MOOSE CREEK DAM

Chena River Lakes Flood Control Project

U.S. Army Corps of Engineers, Alaska District

Project Operations Review
Dam Safety Overview

David J. Frenier, P.E.
Dam Safety Officer
Chief, Engineering Division

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Chief, Construction-Operations Division

August 1*, 2012*

US Army Corps of Engineers
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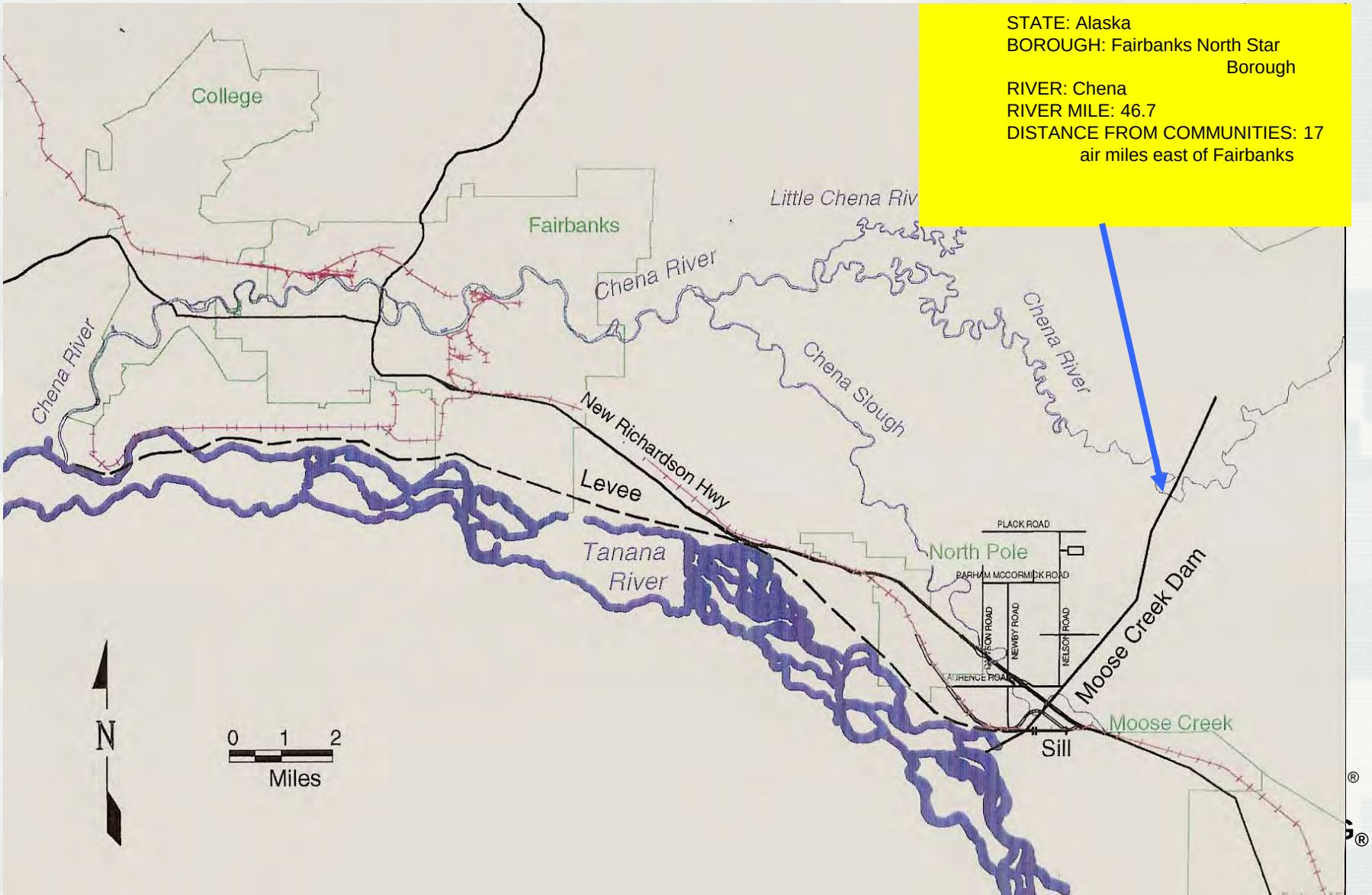
AGENDA

- Project Description and Background
- Hydrology
- Operational Procedures and Challenges
- Dam Safety
- 2008 Flood Event

CHENA RIVER LAKES FLOOD CONTROL PROJECT

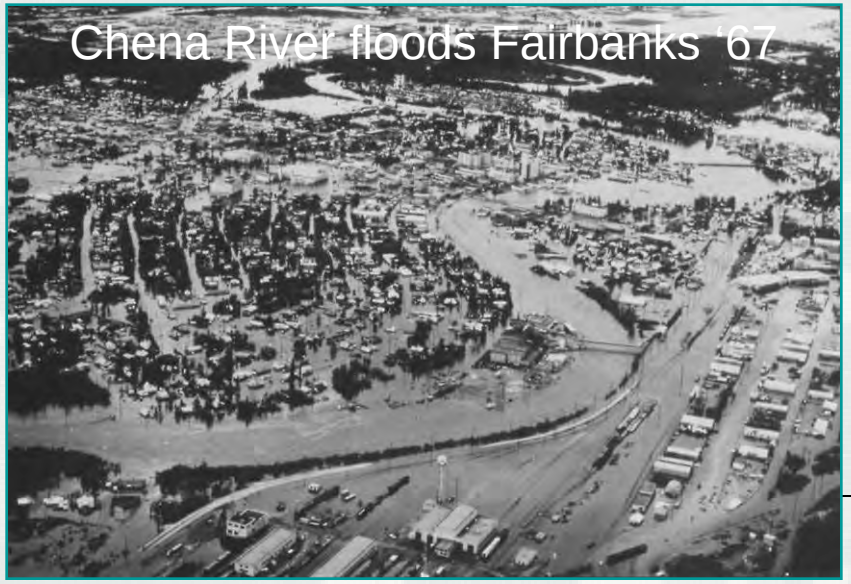
PROJECT DESCRIPTION

PROJECT LOCATION



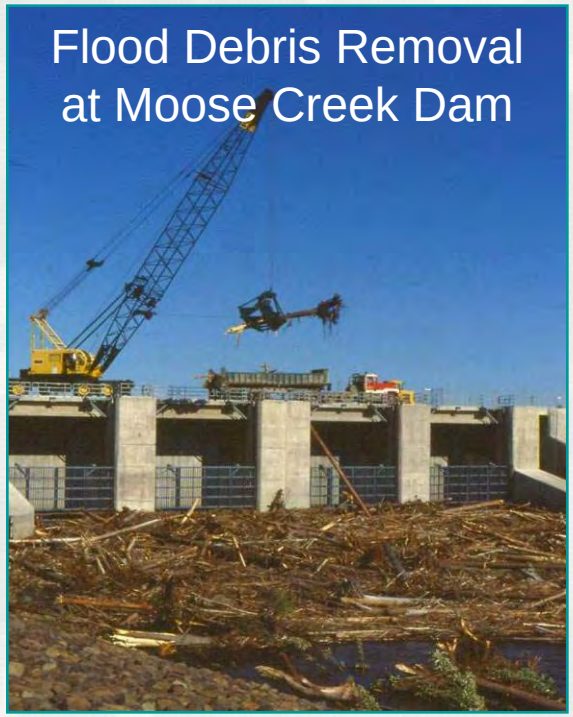
PROJECT TIMELINE

- Chena River floods Fairbanks: 1967
- Congressional authorization: 1968
- Construction begins: 1973
- Project operational: 1979
- Test fill operation: 1981


Chena River floods Fairbanks '67

Downtown Fairbanks during flood of '67

PROJECT HISTORY


Flood Debris Removal at Moose Creek Dam

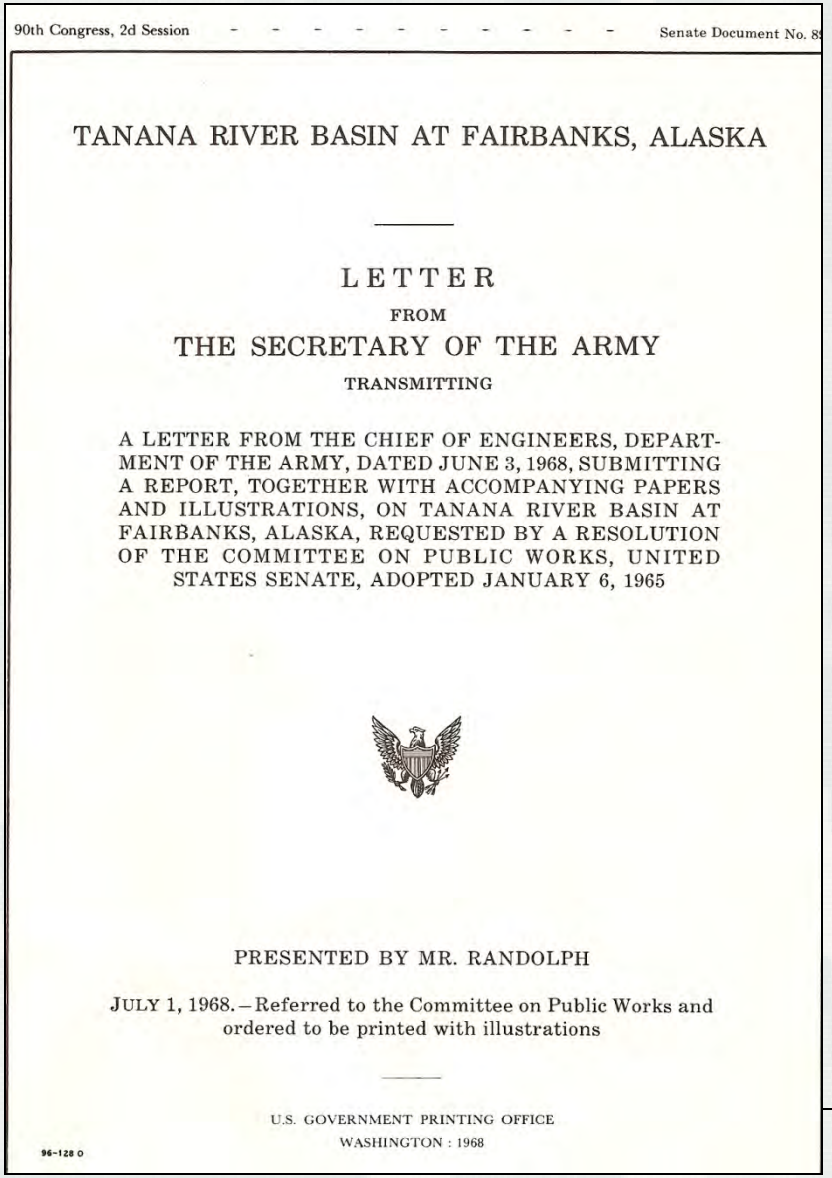
- Dam operations
  - 31-year operating history
  - 20 dam operations to date
  - Last Operation was in 2008
  - Largest operational flood: 1992 *

Chena River Lakes Flood Control Project

* Third largest documented flood of Chena River since 1948

CHENA RIVER LAKES FLOOD CONTROL PROJECT

PROJECT AUTHORIZATION



90th Congress, 2d Session — Senate Document No. 8

TANANA RIVER BASIN AT FAIRBANKS, ALASKA

LETTER

FROM

THE SECRETARY OF THE ARMY

TRANSMITTING

A LETTER FROM THE CHIEF OF ENGINEERS, DEPARTMENT OF THE ARMY, DATED JUNE 3, 1968, SUBMITTING A REPORT, TOGETHER WITH ACCOMPANYING PAPERS AND ILLUSTRATIONS, ON TANANA RIVER BASIN AT FAIRBANKS, ALASKA, REQUESTED BY A RESOLUTION OF THE COMMITTEE ON PUBLIC WORKS, UNITED STATES SENATE, ADOPTED JANUARY 6, 1965

PRESENTED BY MR. RANDOLPH

JULY 1, 1968.—Referred to the Committee on Public Works and ordered to be printed with illustrations

U.S. GOVERNMENT PRINTING OFFICE

WASHINGTON : 1968

96-128 O

Flood Control Act of August 13, 1968, Public Law 90-483, Section 203, 90th Congress

PROJECT AUTHORIZATION

erosion, thereby requiring additional stabilization works. No exact evaluation of the possible stabilization requirements can be made at this time; however, an estimated $500,000 has
cost of the Chena River dam and reservoir for
stabilization work.

e. Reservoir Regulation. The recomm
River dam is uncontrolled; therefore, all regu
would be carried out at the Chena River dam.
would be based primarily on the flood control
it would also be operated for fish and wildlif
imum pool for mitigation of the fishery resour
purposes. Flows would also be controlled to m
dosnatream of the dam. The operation plan req
feet of storage would be available on 1 Octobe
ing 1 October, a gradual release of flows woul
provide storage space of 500,000 acre-feet by
1 January and the beginning of the snowmelt se
would be regulated on a forecast basis. If normal runoff is expected, the reservoir would be drawn down to provide 565,000 acre-feet of storage. If above normal runoff is forecast, the reservoir would be drawn down to provide 700,000 acre-feet of storage. If below normal runoff is predicted, 500,000 acre-feet of flood control storage would be maintained. The reservoir would be filled to the summer recreation pool elevation of 711 MSL by 15 June, leaving 400,000 acre-feet of emergency flood control storage. During the summer (15 June to 1 October), the reservoir would be operated to control summer rain floods to a maximum of 12,000 cfs (bankfull capacity) through Fairbanks and maintain the pool as near elevation 711 as possible. Minimum release from the reservoir for mosquito control and protection of the fish and wildlife resources during the period from 15 June to 1 October would be 800 cfs and during the period from 1 October to 15 June would be 300 cfs.

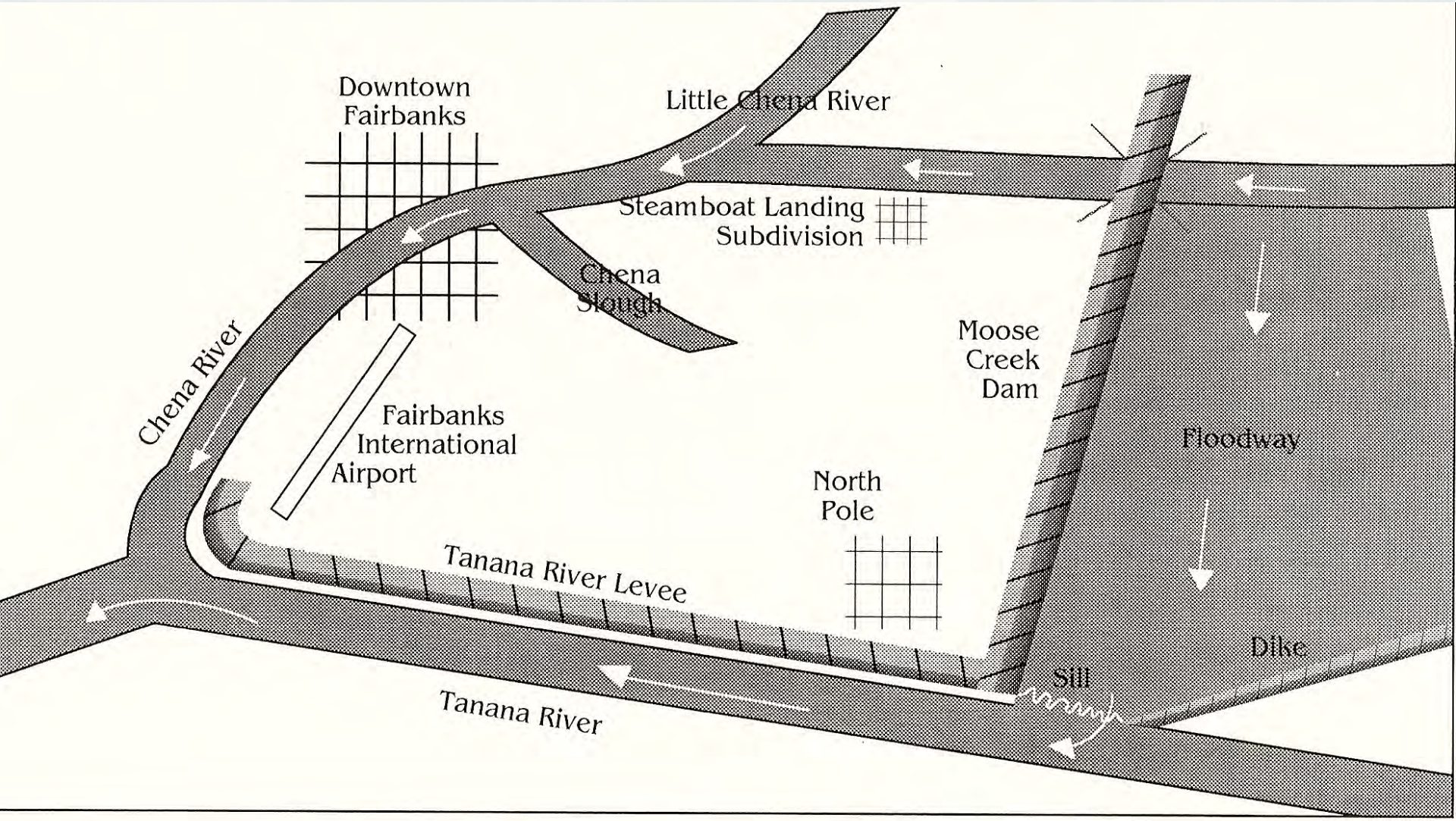
f. Relocations. Construction of the Chena River reservoir would require reconstruction of about 19 miles of roadway around the shoreline of the reservoir. Highway planning would be coordinated with the United States Department of Transportation and the State of Alaska Highway Department regarding their plans for rehabilitation of that portion of the existing highway damaged or destroyed by the August 1967 flood. Construction of levees would require close coordination with the State for roadway crossings and the grade raise along Airport Way. The five-foot grade raise required for the Moose Creek dike would require coordination with the State for possible reconstruction or realignment of the Richardson Highway. Possible realignment or reconstruction of a portion of the Eielson Branch of the Alaska Railroad would also be closely coordinated.

29

emergency flood control storage. During the summer (15 June to 1 October), the reservoir would be operated to control summer rain floods to a maximum of 12,000 cfs (bankfull capacity) through Fairbanks and maintain the pool as near elevation 711 as possible. Minimum release from the reservoir for mosquito control and protection of the fish and wildlife resources during the period from 15 June to 1 October would be 800 cfs and during the period from 1 October to 15 June would be 300 cfs.

Maximum flow objective of 12,000 cubic feet per second in downtown Fairbanks

OPERATIONAL SCHEMATIC



CONTROL WORKS

DAM EMBANKMENT SPECIFICATIONS

TYPE: Zoned Earth Fill
ELEVATION: 528.7 Feet NGVD29 (max @ top)
HEIGHT ABOVE STREAM BED: 50 feet
LENGTH: 40,200 feet
CREST WIDTH: 24 feet
VOLUME OF FILL: 6,231,000 cubic yards
STORAGE CAPACITY: 224,000 acre-feet
@ 525 feet elevation @ control works

FLOODWAY AND CONTROL SILL

Length: 27,000 ft (Chena River to Highway Bridges)
Minimum Width of cleared flow channel: 1,100 feet
Maximum Width of cleared flow channel: 4,200 feet
Channel-peak design outflow: 160,000 cubic feet per second

Floodway Sill:

- Type: Sharp-Crested Weir
- Material: Sheet piling with roller compacted concrete stilling basin
- Crest Elevation: 506.65 feet NGVD29
- Recently lowered to 502.0 Feet NGVD29
- Crest Length: 2,000 feet
- Purpose: Prevent Tanana River floods from entering Chena River.

CHENA RIVER LAKES FLOOD CONTROL PROJECT

HYDROLOGY

BASIN AREAS

CHENA RIVER

1,496 square miles above dam
2,030 square miles at Fairbank
2,115 square miles at confluence with Tanana River

LITTLE CHENA RIVER

409 square miles at confluence with Chena River

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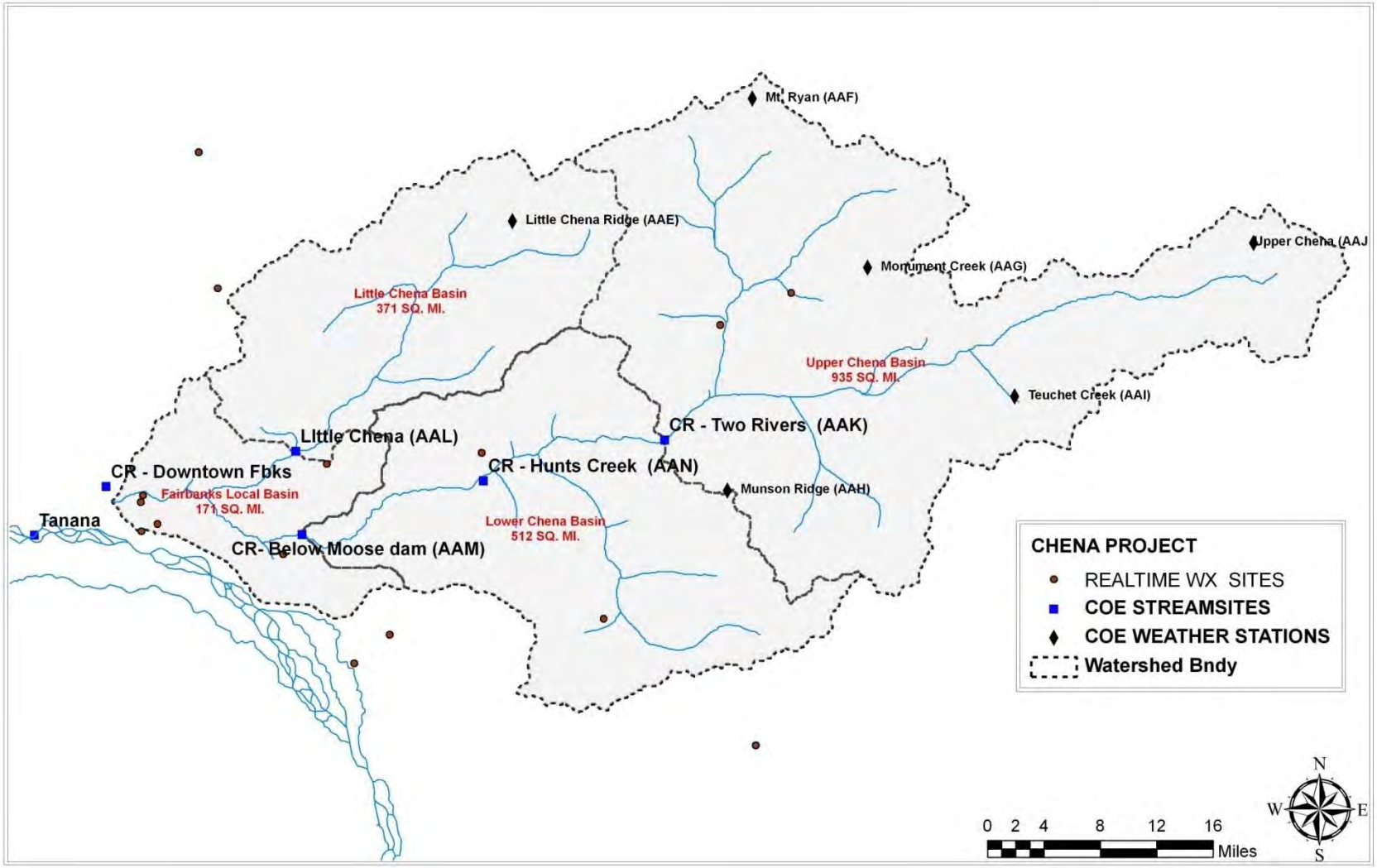
BASIN MONITORING NETWORK



FLOOD FREQUENCIES

Expected Probability

EXCEEDANCE INTERVAL (YRS)	LITTLE CHENA RIVER (CFS)	UNREGULATED CHENA RIVER FAIRBANKS (CFS)*	REGULATED CHENA RIVER FAIRBANKS (CFS)*
2	1,900	9,800	9,000
5	3,300	16,000	12,000
10	4,500	20,000	12,000
50	8,800	34,000	12,000
100	11,800	41,000	15,000[1]

[1] FNSB Flood insurance study, 100 Year Flow = 12,000 CFS (Computed Prob.)

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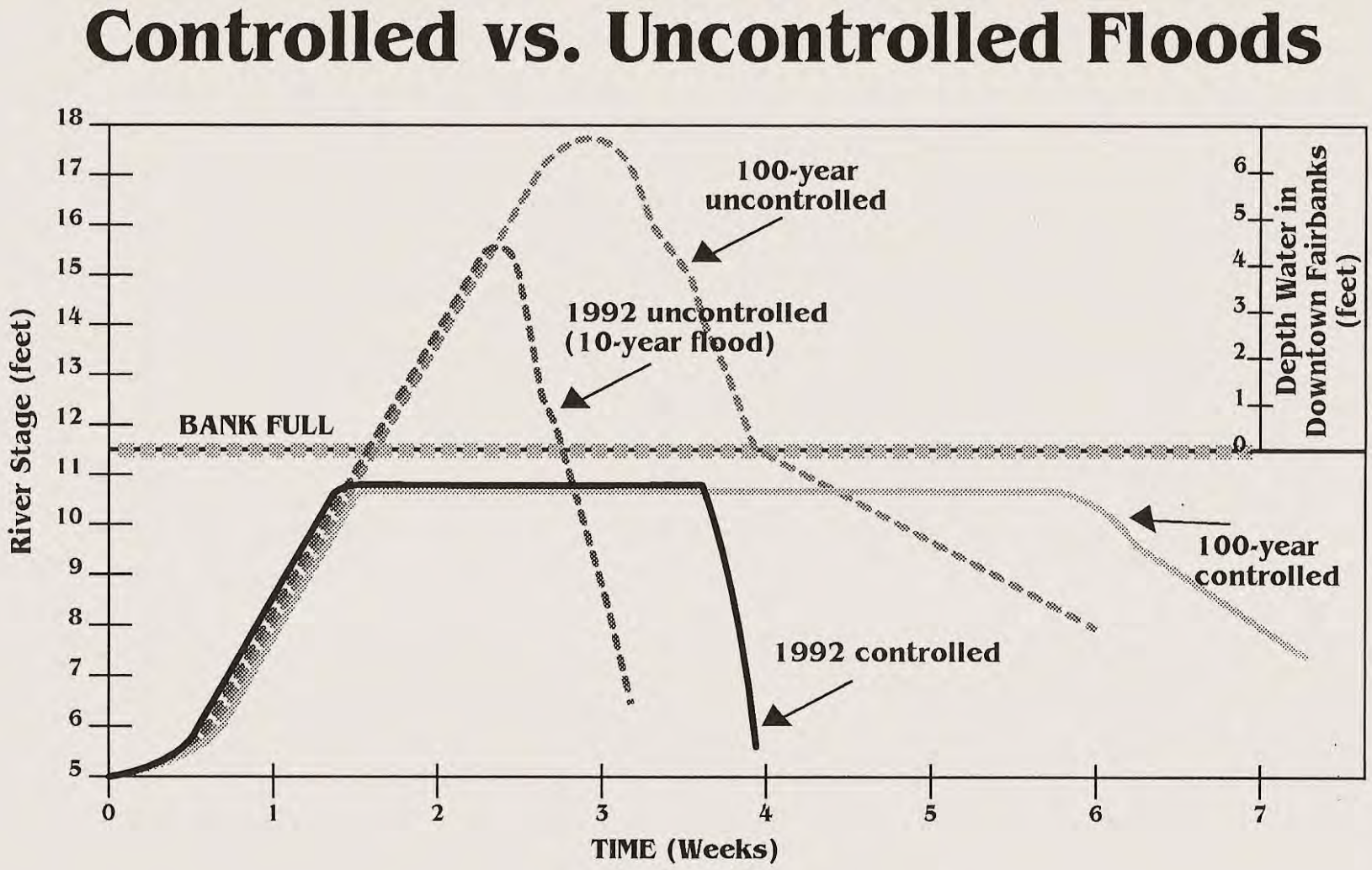
CHENA RIVER @ FAIRBANKS



OPERATIONAL HISTORY

20 High Water Events from 1979 through 2008
The 3 Largest Events to Date:

Dates	Peak Floodway Elevation Feet NGVD29	Peak Flow @ Outlet Works (CFS)	Peak Flow @ Fairbanks (CFS)	Gate Closure Duration (DAYS)
May-June 1992	507.6	8,200	10,500	18
May 1991	503.0	8,300	11,350	11
May-June 1985	505.3	8,250	8,950	12

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CHENA RIVER LAKES FLOOD CONTROL PROJECT

OPERATIONAL PROCEDURES

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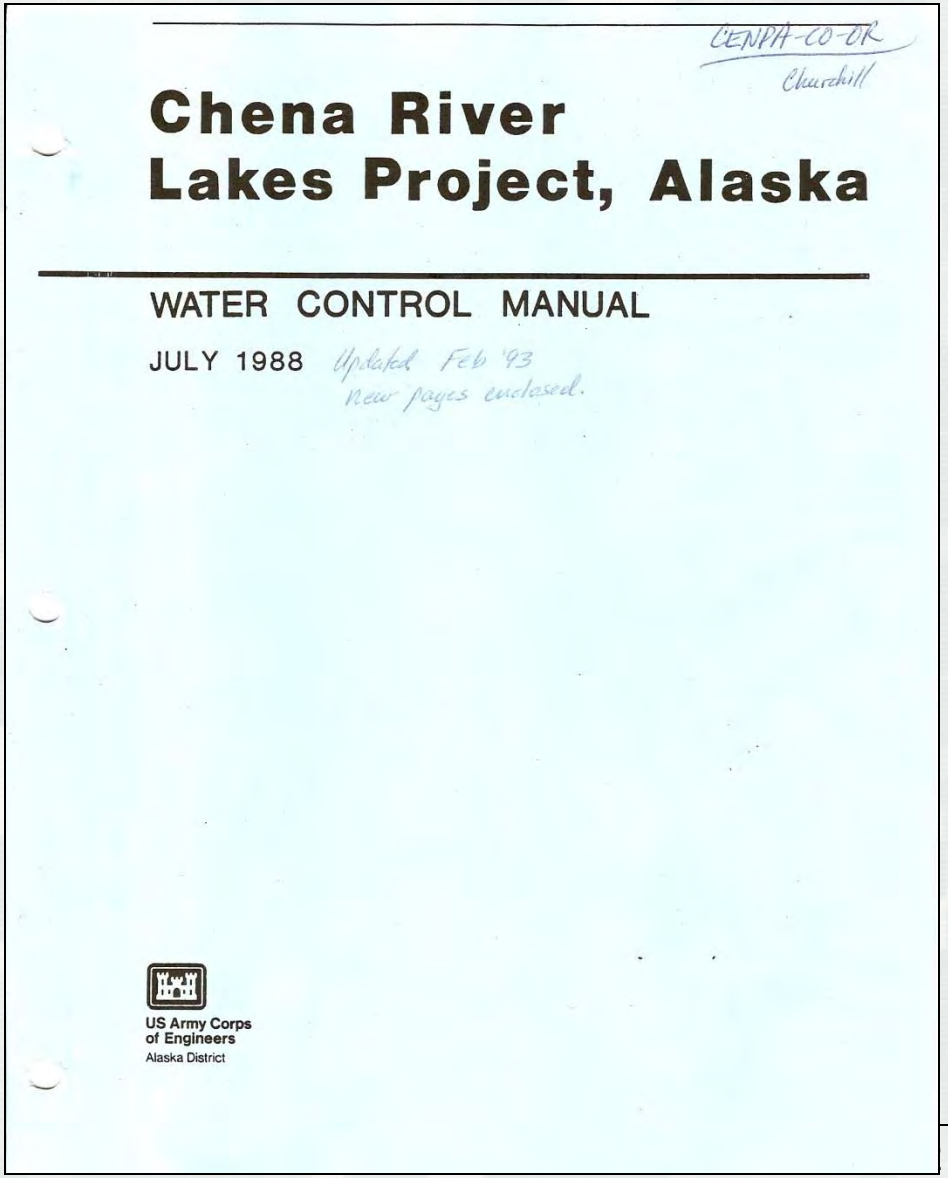
WATER CONTROL MANUAL



CENPA-CO-OR
Churchill

Chena River Lakes Project, Alaska

WATER CONTROL MANUAL

JULY 1988 Updated Feb '93
new pages enclosed.

US Army Corps of Engineers
Alaska District

Contains the Corps operational procedures for controlling flow releases from the Chena Project.

Last updated June 2012

Required by ER 1110-2-240, Section 7

FLOOD OPERATIONS PROCEDURES

Climatological Data received from Chena Basin (via GOES) to Hydraulics-Hydrology Section

SSARR Modeling to forecast flood potential and operational Requirements (EN-CW-HH)

Moose Creek Dam gate settings determined by Hydraulics-Hydrology Section and transmitted to Chena Dam Tender at Chena Project.

Gate settings made by Dam Tender at Chena Project (CO-O-C)

Trash Racks installed by Dam Tender at Chena Project prior to bailing operations (CO-O-C)

Trash Racks removed by Dam Tender at Chena Project at Completion of bailing operations (CO-O-C)

FLOOD NOTIFICATION PROCESS

UPDATE TO MATCH EAP
POSSIBLE EMAIL DISTRO LIST

EN-G-HH notifies:
- CO-O
- EN Chief
- EN-G-GM
- EN-G-ER
- NWS-RFC
- PAO

→ CO-O notifies:
- CO-O-C
- CO Chief
- DE

→ CO-O-C notifies:
- USFWS – Fairbanks
- ADF&G – Fairbanks
- FNSB - EM
- CO-NA

→ PAO notifies:
- City of Fairbanks Civil Defense
- FNSB Mayor

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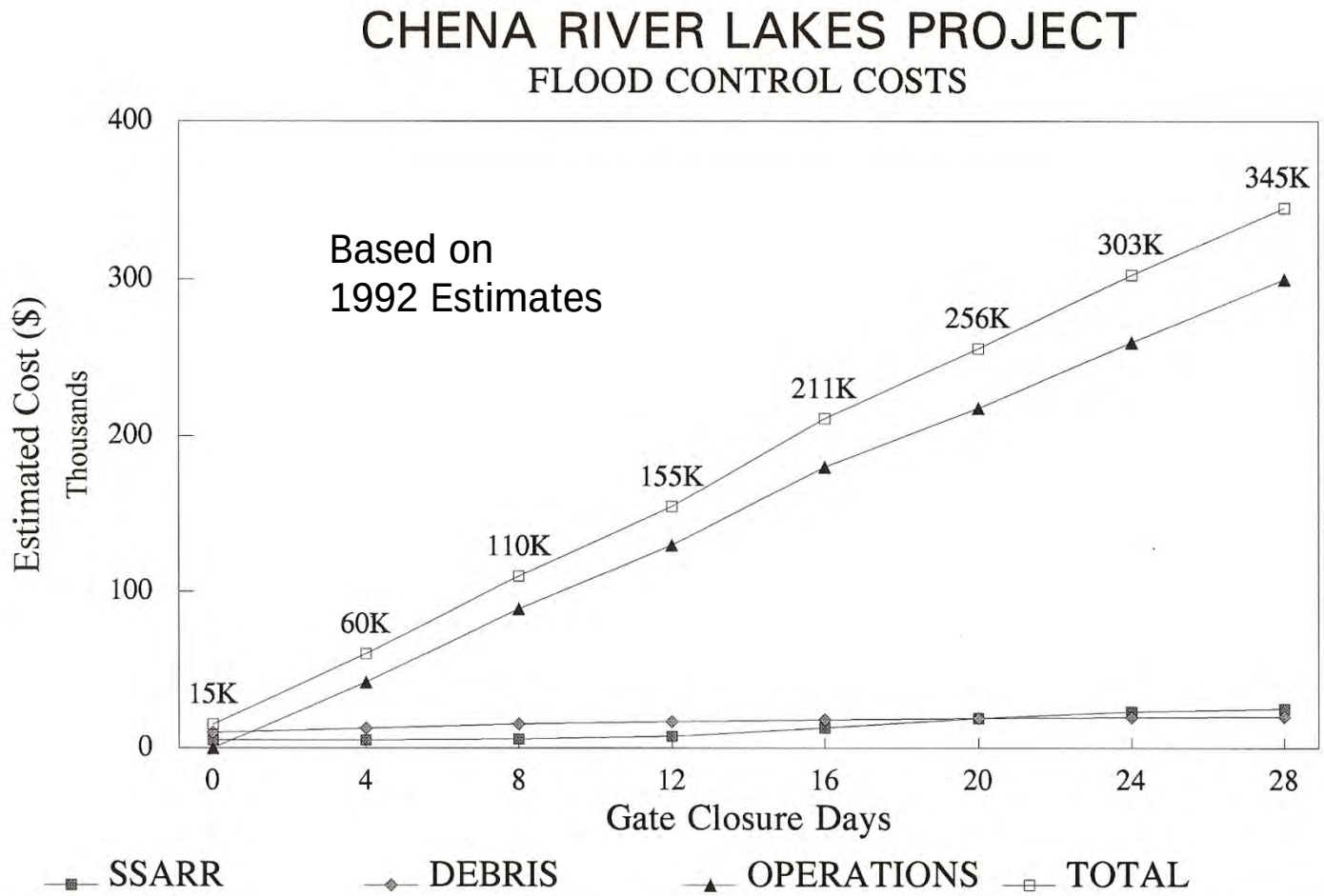
CHENA RIVER LAKES FLOOD CONTROL PROJECT

OPERATIONAL CHALLENGES

DEBRIS

Debris removal performed by service contracts using Government furnished crane.

FUNDING



Duration of Operation	0	4	8	12	16	20	24	28
SSARR Costs	5000	5200	5600	7700	12900	19000	23200	25000
Debris Removal Costs	10000	12800	15300	17100	18200	19000	19700	20000
Operations and Monitoring Costs	0	42000	89000	130000	180000	218000	260000	300000
Total Costs	15000	60004	109908	154812	211116	256020	302924	345028

POTENTIAL FUNDING CHALLENGES

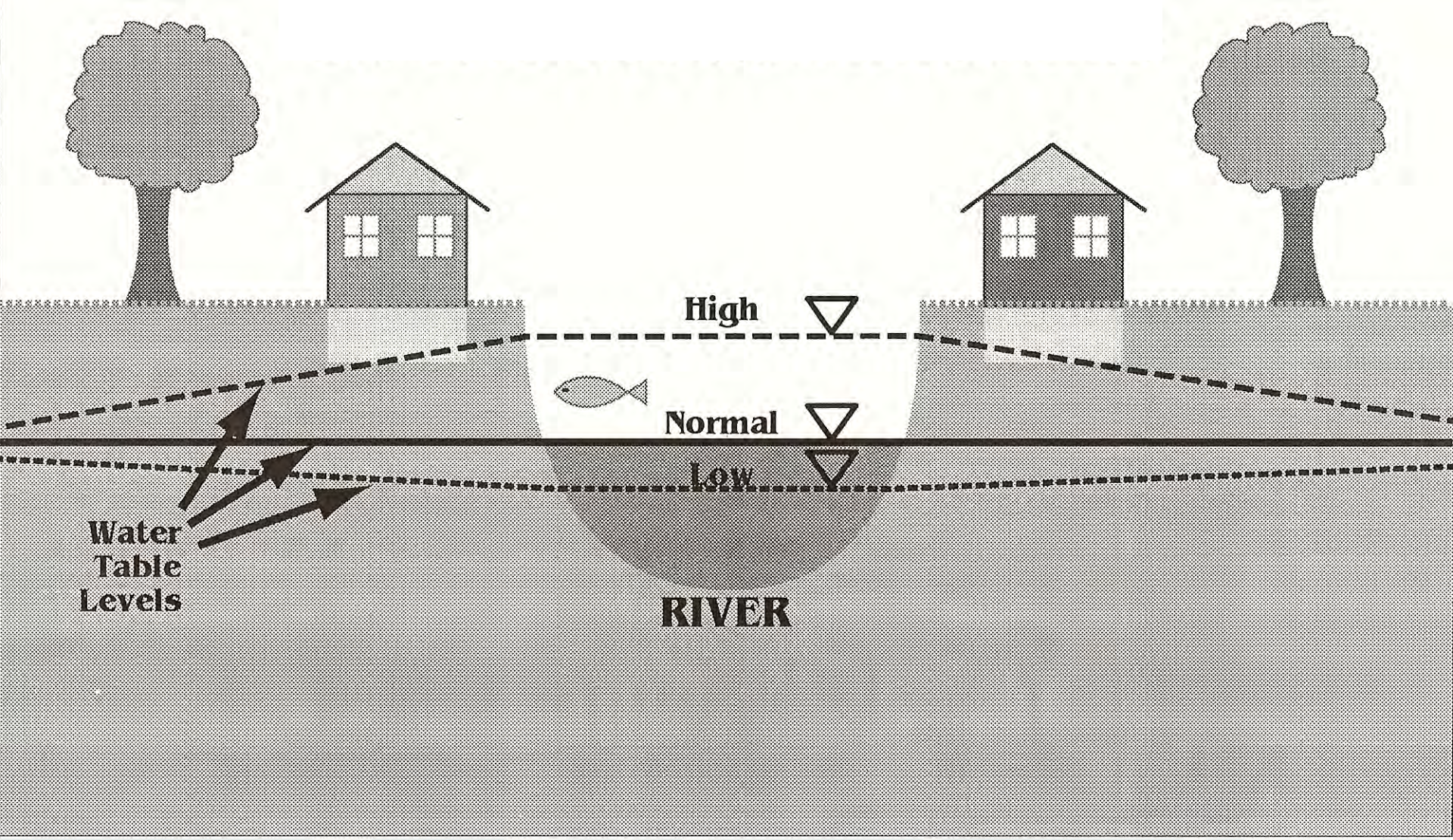
•Budget EC does not allow requests for flood operations during annual budget submittal.

•Flood operations funding shortages to be handled by reprogramming from other civil works O&M projects from within district first, then division, then HQUSACE.

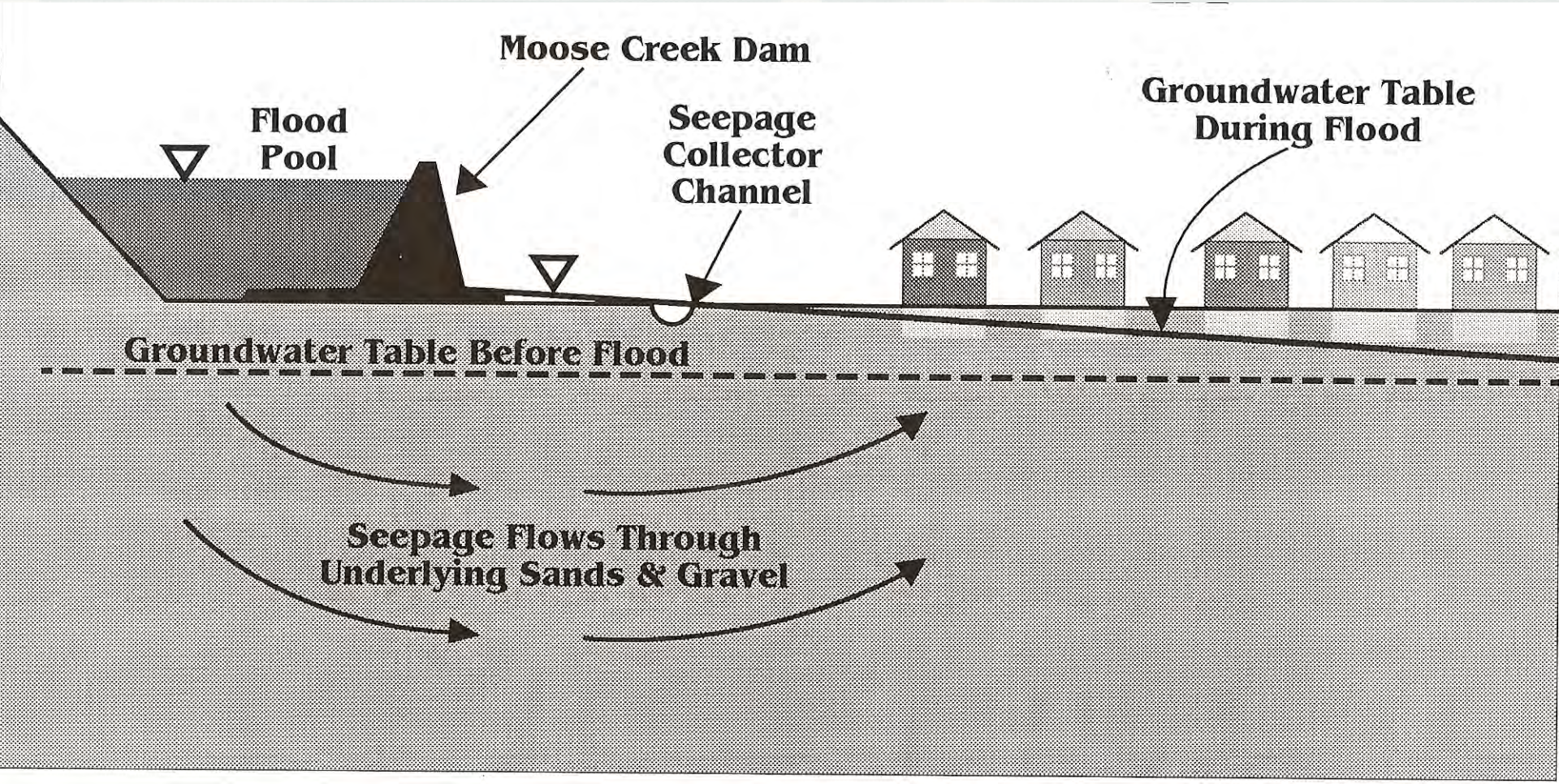
•Congressional notification handled after-the-fact if emergency.

•Response time will be slow if insufficient funding exists and funds are not available within POD.

RIVER STAGE EFFECTS ON GROUNDWATER



FLOODWAY POOL EFFECTS ON GROUNDWATER ELEVATIONS



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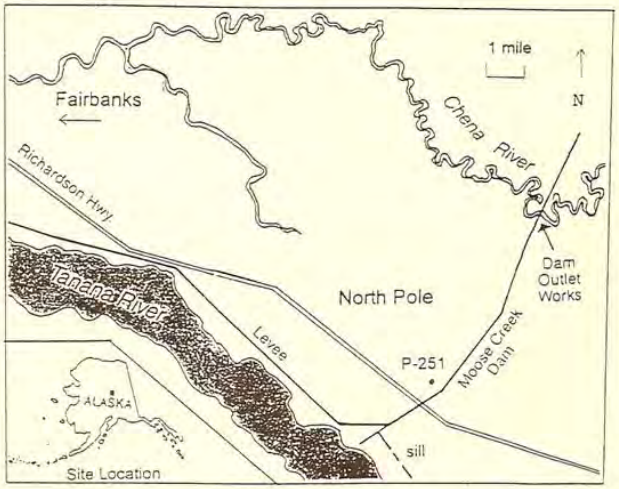
GROUNDWATER MODELING

US Army Corps
of Engineers
Hydrologic Engineering Center

The Development and Application of Initial Hydrogeologic Flow Model for the Chena River Lakes Flood Control Project



July 1995

PR-28

Developed in response to the 1992 flood event that caused ground water infiltration into basements and crawl spaces in The North Pole area.

Contains ground water inundation maps for the North Pole area generated by the 25-, 50-, and 100-year floods regulated by the Chena Project.

GROUNDWATER MODELING

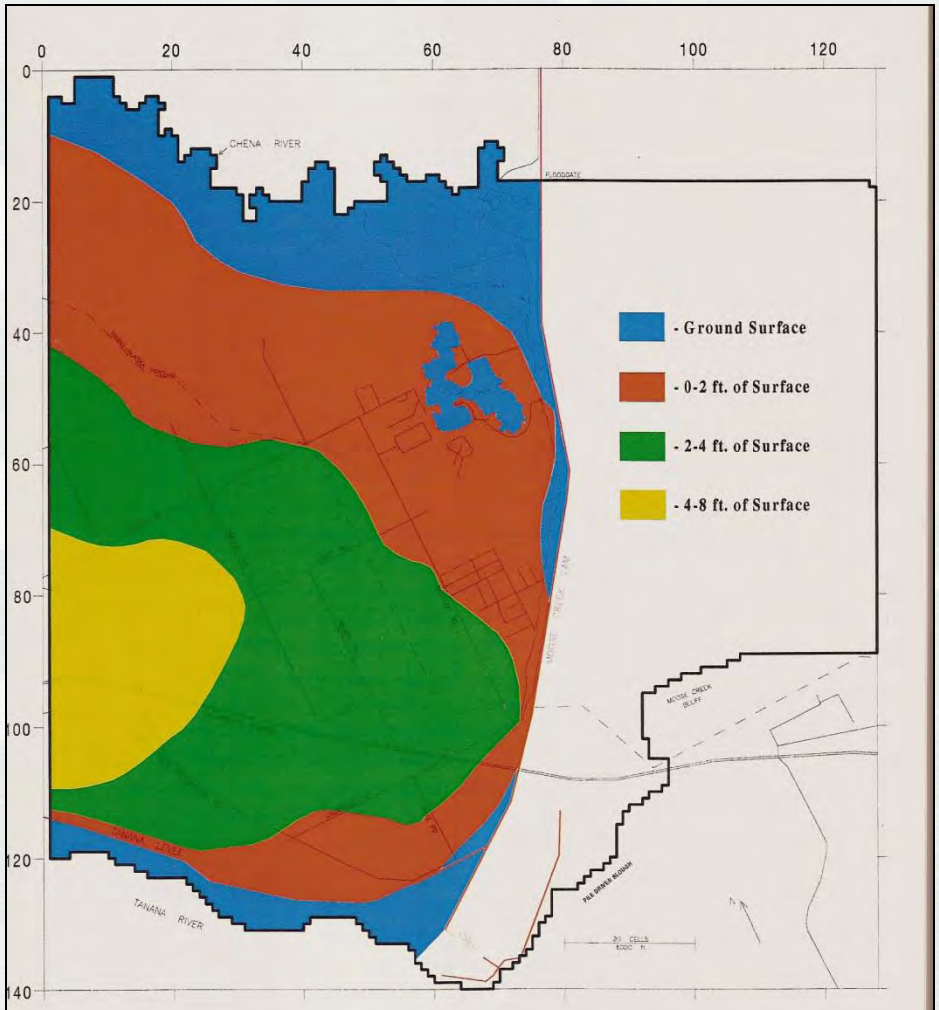


Figure 33 Approximate Depth to Maximum Water Levels - 1% Event

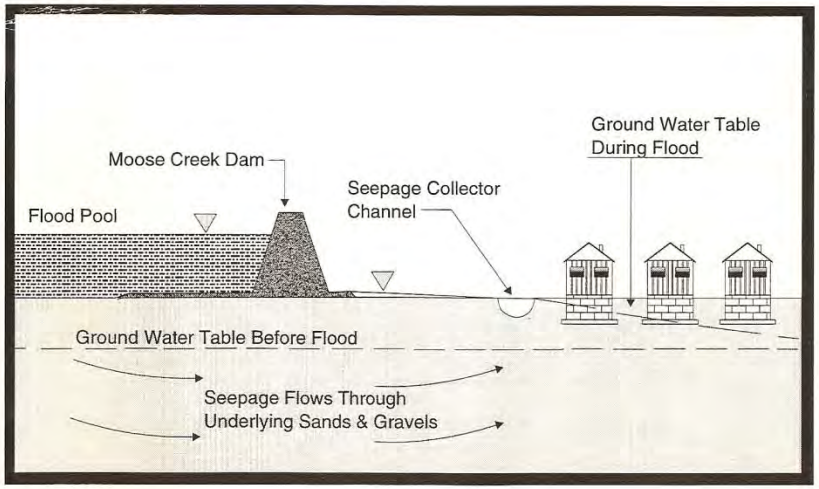
Ground water inundation from the regulated 100-year flood on the Chena River.

GROUNDWATER MODELING

U.S. ARMY CORPS
OF ENGINEERS
ALASKA DISTRICT

Chena River Lakes
Flood Control Project

GROUND WATER EFFECTS
BELOW MOOSE CREEK DAM



Letter Report No. 25 July 1996

Developed in response to the 1992 flood event that caused ground water infiltration into basements and crawl spaces in The North Pole area.

Documents an evaluation of alternatives to improve project operations by maximizing project outflows and minimizing ground water seepage impacts below moose Creek Dam in the North Pole area.

ALTERNATIVES TO ALLEVIATE GROUNDWATER CHALLENGES

- Seal the Impoundment Area
- Comprehensive Floodplain Management
- Construct a Cut-off Wall
- Lower the Tanana Sill
- Increase Flow Releases from the Moose Creek Dam
- Construct an Aqueduct
- Install Wells and Pumps

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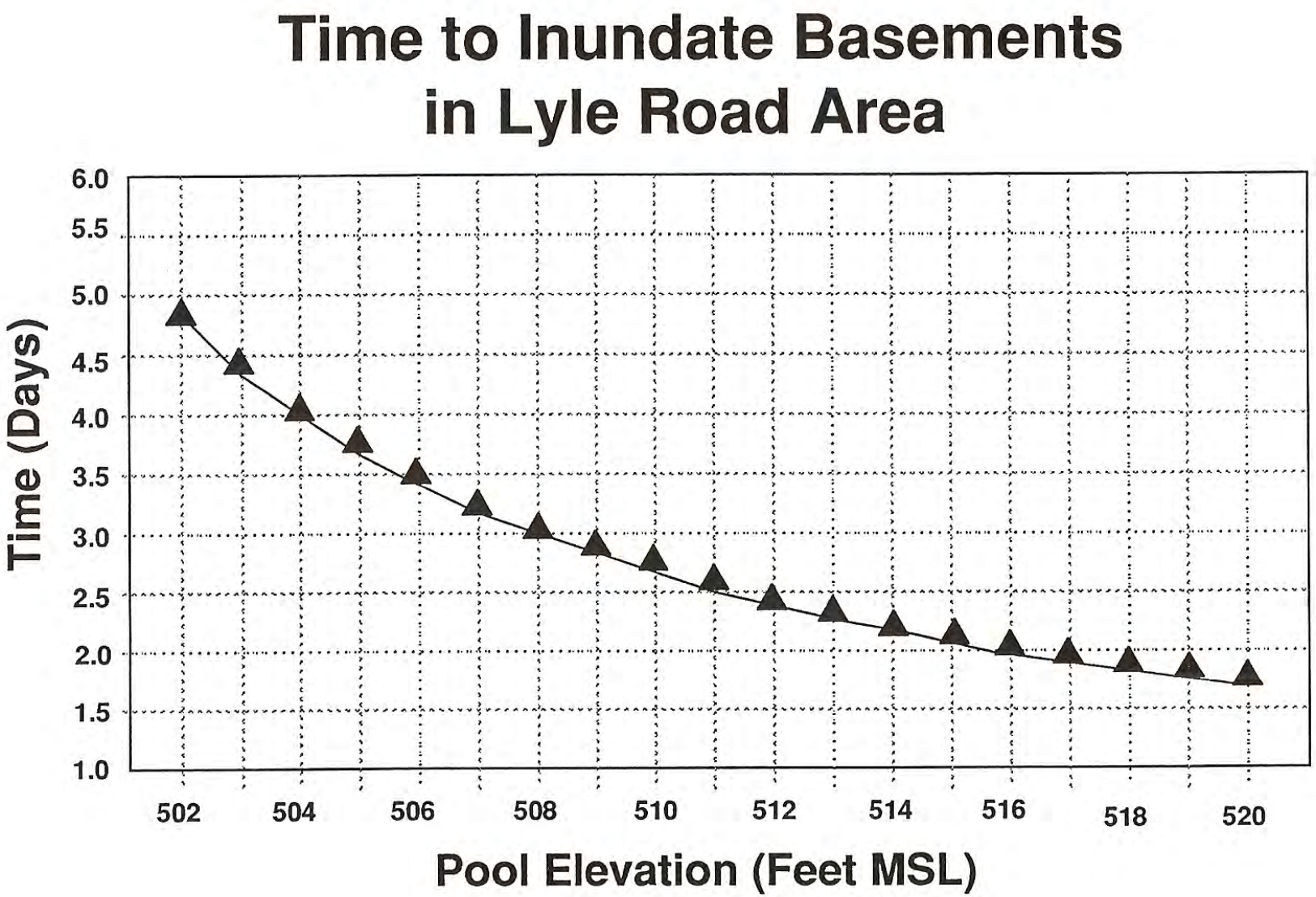
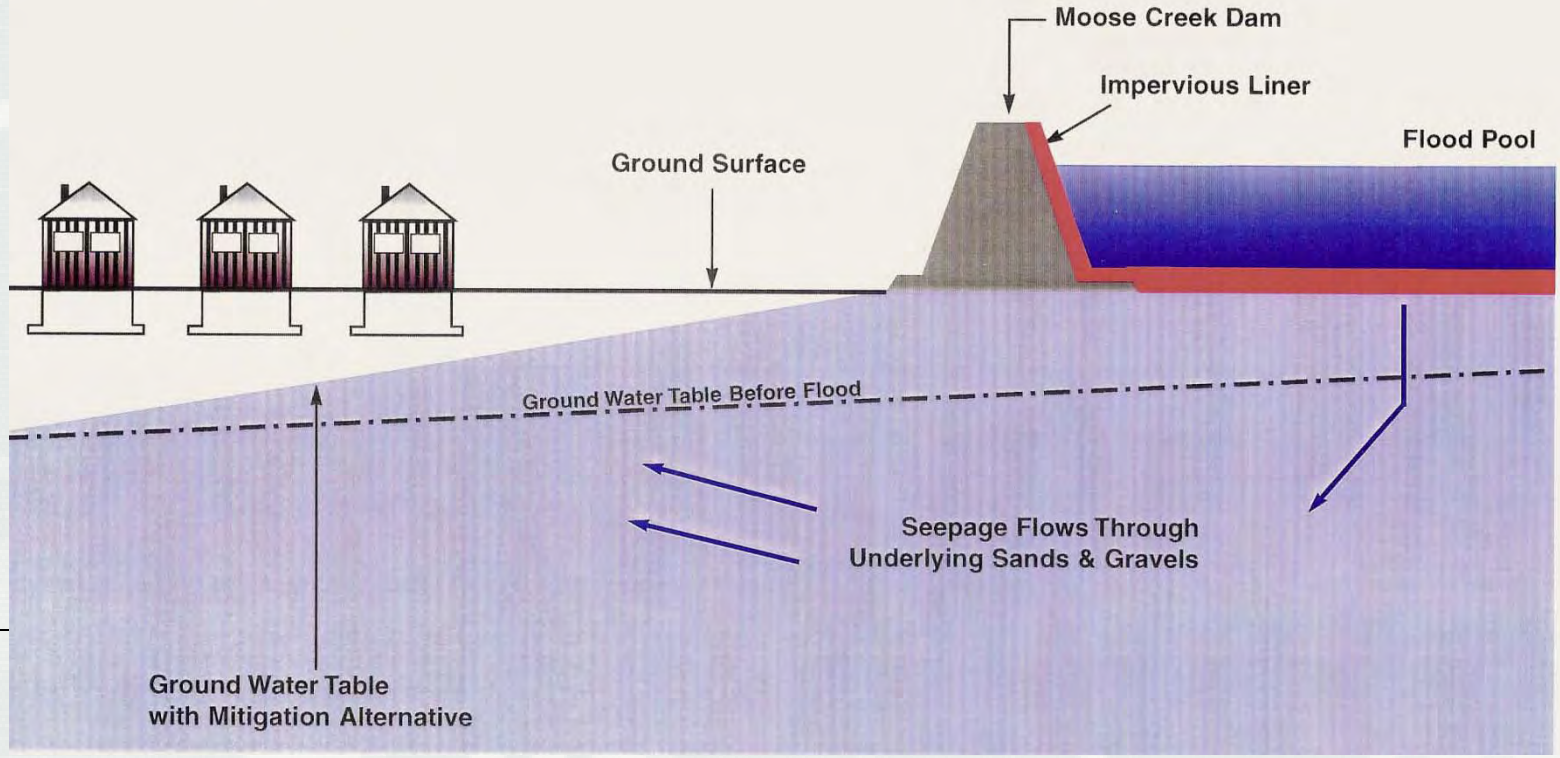
GROUNDWATER RESPONSE



GROUNDWATER ALTERNATIVE 1

Alternative: Seal the Impoundment Area

- Place an impervious geotextile liner over half of the floodway and dam up to an elevation of 510 feet (msl) to reduce seepage problems
- Estimated cost is $350,000,000 - with approximately 90% of costs attributed to the liner



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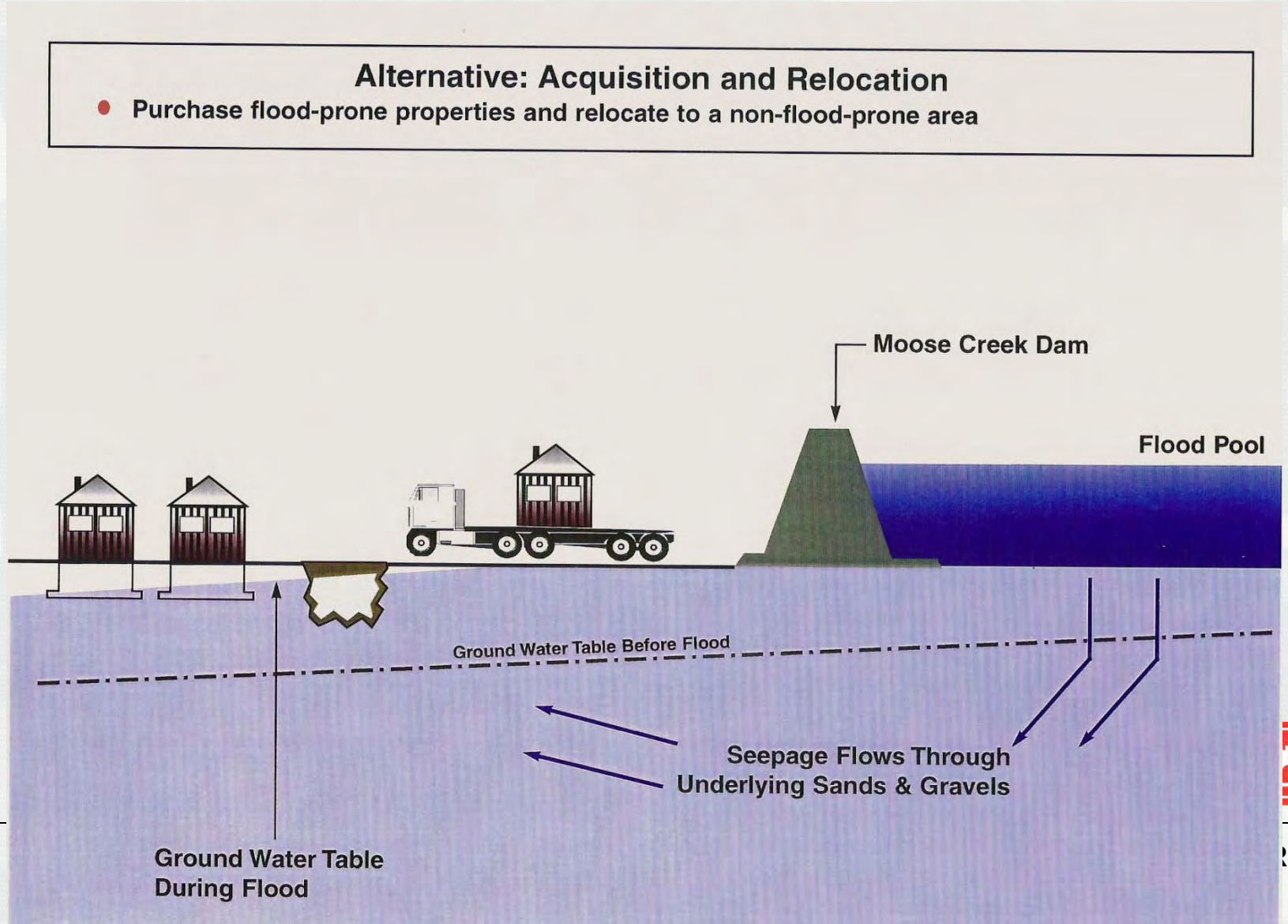
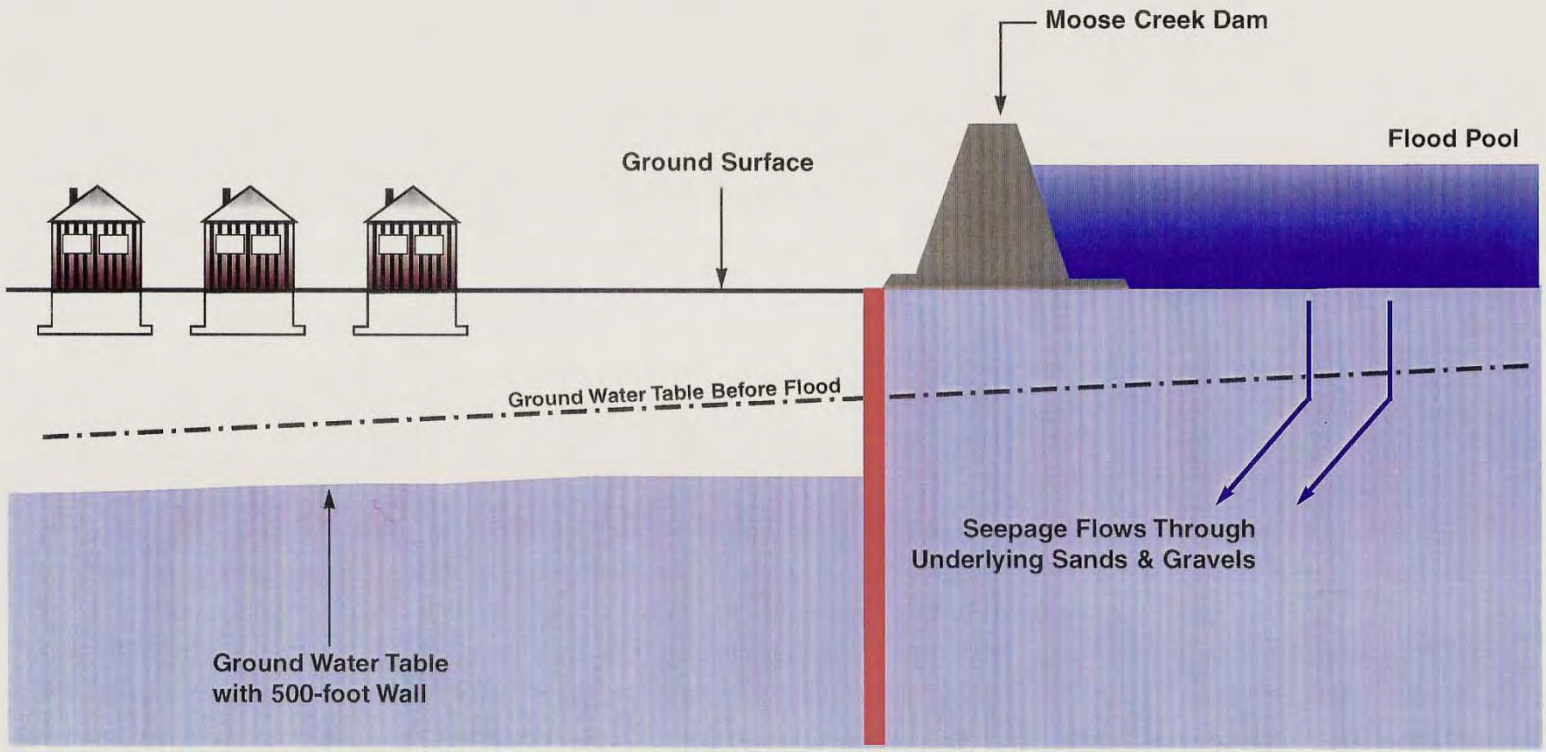
GROUNDWATER ALTERNATIVE 2



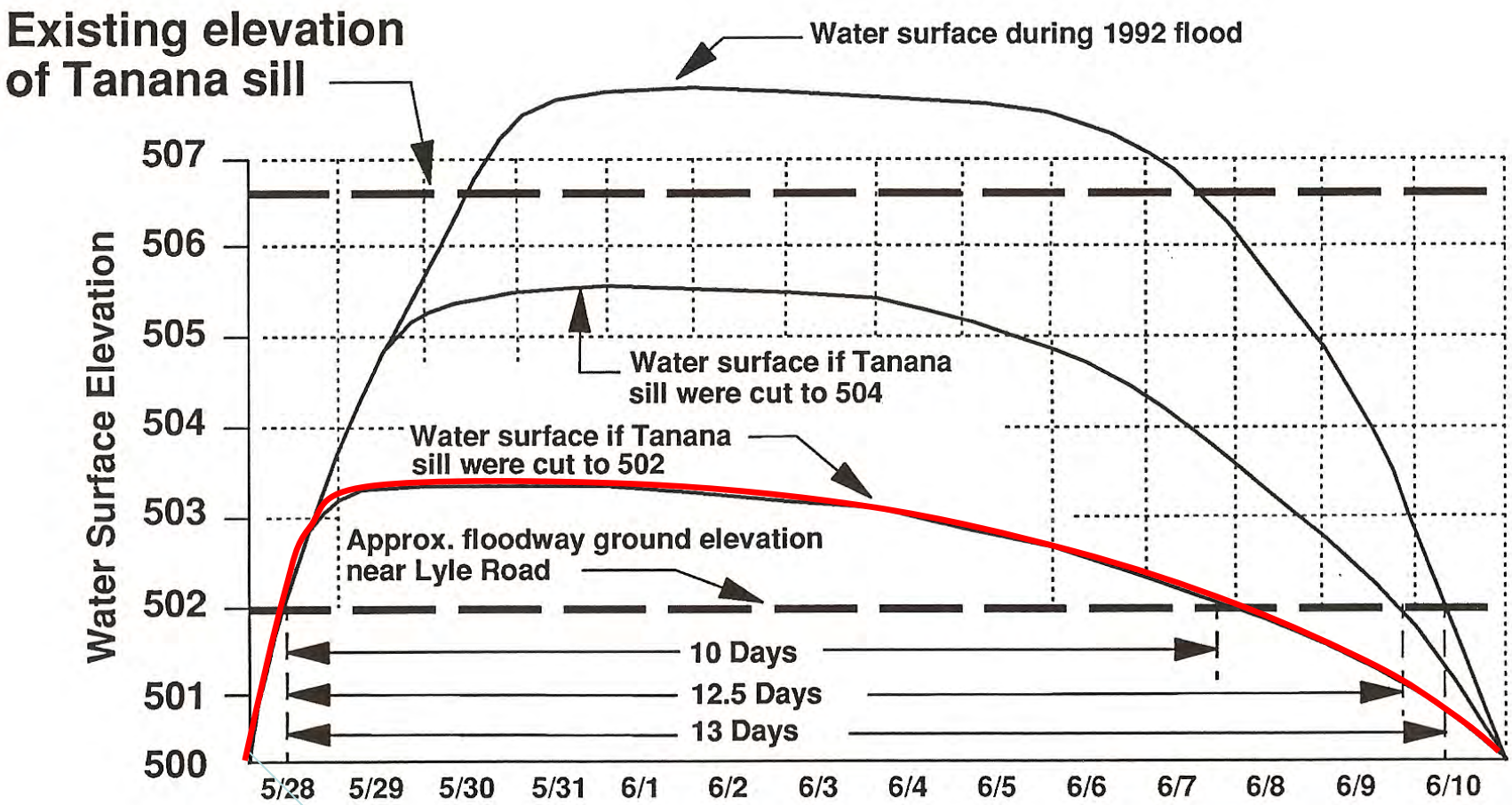
GROUNDWATER ALTERNATIVE 3

Alternative: Construct a Cut-off Wall

- Construct a four-mile cut-off wall along the dam to reduce the seepage problem
- Estimated cost of 500-foot wall is $1.32 billion
- Estimated cost of 50-foot wall is $132 million

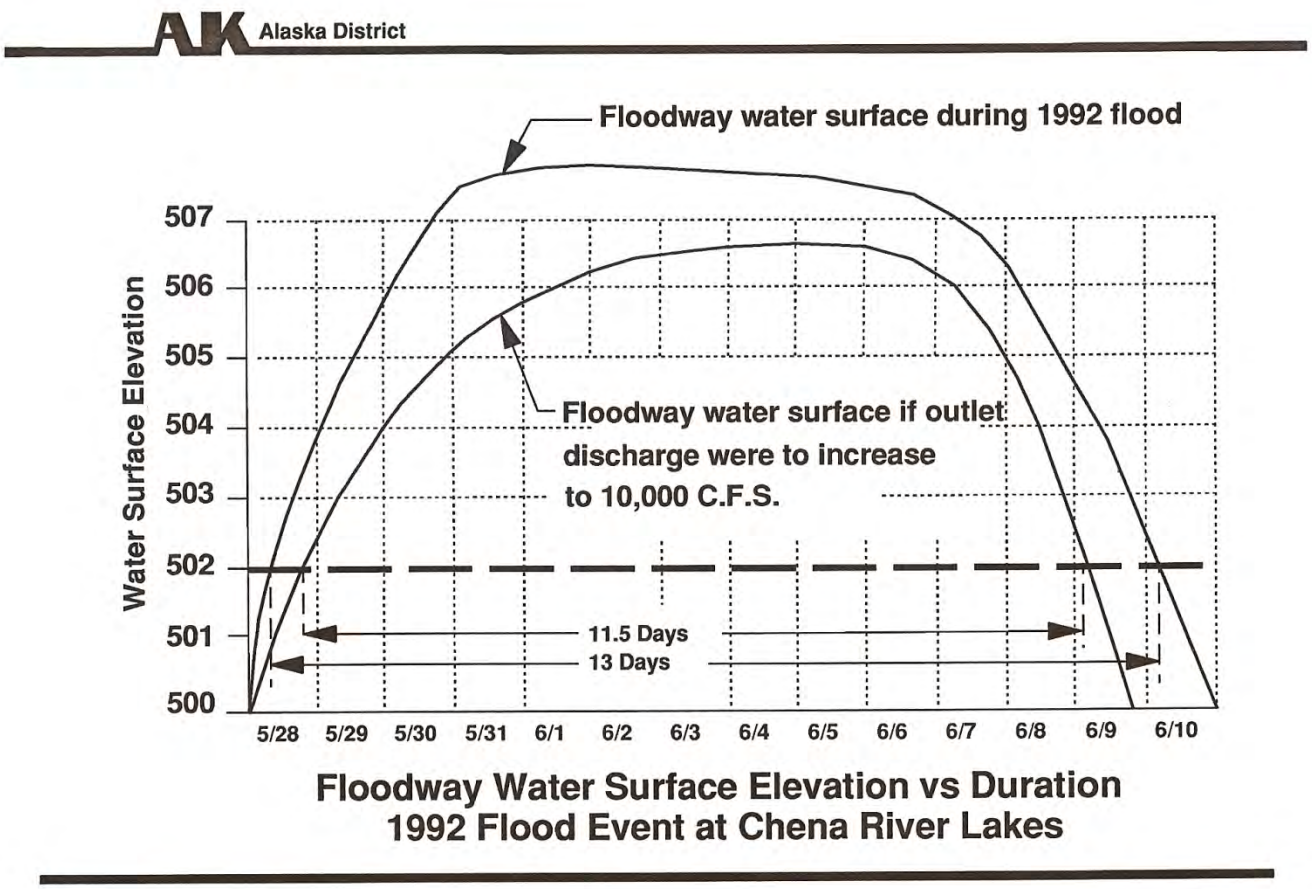


GROUNDWATER ALTERNATIVE 4

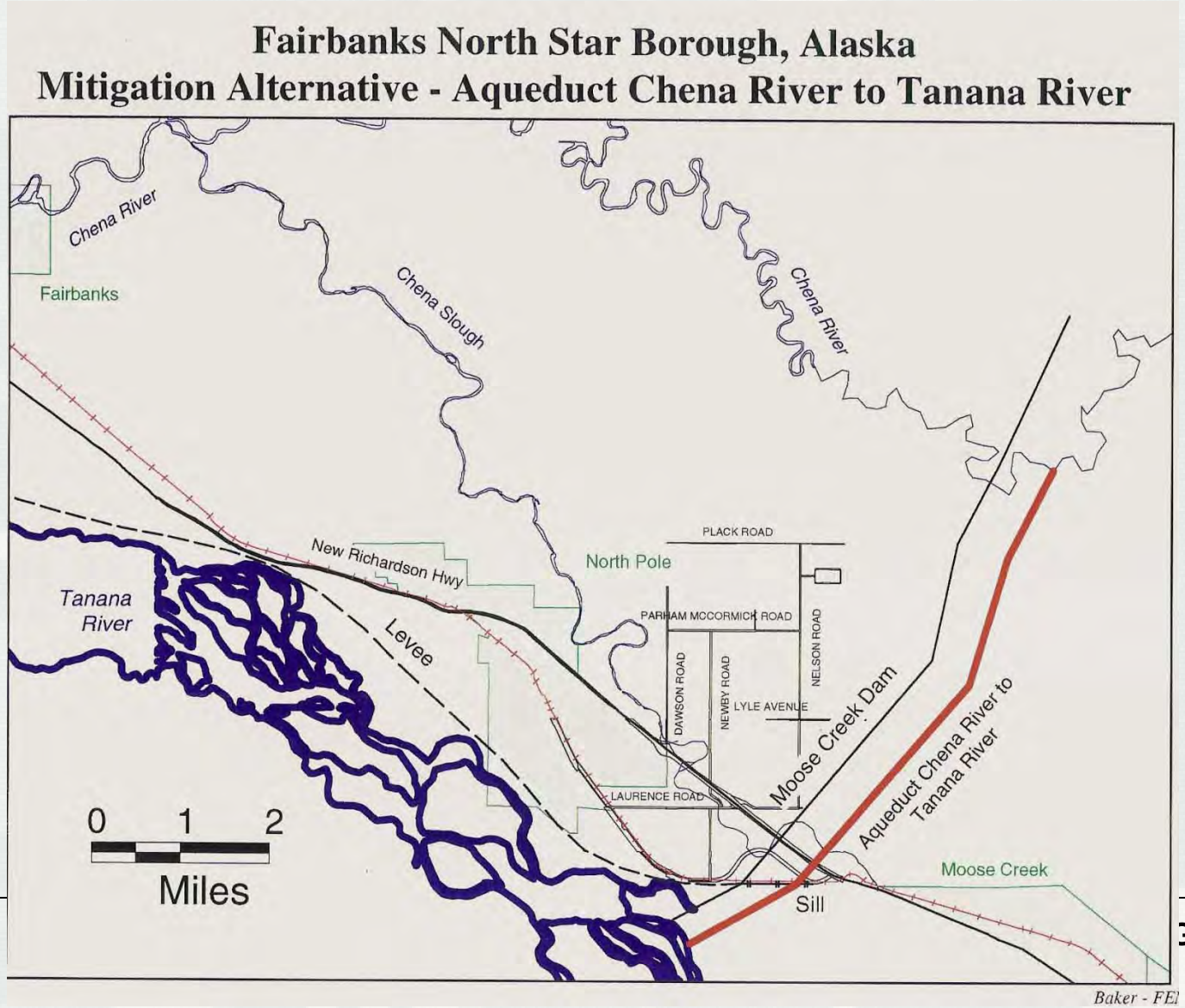


Floodway Water Surface Elevation vs Duration
1992 Flood Event at Chena River Lakes

GROUNDWATER ALTERNATIVE 5



GROUNDWATER ALTERNATIVE 6



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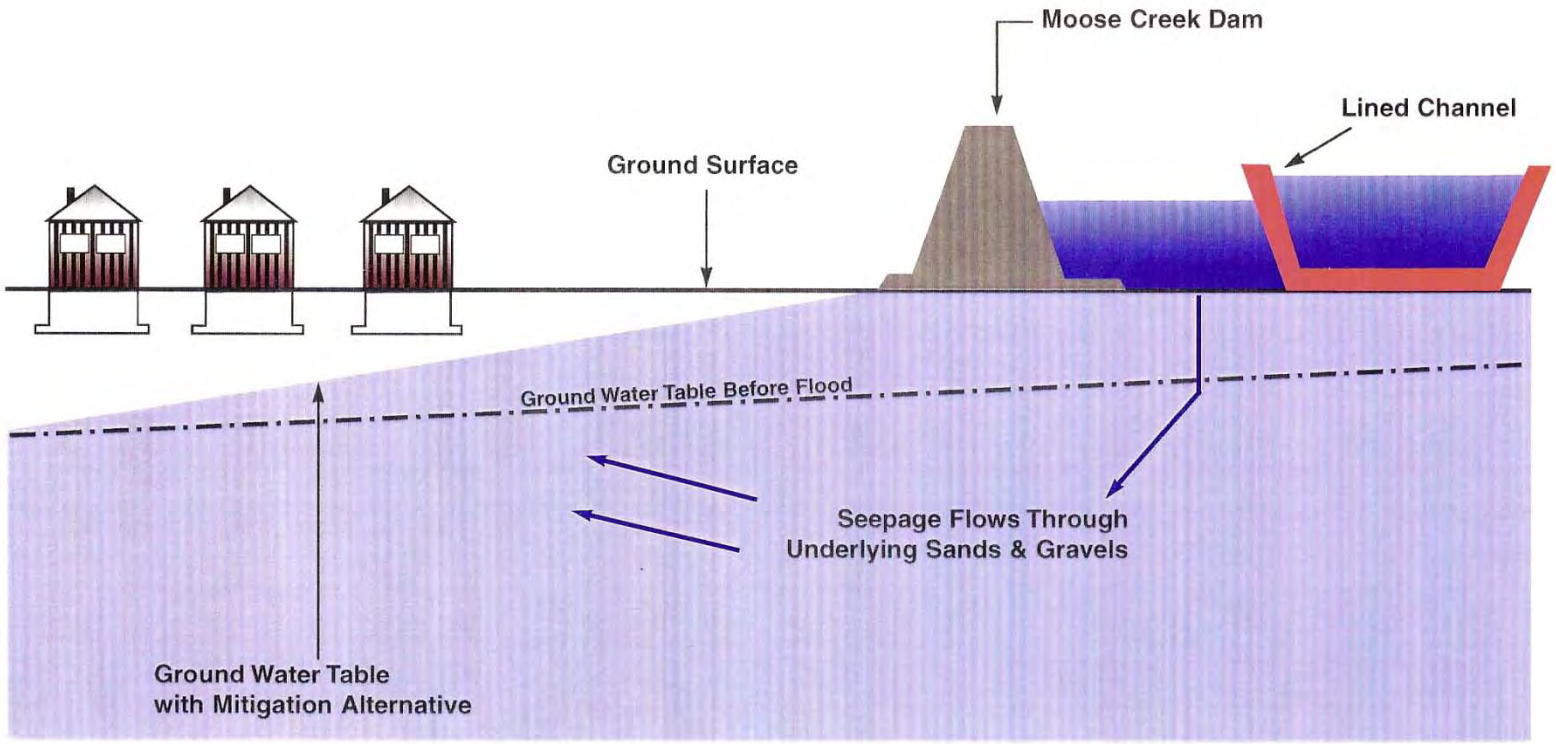
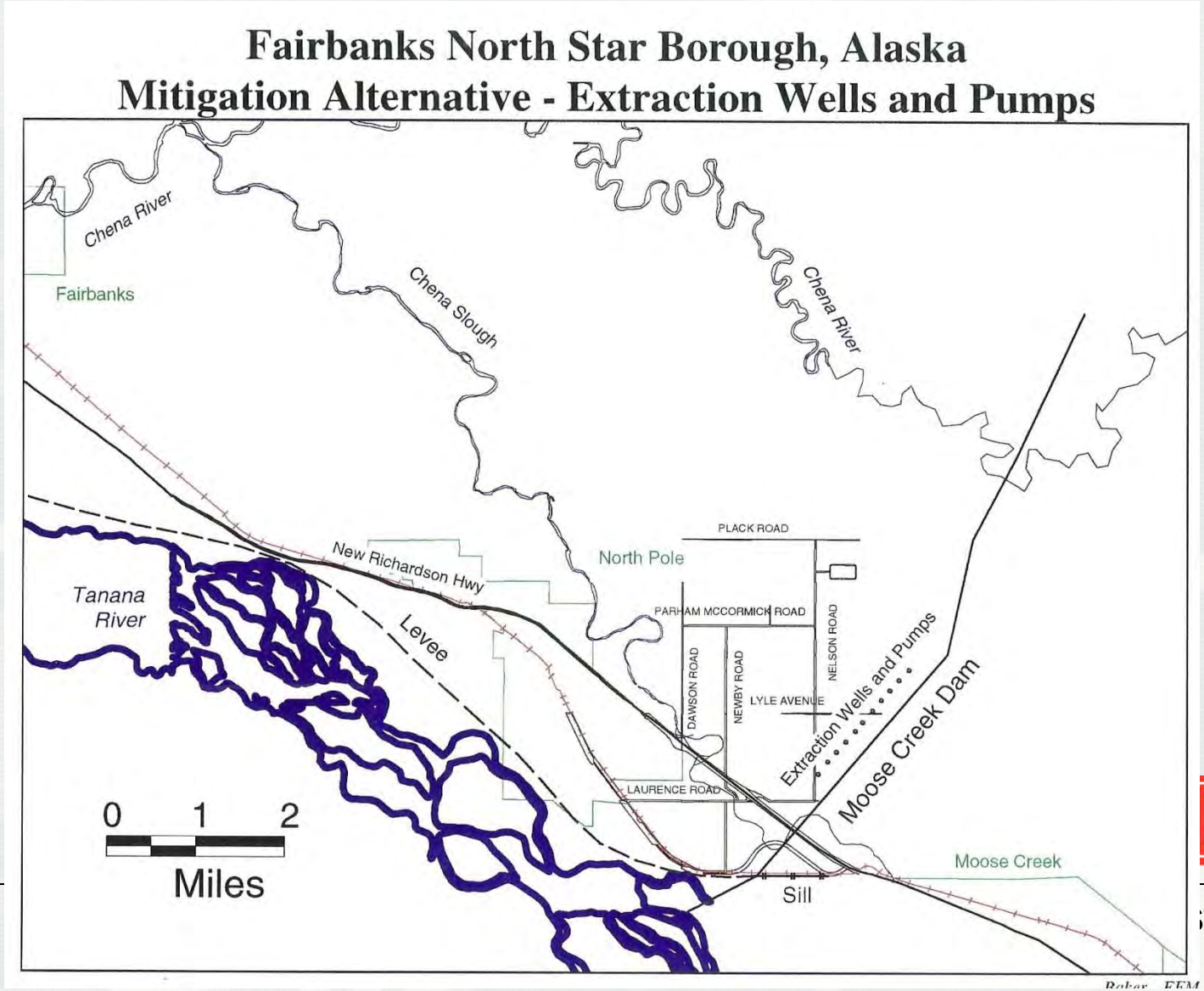
GROUNDWATER ALTERNATIVE 6

Alternative: Construct an Aqueduct

- Construct a lined channel or aqueduct from the Chena River, upstream of the outlet works, across the floodway to the Tanana River
- Initial cost for this alternative is estimated to be $51.5 million



GROUNDWATER ALTERNATIVE 7



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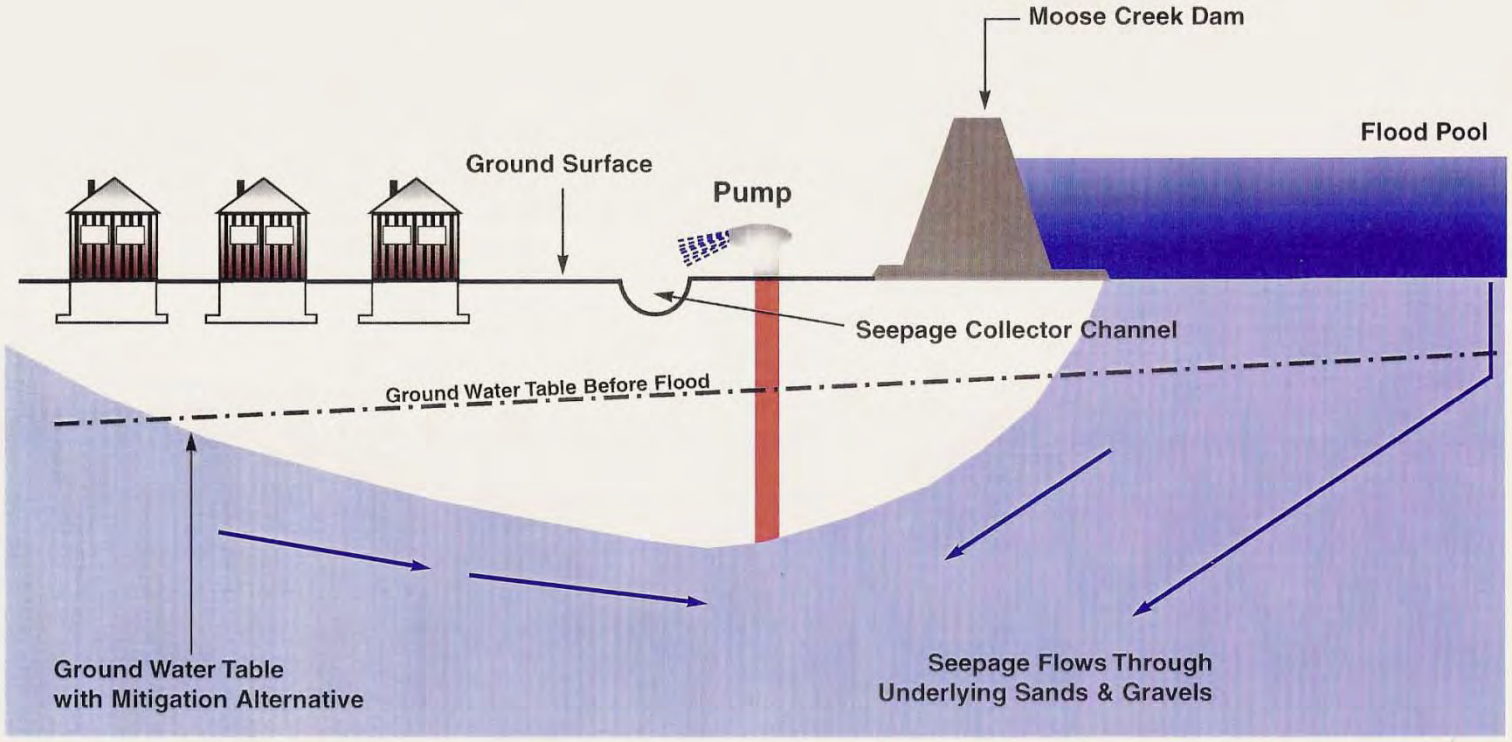
GROUNDWATER ALTERNATIVE 7

Alternative: Install Wells and Pumps

- Install pumps adjacent to the seepage collector channel between Lyle/Nelson Road area and Moose Creek Dam
- The initial cost to keep maximum water levels resulting from a 2% chance flood event from rising within four feet of land surface is estimated to be $6.5 million



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LETTER REPORT #25 CONCLUSIONS

Impounding water above 502 feet NGVD29 for 4 to 5 days could flood basements in North Pole; sooner for higher pool elevations.

Benefit Cost ratios for ground water mitigation alternatives range from 0.0006 – 0.12 to 1.

Increased flow releases from dam may reduce frequency of ground water problems, reduce operational costs; but would require construction of dikes along portions of the Chena River below the dam.

The permanent solution is to relocate residents out of the affected areas which is beyond the current project authorization.

LETTER REPORT #25 RECOMMENDATIONS

- Fairbanks North Star Borough implement and enforce land use ordinances restricting construction of basements, crawl spaces, and septic systems within the ground water impact zones identified by HEC Publication PR-28.

- Provide ground water flood insurance.

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GROUNDWATER FLOODING NEWS RELEASE

FAIRBANKS
Daily News-Miner

LOCAL

Section B

Thursday, April 1, 1999

Borough, feds try again to solve ground-water flooding

By KATE RIPLEY
Staff Writer

Over 1,000 new homes have been built near the Moose Creek dam since the Chena Lakes Flood Control Project started in 1979. Thirty-five new homes with basements have been built in the area since 1992, when water behind the dam caused ground water in front of it to rise so high it caused $300,000 in damage to 98 homes.

Each year there's a 4 percent chance the water will seep up through the soil again if flood waters are contained behind the dam long enough, soaking crawl spaces and drenching basements. Federal officials have repeatedly recommended the borough, through zoning laws, restrict construction of new basements in affected neighborhoods.

Yet, seven years after the last flood, nothing has been done.

It's a situation that makes borough planning chief Rex Nutter a bit edgy.

"The bottom line is if something's not done, sooner or later we'll have a resounding scream from the homeowners out there," Nutter said.

But, like the planner that he is, Nutter has a plan.

A key component is rezoning affected properties, those 1½ to 2 miles of the dam. That, at a minimum, would alert prospective home buyers to the problem, he said. The Federal Emergency Management Agency has said it would then extend insurance for ground-water flooding to all affected residents. The borough could also outlaw construction of new basements as part of the zoning.

Another component is a hoped-for $11 million grant from the federal government, through Sen. Ted Stevens, to retrofit homes so that ground-water flooding is no longer an issue. A 1995 federal report said such action would cost $11 million.

There are probably other ideas as well.

"We're going to try something

See HOMES, Page B-4

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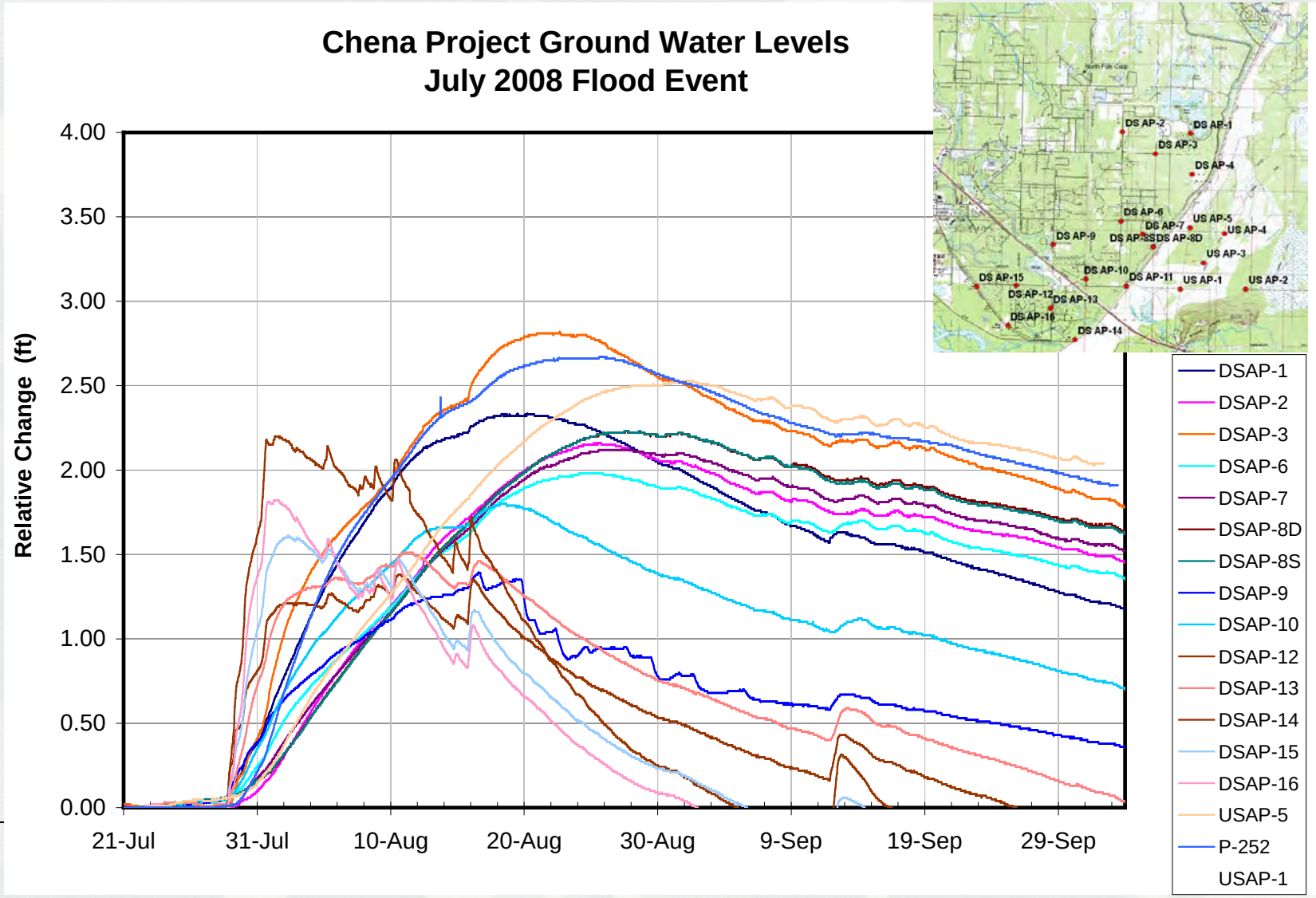
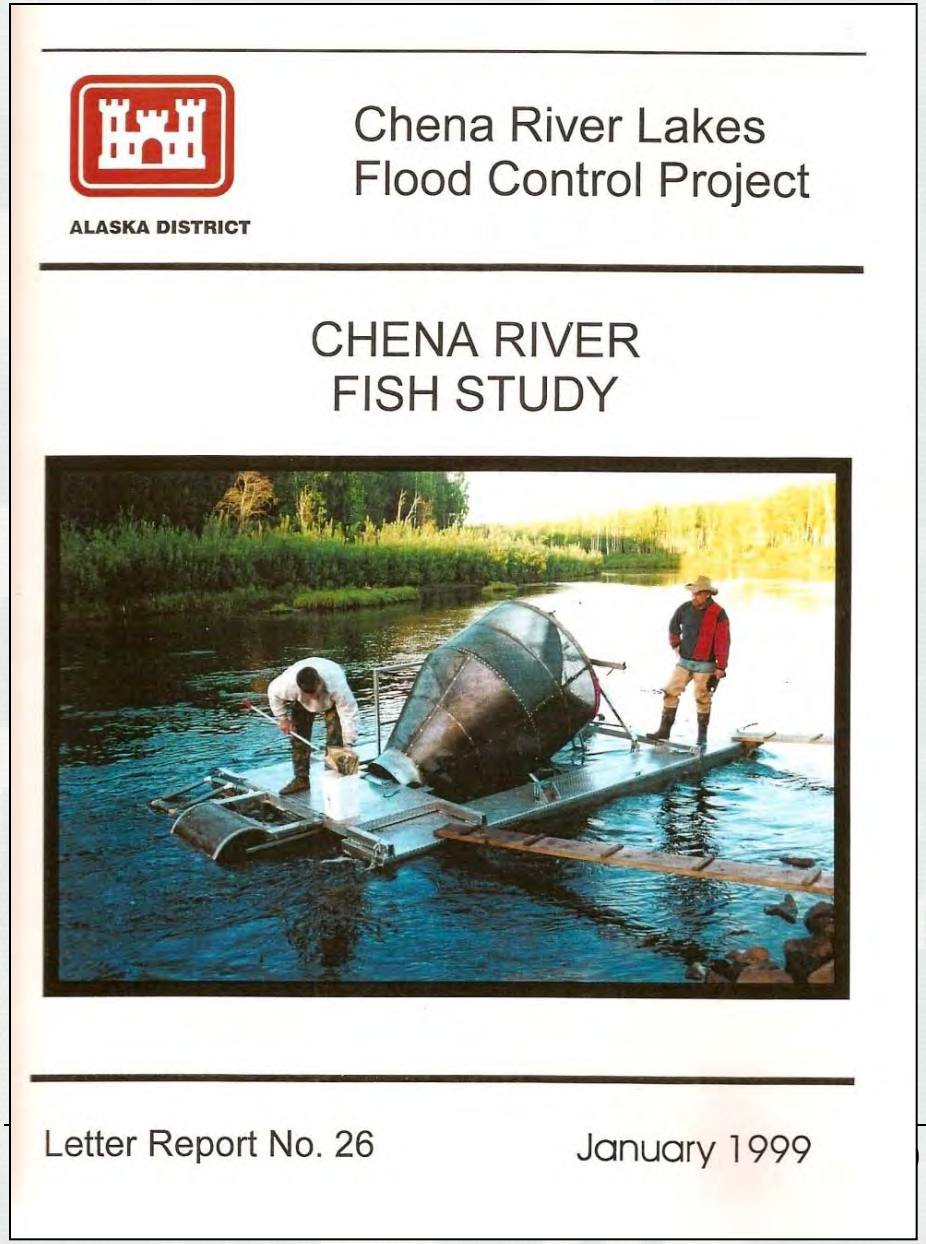
GROUNDWATER RESPONSE 2008



CHENA RIVER FISH STUDY



An evaluation of the contribution of the Chena River to total populations of Chum and Chinook Salmon in the Yukon and Tanana Rivers by the Alaska Cooperative Fish & Wildlife Unit, University of Alaska, Fairbanks through the Biological Resources Division, U.S. Geological Survey.

CHENA RIVER DREDGING

- Funding - congressional add on within the energy and water appropriation act of 1998.
- Purpose - to improve navigation for vessels up to 350 feet long - 60 feet wide with up to 3 feet of draft along 3.2 miles of the lower Chena river.
- Original program amount: $800,000
- Final cost: $2,294,000
- Original quantity est.: 86,000 cu yds.
- Final quantity: 112,000 cu yds.

CHENA RIVER LAKES FLOOD CONTROL PROJECT

DAM SAFETY

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MOOSE CREEK
RISK INFORMED DAM SAFETY TIMELINE

- SPRA completed June 2009
  - Moose Creek Dam DSAC 1
  - East Cutoff Dike DSAC 3
- SPRA Report September 2009
- IRRMP Complete November 2009
- PFMA and Risk Assessment conducted June/October 2010
- Restarted Risk Assessment Spring 2012

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DOMINANT POTENTIAL FAILURE MODE

- Seepage and piping in the foundation

  600 feet of alluvium +/- makes a positive cutoff infeasible. History of sand boils during flood control operations.

BUILDING STRONG®

DOMINANT POTENTIAL FAILURE MODE

- Seepage and piping in the foundation

Relief wells are subject to damage by frost action and have required continual maintenance or replacement

RISKS – BOTTOM LINE

- Dam untested above ~25-year event (1992) and no major flood since last round of relief wells
- Foundation consists of sands and gravels with lenses of fine sand
- Foundation soils are loose because they were recently frozen/thawed
- Geology variations along 8 mile long dam a challenge to quantify
- Seepage measures require continual maintenance
- Risk increases with height and duration of impoundment

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INTERIM RISK REDUCTION MEASURES

- No. 1 - Evaluate and Implement Lowering the Control Sill (structural measure)
- No. 2 - Revise and Exercise the Emergency Action Plan
- No. 3 - Increase Stockpiled Materials
- No. 4 - Revise Flood Control Operations
- No. 5 - Increased Monitoring and Surveillance
- No. 6 - Provide lighting for flood monitoring
- No. 7 - Improve relief well capability
- No. 8 - Identify an alternative incident command center
- No. 9 - Vegetation removal
- No. 10 - Perform a potential failure mode analysis

OPERATIONAL CHANGES (Tier 1 of 3)

- Tier 1 ~ Any pool elevation below the 1992 event (507.6 feet NGVD29).

  - Modify upstream fish migration operations
  - Continuous monitoring and surveillance of the dam during floods

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OPERATIONAL CHANGES (Tier 2 of 3)

- Tier 2 ~ Any pool elevation above the 1992 event (507.6 feet MSL).
  - Tier 2 preparation begins upon model forecast above 507.6 feet MSL or at pool elevation 506.6 feet MSL
  - Discharge up to maximum authorized; 12,000 cfs measured at downtown Fairbanks
    - Downstream areas historically experience flooding around 8,600 cfs discharge through the dam (Steamboat and Freeman Road)
  - Increased monitoring and surveillance downstream of the dam in low-lying areas

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OPERATIONAL CHANGES (Tier 3 of 3)

- Tier 3 ~ Any pool elevation causing distress that compromises integrity of the dam.
  - Require immediate implementation of the Emergency Action Plan including evacuations and flood fighting
  - Discharge above 12,000 cfs is considered

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IRRM STATUS UPDATE

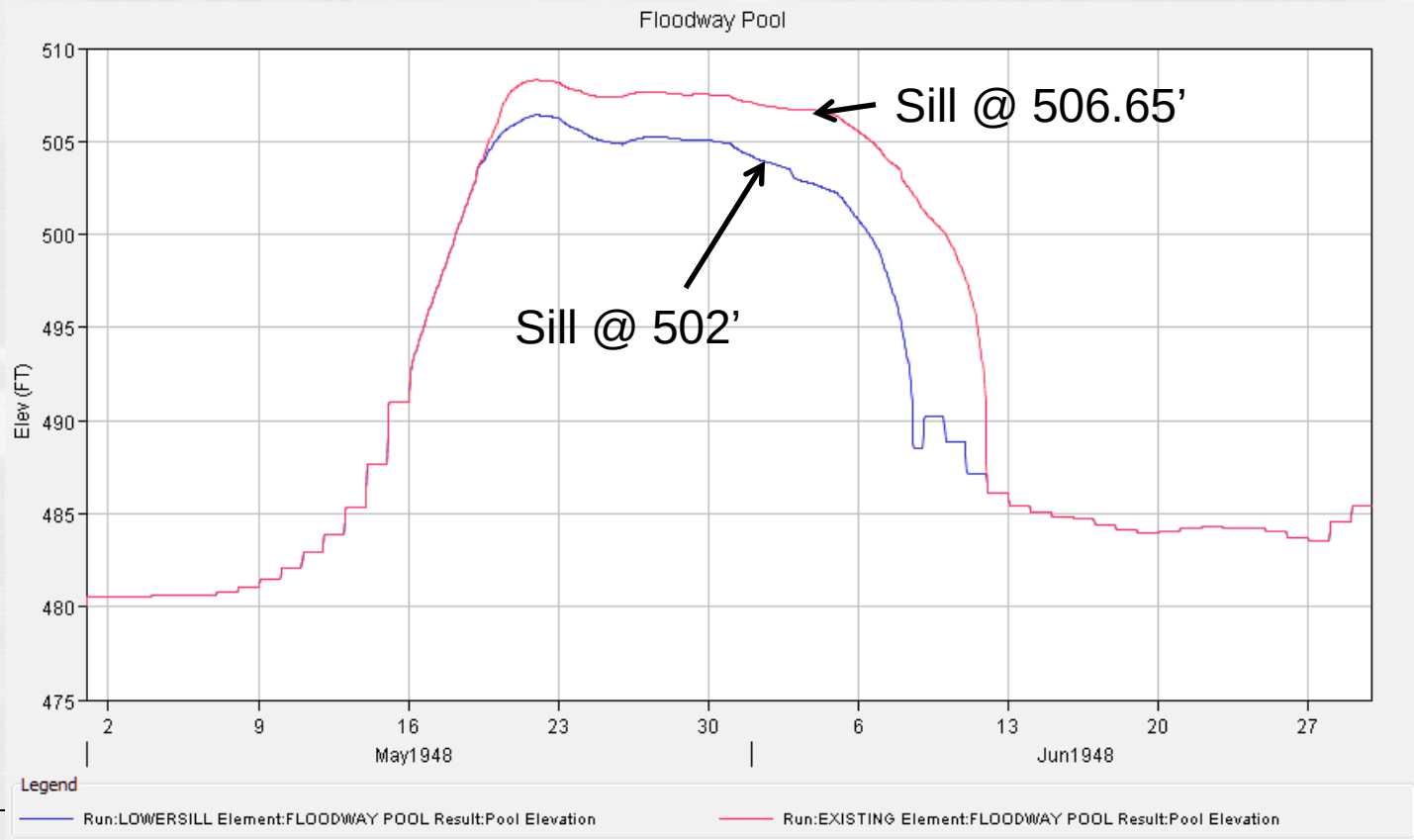
- No. 1 - Evaluate and Implement Lowering the Control Sill (structural measure)
  - Completed prior to 2010 flood season

IRRM STATUS UPDATE

- No. 1 - Evaluate and Implement Lowering the Control Sill (structural measure)
  - Completed prior to 2010 flood season

Flood of 1948 routed through Moose Creek Dam

With Lower Sill
- 1.4 Feet Lower
- 3.1 Days Less above 502’



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IRRM STATUS UPDATE

- No. 2 - Revise and Exercise the Emergency Action Plan
  - Completed exercises in FY10, FY11, and FY12
  - EAP revised after first two exercises

IRRM STATUS UPDATE

- No. 3 - Increase Stockpiled Materials
  - Purchased additional sand bags
  - Stockpiled enough sand to fill sand bags on hand
  - Purchased “tiger dams”
  - Purchased equipment

IRRM STATUS UPDATE

- No. 4 - Revise Flood Control Operations
  - Complete -> Water control manual updated
- No. 5 - Increased Monitoring and Surveillance
  - New procedures implemented
  - Cross training and dry run of new procedures completed after exercise
  - Completed HSS inspection, and inspections of floodway sill stilling basin and control works stilling basin

IRRM STATUS UPDATE

- No. 5 - Increased Monitoring and Surveillance (continued)
  - Added piezometers at key locations
  - Ensured other piezometers were functional or programmed for repair or replacement

IRRM STATUS UPDATE

- No. 6 - Provide lighting for flood monitoring
  - Portable vehicle mounted lighting purchased prior to 2010 flood season
- No. 7 - Improve relief well capability
  - All relief wells inspected
  - Damaged relief wells repaired or replaced
  - All relief wells pumped and tested for specific capacity

IRRM STATUS UPDATE

- No. 8 - Identify an alternative incident command center
  - Resident office on Eielson AFB
- No. 9 - Vegetation removal
  - Completed majority
- No. 10 - Perform a potential failure mode analysis

IRRM ITEMS LEFT TO COMPLETE:

- Update IRRMP (revisit IRRMs since PFMA completed)
- Piezometer automation (additional monitoring and surveillance
- Complete vegetation removal
- Enhance alternate incident command center plan
- Once risk assessment complete, revisit operational changes

LONG-TERM SOLUTIONS

- Work in support of Risk Assessment and/or DSMS completed to date:
  - Survey of dam, floodway, and inundation area
  - Probable Maximum Precipitation (PMP) study
  - Relief Well testing to determine updated hydraulic conductivities
  - Two dimensional floodway model
  - HEC-HMS model
  - Additional geotechnical data gathered

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LONG-TERM SOLUTIONS

- Work in support of Risk Assessment and/or DSMS currently underway:
  - Compiling all spatial data in one plan drawing:
  - Compiling and digitizing all available instrumentation data
  - Dam Safety Modification Study outline
  - Drafting geologic cross sections for seepage analysis
  - Digitizing logs in key areas of interest

NWD/POD PARTNERSHIP

- NWD->POD
  - Geology support for Moose Creek
  - Geology support for Glacier Fork Dam Reconnaissance
    - New small hydropower dam site recon for Alaska Energy Authority
  - Ongoing DSPC coordination

- POD->NWD
  - Report writer for PFMA on Mud Mountain Dam
  - Assistance to NWO for flood fight and recovery
    - Three engineers for a total of 120 man-days
    - Likely one more deployment
  - Augments for risk cadres
  - Potential TDY support from POA drill crew

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CHENA RIVER LAKES FLOOD CONTROL PROJECT

JULY 29 – AUGUST 7 2008 EVENT REVIEW

JULY 29 – AUGUST 7, 2008 EVENT

EVENT #: 20
EVENT TYPE: RAINFALL
PEAK FLOW THROUGH DAM BEFORE GATES CLOSED (CFS & DATE): 8,010 (8/1/08)
PEAK FLOW @ FAIRBANKS BEFORE GATE CLOSURE (CFS & DATE): 8,690 (8/1/08)

DATE OF GATE CLOSURE: 8/1/08

PEAK FLOW REGULATED THROUGH DAM (CFS & DATE): 8,050 (8/1/08)
PEAK FLOW @ FAIRBANKS DURING REGULATION (CFS & DATE): 9,160 (8/2/08)
PEAK FLOW @ FAIRBANKS DURING ENTIRE EVENT (CFS & DATE): 9,160 (8/2/08)

PEAK RESERVOIR ELEVATION NGVD29: 495.5’

DATE GATES COMPLETELY OPEN: 8/2/08
DATE DEBRIS BAILING COMPLETED: 8/7/08

REMARKS: UNREGULATED PEAK DISCHARGE ESTIMATED TO BE LESS THAN 8,500 CFS AT THE DAM.

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DEBRIS BAILING COMMENCED AUGUST 2, 2008

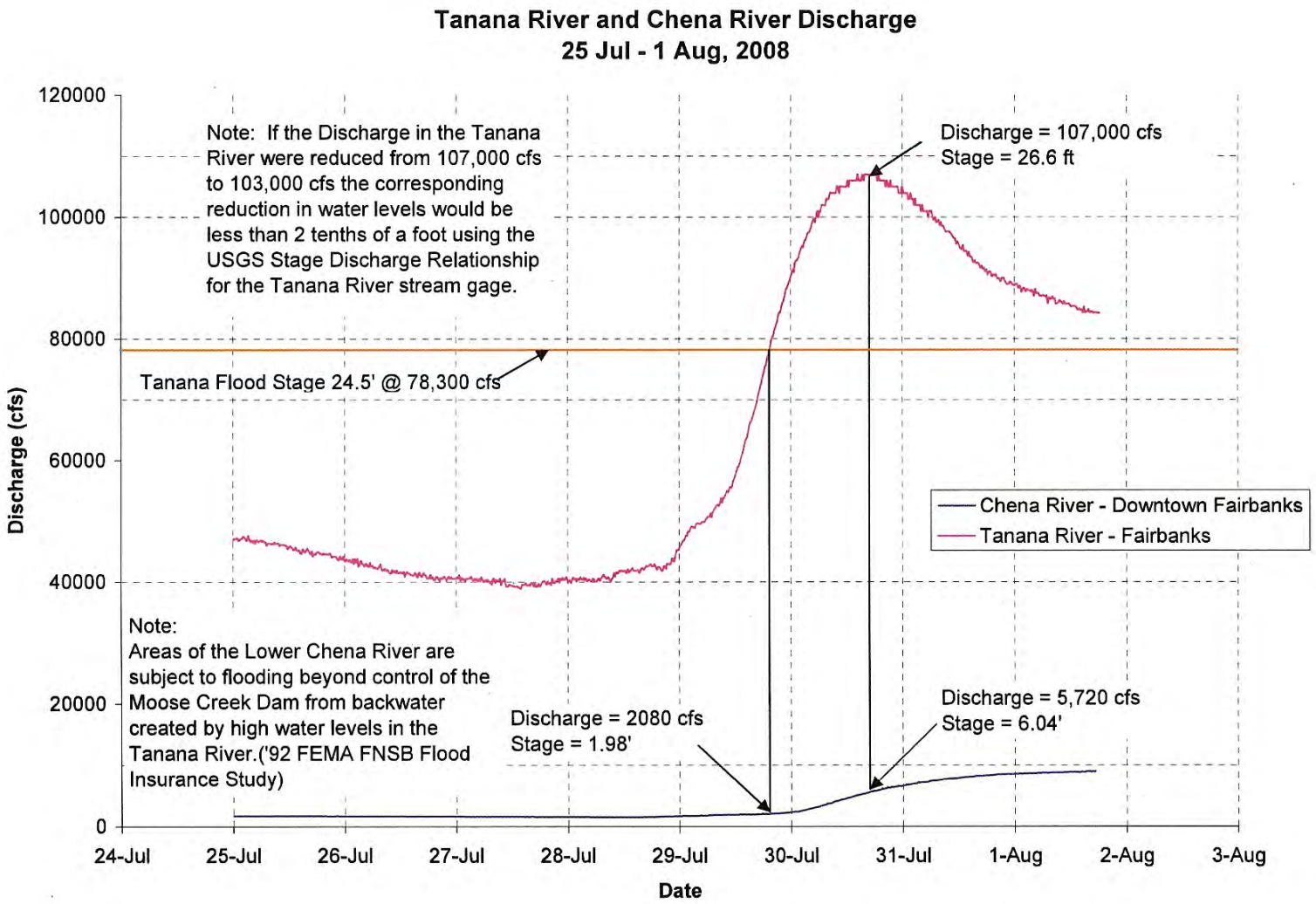
DEBRIS BAILING COMPLETED AUGUST 7, 2008

JULY 29 – AUGUST 7, 2008 EVENT

ISSUES IDENTIFIED:

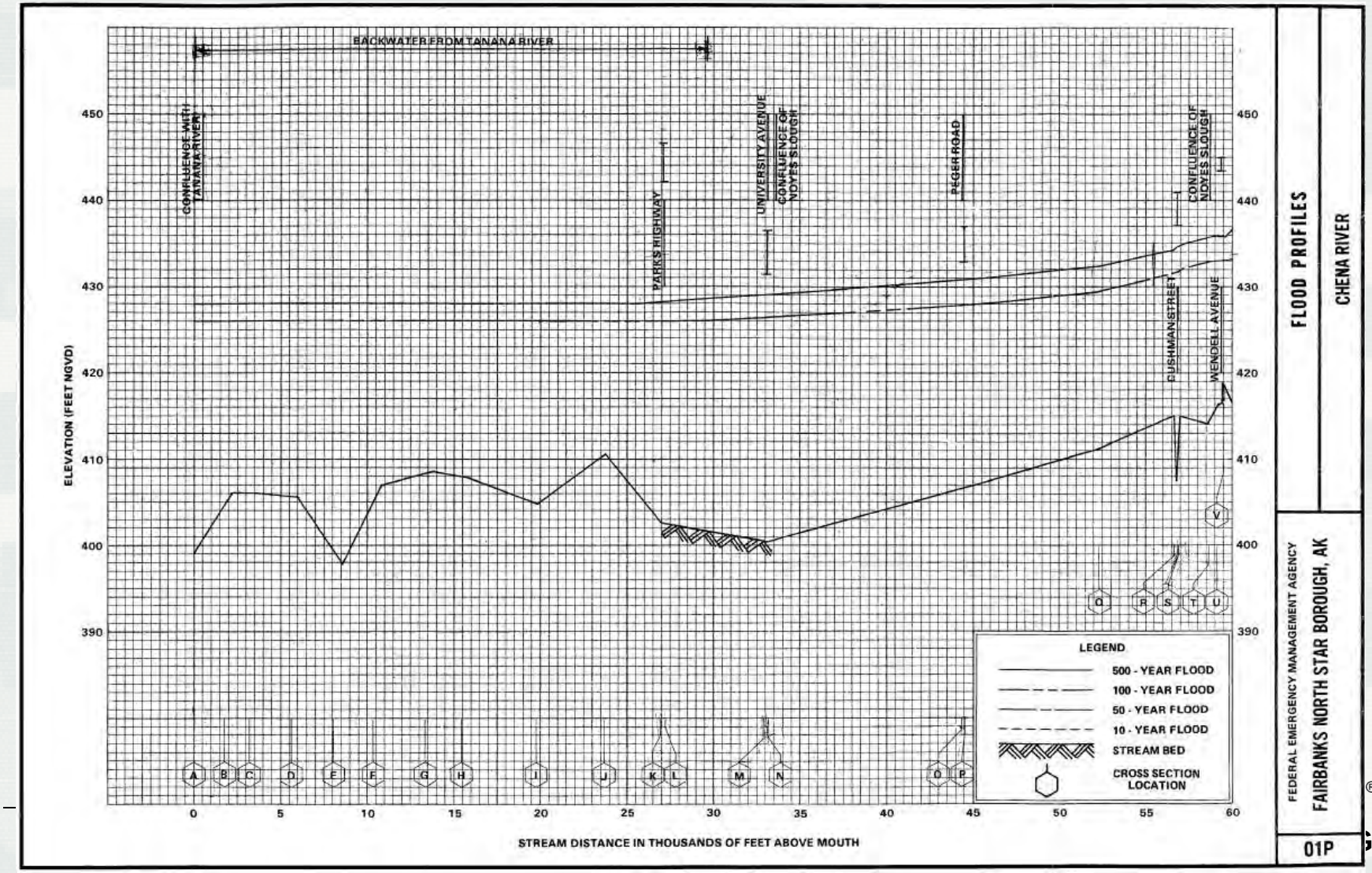
1. Tanana River flooding at time of event affected properties on lower Chena.
2. Confusion of what impact Chena Project has on Tanana River.
3. Coincident with planned flood exercise.
4. New experience for many new Corps employees, Borough Officials, and property owners. (Previous Event 9/4/2003)
5. Local contacts along river contacted during previous events could not be reached
6. Lack of upstream river gages on the Tanana River limit forecasting of Tanana flows.
7. Post event public contact and site assessments of downstream areas is important to continue.

JULY 29 – AUGUST 7, 2008 EVENT



FLOOD INSURANCE RATE MAP @ MOUTH OF CHENA RIVER

CHENA RIVER
FLOOD PROFILE



AFTER-ACTION ITEMS TO COMPLETE JULY 29 – AUGUST 7, 2008 EVENT

1. Record new resident points of contact (human staff gages) who live along river for future high water events. (CO-O, CO-O-C, PAO)
2. Revise sections of the 1993 Water Control Manual regarding event notification and…??? (G-HH)
3. Investigate historical problem areas below dam for new information for future events. (G-HH)
4. Verify Tanana flooding impacts along lower Chena with previous studies (Letter Report #18 & Fairbanks FIS flood profiles) (G-HH)
5. Update FAQs to include Tanana River flooding impacts on lower Chena. (CO-O)
6. Repair/replace broken relief wells. (G-GM)
7. Include data from other agencies into our hydrologic forecasting operations. (G-HH)

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AFTER-ACTION ITEMS TO COMPLETE JULY 29 – AUGUST 7, 2008 EVENT

8. Remove vegetation & establish management practice for keeping Vegetation cleared from emergency material stockpiles. (CO-O-C)
9. Repair/replace damaged fence panels on dam from bailing operations and Evaluate/implement alternative for future bailing operations. (CO-O-C)
10. Public service announcements for radio and video clips for TV commercials need to be established and set to run in April and July time periods. (PAO, CO-O-C)
11. Continue working instrument replacement/upgrade plan at telemetry sites in the upper basin with AMBCS. (G-HH)
12. Work with the NWS to include information about release levels from the Chena Project on their 'Chena River near Chena Lakes' real time hydrologic prediction website. (G-HH)

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LESSONS LEARNED
JULY 29 – AUGUST 7, 2008 EVENT

1. Partnership/teambuilding meetings with FNSB, NWS, USGS paid for themselves 10 fold – must continue.

2. Flood response exercises should occur at least every three years or a minimum of two years following a real event. Current dam safety regulation requires exercises yearly for DSAC 1 dams.

3. Established new debris hauling route making cycle time shorter and reducing traffic flow congestion around visitor kiosk.

4. Flood awareness is everyone's responsibility – cannot over communicate it.

SECURITY CONTRACTORS

QUESTIONS ?

PLAZA
SHOPS
BEADS AND THINGS
WATER SHERIFF
WATER SAFETY IS NO BULL!
U.S. Army Corps Of Engineers
Chena Flood Control Project