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MEMORANDUM

To: Clifton Court Forebay Fish Facilities Review Team
From: J. W. Buell, Ph.D.
Date: 07 September 1999
Subject: CCFB Fish Facilities - Two potential configurations

One of the goals of last week's workshop was to develop alternative configurations for fish protection facilities at CCFB. Although we addressed some of the alternative elements that might be incorporated in various configurations, we never developed "bundles" of elements that would constitute alternative configurations themselves. This memorandum contains two such bundles of elements. The purpose here is to start the process of bundling elements into discrete alternatives, not necessarily to formally propose alternatives for adoption. The two alternative facility configuration presented here are mutually exclusive to the extent that they represent "real" alternatives, not just variations on a common theme; each could easily be altered internally to generate "sub-alternatives" or changed to improve performance, cost, etc.

I have followed the lead of Ken Bates and have broken out the elements of each configuration according to primary function. I have also tried to keep reasonably close to those elements we discussed during the workshop.

ALTERNATIVE A

Debris Management

- Primary sloping rack with conveyor at entrance to facility
- Screen cleaning device (lateral moving brush system or the like)
- Secondary sloping debris rack with conveyor at bypass entrance
- Final drum screen at holding tank tailwater(s)

Screen Assembly (Positive Barrier)

- Vertical "V"
 - *Variation 1:* Subject to tidal action; screens tall enough to operate over tidal range
 - *Variation 2:* Screens mounted in a floating bay (similar to a dry-dock)
 - *Variation 3:* Fish-friendly "lift" incorporated upstream of the screen bay

Bypass

- Open flume
- Incorporate *both* ramp and secondary dewatering screens
- Establish positive flow control by balancing forebay and tailwater elevations with pumping

Fish Sorter/Separator

- Mechanical wet separator (near-horizontal bars; minimum of three sizes)
- Use Tracy experimental results to determine appropriateness of "leaky louver" systems

Fish Lift

- Possible use upstream of screens (see "Variation 3")
 - *Variation 1:* Use "fish-friendly" pumps between sorter/separator and holding tanks
 - *Variation 2:* Use "fish-friendly" pumps between low-elevation holding tanks and trucks
 - *Variation 3:* No lift; incorporate low-elevation truck loading facility

Fish Holding Facilities

- Hold fish according to size (sort before holding)
- Rectangular tanks
- Incorporate drum screens at tailwater for debris removal

Fish Transport

- Any method not fatally-flawed

Sediment Management

- Forebay dredging (episodic maintenance)
- Incorporate traps (sumps) and sand pumps in the throat of the "V"
- Incorporate small water jets at critical points to maintain suspension upstream of traps/pumps
- Test a low-speed "travelling riffle" at Tracy for continuous sediment removal

ALTERNATIVE B

Debris Management

- Same as "Alternative A"; debris removal in bypass is *very important* in this configuration

Screen Assembly

- Overflow (Coanda) screen (*forebay water surface elevation control is very important*)
 - *Variation 1:* Fish-friendly lift upstream of screens
 - *Variation 2:* Mount screens in a floating bay (no "pre-lift" necessary)

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Bypass

- Incorporate ramp for critical tailwater elevation and positive flow control

Fish Sorter/Separator

- Mechanical wet separator
- Use Tracy results to evaluate appropriateness of “leaky louvers” upstream of the screens

Fish Lift

- Possible use upstream of screens (see Variation 1)
 - *Variation 1:* Use “fish-friendly” pumps between sorter/separator and holding tanks
 - *Variation 2:* Use “fish-friendly” pumps between low-elevation holding tanks and trucks
 - *Variation 3:* No lift; incorporate low-elevation truck loading facility

Fish Transport

- Any method not fatally-flawed

Sediment Management

- Forebay dredging (episodic maintenance)
- Incorporate a sand trap with sand pump(s) upstream of the overflow (“Coanda” screen) weir
- Incorporate small water jets at critical points to “guide” sediment to desired settling points
- Test a low-speed “travelling riffle” at Tracy for continuous sediment removal

I hope these Alternatives will stimulate discussion and the formulation of other “bundles” of fish protection facility elements. Feedback is encouraged.