VALUE ENGINEERING STUDY: SOUTHWEST REGIONAL WATER SUPPLY PROJECT

RJH Consultants, Inc.

Solutions Engineering & Facilitating, Inc.

GOALS FOR THE VE STUDY

1. Review AWSA water availability
   - Review ISC's AWSA diversion model with drought flow reductions
   - Provide a range for annual firm yield with climate change scenario
2. Review BHI and BOR appraisal-level designs
   - Suggest improvements
   - Suggest additional approaches or concepts
   - Recommend any alternative concepts
3. Identify preferred configuration of components
4. Recommend further studies and investigations

TECHNICAL FOCUS AREAS

1. Potential technical challenges
   - Sediment
   - Seepage
   - Diversion structure design and feasibility
   - Water availability
   - Conveyance structural concepts and design
   - Storage structure design
   - Power requirements
2. Drought impacts (ISC, TNC, and BOR flow reduction predictions)
3. Minimize energy costs and carbon footprint
4. Environmental impacts
   - Minimize negative impacts to endangered species and the environment
   - Must be possible to mitigate all negative impacts
   - Maximize positive impacts to endangered species and the environment

AREAS NOT REVIEWED

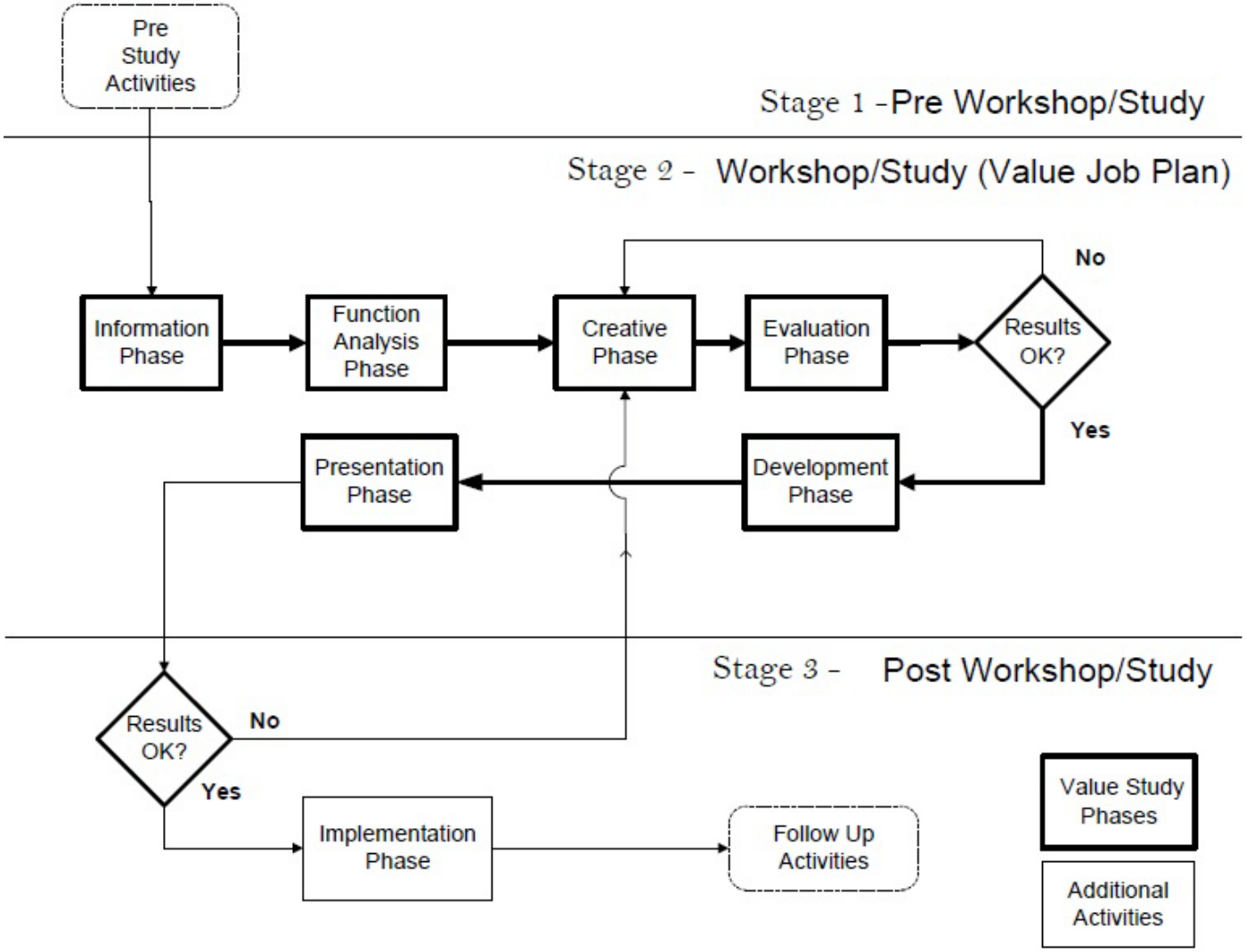
1. No quality control check of the current designs
2. No review of the legal implications of the project
3. No independent cost estimate review of the current designs
4. No evaluation of economic viability

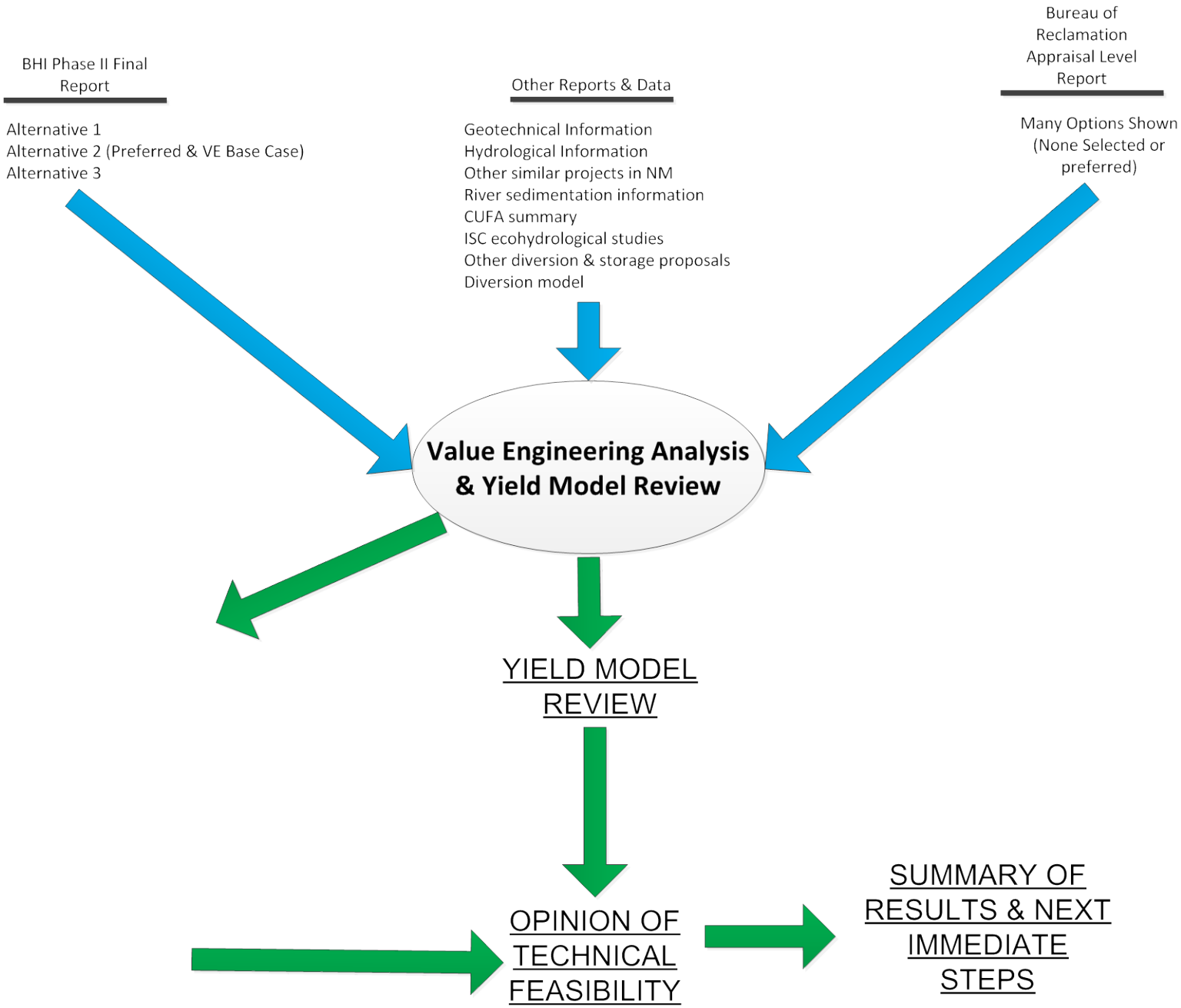
BACKGROUND

- The VE Team was assembled by specialties based on the broad technical needs of the project
- A field trip was made by some of the VE Team Members plus BHI and the BoR on October 3rd
- The workshop was conducted the week of October 6th in Denver, CO (for the least amount of overall travel cost)

Specialty
Constructability & Costing
Hydraulic Structures & Conveyance
Environmental Permitting
Geomorphology & Sediment Transport
Dams, Reservoirs & Geotechnical
Electrical
Tunneling
Hydrology, Water Modeling & Yield
Value Engineering & Life-Cycle Costing

VE STUDY PROCESS FLOW DIAGRAM




BHI Phase II Final Report
Alternative 1
Alternative 2 (Preferred & VE Base Case)
Alternative 3
Other Reports & Data
Geotechnical Information
Hydrological Information
Other similar projects in NM
River sedimentation information
CUFA summary
ISC ecohydrological studies
Other diversion & storage proposals
Diversion model
Bureau of Reclamation Appraisal Level Report
Many Options Shown (None Selected or preferred)
Value Engineering Analysis & Yield Model Review
YIELD MODEL REVIEW
OPINION OF TECHNICAL FEASIBILITY
SUMMARY OF RESULTS & NEXT IMMEDIATE STEPS

SUMMARY OF RESULTS: AWSA WATER AVAILABILITY

1. ISC diversion model provides reasonable estimates of divertible flow for historical conditions

2. Average annual amount of divertible water = about 12,000 AF/yr.

3. The ISC estimates of divertible flow under a climate change scenario are reasonable for reconnaissance level planning purposes.

SUMMARY OF RESULTS: YIELD

1. A simple “firm yield” assessment was developed with the “single bucket” model with a “climate change” scenario.
2. The amount of water that can be delivered from the Project will substantially increase if the reservoir is not operated on a strict “firm yield” basis.
3. About 8,000 to 9,000 acre feet of water can be delivered from reservoir on an average annual basis, depending upon the capacity of storage.

ESTIMATED FIRM YIELD OF SWRWS (For VE Purposes Only) CLIMATE CHANGE SCENARIO (ISC Method) (Acre Feet per Year)			
Active Reservoir Capacity (AF)	Reservoir Seepage (% of Water in Storage per Year)		
	1%	3%	5%
15,000	2,250	2,100	1,950
20,000	3,075	2,875	2,675
25,000	3,925	3,700	3,450
30,000	4,575	4,225	3,900
35,000	5,100	4,725	4,350
40,000	5,675	5,225	4,825
45,000	6,200	5,725	5,250
50,000	6,425	5,925	5,425
55,000	6,625	6,075	5,525
60,000	6,800	6,200	5,625
65,000	7,025	6,375	5,750
70,000	7,250	6,550	5,900
75,000	7,475	6,725	6,025

SUMMARY OF RESULTS: PREFERRED CONFIGURATION OF COMPONENTS

1. Use two diversion structures:
   - Coanda screens, expanding across the erosion area
   - Infiltration galleries or passive intake screens
   - Use BHI's recommended diversion point
2. Use two reservoirs with capacity at least in the 45K AF range:
   - Small Spar (as proposed by BHI) (1642 AF)
   - Replace Winn, Pope, and Sycamore Reservoirs with:
     - A larger Spar Reservoir with a pump station (46K AF), or
     - Greenwood Reservoir with a pipeline to the Upper Gila Valley (47K AF)
3. Reduce or eliminate the canyon sediment traps

SUMMARY OF RESULTS: PREFERRED CONFIGURATION OF COMPONENTS (CONT'D.)

4. Conveyance:
   - From diversion point to small Spar:
     - Tunnel or
     - Steel buried pipe
5. Delivery Over the Continental Divide:
   - Route:
     - Via Tyrone mine (Establish a cooperative agreement with FMI), or
     - Via Twin Sisters Canyon (Grant County Reservoir)
   - Reduce the number of pump stations
   - Use hydro-generation as proposed by BHI

SUMMARY OF RESULTS: COST SAVINGS and VALUE ADDED

1. Value Engineering proposals:
   - 13 proposals were made for life-cycle cost savings
     - 8 were accepted or accepted with modifications = $106,514,000 in capital savings
     - 3 were tabled (deferred) for additional study =
     - $15,260,00 in potential future savings
2. Supplemental Recommendations:
   - 18 Supplemental Recommendations were made to add value
     - 11 were accepted outright
     - 5 were tabled for additional study

NEXT STEPS/FURTHER STUDIES

1. Develop a definitive and concise purpose and need statement
2. Conduct the following investigations:
   - Integrated simulation of water supply and key system operations elements (timing, amount, etc)
   - detailed hydraulic modeling of the diversion structures
   - detailed assessment of climate change
3. Refine the major components' configurations and sizing
4. Perform additional geotechnical investigations for selected sites
5. Revisit the dam design and reservoir seepage design

CONCLUSIONS:

1. The VE Team believes the overall concept of diversion and storage is technically feasible.
2. The VE Team feels permitting will be prolonged and challenging.
3. It is the VE Team's opinion there will be future reductions in yield due to various permitting and operational requirements.
4. Reusable return flows and tributary runoffs should be recaptured/exchanged.

THANK YOU!

- QUESTIONS?