Tittabawassee River and Floodplain Cleanup

June 15, 2

Tittabawassee & Saginaw River & Floodplain

Project Team

Site Overview

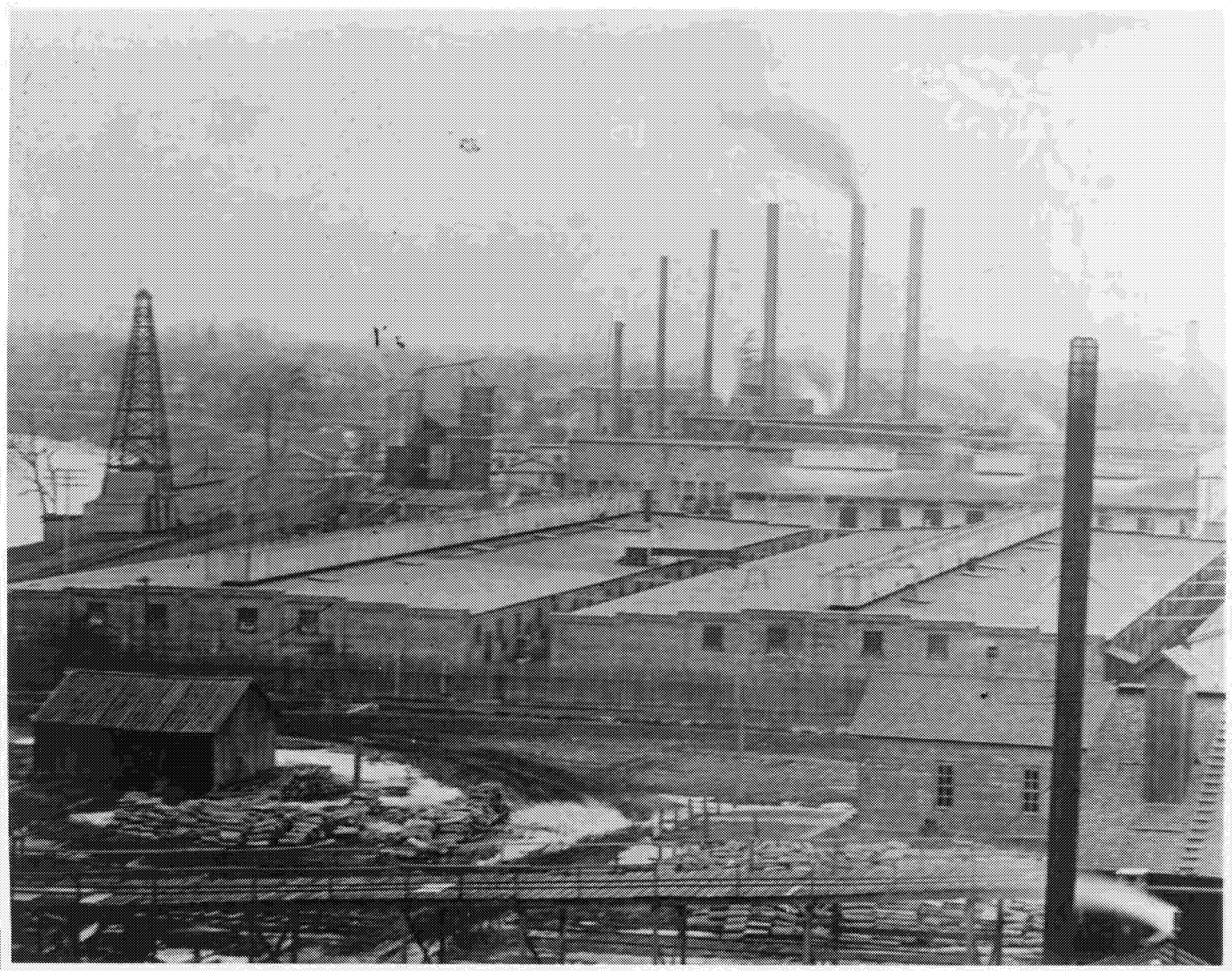
- Defined as: Tittabawassee River and its floodplain, Saginaw River and its floodplain, and portions of Saginaw Bay
  - Tittabawassee River & Banks - 24 miles
  - Tittabawassee River Floodplain - ~4,500 acres
  - Saginaw River - 22 miles
- Primary constituent of concern: furans (a chemical in the dioxin family)

Site Map

Dow Plant
Image Landsat / Copernicus
Image NOAA
Google Earth
Imagery Date: 6/28/2016 43°29'44.55" N 84°00'14.63" W elev 613 ft eye alt 19.96 mi

Background

- Early 1900's, is when the furans were released to the river
- Dow's early manufacturing used an electrolysis process to produce bleaching powders and bromides
  - **Electric current** was used to initiate a chemical reaction
  - **Graphitic carbon anodes/rods** were used to introduce the electric current
- Facility started with 9 bromine cells and grew to 16 cell buildings with 2 million graphitic carbon anodes by 1913



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Background

- The tar binding agent in the graphitic carbon contained **furans**
- Small particles of the graphitic carbon would flake off and settle in the cells, requiring frequent cleaning
- Prior to the construction of Waste Management Ponds around 1920, the solids were washed to the Tittabawassee River
- Furans were primarily discharged to the river prior to the 1920's

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Extensive Investigation Activities

- Essential to understand where contamination was and where it wasn't
- From 2006 to 2009:
  - 10,000 samples floodplain and bank soils
  - 8,000 samples of in-channel sediments
- Since 2010, over 1,000 samples have been collected to inform remedy selection and design

Dow Plant
Image Landsat / Copernicus
Image NOAA
Google Earth
Imagery Date: 6/28/2016 43°29'44.55" N 84°00'14.63" W elev 613 ft eye alt 19.96 mi

Critical Elements for Success:

- Early Cleanup Process
- Collaboration
- Adaptive Management
- Innovative and Sustainable Approaches
- Community Engagement

Early Cleanup Process

- Superfund Alternative Process
- Early clean-up approach
- Prioritized, targeted cleanup actions
- Residual risk assessment to come later
  - Element of risk for Dow

Collaboration with EPA and MDEQ

- Pragmatic and flexible approach by EPA, MDEQ and Dow teams
- Strong commitment to the process
  - Work in real time
  - Face-to-face monthly meetings
  - Common goal to meet the aggressive timeline
  - Over 250 major documents submitted to Agencies, that require review and approval

Adaptive Management Approach

- Learn by doing and improvement as you go along
  - Numerous pilot trials of remedies
  - Lessons learned in one phase of the cleanup inform the next
  - Facilitates continuous improvement and innovation
  - Results in faster and more effective cleanups

Innovative and Sustainable Approaches

- Cleanup designed specifically for the characteristics of the Tittawassee River
- Development of technologies and specialized equipment for remedy implementation
- Used green technologies to minimize impact
  - DNAPL removal – 4,500 gallons removed without any environmental releases or worker exposures
  - Natural capping utilizing Geoweb technology
  - Bank stability using green bioengineering techniques

Community Engagement

- Extensive outreach to property owners and community
  - EPA Information Sessions
  - Public Meetings
  - Community Advisory Group (CAG)
- Ongoing communications with property owners on all project stages and activities

Aggressive Timeline

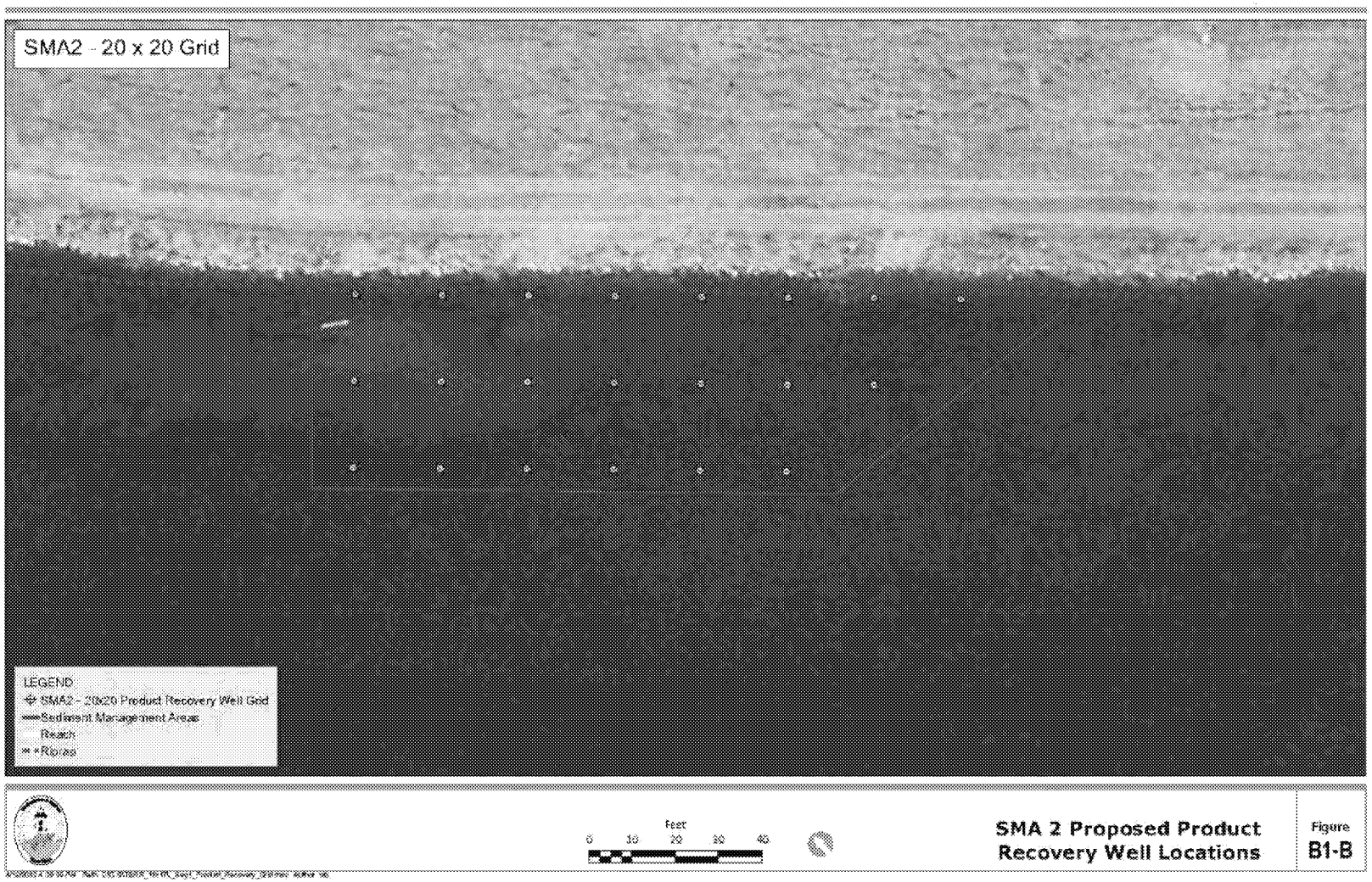
- Following the EPA's systematic process, working from upstream to downstream
  - AOC signed in 2010; work began same year
  - Currently working on Segment 4
  - Expect to complete Tittabawassee River and floodplain work in 2020
  - Saginaw River efforts will begin prior to 2020
- Would not be this far along with traditional approaches
- Need to continue on path with EPA

Implementation

Examples of Remedy Implementation Activities

DNAPL Removal

SMA 1-2 Initial Recovery Well Locations



06. 19. 2012

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Bank Removal

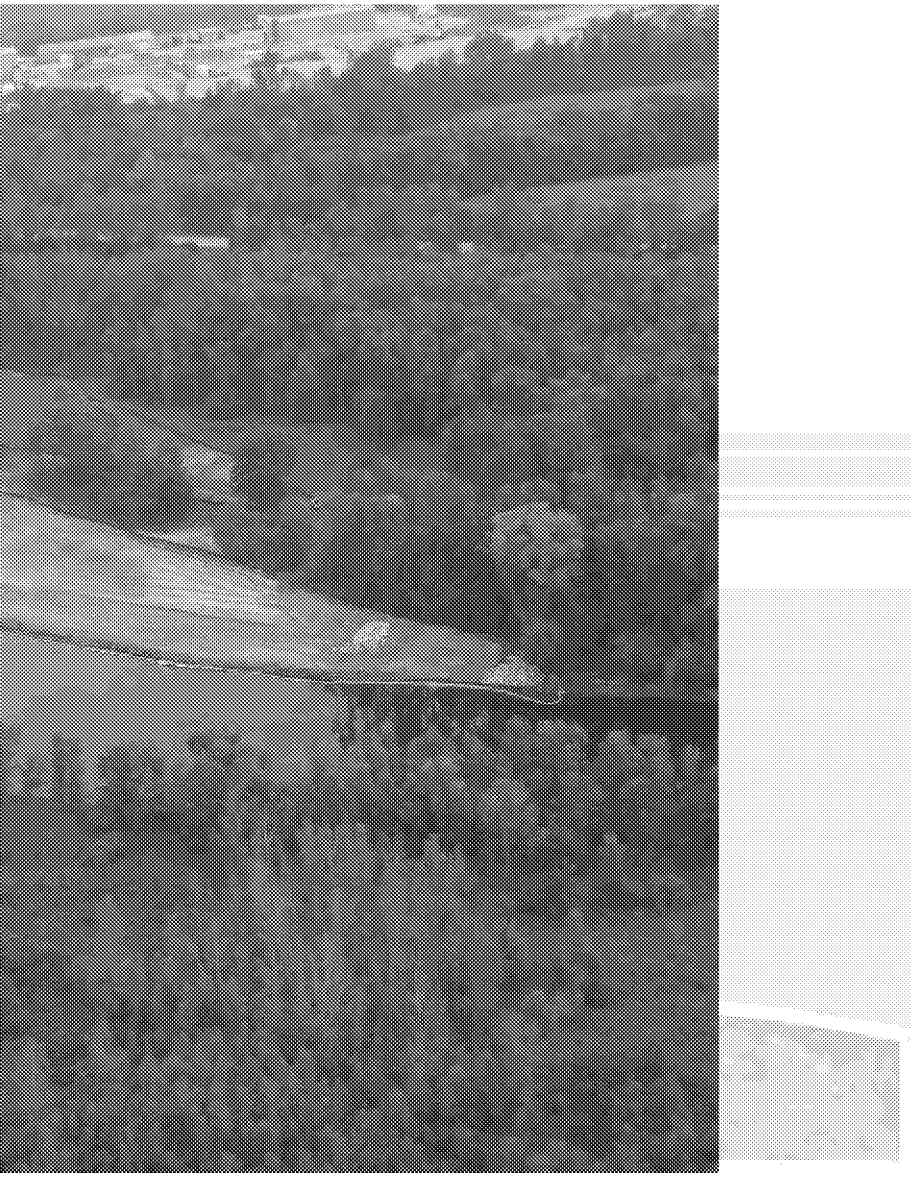
Reach J/K Bank Removal

Reach J/K Bank Removal

Reach J/K Bank Removal

Reach J/K Bank Removal

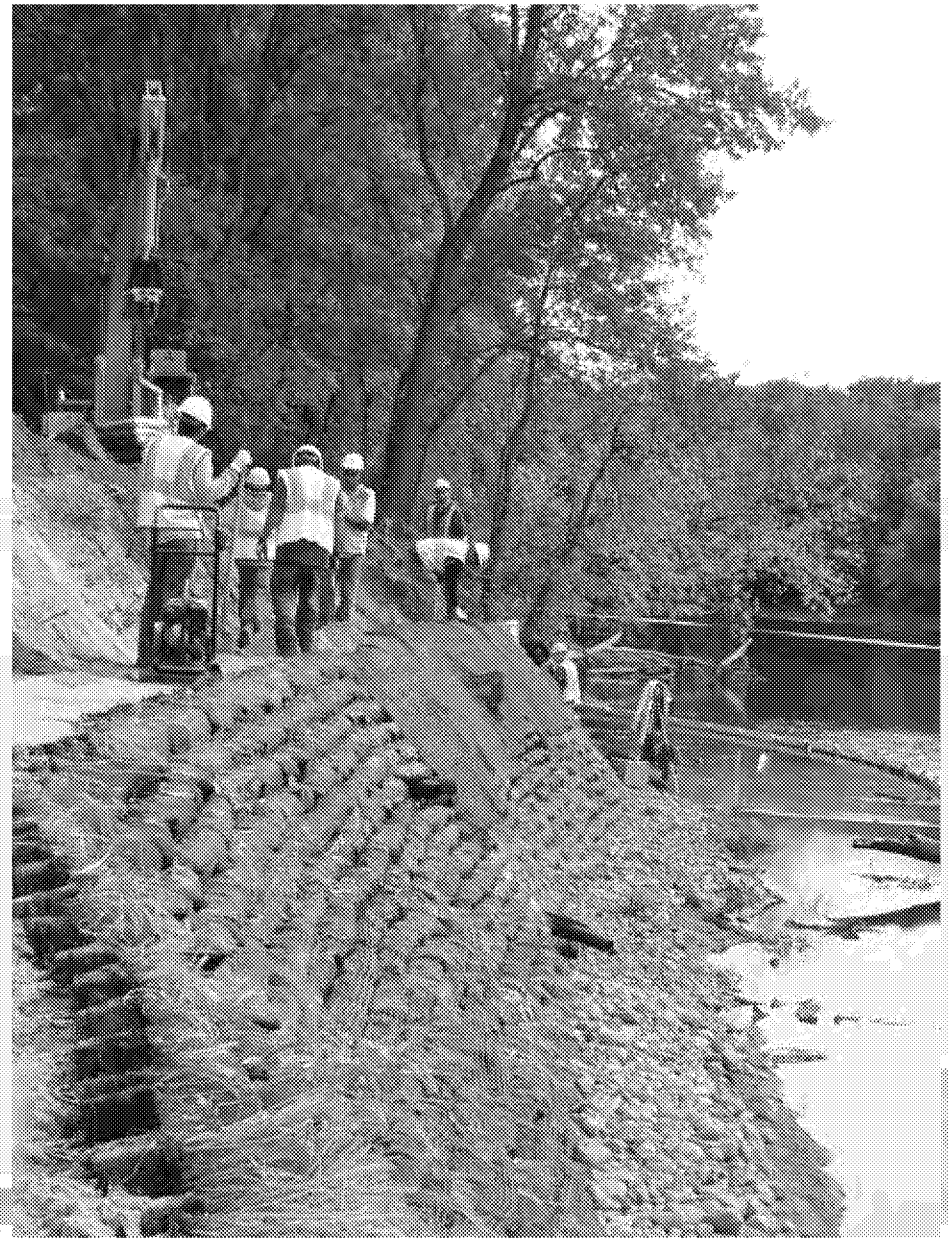
Reach J/K Bank Removal



Bank Stabilization

Reach M Bank Treatment-Upper M

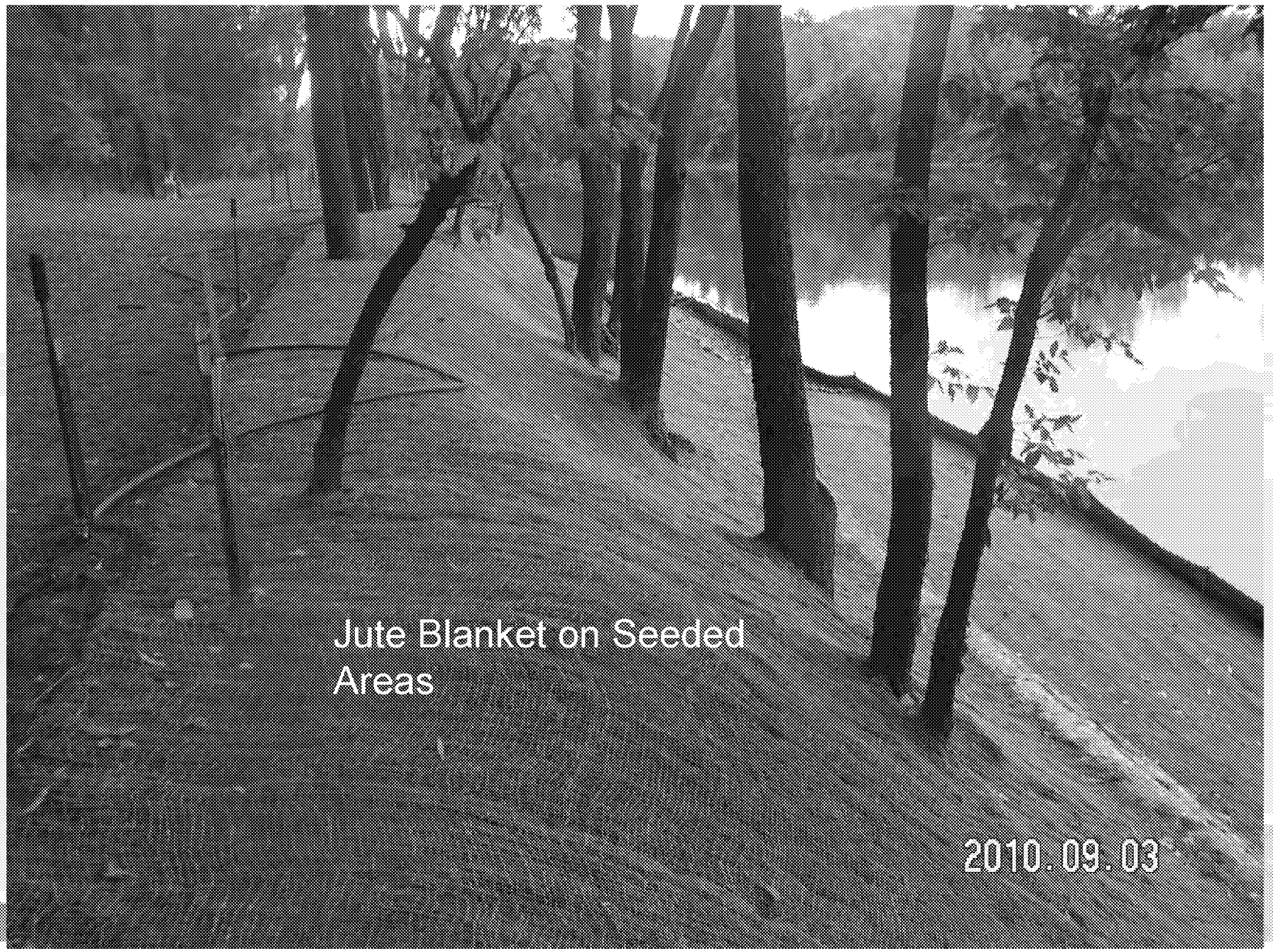
Reach M Bank Treatment-Upper M



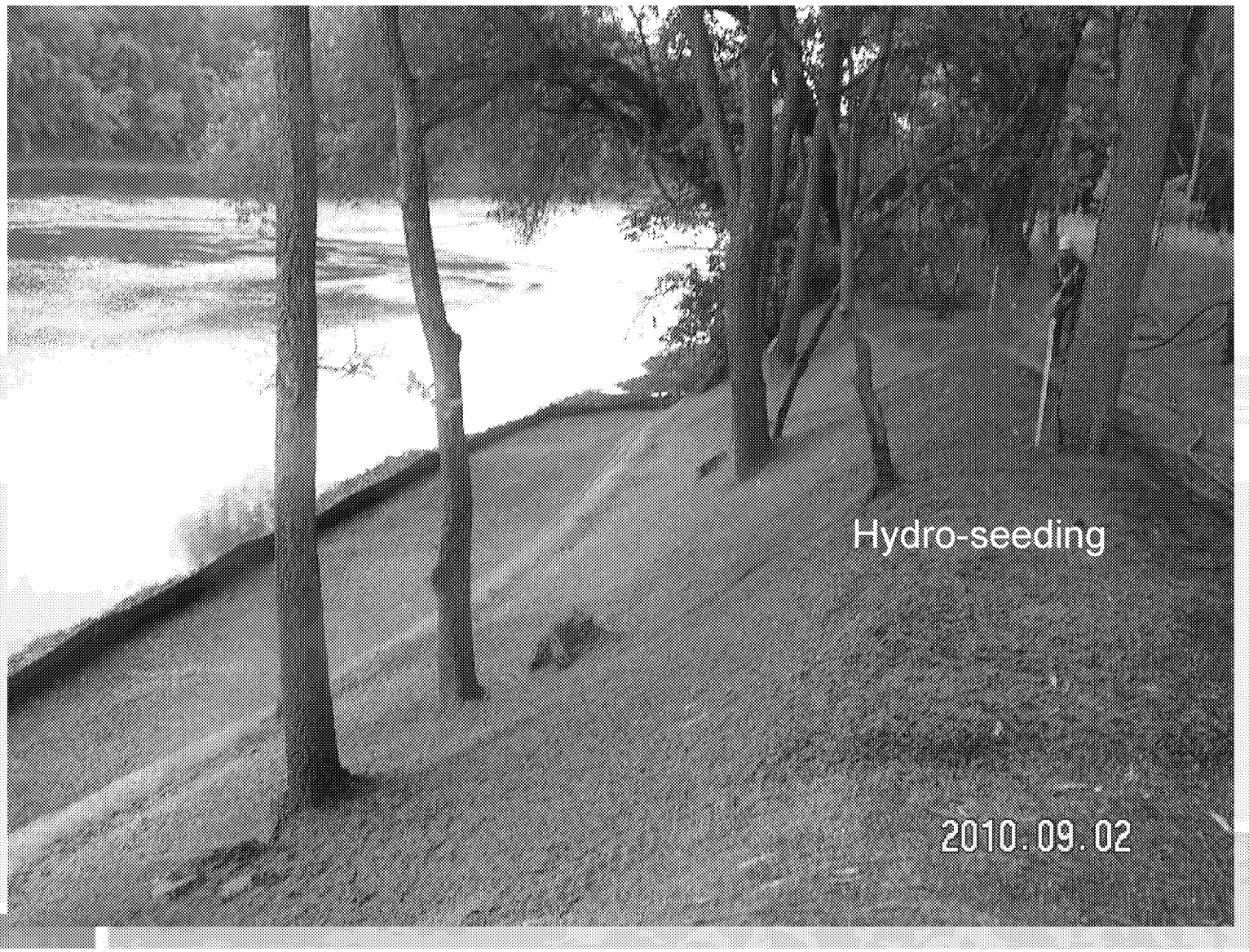
Reach M Bank Treatment-Upper M

Reach O Bank Stabilization

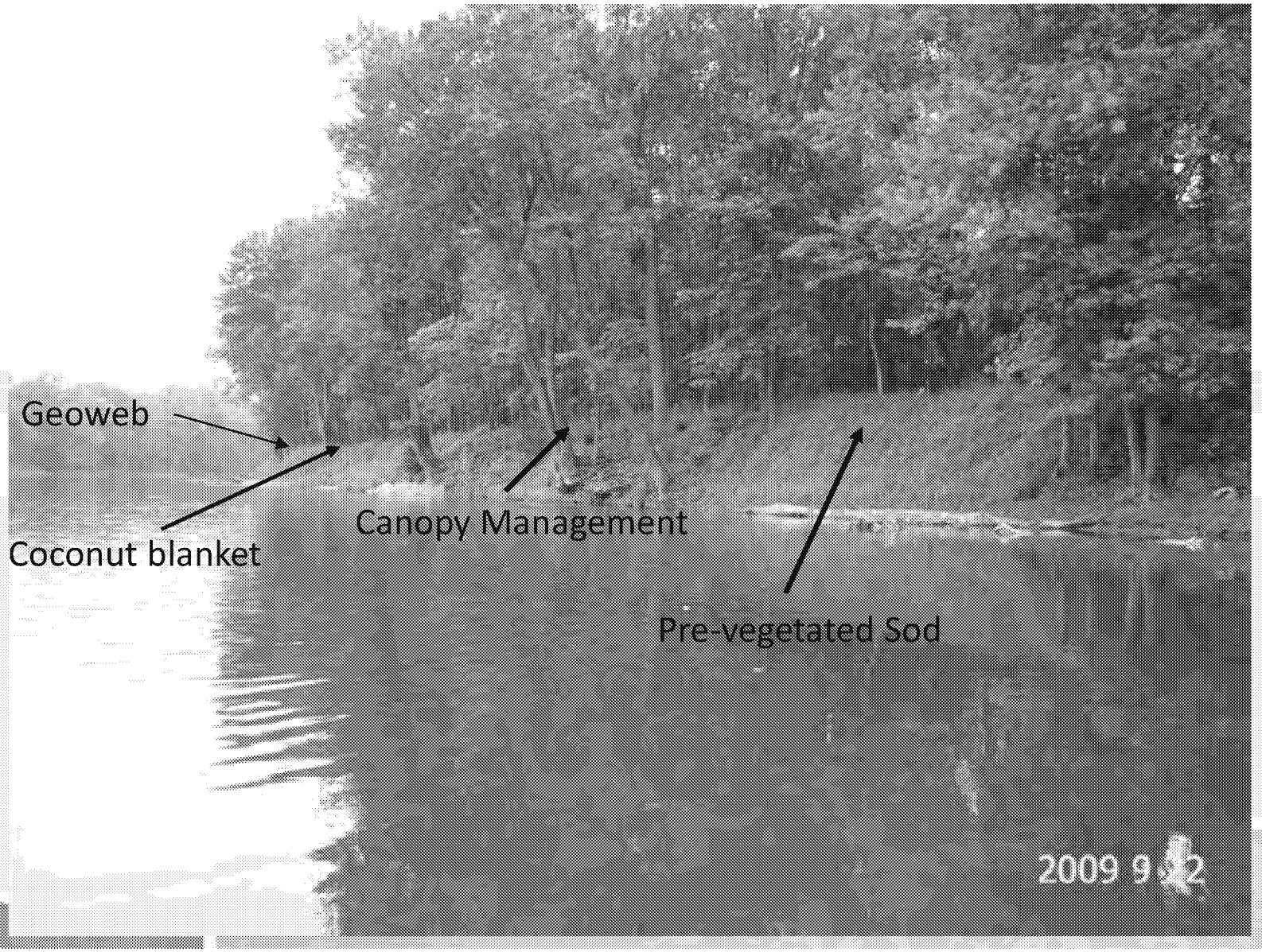
Reach O Bank Stabilization



Reach O Bank Stabilization



Reach M Bank Treatment-Lower M



BMA 2-4 – Bank smoothing/shaping

BMA 2-4 – Treatment installation

BMA 2-4 – Treatment installation

Reach O Bank Stabilization

Reach O Bank Stabilization

BMA 2-3 – Enkamat Treatment installation

BMA 2-3 – Trees planted and irrigation

BMA 2-4 – Seed germination

BMA 2-4 – Cover vegetation establishing

Reach M Bank Treatment-Lower M

Reach M Bank Treatment-Lower M

Reach M Bank Treatment-Upper M

Cellular Confinement System (CCS) Cap

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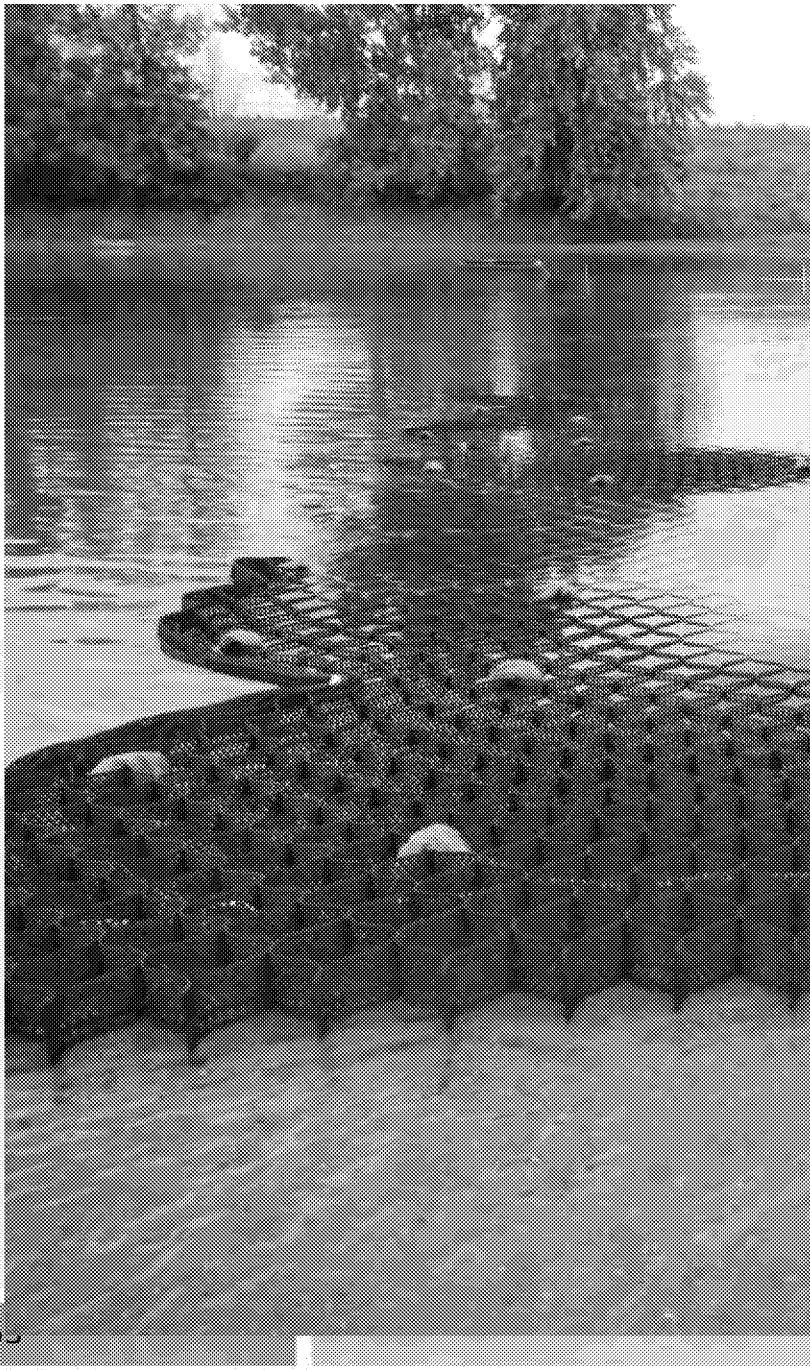

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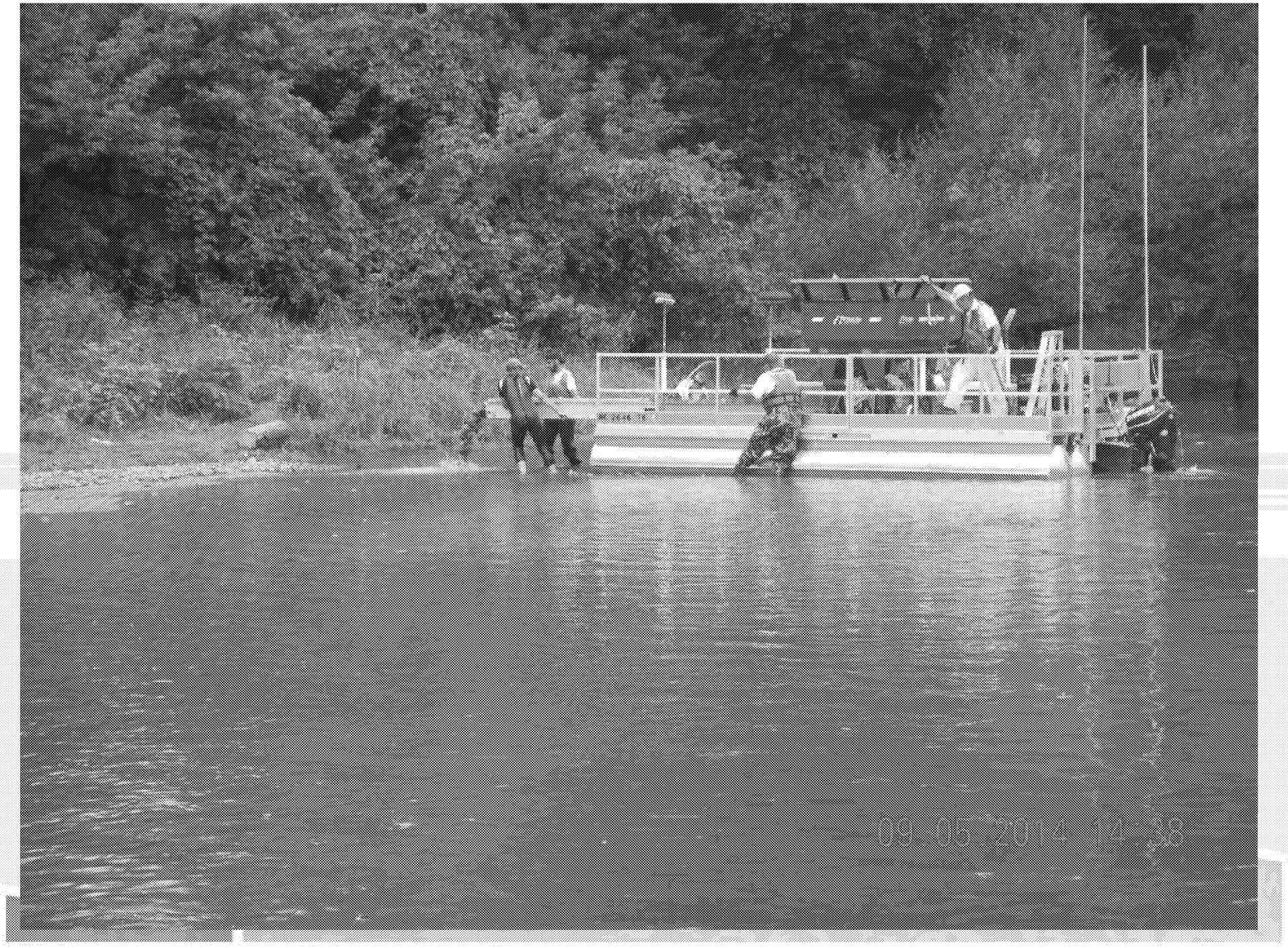

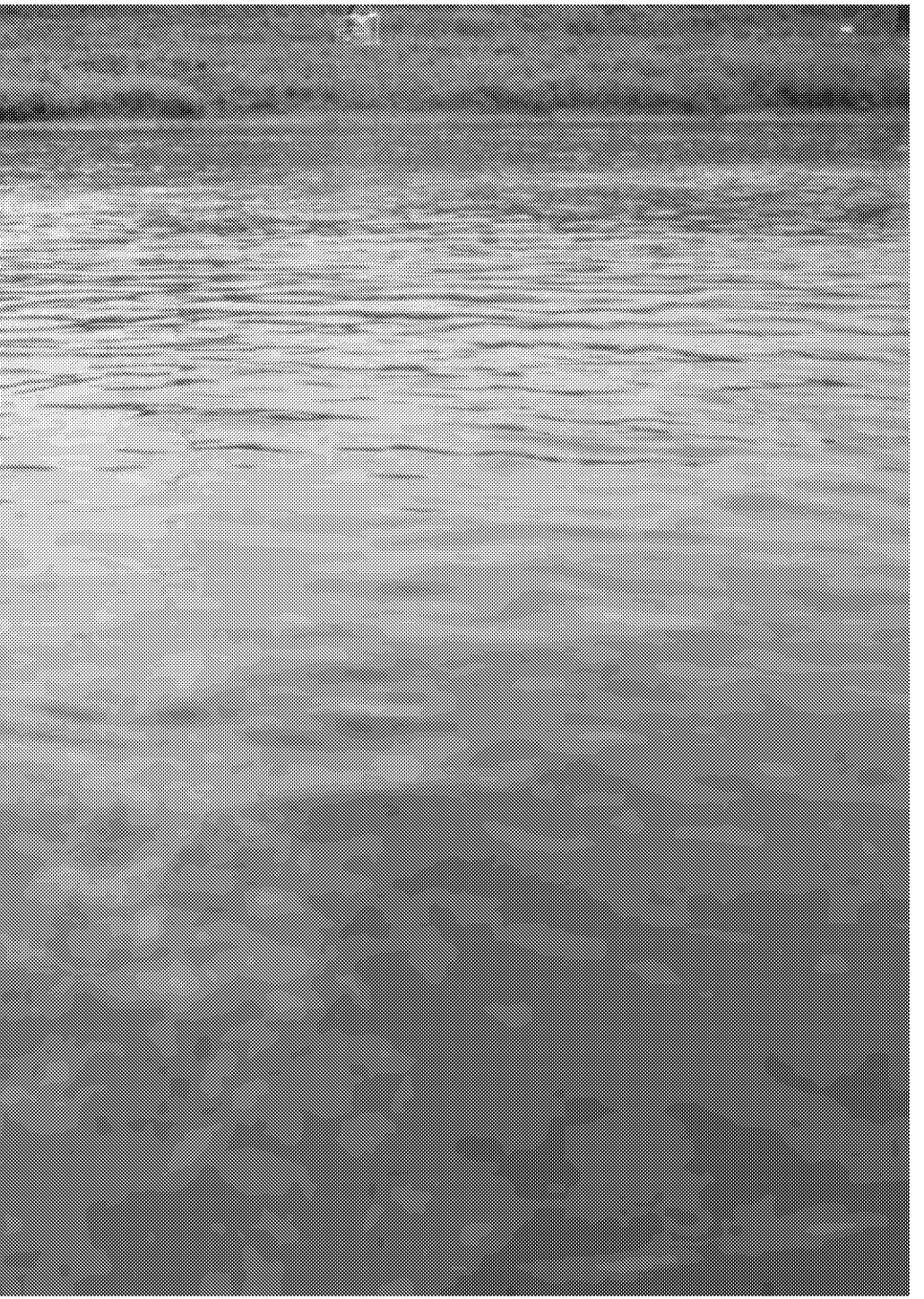

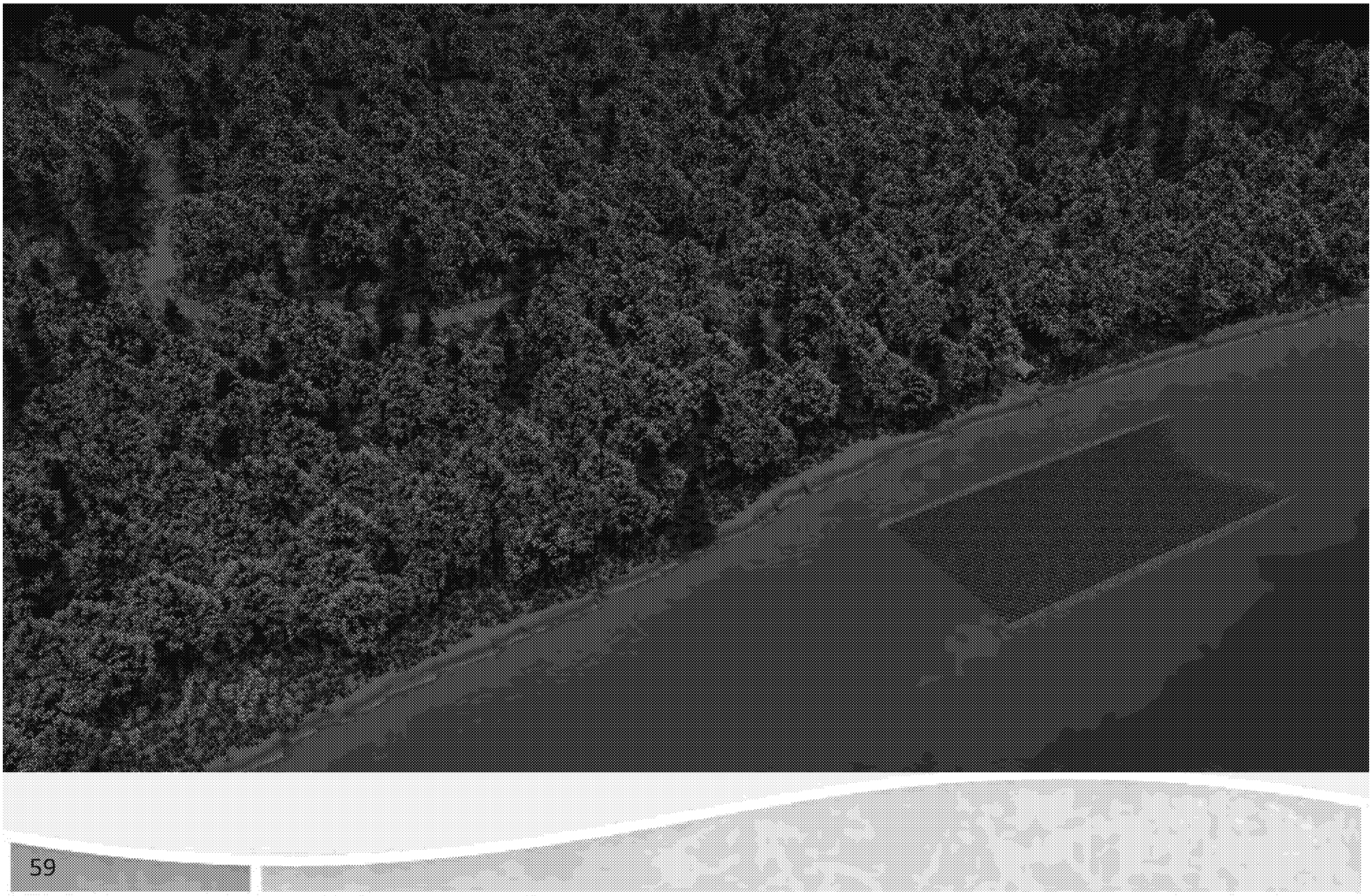

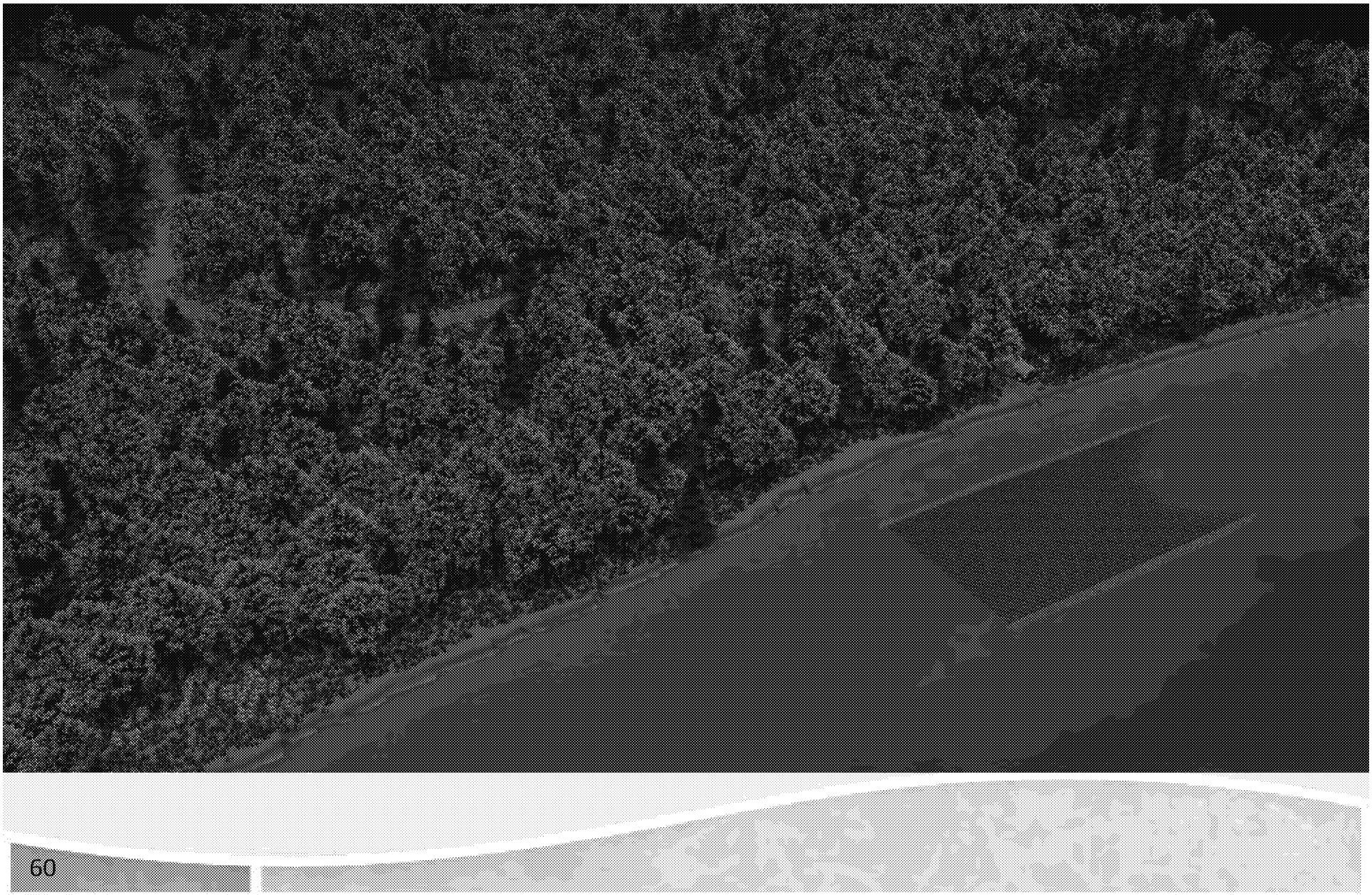

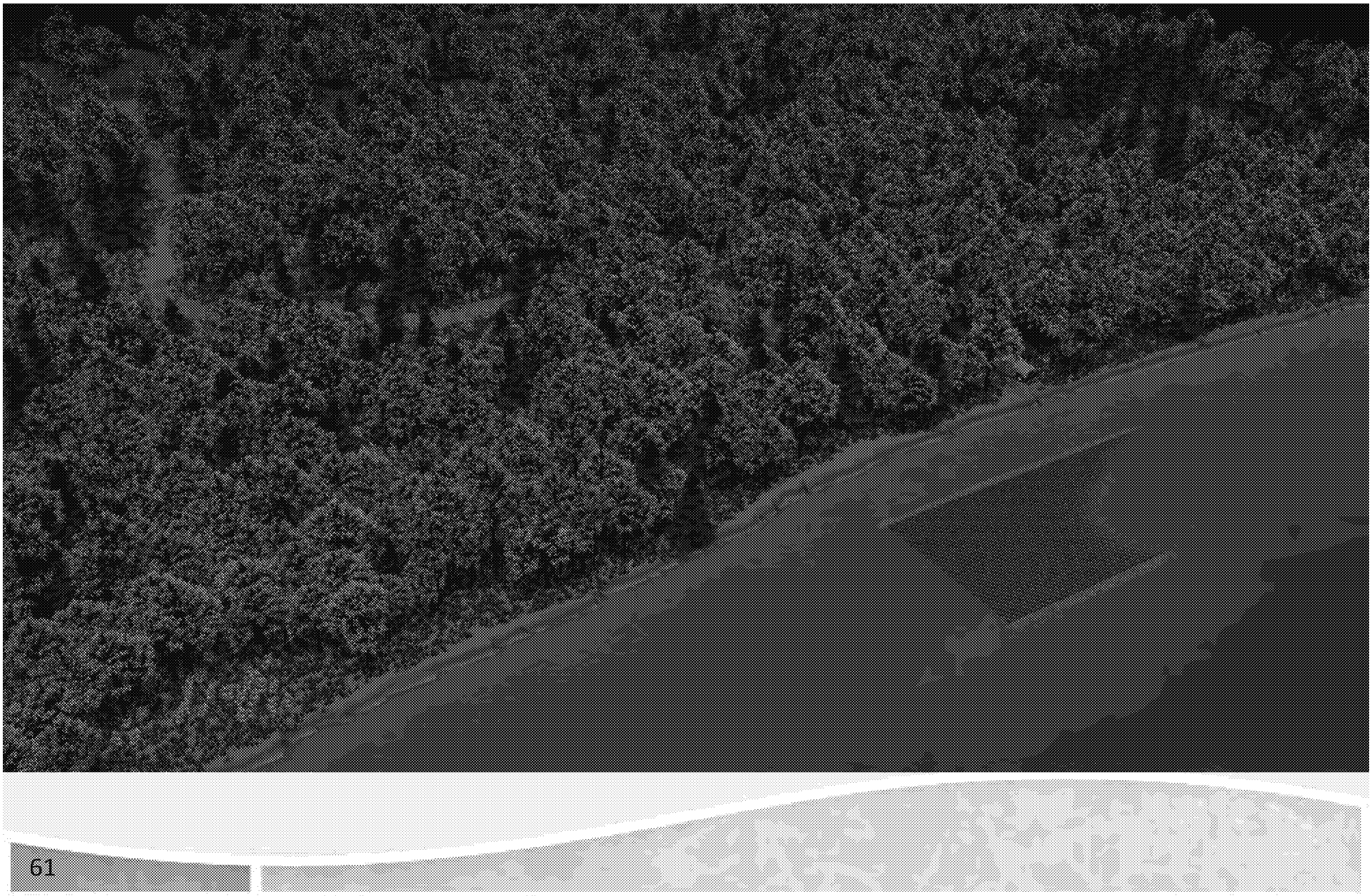

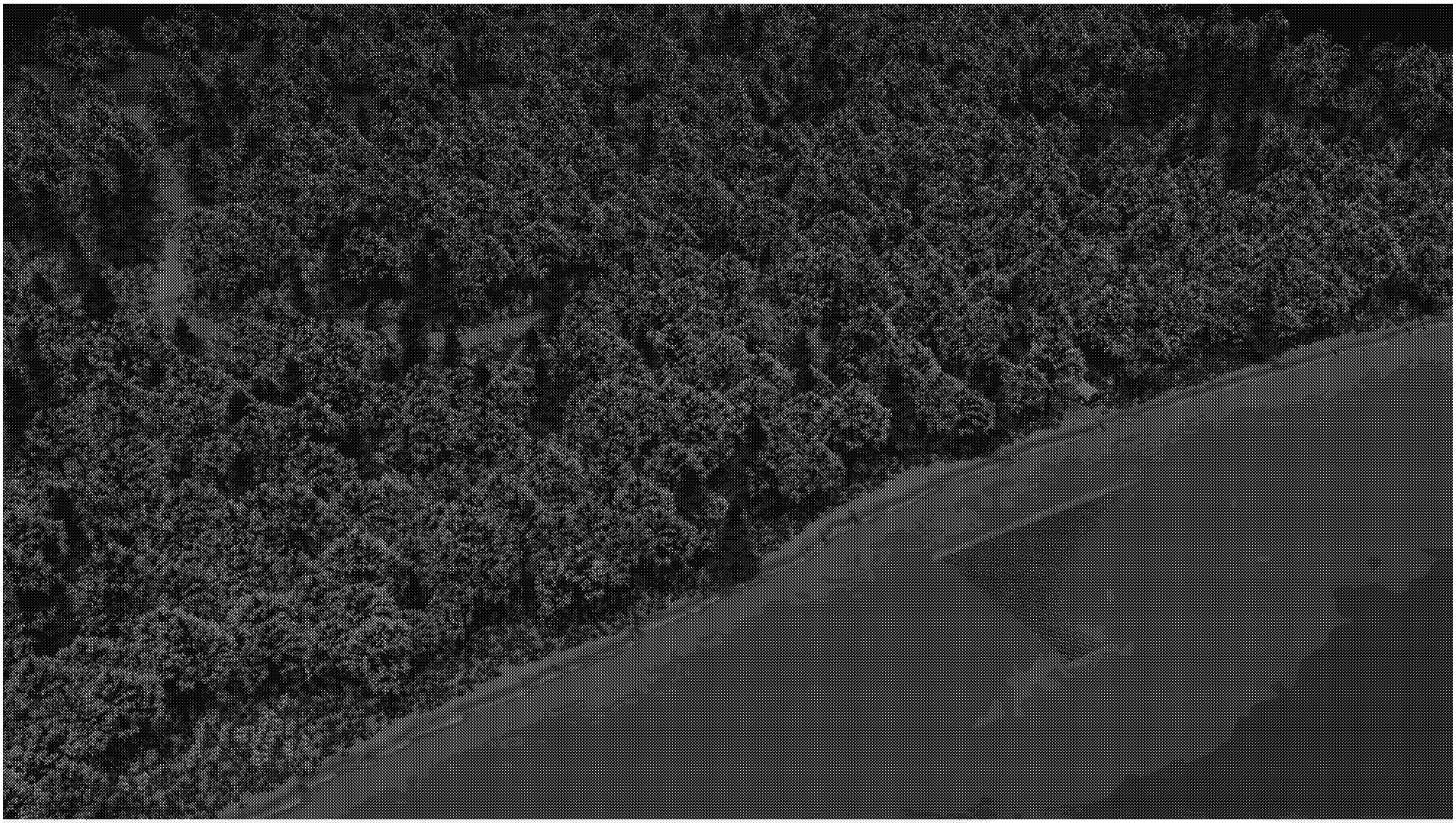

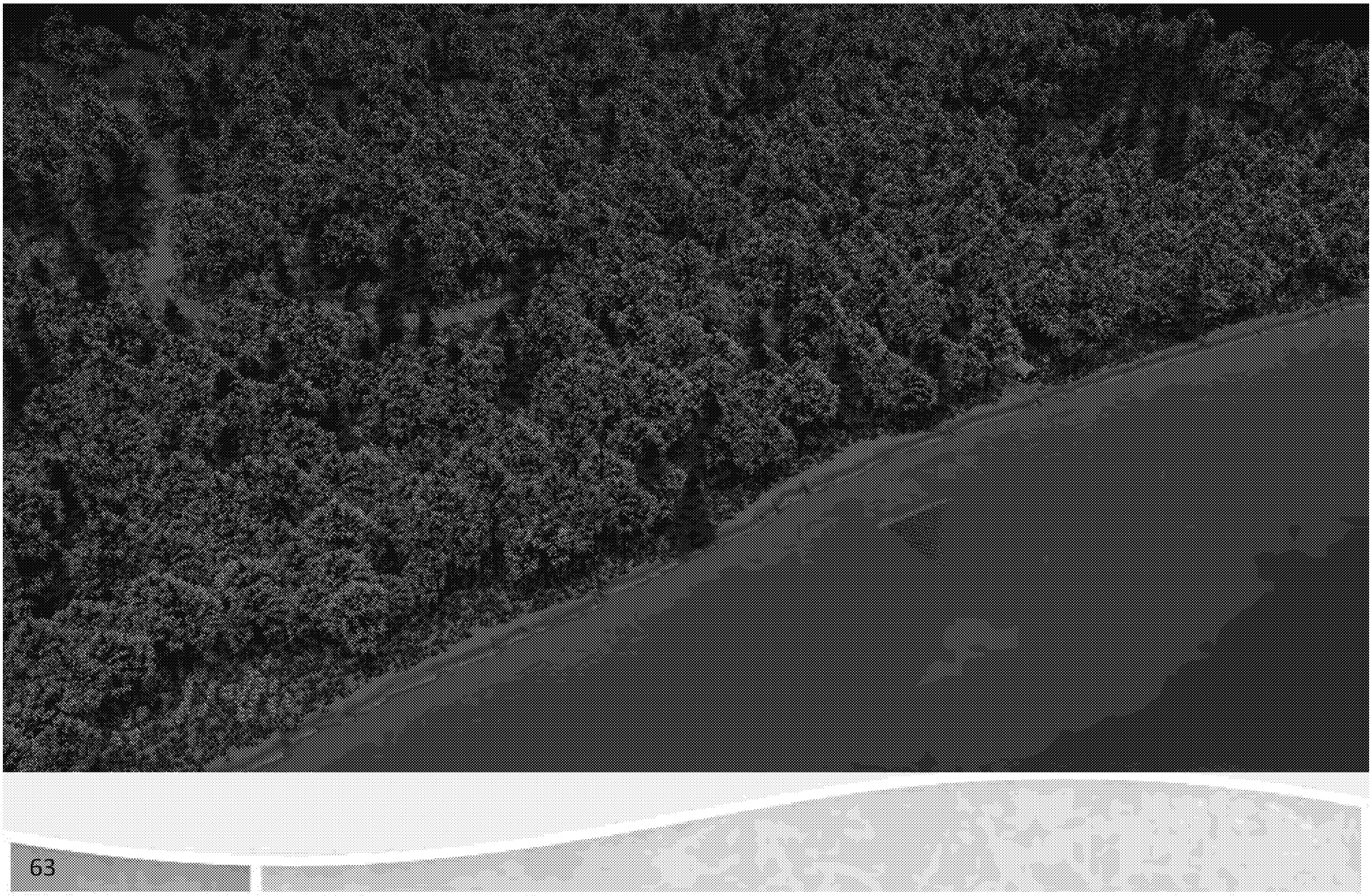

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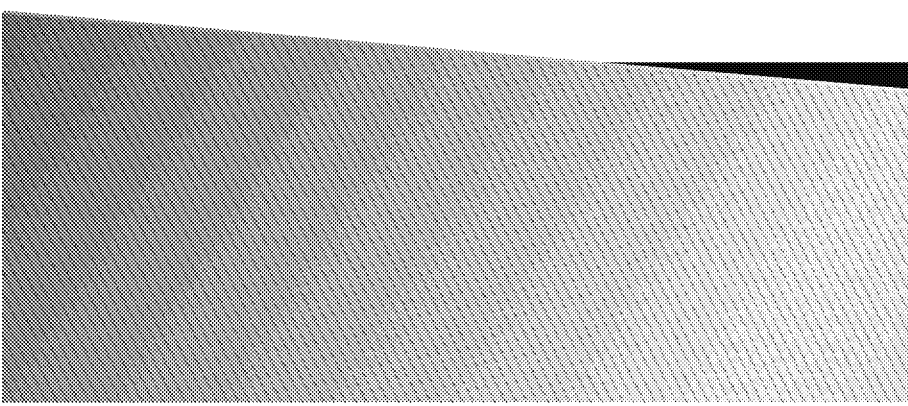
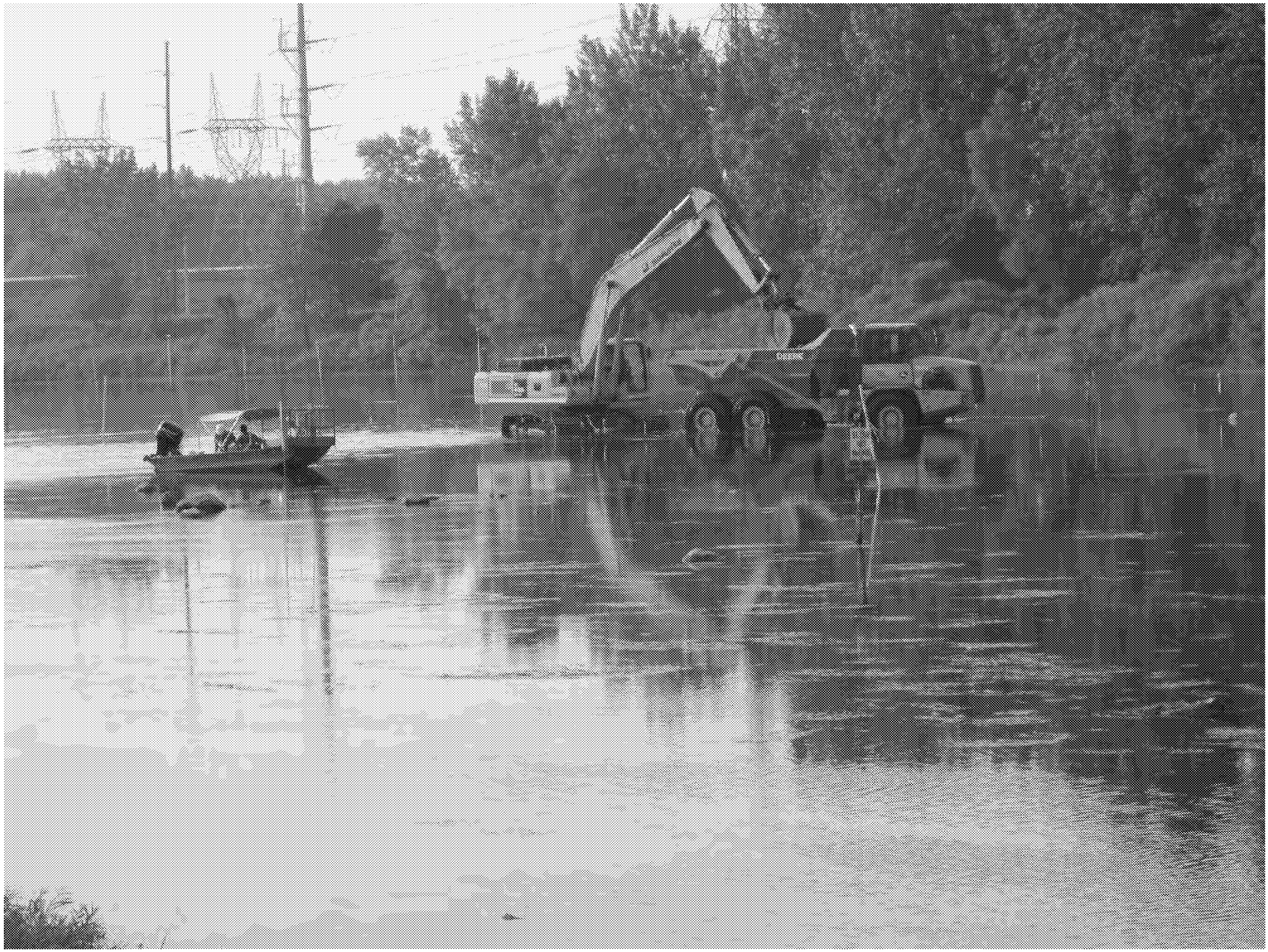


ditional Capping



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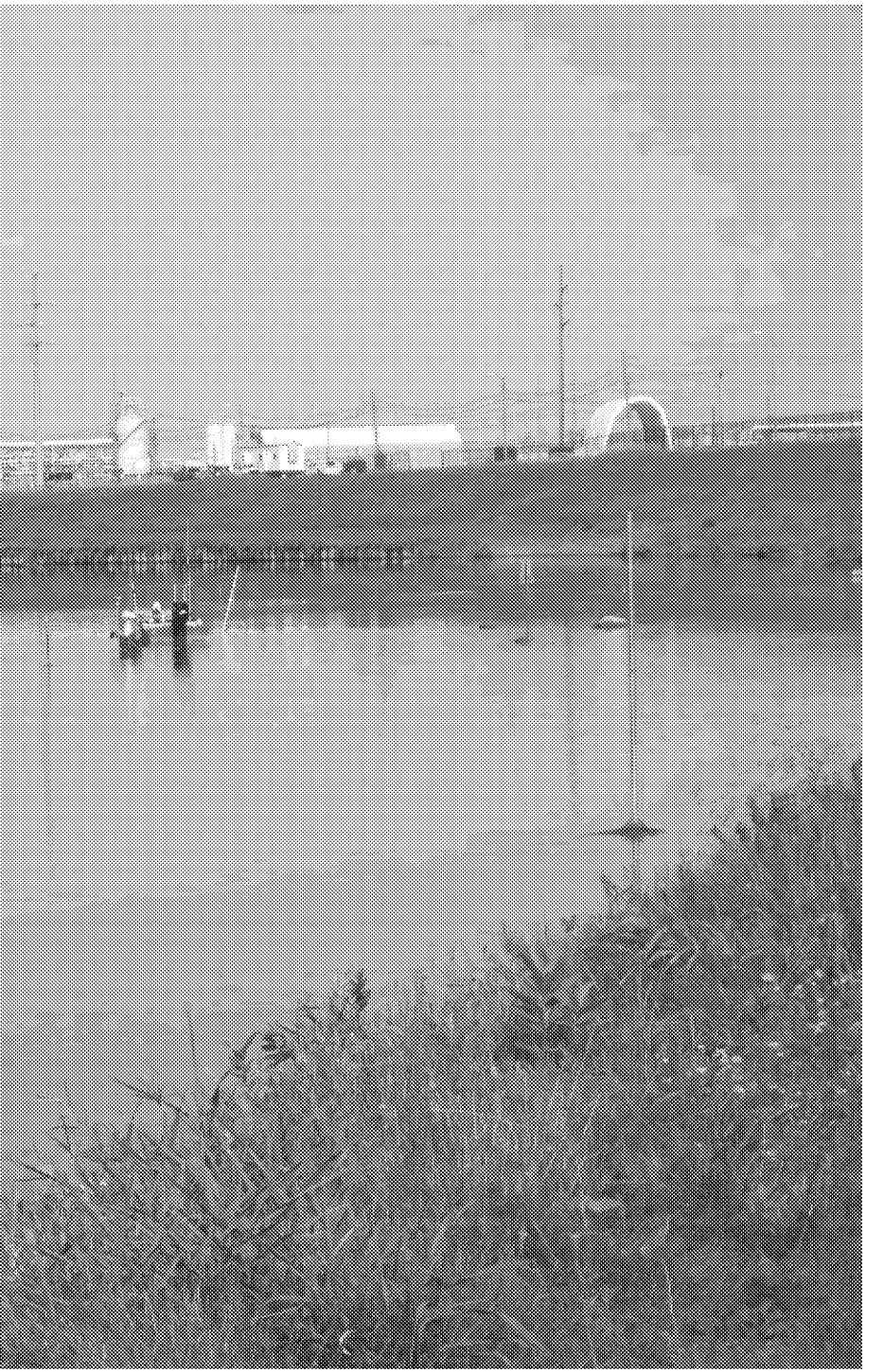
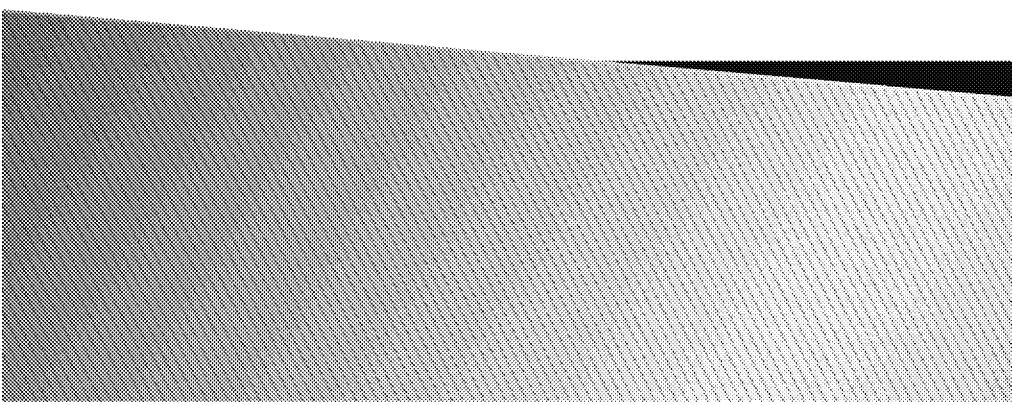
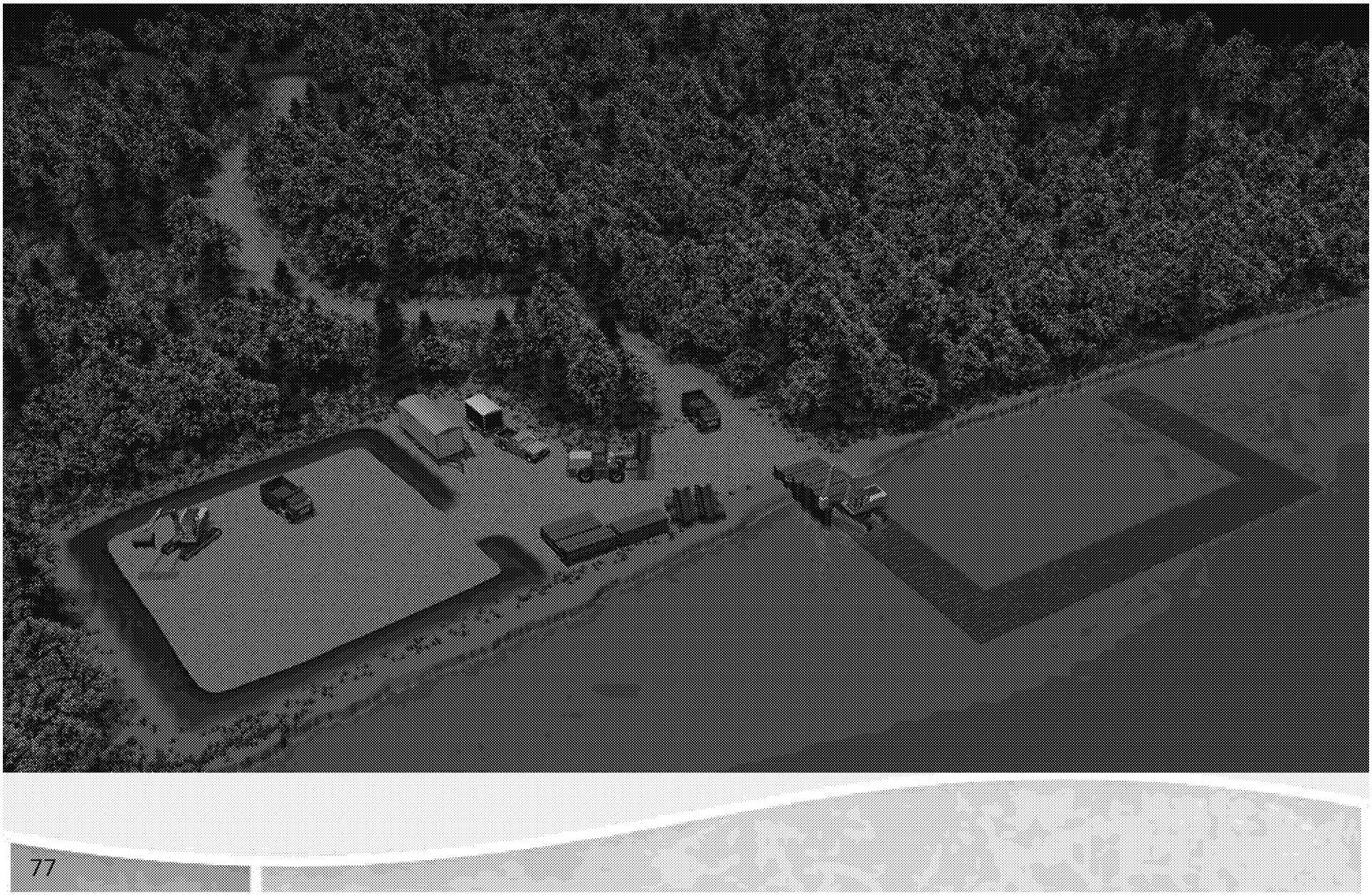
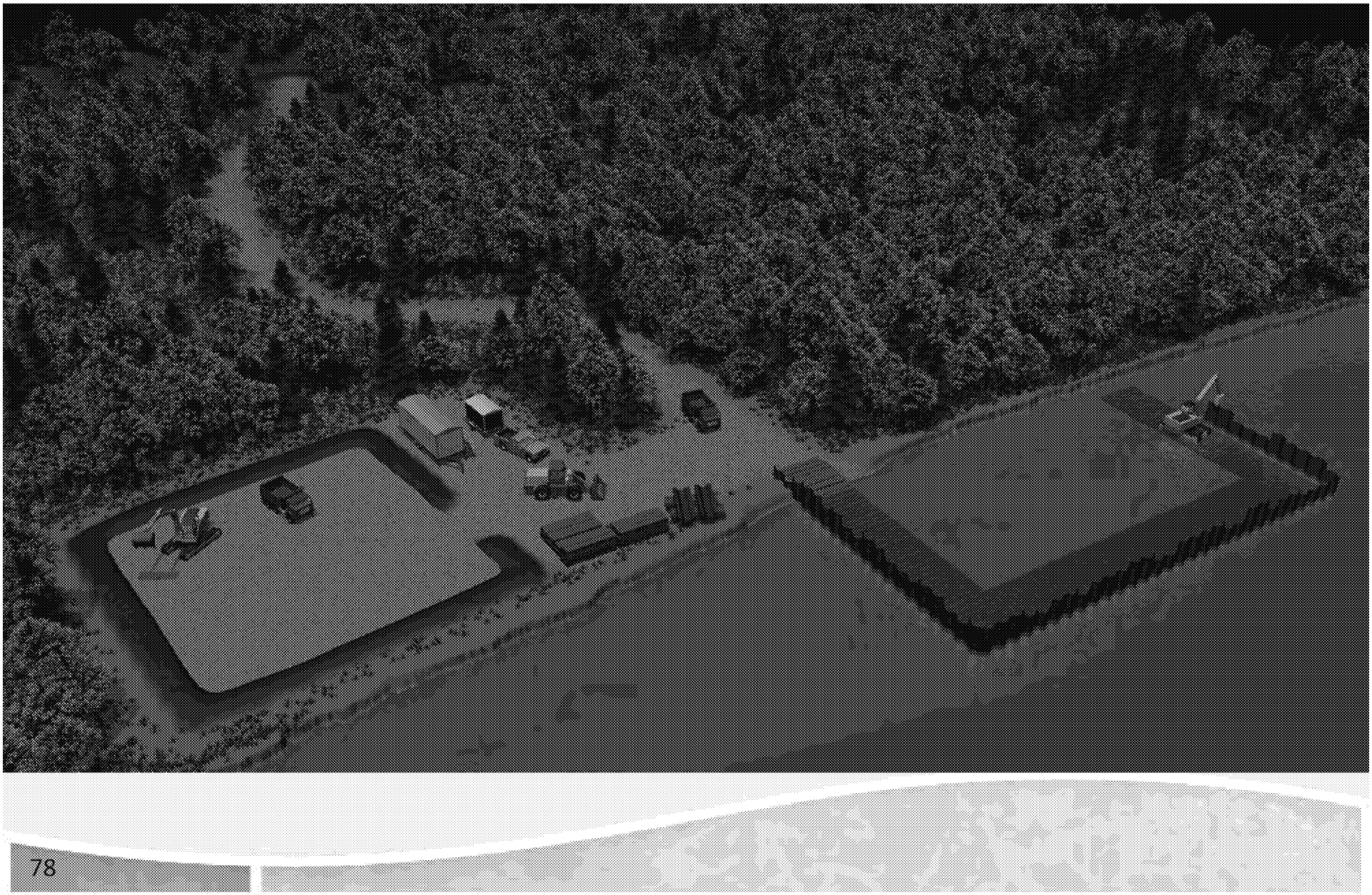




Dry Dredging





BMA 2-3 In-Channel Removal

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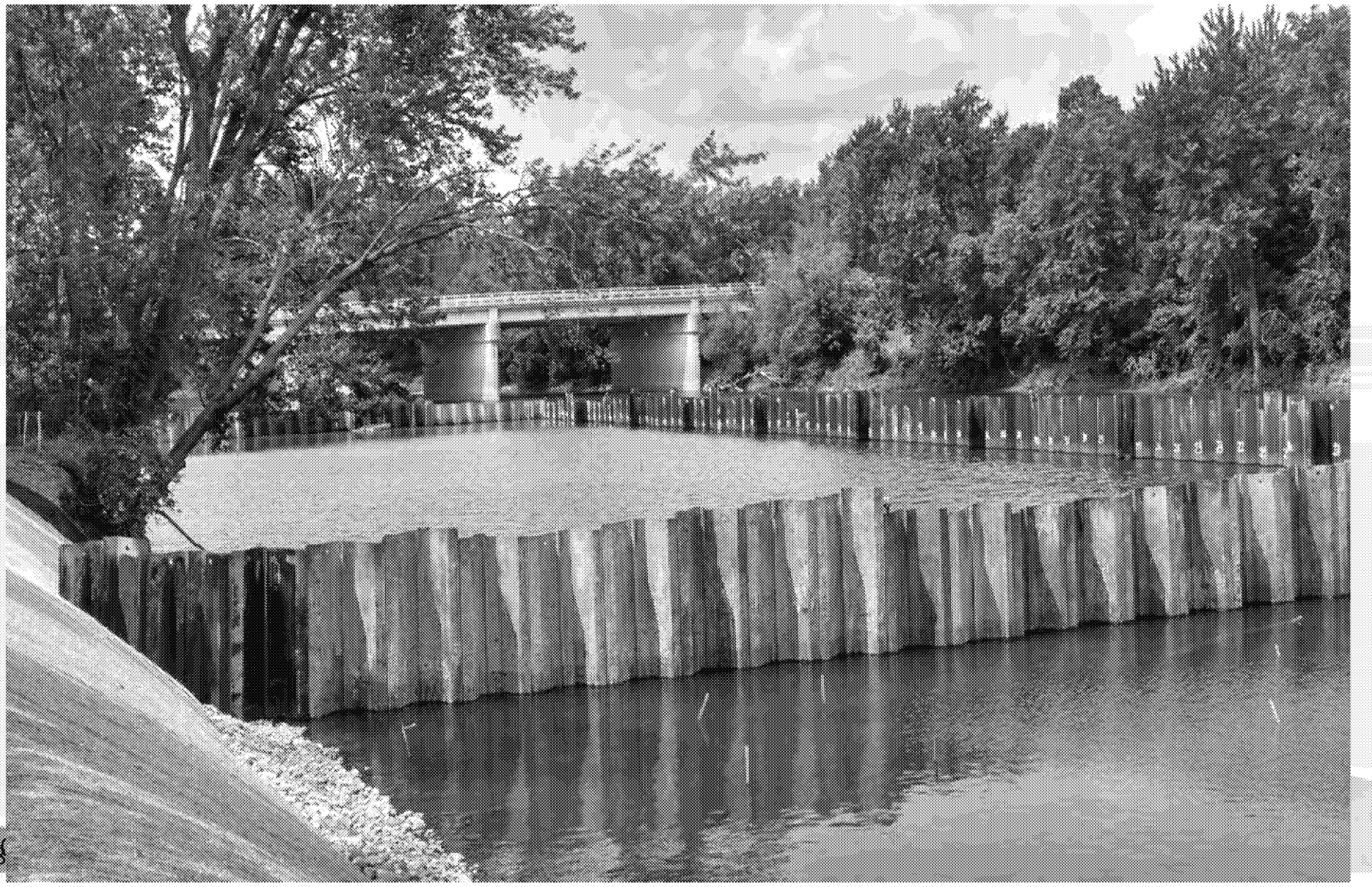

BMA 2-3 In-Channel Removal

BMA 2-3 In-Channel Removal

BMA 2-3 In-Channel Removal

CAT
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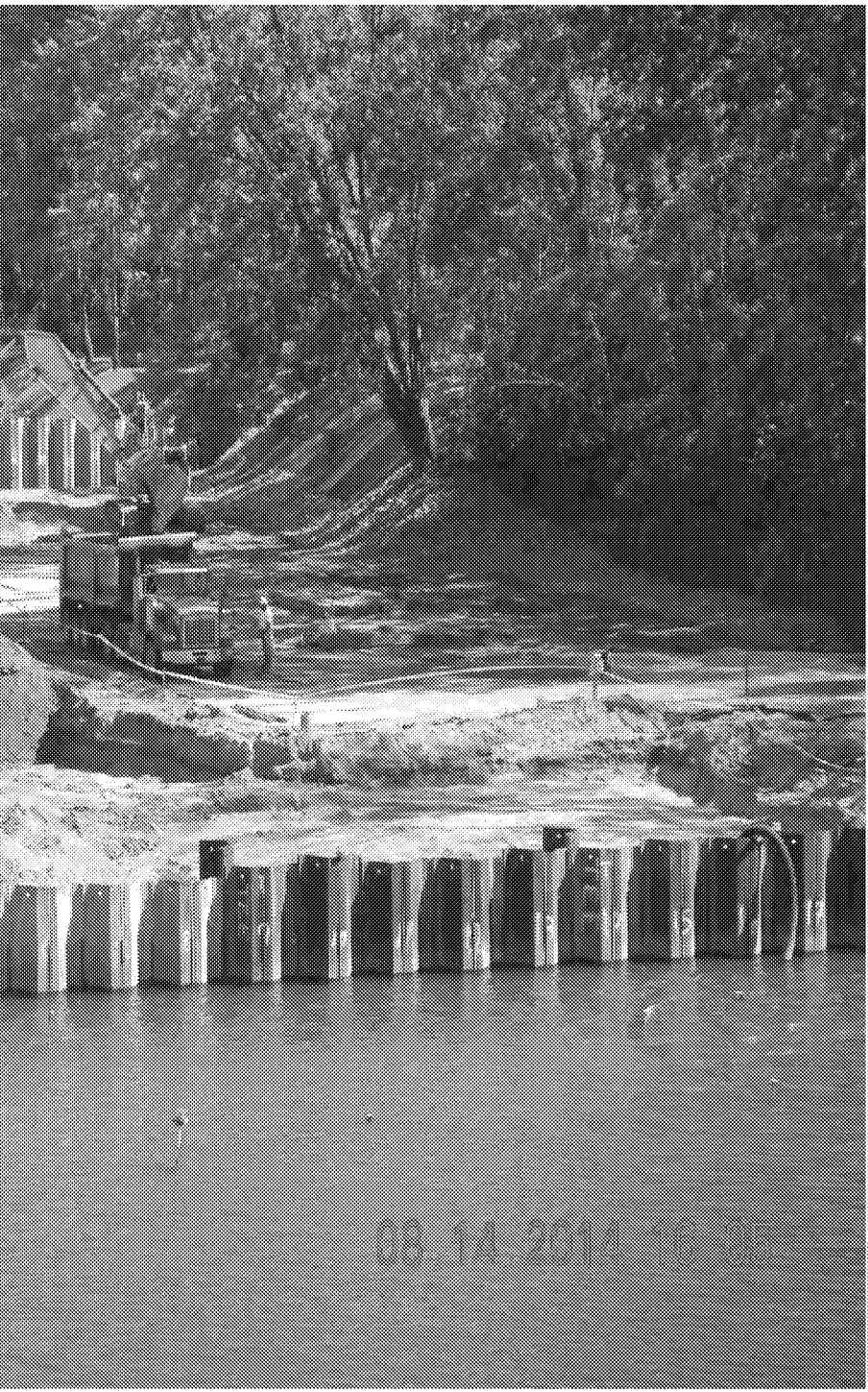

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Floodplain Removal

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Tittabawassee River Conservation Program

- Voluntary program offered by Dow
- Helps ensure long-term effectiveness of the remedy
- Keeps the natural areas from becoming maintained

Risk Assessment

- Required for Project to be completed
- Collaborative effort between Dow and the Agencies to evaluate:
  - Risk for humans engaged in activities around the Tittabawassee River and floodplain
  - Risk for wildlife living in and near the Tittabawassee River and floodplain

Human Exposure Study

- University of Michigan Dioxin Exposure Study (UMDES) funded by an unrestricted grant from Dow
- Scientific Advisory Board that provided guidance to the study included a representative from the EPA, Dr. Linda Birnbaum
- Featured at international conferences and in 17 publications
- Concluded that there was no correlation between living on soils with elevated concentrations of dioxin and people's blood dioxin levels

"The Study found no direct exposure pathway by which dioxins in soils and sediments have accumulated in bodies of residents inhabiting Midland and Saginaw."

- Principal Investigator Dr. David Garabrant

Risk Assessment:
Ecology Study

- Michigan State University Wildlife Study

- Seven-year study funded by an unrestricted grant from Dow concluded that there were no adverse effects on wildlife in the Tittabawassee River basin from exposure to dioxins and furans:

"Despite more than 20,000 person-hours in the field and the conscription of more than 6,350 animals, we were unable to identify the presence of any adverse effects associated with exposure to the contaminants of concern."

- Principal Investigator Dr. Matt Zwiernik

Risk Assessment

- The risk assessment will ultimately determine the success of this project.
- A realistic and pragmatic approach utilizing the site specific data with the risk assessment is needed to get to a Record of Decision.

Questions

Preview of Tour

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