

DESIGN AND CONSTRUCTION ISSUES FOR THE PLANNED RCC SUSITNA DAM

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PROJECT HIGHLIGHTS

SUSITNA-RIVER MILE 187
87 RIVER MILES FROM TALKEETNA
22-32 RIVER MILES UPSTREAM FROM
DEVILS CANYON
42-MILE RESERVOIR
AVERAGE WIDTH OF ONE MILE
~50 PERCENT OF RAILBELT'S ENERGY DEMAND
(2800 GWH OF ANNUAL ENERGY)
DAM HEIGHT: 705 FEET
ESTIMATED COST: \$5.6 BILLION



The Challenges of Dams in Cold Climates

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ECONOMIC IMPACT

- STUDY CONDUCTED BY NORTHERN ECONOMICS
- \$11.2 BILLION IN ENERGY SAVINGS DURING FIRST 50 YEARS (2014\$)
- 2.39 COST BENEFIT RATIO BASED ON ENERGY SAVINGS
- 3.07 COST BENEFIT RATIO BASED ON NEW CAPACITY, GENERATION FACILITY RETIREMENT, GREENHOUSE GAS REDUCTIONS AND POWER OUTAGE REDUCTION
- 1,300 AVERAGE ANNUAL JOBS DURING CONSTRUCTION
- 205 PRE-CONSTRUCTION AND NON-CONSTRUCTION JOBS ON AN ANNUAL BASIS (2010-2028)
- \$800 MILLION IN LOCAL PRE-CONSTRUCTION SPENDING
- \$2.6 BILLION IN LOCAL CONSTRUCTION SPENDING

DESIGN ISSUES

RCC DAM SELECTION

DAM HEIGHT

INSTALLED CAPACITY AND UNIT SIZES

PERMAFROST

RCC DAM SELECTION

DAM TYPE

- CONCRETE THIN ARCH
- CONCRETE GRAVITY
- EARTH-CORE ROCKFILL (ECRD)
- CONCRETE FACED ROCKFILL (CFRD)
- ROLLER COMPACTED CONCRETE (RCC)

RCC DAM SELECTION

CONSIDERATIONS

- PRECEDENT
- COST
- SCHEDULE
- RISK (SEISMIC, PRICE, PERFORMANCE)
- WATER RESOURCES ASSESSMENT
METHODOLOGY

RCC DAM SELECTION

	RCC	CFRD	ECRD
COST	\$1.7 B	\$1.9 B	\$2.3 B
SCHED.	7.5 YR	9.5 YR	
WRAM	2.45	1.9	1.65
	2.325	1.98	1.695

- OTHER FACTORS
- FLOODS DURING CONSTRUCTION
 - DIVERSION TUNNEL LENGTH
 - UNDERGROUND CONSTRUCTION RISK

DAM HEIGHT

1980s NORMAL MAX OPERATING LEVEL

- STAGE 1 - ELEVATION 2000 FT
- STAGE 3 – ELEVATION 2185 FT

2010 LARGE HYDRO DECISION DOCUMENT

- ELEVATION 2000 FT

2011-2013

- ELEVATION 2000 FT (CREST EL 2025)
- ELEVATION 2050 FT (CREST EL 2075)

DAM HEIGHT CONSIDERATIONS

- COST
- SCHEDULE
- STORAGE
 - FLOW 510,000 AC-FT NOV-APR
 - FLOW 5,300,000 AC-FT MAY-OCT
- ENERGY GENERATION
 - CRITICAL PERIOD NOV-MAR

DAM HEIGHT COMPARISON

NMOL	EL 2000	EL 2050
COST (BILLIONS)		5.6
CONSTRUCTION SCHEDULE	8	9
ACTIVE STORAGE (AC-FT)	2,320,000	3,380,000
ENERGY GEN. (GWH)	2580	2760
NOV-MAR ENERGY (GWH)	1080	1380

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INSTALLED CAPACITY

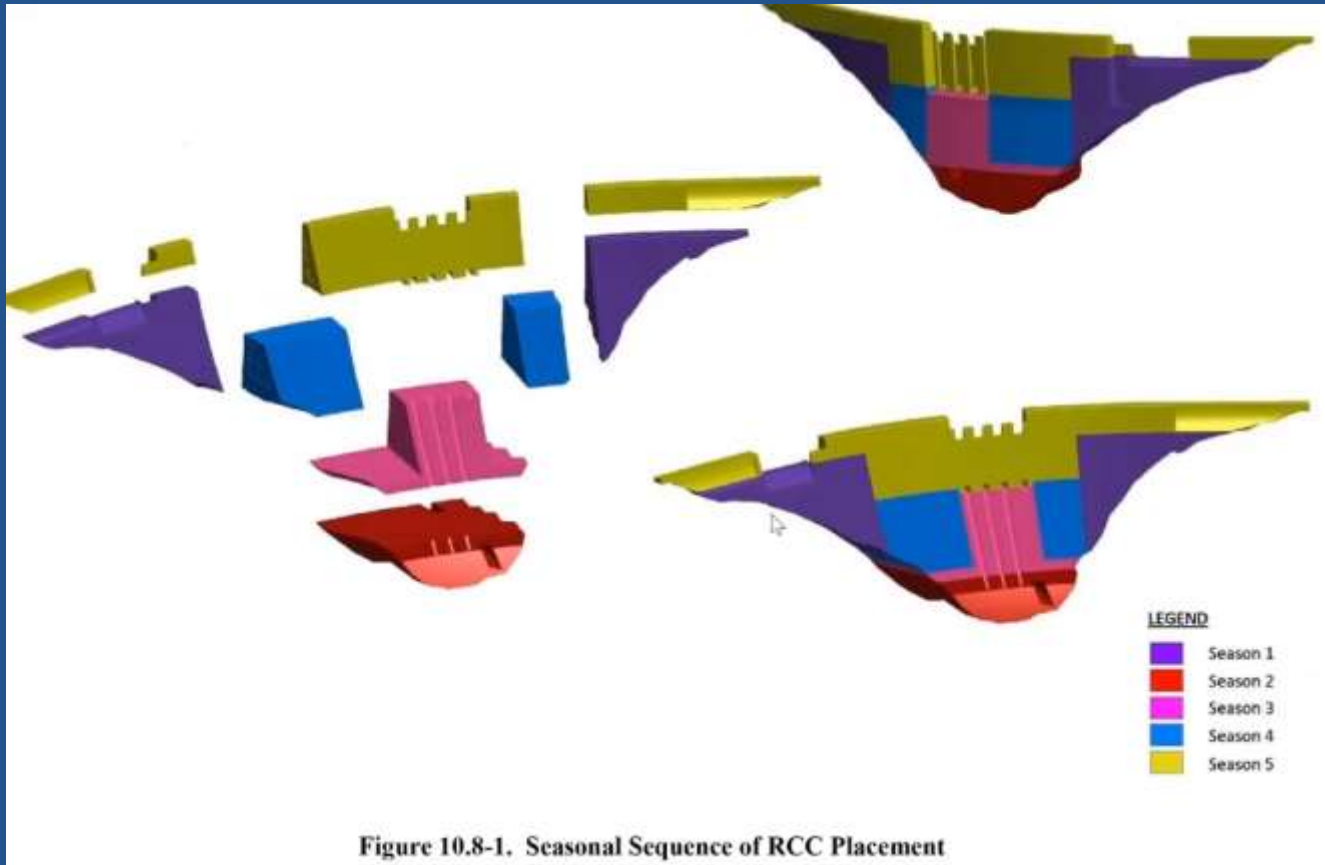
- BIG ISSUE FOR UTILITIES BUT NOT A MAJOR FACTOR FOR COLD CLIMATES
- MORE OF A FACTOR FOR SYSTEM DEMAND
- COLD CLIMATE REQUIRES SUBSTANTIAL BASELOAD ENERGY IN WINTER
- REDUCED INSTALLED CAPACITY FROM 600 TO 459 MW
- ONLY MINOR LOAD VARIATION ON A DAILY BASIS

PERMAFROST

- DISCONTINUOUS PERMAFROST IN VICINITY OF DAM
- REQUIRES SUBSTANTIAL ADDITIONAL GEOTECHNICAL EFFORT WITH CONSTRUCTION OF ADITS
- GOOD TO DO DURING LICENSING PROCESS, BUT COST OF \$20 MILLION REQUIRES DEFERMENT

RCC DETAILS

- 5.2 MILLION CUBIC YARDS
- SLOPING LAYER METHOD
- TWO DEFINED CONSTRUCTION JOINTS WITH TRANSVERSE VERTICAL JOINTS @ 50 FEET
- PLACEMENT - 150 DAYS PER YEAR
- PLACEMENT – 335 TO 407 CY/HOUR
- LIMIT RCC PLACING TEMPERATURE TO 40⁰F
- SEQUENCE – YR 1 - ABUTMENTS, YR 2 TO 4 – MIDDLE, YR 5 - ABUTMENTS



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