

Susitna Hydro Evaluation Project

Seminar on the Development of Large Hydroelectric Projects with a Focus on the Susitna Project

presented to
Alaska Energy Authority

November 2008





Project History

Presentation Content

- Introduction to presentations by HDR, DTA and NE
- Background and history of Susitna Project, including Watana and Devil Canyon
- Original studies completed in the 1980s
- Engineering and environmental considerations
- Regulatory processes and FERC license application
- Original approaches to financing
- Project postponement

.....fast forward to **2008**

Susitna Project Background and History

- Susitna River recognized as a valuable Alaskan renewable resource and energy asset
- Vast natural resources surround the river
- Early studies set original potential for hydropower
- Location between Anchorage and Fairbanks is significant
- Well suited to providing energy needs for the Railbelt and other parts of Alaska

Previous Studies

- U.S. Bureau of Reclamation 1953 Studies
- U.S. Bureau of Reclamation 1961 Studies
- Alaska Power Administration (APA) 1974 Studies
- Kaiser Proposal for Development 1974 Studies
- U.S. Army Corps of Engineers 1977 Studies
- U.S. Army Corps of Engineers 1979 Studies
- APA Studies for FERC License 1983 Application
- APA Extended Studies for License 1985 Amendment

More Background and Recent History

- Alaska's rich energy base includes hydropower
- Diversification of resources for energy security
- Numerous detailed Susitna optimization studies, including environmental and engineering, were completed
- Studies led to 1983 FERC license application
- Project could present investment and revenue opportunity for the State of Alaska and other project participants



GOVERNMENT PUBLICATIONS
UNITED STATES GOVERNMENT

SUSITNA HYDROELECTRIC PROJECT

FEDERAL ENERGY REGULATORY COMMISSION
LICENSE APPLICATION

EXHIBIT F
SUPPORTING DESIGN REPORT
(PRELIMINARY)
FEBRUARY 1983



ALASKA POWER AUTHORITY

SUSITNA HYDROELECTRIC PROJECT
FERC LICENSE APPLICATION
PROJECT NO. 7114-000

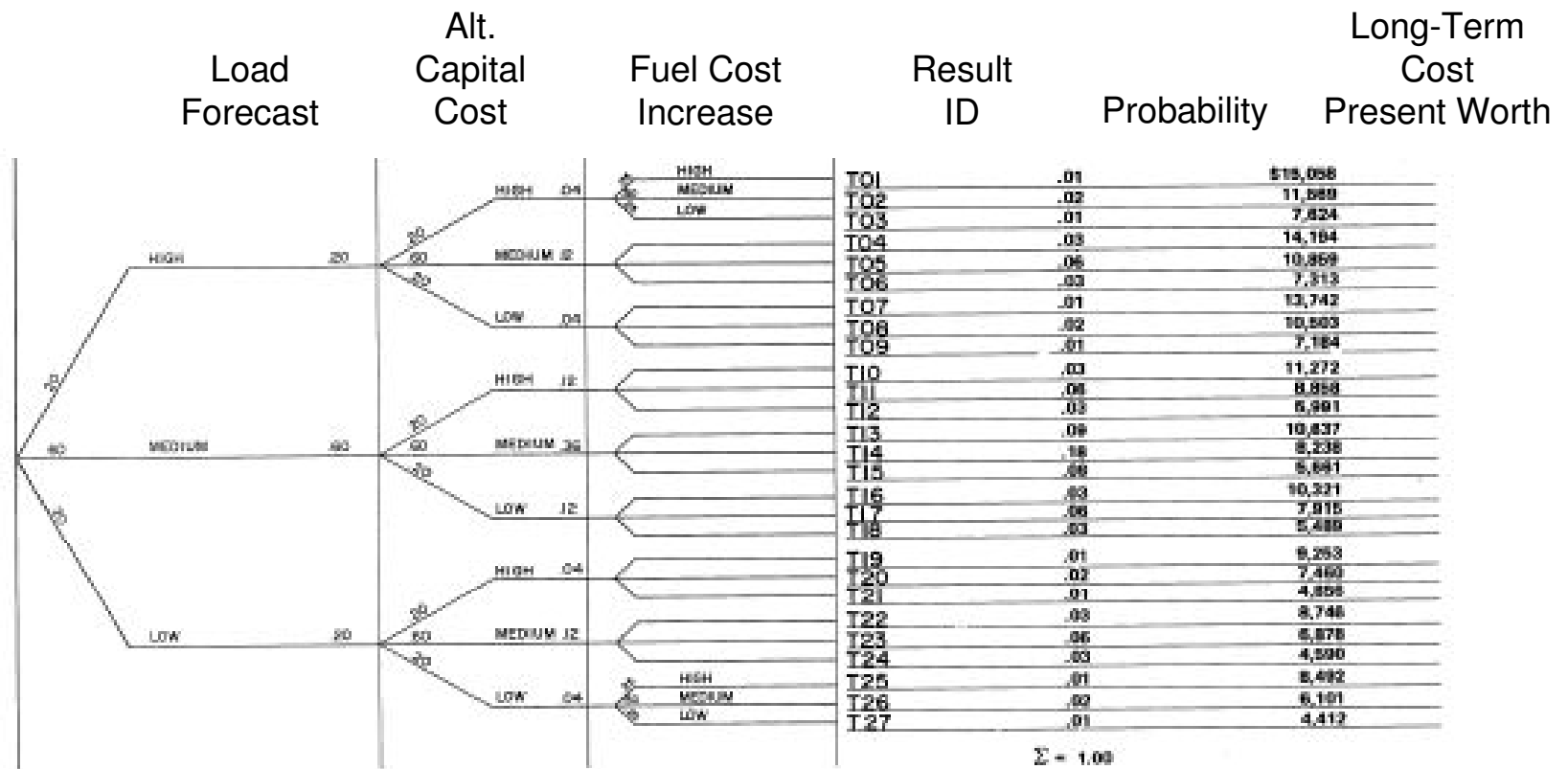
FERC License Process Led to More Study

- Case for Susitna was strong enough to call for additional studies
- Major design study and environmental appraisal began
- Basis of engineering design followed earlier conclusions and examined options for staged construction
- Studies terminated when FERC Application withdrawn

Earlier Studies Recognized Risk Management and Made Provisions

- Hydropower development, as in all infrastructure, has specific risks that can be identified, assessed and managed
- Dam, powerhouse and transmission construction incurs climatic, flood and geological risk
- Excavation incurs geological and seismic risk
- Hydrology and associated energy generation varies seasonally and annually
- Revenue is also subject to market demand
- Based on personal experience, large-scale hydro projects compare well with other energy sources

Example of Risk Tabulation from 1982



Probability Tree – System with Alternatives to Susitna

Risk Considerations

- Power generation alternatives are all subject to varying risks
- Uncertainties and variability in world and regional economies, commodity values, and fossil fuels pricing compound these risks
- Geologic, seismic, and engineering risks are today among the more manageable of project risks
- A comprehensive assessment of project risks is warranted based on many past project examples

Recent History

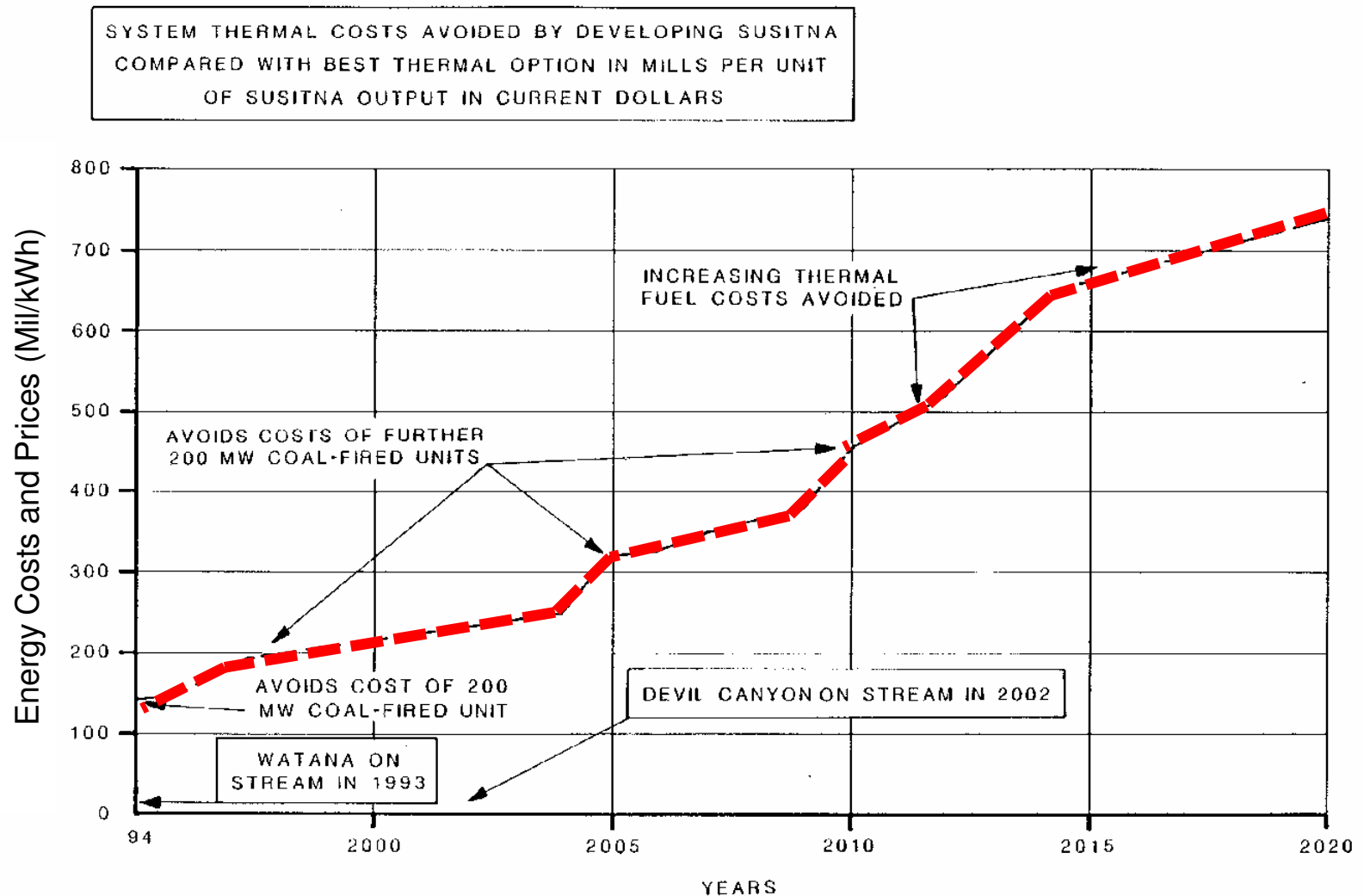
1983 to 2008

- From early 1980s energy prices were sharply reduced
- Progress on possible Susitna development slowed down
- Finally FERC license application was withdrawn
- Substantial design studies underway were ended
- Valuable environmental baseline data records preserved
- Integrated Resources Plan (IRP) linked with Susitna review

Principal Objectives of 2008 Review

- Valuable project definition exists from 1980 studies
- Requires full updating and matching to changed conditions
- Economic pressures have forced increasing cost escalation
- Commodity costs are much higher with Asian demand
- Oil pricing and electricity costs have substantially increased
- Hydropower has become economically more attractive

Type of Comparative Analysis Employed in 1983



Project Development Stages

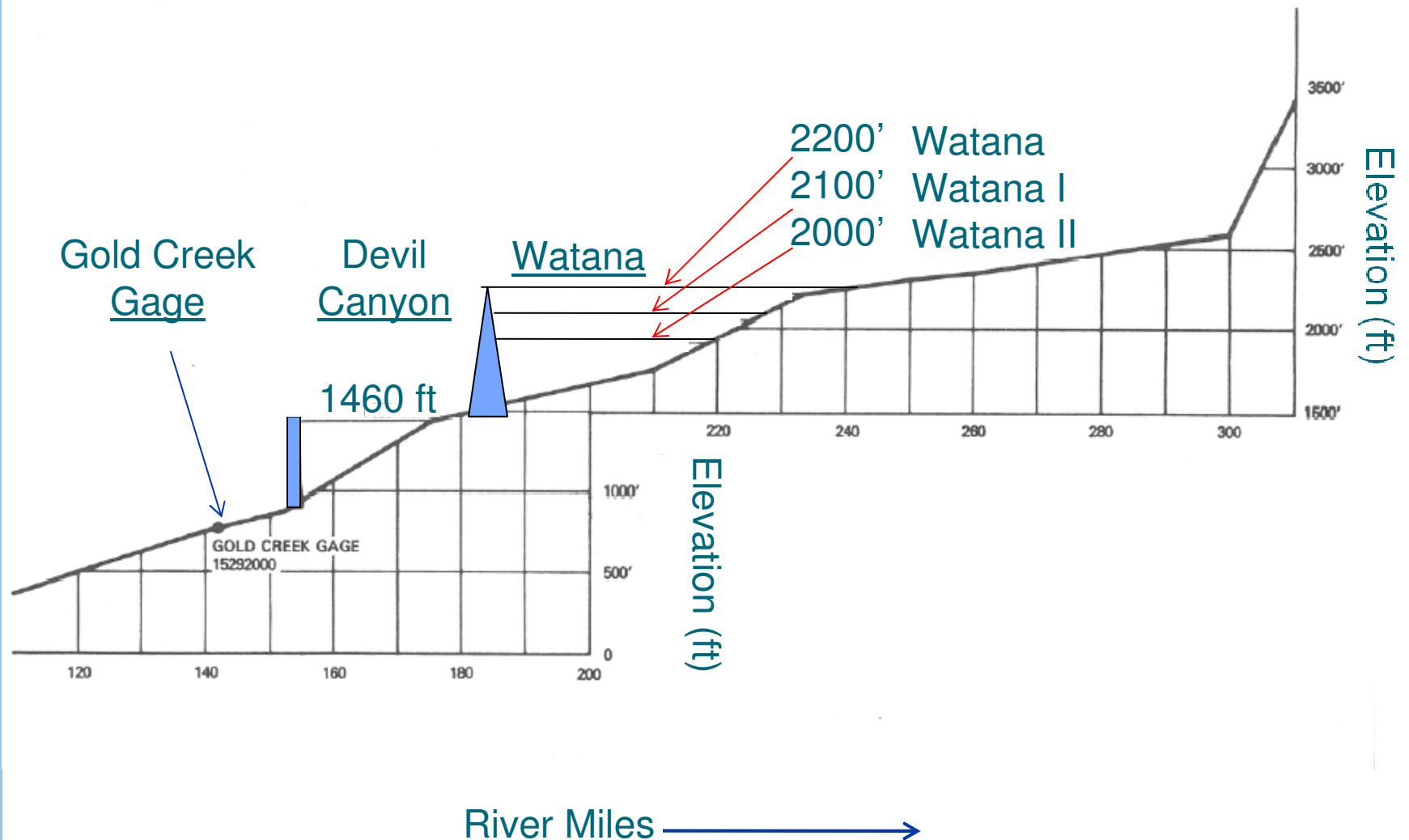
These alternatives were previously studied and will be revisited:

- (1) Watana ~ Full-scale development
- (2) Watana and Devil Canyon
in 3 stages ~ Watana Stage 1
~ Devil Canyon
~ Full-scale Watana
- (3) Watana ~ Stage 1 only
- (4) Devil Canyon ~ only

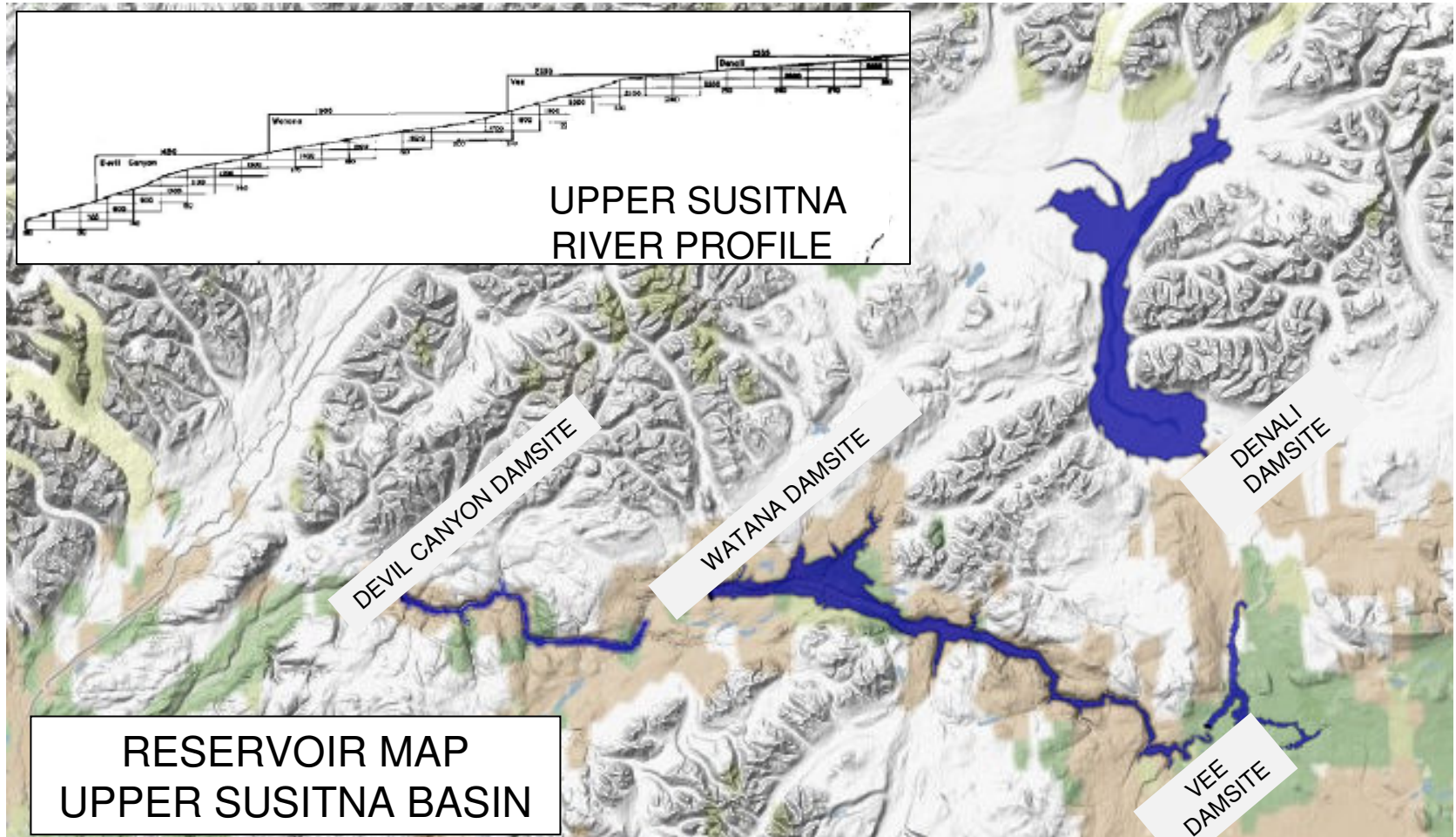
Susitna Project Location



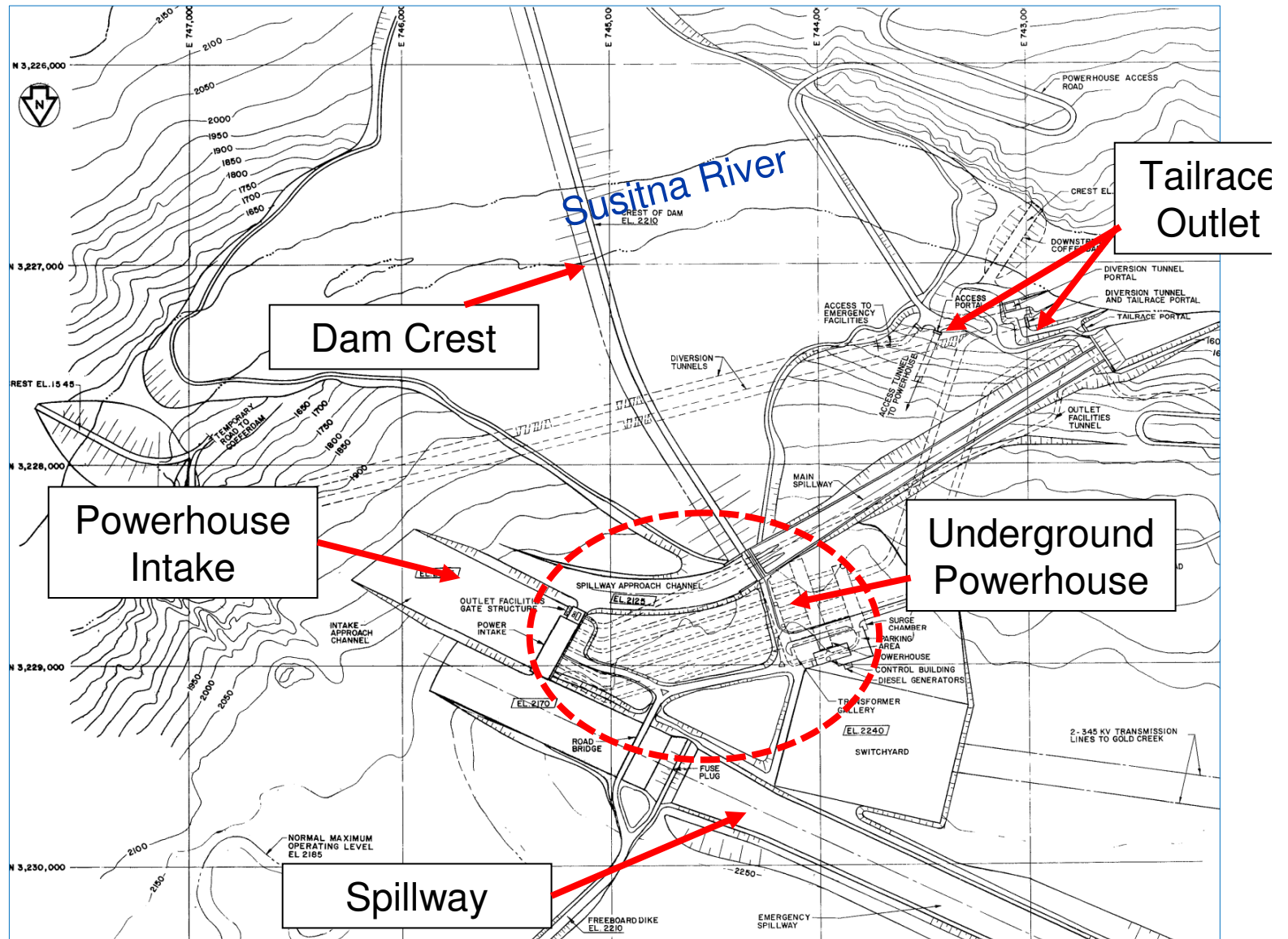
Profile of Watana - Devil Canyon Development



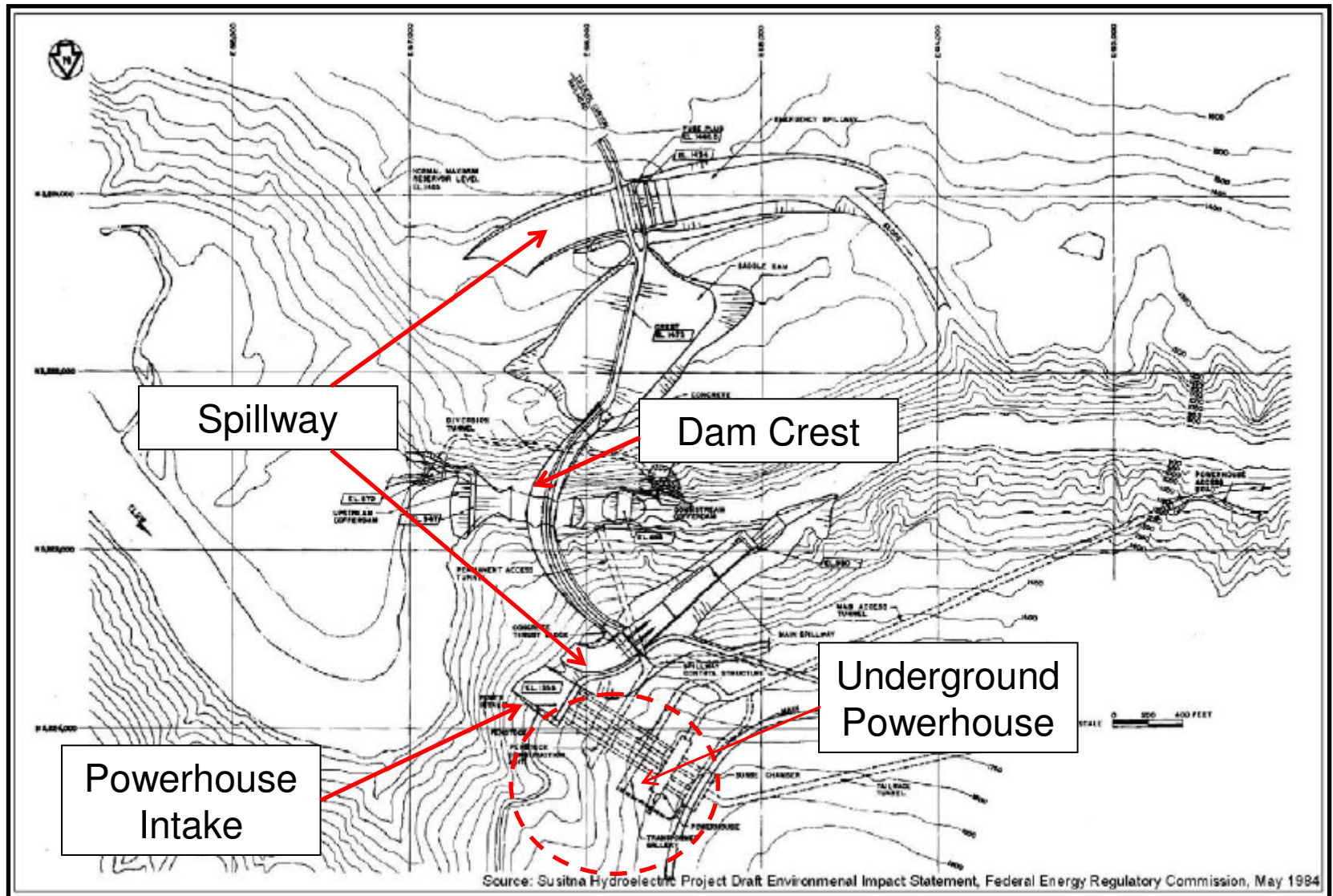
Susitna Four Dam Scheme Alternative



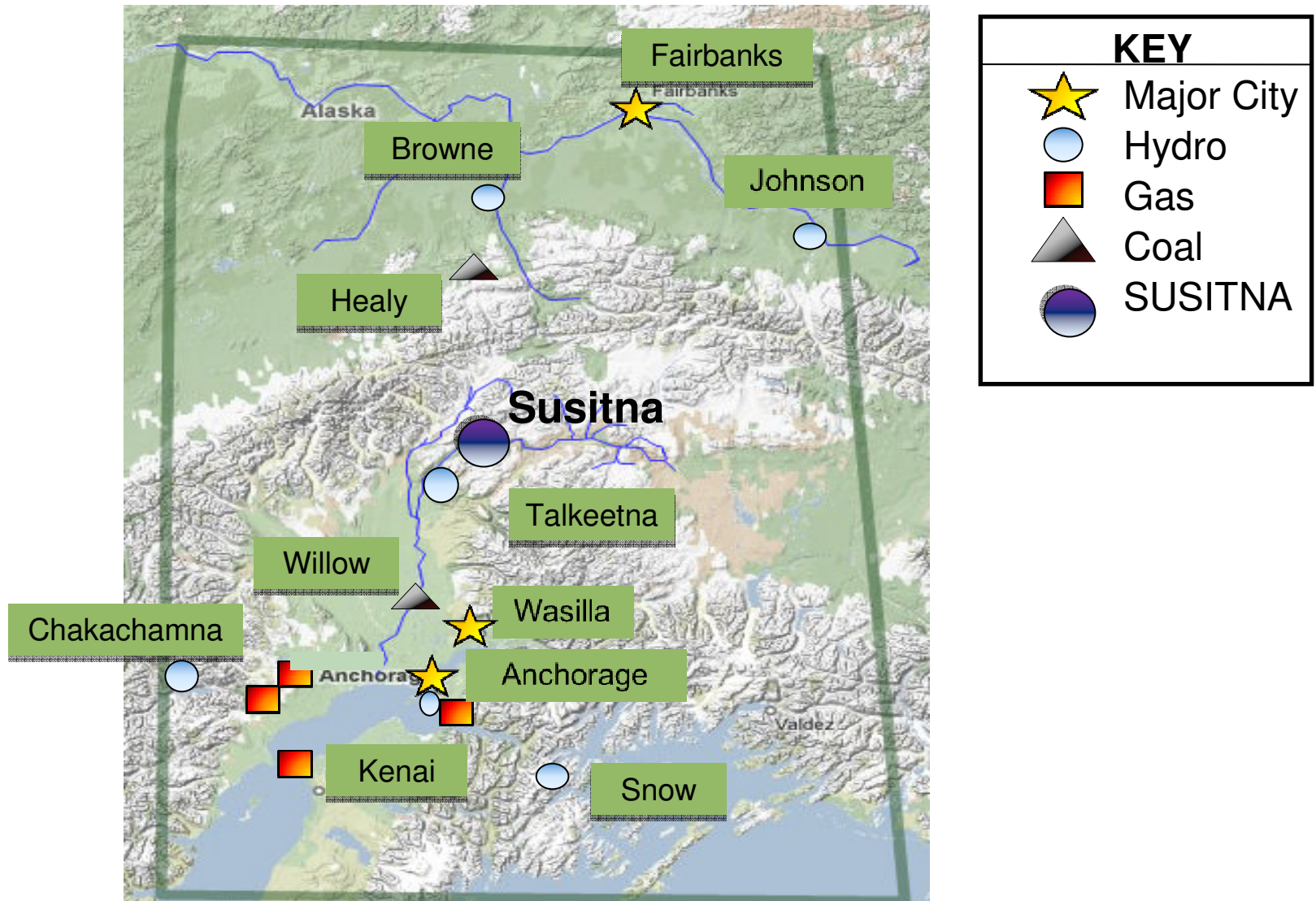
General Arrangements – Watana



Devil Canyon Hydropower Plan



Susitna and Power Alternatives in 1983



Alternative Generation Options Considered for Railbelt in 1983

- Coal-fired generation 200 MW at Beluga
- Coal-fired generation 200 MW at Nenana
- Gas-turbine generation 70 MW at various sites
- Combined-cycle generation 400 MW at one or two sites
- Chakachamna hydropower 330 MW

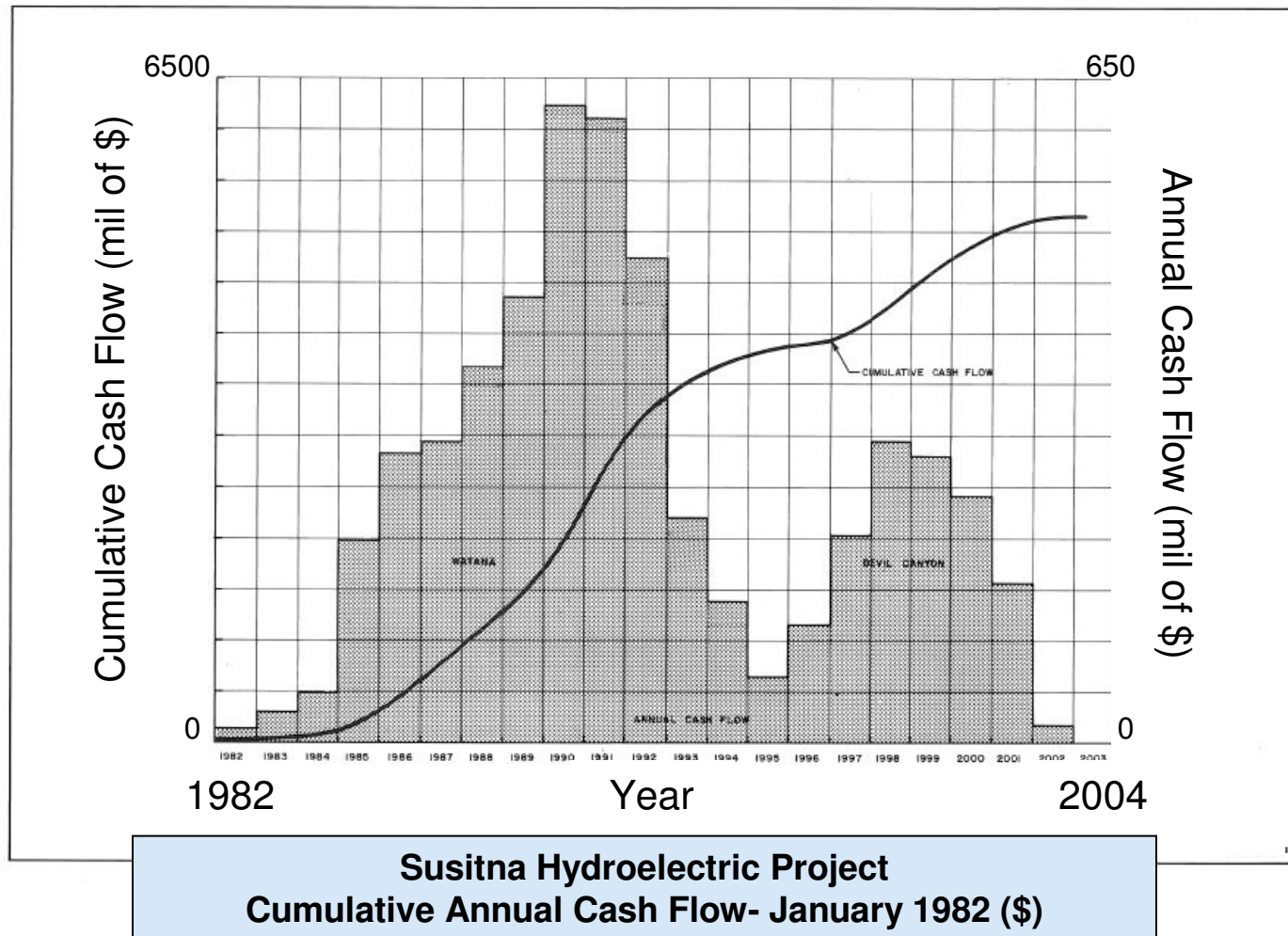
Environmental and Socioeconomic Considerations

- Water use and quality
- Fish - recreational and commercial
- Wildlife
- Botanical resources
- Historical and archaeological data
- Socioeconomic impacts
- Geological and soil conditions
- Recreational resources
- Aesthetic resources
- Land-use issues

Economic Considerations in 1983

- 1980 support for Susitna came from energy pricing side
- Realization that high capital cost led to high entry price
- Banking view that Alaskan State Appropriation essential
- Value in long-term savings over escalating thermal power
- Financing mechanisms such as Bill 646 proposed
- Outcome supported decision to proceed with FERC process

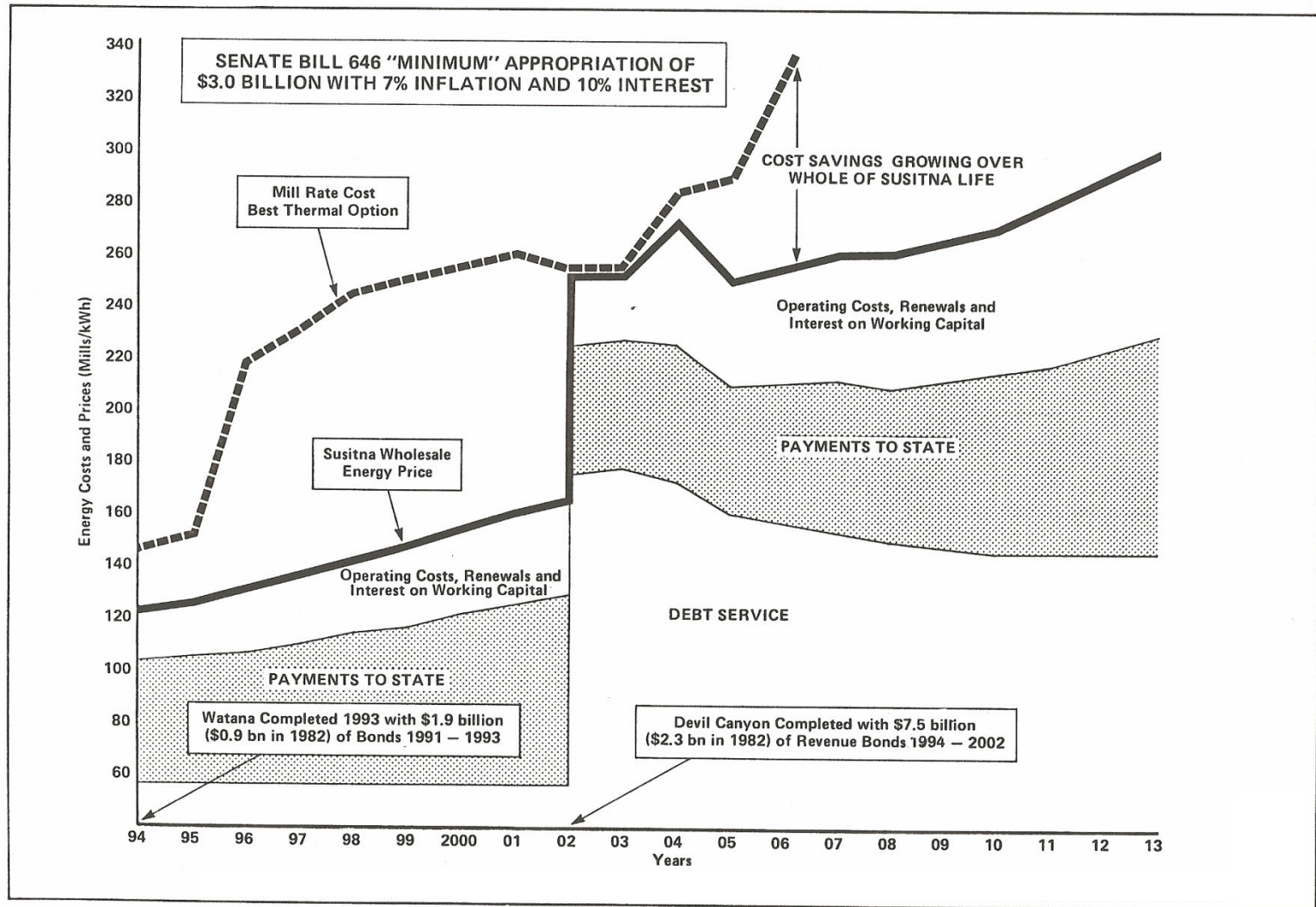
Cost Distribution Over 21-Year Period



Dealing with *“Inflationary Financing Deficit”*

- Hydropower has higher initial capital cost, lower long-term O&M, and ever-increasing revenue value
- Interest and inflation rates interact over early years
- Over time, hydropower becomes increasingly more economic
- Financing debt turns into long-term savings
- Hydropower is a long-term-valued asset

1983 Energy Cost Comparison



Specific Study Steps to be Based on...

- Engineering, socioeconomic environmental findings of 1980s
- Updating for engineering advances in past 25 years
- Adapting to meet changed regulatory requirements
- Re-estimating with advanced construction practice
- 2008 costs for large hydropower works
- Price trends, escalation and contingencies
- Likely trends in major power project credit financing

Fundamental Issues Remain ~ 1980s and Today

- Capacity limits within system to absorb the energy
- Staging of construction may be needed but adds cost
- Environmental effects may need extensive study
- Financing likely to again need special action
- Hydropower “green” benefits are greater than ever

**THANK YOU
FOR YOUR ATTENTION**