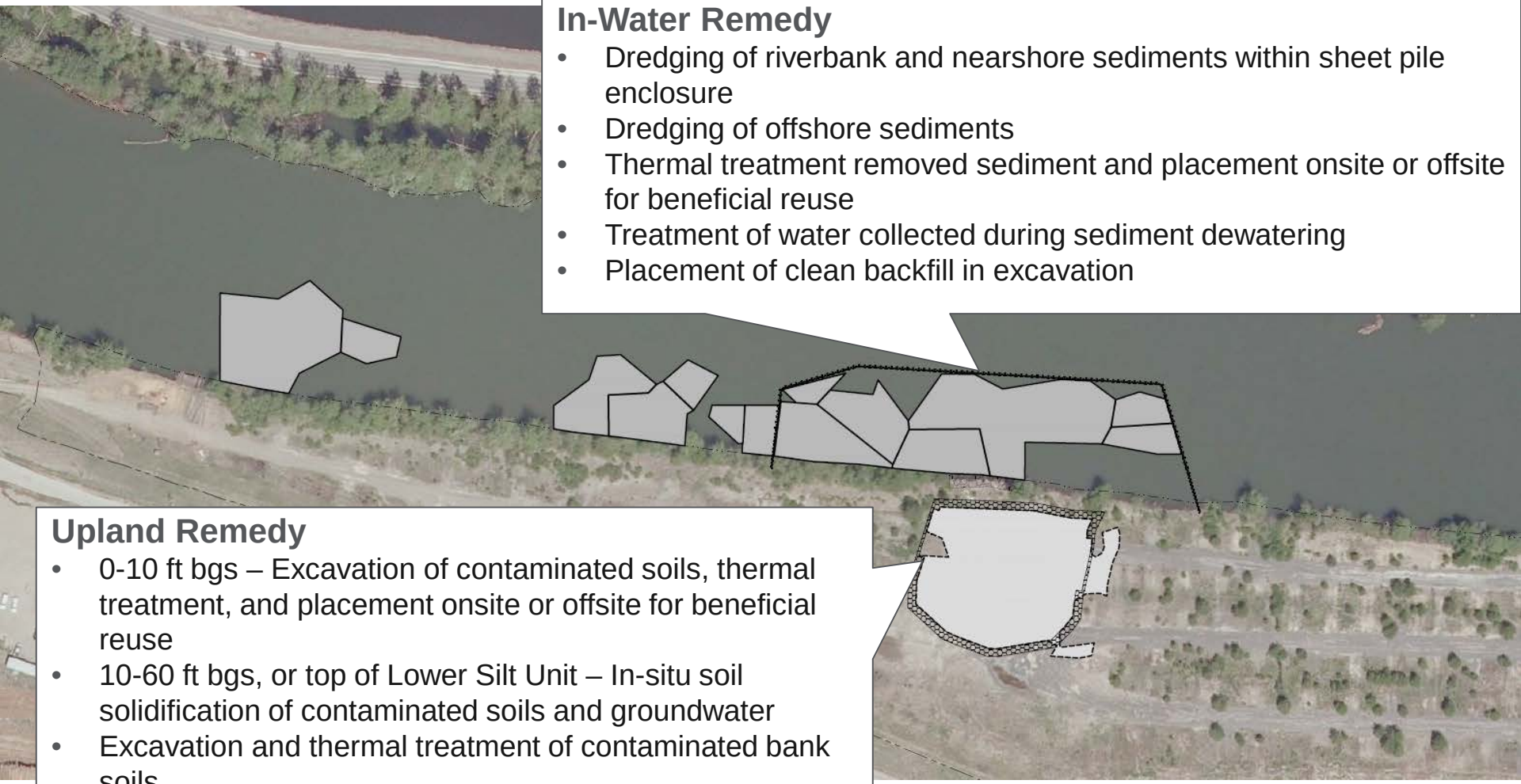
1. Site Background and Summary of Remedial Action
2. Water Quality Criteria
3. Water Quality Management Approach
4. Water Quality Results and Monitoring Modifications
5. Outcomes

Site Background

- **Late 1930s to 1960**: Operated as wood treating facility
- **1965 to April 2003:** Operated as pole storage, peeling, and sorting facility
- **Dec 1998:** Sheen on riverbank and in River
- **Feb 1999:** Removal of bank material
- **Jul 2007:** Record of Decision (ROD) provided by USEPA
- **2010 to May 2015:** Pre-Design Investigations and Remedial Design
- **2014 to Present:** Remedial Construction



Summary of Remedial Action



In-Water Remedy

- Dredging of riverbank and nearshore sediments within sheet pile enclosure
- Dredging of offshore sediments
- Thermal treatment removed sediment and placement onsite or offsite for beneficial reuse
- Treatment of water collected during sediment dewatering
- Placement of clean backfill in excavation

Upland Remedy

- 0-10 ft bgs – Excavation of contaminated soils, thermal treatment, and placement onsite or offsite for beneficial reuse
- 10-60 ft bgs, or top of Lower Silt Unit – In-situ soil solidification of contaminated soils and groundwater
- Excavation and thermal treatment of contaminated bank soils
- Treatment of groundwater and stormwater water collected during the upland and bank soil excavation

Water Quality Criteria

Parameter	Requirement
Turbidity	5 NTU above background when background is less than 50 NTU; or 10% above background
Temperature	0.3° C above background when water temperature is below 16° C
Dissolved Oxygen	0.2 mg/L below background when temperature is above 16° C; or when temperature is below 16° C and background DO is above 8.0, mg/L
pH	Must range between 6.5 and 8.5

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Water Quality Management Approach

Real-time Water Quality Monitoring

- Solar-powered monitoring buoys
- Data uploaded to a data management interface via telemetry every 10 minutes
- Office-based data management

Frequent visual observations

- On-site biologist to observe sheen, turbidity, floating debris, and impacted wildlife
- Frequent calibration checks and manual water quality measurements

Adaptive Management

- Ongoing engagement and discussions with agencies regarding expected turbidity
- Working with Tribal biologists to modify water quality monitoring program based on results from previous phases
- Collaboration between contractors, CQA monitors, and engineering team to facilitate monitoring

Construction Water Quality Monitoring Locations

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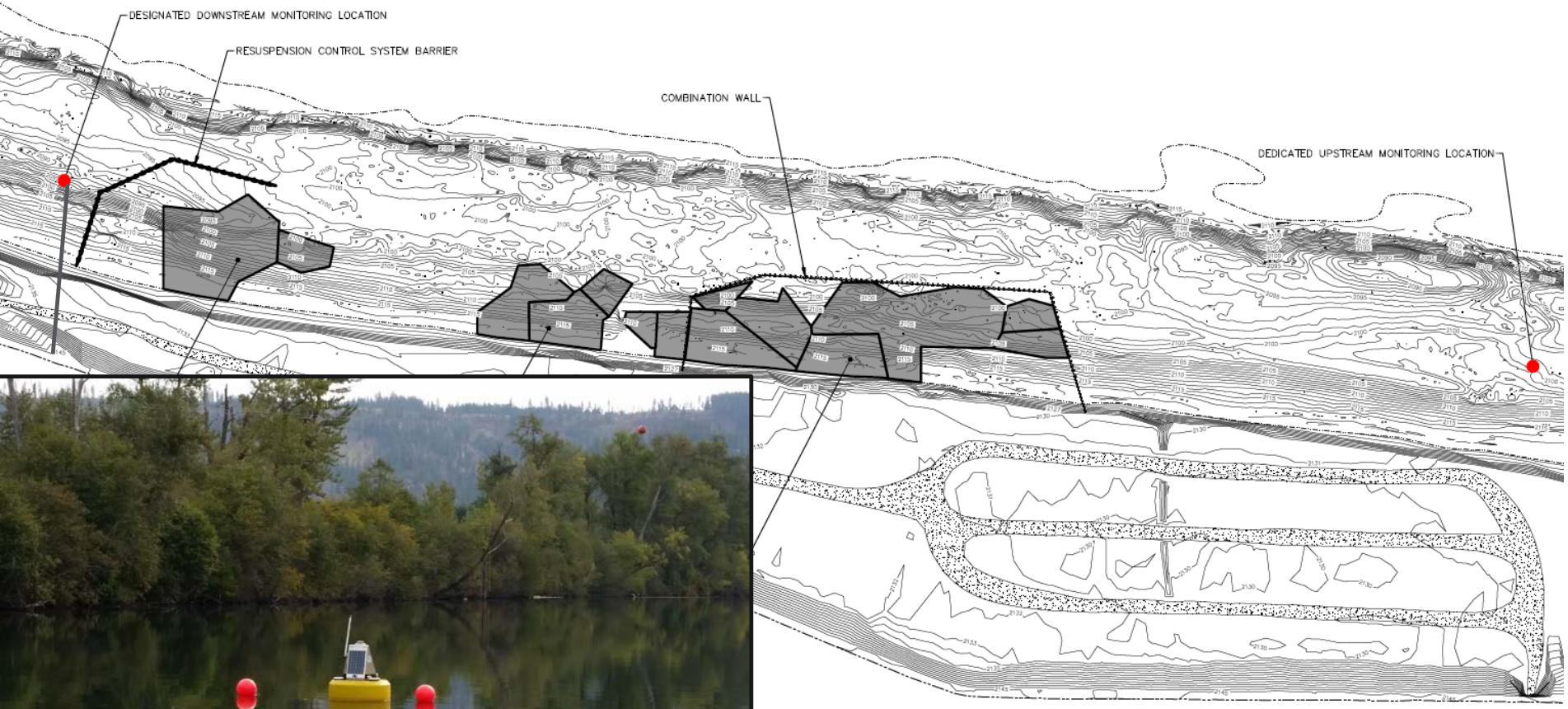


Water Quality Actions

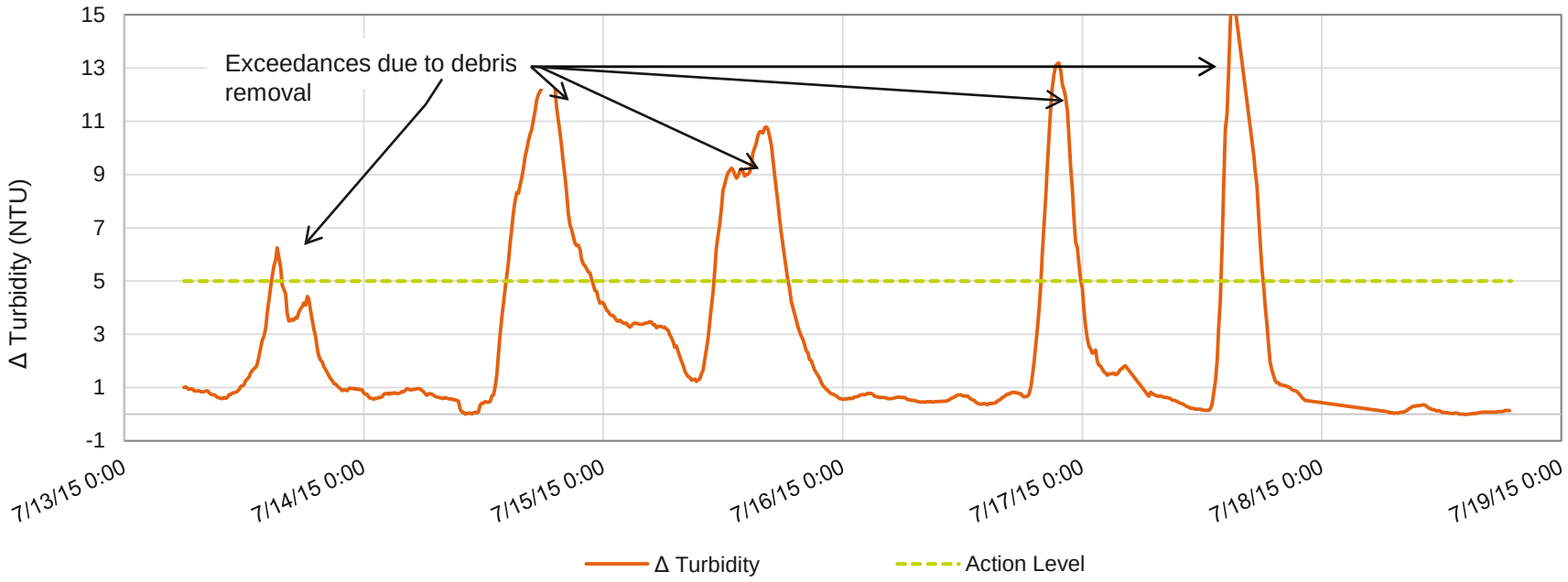
First Exceedance	Exceedance observed 2 hours after first exceedance	Exceedance observed at downriver monitoring point 4 hours after second exceedance
Operational BMPs will be modified or implemented and monitoring will continue every two hours	Engineering BMP will be modified or implemented and monitoring will continue every two hours. An additional monitoring station 500 ft downriver will be added	Shut down in-water work for 12 hours, or until water quality criteria are met at downriver monitoring point for 2 hours, whichever occurs first

Anticipated Water Quality Management Challenges

- Natural fluctuations of water quality parameters between background and downriver locations, especially prominent during rain events
- City stormwater discharge within the work area.
- The municipal wastewater treatment plant discharge located across the river from the work area.
- Seasonal lake influence resulting in anoxic conditions in deeper water
- Published monitoring equipment (YSI 6920) accuracy range:
  - Temperature: ±0.15° C (range of 0.3° C)
  - pH: ±0.2 unit (range of 0.4 unit)
  - DO: ±0.1 mg/L (range of 0.2 mg/L)
  - Turbidity: ±2% or ±0.3 NTU, whichever is greater (minimum range of 0.6 NTU).

2015 Construction Water Quality Results

- Water quality monitoring required for enclosure installation and debris removal
- Debris removal resulted in daily turbidity exceedances
- Turbidity exceedances occurred late in the work day, and water quality recovered overnight, so no work shut downs were required

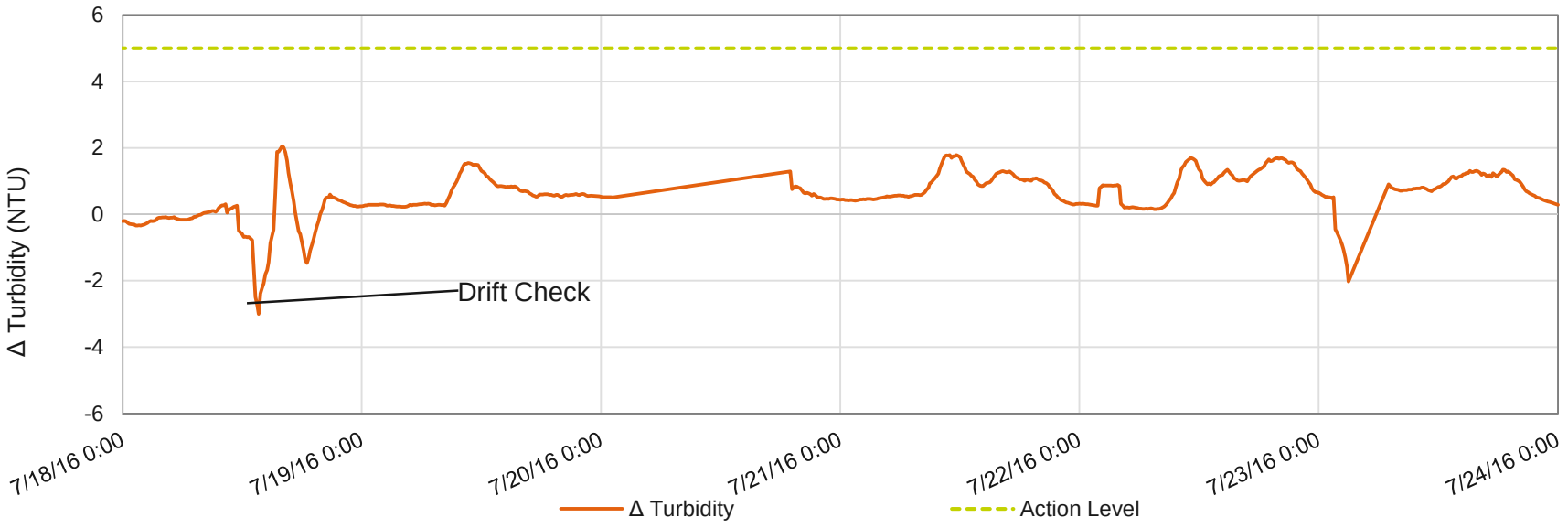


Modification of Water Quality Monitoring Program

- Based on 2015 turbidity measurements, there was a significant potential for work stoppages and slow downs for the planned 2016 work
- Arcadis worked with USEPA and the Tribe to modify the monitoring requirements
- The modifications included:
  - Moving the downriver monitoring location from 150 ft downriver to 850 ft downriver based on water quality modeling
  - Averaging of measured turbidity from various depths
  - Suspending DO and Temperature requirements during anoxic conditions

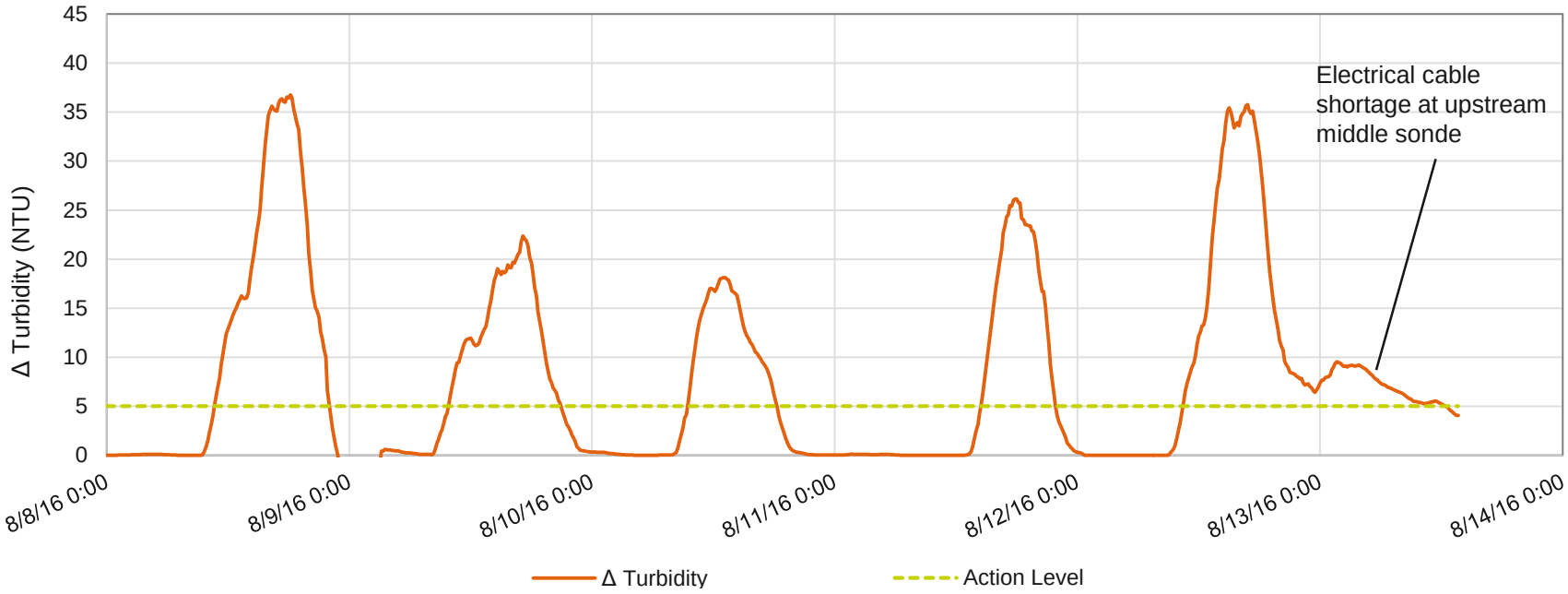
2016 Dredging Water Quality Results

- Adaptive management approach successful
- No water quality exceedances or resulting shut downs



2016 Backfilling Water Quality Results

- Suspended solids modeling results not representative of backfill material
- Specified backfill included fines (up to 35% passing the #200 screen)
- Work hours generally restricted to 6-8 hours per day



Outcomes

- In water work performed in 2015 and 2016 were completed on schedule, with relatively few work stoppages
- Met permit and regulatory requirements for the work, including reducing potential impacts to sensitive receptor species
- Effective real-time water quality monitoring and management practices, including close collaboration between field and engineering teams lead to timely implementation of best management practices

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Questions?