

# FSCF Value Engineering Opportunities

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## Outline

- Review of current Value Engineering Opportunities status
- Review of VE items needing science input/approval
- Timeline for finish milestones for VE items
- Action Items to make decisions

# Current Consolidated List of VE Items

VE Idea	Accept?	Status
<b>EXC</b>		
Move the following tasks into Pre-Exc		
Underground Equipment Mobe	FRA - Pending	
3650L Mucking and rehab	FRA - Pending	
3650L Borehole machine exc	FRA - Pending	
Drift to borehole bottom	FRA - Pending	
Shop excavation	FRA - Pending	
Blast Doors	FRA - Pending	
Test Blast	FRA - Pending	
Rock Breaker Exc and install	FRA - Pending	
Surface utility tunnel	FRA - Pending	
4550L prep for batch plant (remove equipment, recertify hoist, etc.)	FRA - Pending	
4850L Utility relocates in prep for brow excavation	FRA - Pending	
Relocate or suspend Ross Campus Science	FRA - Pending	
Use 17 ledge for intial rock disposal	FRA - Pending	Assume max of 5,000 yards
Relax waviness criteria	Yes	Agreed, need to look at the out of tolerance for the waviness of the wall
Reduce overbreak assumption, allow unit rates for corrections	Yes	
Other examples - concrete, shotcrete, temp support, spot bolting, etc.	FRA - Pending	
Replace or supplement batch plant with other options (buckets or slick line from surface)	FRA - Pending	
Use Yates for concrete delivery	FRA - Pending	Cost/schedule benefit analysis must consider transport across level
Right-size equipment fleet (move equipemnt between faces)	Yes	
Drift bolts - threaded dowels, wedge anchors, resin vs. CT bolt	KAJV Pending	KAJV to suggest alternatives
TSL in place of shotcrete	NO	Not considered technically acceptable
Buy vs. Rent equipment	FRA - Pending	Whichever is least cost would be accepted

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VE Idea	Accept?	Status
Remove or reduce center access drifts - route cryo pipe through mucking or other	NO	Rejected by experiment (considered \$1-2M potential)
Gravel in place of concrete in drifts (overbreak fill only), no "blow bottom"	If technically acceptable	
Eliminate settling system for drill water (transfer responsibility to SDSTA)	FRA - Pending	
Prefab trench drain	FRA - Pending	
Single slope rather than drains both sides	FRA - Pending	FRA willing to accept potential for water flow across slab from seeps. Arup to validate technical feasibility
Eliminate shotcrete in all drifts (two options -all shotcrete, or shotcrete below 6')	FRA - Pending	Can be removed in the drifts. Not in CUC. Not recommended to remove the shotcrete from the walls of the caverns. What is the cost saving from eliminating from the drifts, shop, substation
Relax shotcrete "pizza" test requirements -only initial work	Yes	
Study whether mucking ramp size is requiring equipment that adds cost, optimize	FRA - Pending	Do we need to buy equipment to create mucking ramps? What is the minimum clearance required for the ramp to the underside of CUC.
Eliminate cavern mesh (grounding)	No	Rejected by experiment
Small pilot tunnel through CUC to reduce sidewall issues and establish early air	FRA - Pending	Rather than east drift
Monorail bracket – difficult to construct, level, is there an alt?	NO	Does not work with the lateral stability requirement
Qualified blast consultant clause – ALL blasts?? Modify / relax	Yes	

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VE Idea	Accept?	Status
Monorail beam: increase length from 16'-6" to 25' to allow for optimized install	If technically acceptable	
Modify rebar under invert/rail cost driving detail	If technically acceptable	
KAJV to create concrete mix rather than purchase pre-mix	If cost reduced	
Eliminate notch excavation for ductwork in detector caverns	FRA - Pending	
Weathering steel rather than galvanized	If cost reduced	
Reduce time when contractor is responsible for instrumentation monitoring	Yes	
Picking eye alternates (monorails or other)	FRA - Pending	
<b>BSI</b>		
Replace clean agent systems with conventional sprinklers	FRA - Pending	
Replace spray chamber with cooling tower	Yes	Updates being made to BSI package
Eliminate duct insulation in surface exhaust and relief air and underground outside air supply	Yes	Updates being made
Eliminate condenser reheat	Yes	Updates being made
Demo warehouse, build conventional building	No	
Use Yates shaft for deliveries	FRA - Pending	
Use borehole(s) for gas pipes rather than shaft pipes	FRA - Pending	
Alternate route for shaft pipe - new shaft from surface	FRA - Pending	
Flanged pipe in Ross shaft	FRA - Pending	
Eliminate galvanized requirements	Yes	Is this on steelwork package only? (i.e. piping also?)
Eliminate fire pump in compressor building (Shift to SDSTA project)	FRA - Pending	Pressure confirmed. TSP reviewing compliance with NFPA 20
Remove or optimize surface rail work	No	Rail on surface being reinstated, as confirmed in mtg 4 January 2019
Remove structural support in center access drifts	Yes	Confirmed by FRA (Jack Fowler/Doug Pelletier in attendance) that it is not required
Optimize cavern AHU's to use detector heat for reheat	Yes	

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VE Idea	Accept?	Status
Use schedule 30 pipe for 16"	Yes	Acceptable for Gaseous Nitrogen 16" diameter, not for 8"
Aluminum wire rather than copper	FRA - Pending	Potential for increased OPEX / reduced lifespan. Arup can review if necessary
PVC or HDPE pipe in place of steel where possible	No	ESH limits due to halogen content - only possible in unoccupied spaces
Use armored cables rather than conduit/wire	FRA - Pending	
Eliminate tolerance for ground bar	Yes	
Eliminate access control	FRA - Pending	
Re-evaluate electrical loads and correlating chiller loads	No	Rejected by experiment
Use Pre-cast slab or steel floor in lieu of concrete for CUC mezzanine (avoid all concrete in BSI)	KAJV Pending	Or bring concrete deliveries down shaft
Remove standby power requirements for cranes / hoists	Yes	Picked up in the changed requirements list.
Remove hydronic heating system from the underground package	Yes	Updates being made
Replace linear diffusers with 4-way blow	Arup reviewing	
Replace 2 compressors at 100%, with 2@50% capacity	Yes	Arup updating
Review whether in-situ grooved pipework is acceptable, or do all grooves require to be pre-grooved?		If technically acceptable

## VE Items needing Science input and approval

- Removal or reduction of center drift access
- Eliminate shotcrete in access drifts and non-science spaces
- Eliminate notches for exhaust ductwork
- Reduce picking eyes
- Eliminate clean agent fire suppression systems
- Eliminate galvanized steel
- Remove structural steel supports in center drifts
- Optimize cavern AHUs to use detector heat for re-heat
- Use schedule 30 pipe for gas piping
- Eliminate access card control

## Timeline for VE items

- EXC items need to be completed by June 1, 2019
- BSI items can be changed in 2020 prior to BSI bid package solicitation



## Action Items

- FRA ESH to make final decision if permanent fire suppression systems can be removed via alternative method that will have to be reviewed by AHJs.
- DUNE to respond on any EXC VE item by May 1, 2019 to accommodate EXC bid packages
- DUNE to respond on any BSI VE items by December 1, 2019 to accommodate BSI bid packages