Process Water and Air Treatment

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Process Water - RDR Summary

- Process Water Components in RDR
  - Process Water and Low Conductivity Water
  - Chilled water System (*this will be transferred to Air Treatment Systems*)
  - Compressed air system for process use.

- In RDR, we basically costed one plant and everything else was scaled from that, based on each area's heat load. History of Process Cooling Water from early 2006 to Nov 2006 was documented in the CFS Companion Document (this includes preliminary value engineering, assumptions, reviews, etc) located in CFS wiki

- Work on Process Water stopped on Nov 2006 to finish the RDR cost estimate on December 2006. Scope and Cost was based on information (**snapshot**) we had at that point. Since then, no effort has been made to update the information. (No attempt made to revise heat load since then, nor reconciling the power usage.)

- Used LCW as basis (instead of non-lcw water) because there was no concurrence as of Nov 2006 from various users to use the pushback-non-lcw, and the preliminary savings was not in the $100 millions. Also, No Heat Rejection is considered into the rock wall, Chilled water to fancoils was used.

- Although value engineering was initiated, (even with loose and incomplete criteria), the system design is still immature, with a lack of detailed specifications and requirements. Value engineering has been deferred.

WP#0 …Catching up….

- Revisit & update (*RDR level info*) heat loads
- Develop distribution systems (*RDR level info*) to other areas instead of scaling
- Develop bottoms up estimates for other applicable areas and compare with the scaling method used.
- Revisit/reconcile and update power usage (*RDR level info*)

Process Water - EDR Goal & deliverables

Goals

- Work with " integration group or Criteria Group" to establish a preliminary conceptual design
- Provide bottoms up cost estimate
- Provide various option studies to support the value engineering effort

Deliverables

- Conceptual design (more detailed than the scaling used in RDR but still ~20% level)
- Cost Estimate (bottoms up instead of scaling)
- Interfaces defined and agreed
- Other reports or other design work needed for the EDR

…need concurrence

Process Cooling – Site dependent & site independent

Site-dependent/Site-independent components

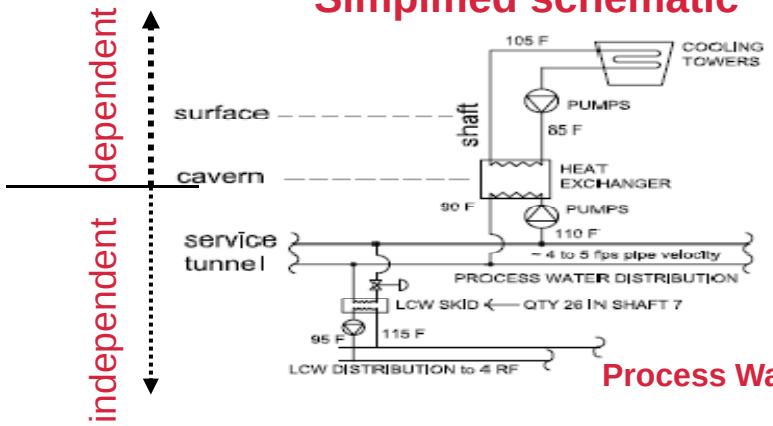
(In RDR, all regions used the same preliminary concept/cost, and ignore the minor site dependent component.)

- Site Dependent (Regional) - In general, any process cooling component in the surface
  - Final heat rejection (Cooling tower or Pond etc) may vary with region
  - Method of providing the final required supply temperature to the machine will vary depending on site climate (some may need chillers to accomplish this, some only towers,)
  - Any additional component due to tunnel depth may vary (shallow vs deep).
  - Water Distribution to BDS water dump may vary

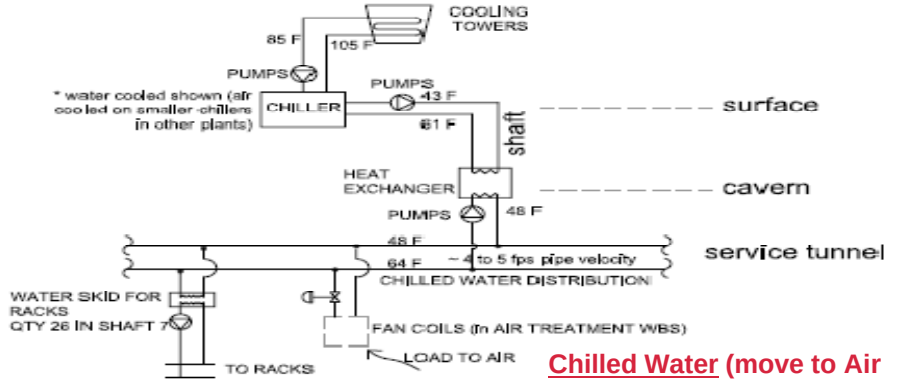
- Site Independent - Any process cooling below surface
  - Criteria for process water cooling for machine will be same for all regions
  - Concept and Method of distribution within the tunnel will be the same

Process Water -EDR Simplified snapshot

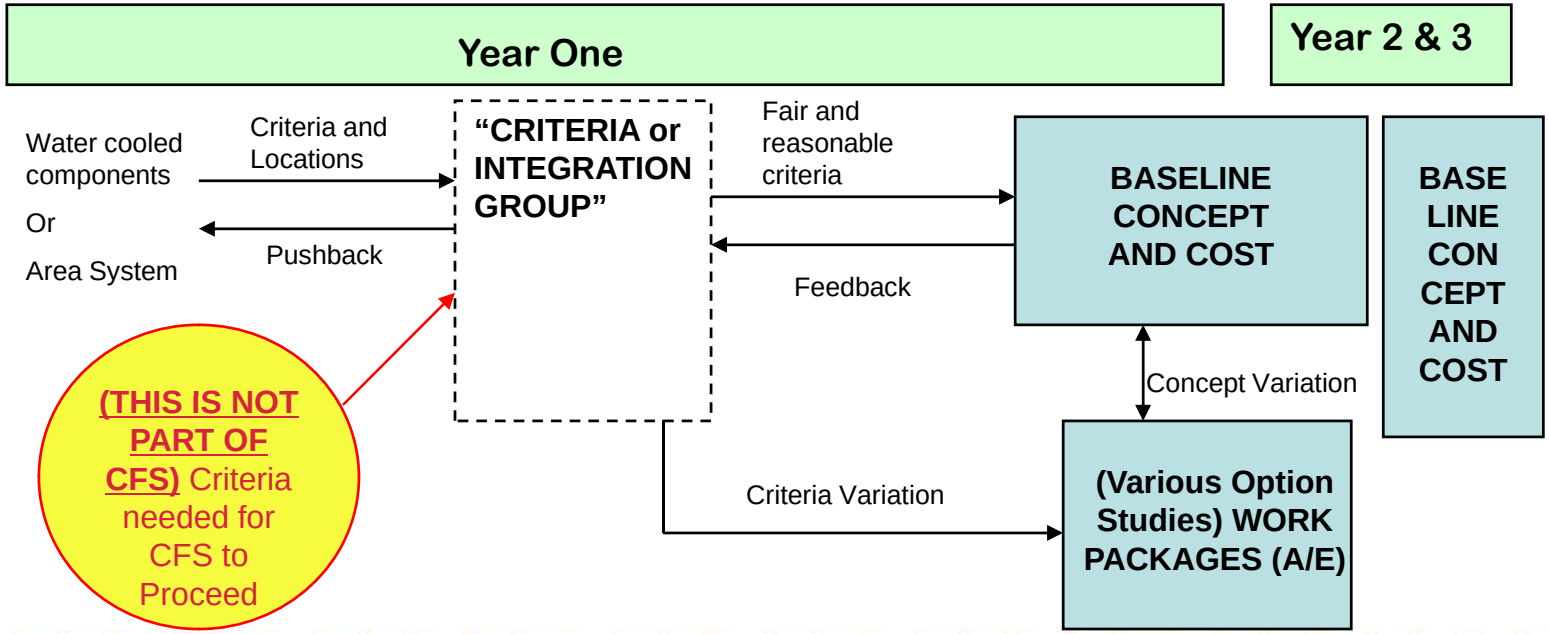
Simplified schematic



Process Water



Chilled Water (move to Air treatment)



Process Water –EDR Work Packages

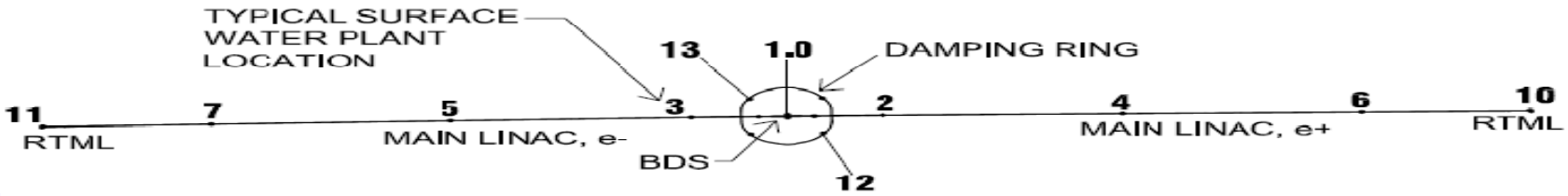
WORK PACKAGES (WP)

WP#1 Conceptualize and cost, baseline detail water systems (LCW & Process Secondary Loop) for different area systems such as, RTML, DR, BDS, ML, e-Source, e+ Source (site independent)

WP#2 Conceptualize and cost baseline process water systems distribution to surface (site dependent)

WP#3 Compressed Air System for process use

WP#4 Various Option Studies. After the criteria has been fairly developed, and baseline concept started, then we can revisit various value engineering items such as higher delta T, quality of water, stacking loads (series systems), final heat rejections, warm tunnel temperature, and conduct option studies as needed, including cost and the options impact on power and other component of the whole machine. Baseline concept will be updated depending on the studies results



Process Water – Notes about Criteria

- CFS needs fair and reasonable process cooling criteria that has been agreed upon by appropriate parties, very early in the EDR stage.
- We envision that there will be a group (of very very wise and very powerful men) that would gather criteria and sort thru the differences in opinion between users before passing this criteria to CFS. This will be used to provide baseline concept. Variation of criteria and concept will then lead to various option studies.
- This development of the criteria for process water cooling needs to happen very fast in order for baseline concept to be developed within the first year of the EDR

Air Treatment – RDR Summary

- Air treatment Components in RDR
  - Heating/Air Conditioning/Exhaust systems on surface for tunnel ventilation air
  - Ductwork distribution systems on surface/shafts/tunnels
  - Air handling units (AHU) in alcoves and fan coil units (FCU) in the tunnel for local temperature control

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- In the RDR, we costed the major air treatment system at one typical shaft. Other shafts were considered similar as the air volume was based on the cross-sectional airflow in the tunnel. History of Air Treatment Systems from early 2006 to Nov 2006 is documented in the CFS Companion Document located in CFS wiki

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- Used the basis that airflow could pass from the service tunnel to the beam tunnel through fire/smoke/ODH/radiation protected passages between the tunnels. This assumes that radiation/oxygen deficiency hazards (ODH) do not exist or can be mitigated between the tunnels from the standpoint of air mixing. This item needs concurrence as soon as possible.

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- AHU and FCU sizes in the alcoves and tunnels did not consider Heat Rejection/Absorption into the rock wall. These units use chilled water from the surface as the heat rejection source.

Air Treatment – Immediate Tasks

WP#0 …Catching up….

- Revisit & update (*RDR level info*) current air treatment scenarios
- Develop airflow distribution systems (*RDR level info*) for each shaft area instead of scaling
- Develop bottoms up estimates for other applicable areas and compare with the scaling method used.
- Revisit/reconcile the “heat to air” and “heat to chilled water” loads (*RDR level info*)

Air Treatment – EDR Goals and Deliverables

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WP#2 Conceptualize and cost baseline air treatment systems distribution to surface (site dependent)

WP#3 Various Option Studies. After the criteria has been fairly developed, and baseline concept started, then we can revisit various value engineering items such as final heat rejections, warm tunnel temperature, once through air flow and series recirculating air. Conduct option studies as needed, including cost and the options impact on power and other components of the whole machine. Baseline concept will be updated depending on the studies results