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Project: Environmental Consulting Services  
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Implementation Program (EARIP)

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## **RE: Fundamental Assumptions for Technical Evaluation of Bottom-Up Program**

Based on discussions at the September 23-24, 2010 EARIP meeting and subsequent follow-up conversations, you have asked us to evaluate the following elements for a “bottom-up” approach to spring flow protection: (1) dry-year option; (2) purveyor conservation; (3) expanded use of the SAWS ASR with a trade-off scenario; and (4) implementation of a Stage V “emergency CPM reduction with 44 percent reductions from IRP pumping levels.<sup>1</sup> The purpose of this technical evaluation is to analyze the enhanced contribution to springflow at the Comal and San Marcos springs from applying these elements in a layered approach.

The overall concept is to simulate the incremental effects of each element or layer of the “bottom-up” program sequentially and cumulatively (*i.e.*, DYO, DYO+Conservation, DYO+Conservation+SAWS ASR, *etc.*). In accordance with this concept, the two elements least affected by other elements (dry-year option and conservation) will be integrated first and followed by SAWS ASR. The final layer is Stage V CPM, which is considered to be an emergency condition. The SAWS ASR element will be operated to meet springflow protection objectives to the degree that existing facilities and storage can accommodate that is consistent with its position in the stack. Simulation results for the “bottom-up” program will be presented and summarized for the full 1947-2000 period. Fundamental assumptions for each of the four layers comprising the “bottom-up” program are discussed below.

### **A. Dry-Year Option (DYO)**

- 1) The schedule, rate of irrigation reduction, and costs will be based on those provided by the Dry-Year Option Subcommittee and considered in Program #2, Run #3.
- 2) DYO will apply to about 40,000 acft/yr (IRP value) of Edwards pumping rights with 20,000 acft/yr in Medina County, 15,000 acft/yr in Uvalde County, and 5,000 acft/yr in Bexar County. The reductions will be triggered on January 1 if the water level in J-17 is below 650 feet above mean sea (ft-msl) level on September 1 of the previous year.
- 3) These reductions are assumed to be equally distributed across all irrigation wells in the respective counties.
- 4) DYO will be subject to Critical Period Management (CPM) reductions.
- 5) As the SAWS ASR element of the “bottom-up” program involves lease of 50,000 acft/yr of irrigation IRPs, it is tacitly assumed that most, if not all, of the Edwards water committed to the DYO program element will be from the base (or restricted) portions of irrigation IRPs.

<sup>1</sup> Additional elements focusing on agricultural conservation and brush management above Canyon Reservoir were initially considered for the “bottom-up” program, but have been deferred for consideration under Adaptive Management.

## B. Conservation.

- 1) The conservation layer is based on a Voluntary Dedicated Water Supply Program as described in a document entitled “White Paper-Water Conservation Program,” which was developed by the Conservation Work Group and dated August 31, 2010.
- 2) In accordance with the white paper (including minor corrections), the conservation element of the “bottom-up” program will include pumping reductions of 10,067 acft/yr when the Edwards Aquifer is not in CPM. These reductions are to be accomplished through: a) Toilet retrofit (1531 acft/yr); b) Replacement of inefficient fixtures (1286 acft/yr); c) Leak detection and repair (3750 acft/yr); d) Large-scale retrofit (2500 acft/yr); and e) Landscape watering savings (1000 acft/yr).
- 3) Pumping reductions will be geographically distributed in proportion to municipal IRPs because planned model simulations do not include an expected shift from initial urban savings to rural communities over time.
- 4) Pumping reductions associated with the conservation layer will be implicitly limited during CPM as overall municipal pumping is reduced.
- 5) Cost estimates for the conservation layer will be calculated using unit rates in the white paper.

**C. SAWS ASR with Trade-Off Option.** This element is the fourth layer of the “bottom-up” program as presently envisioned. It utilizes the existing San Antonio Water System Aquifer Storage & Recovery (SAWS ASR) facilities for storage and delivery of Edwards water. This water will be obtained by leasing Edwards irrigation permits, stored in south Bexar County, and delivered into SAWS water distribution system. The delivered water is to reduce or off-set SAWS pumping of the Edwards Aquifer by an equal amount during severe drought. Work elements involved are summarized as follows:

- 1) Lease of 50,000 acft/yr of Initial Regular Permits (equivalent to 30,000 acft/yr under CPM Stage IV) for Edwards Aquifer pumping to support use of SAWS ASR facilities for springflow protection. Leased rights will be unused during periods when they are not being used for storage in SAWS ASR facilities.
- 2) Preliminary operational and modeling procedures are for “dynamic sharing” of injection, recovery, and transmission capacities associated with SAWS ASR facilities. In this context, “dynamic sharing” means that the maximum commitment of SAWS ASR recovery and transmission capacity for direct springflow protection could be 100% during severe drought.
- 3) Use of up to 100% of the conveyance capacity of existing SAWS ASR facilities to reduce (off-set) Edwards Aquifer pumping by SAWS when the monthly average Comal Springs discharge falls to 50 cfs. The selected wells with reduced pumping will be on the northeast side of SAWS water distribution system.
- 4) Assume that: (a) the initial storage in SAWS ASR is 80,000 acft; (b) the full storage capacity is 200,000 acft; and (3) there is an annual water loss factor of 10 percent.
- 5) The availability of water from the leases will be subject to CPM.
- 6) Guidelines on making a cost estimate for this program element are to be provided by SAWS.

**D. Stage V CPM.** Simulation of this program element or layer is based on the following assumptions:

- 1) Permitted pumping during Stage V will be reduced by 44 percent from the Initial Regular Permit (IRP) values. Estimated domestic & livestock pumping is not restricted. Un-permitted Federal pumping is assumed to be reduced in critical period by the same percentages as permitted pumping.
- 2) Stage V would be triggered for the San Antonio Pool when J-17 is lower than 625 ft-msl and for the Uvalde Pool when J-27 is lower than 840 ft-msl. The J-27 trigger of 840 ft-msl was determined by a simple linear regression of the SB3 triggers for CPM stages for the two index wells and selecting the approximate equivalent water level at J-27 when J17 is at 625 ft-msl.
- 3) The percentage reductions were chosen to be equal for the two pools. Stage V CPM is considered to be an “emergency” situation and all permit holders would be required to make an equal sacrifice. The reduction factor for the two pools was calculated to be 44 percent based on the percentage reduction to move from an IRP total of approximately 572,000 acft/yr to a critical period floor of 320,000 acft/yr. For the SB3 Baseline model simulation with the nominal 340,000 acft/yr of Stage IV permitted pumping (actually about 347,000 acft/yr subject to SB3 triggers and reductions), the percentages of time that the San Antonio and Uvalde Pools would be in Stage IV CPM are 16 and 39, respectively, for the 1947-2000 simulation period. The percentages of time that the San Antonio and Uvalde Pools would be in Stage V CPM are 11 and 37, respectively. The associated reductions in permitted pumping during Stage V in the San Antonio and Uvalde Pools are 19,200 acft/yr and 8,200 acft/yr, respectively. Many other triggers and/or reduction factors for Stage V could have been chosen, however, the differences in springflow protection at the two springs are believed to be relatively small.
- 4) An additional simulation will be performed based on use of a J-17 water level of 625 ft-msl as the trigger for Stage V CPM in both the San Antonio and Uvalde Pools with associated pumping reductions of 44 percent. This simulation will include the Dry-Year Option, Conservation, SAWS ASR, and Stage V CPM elements.
- 5) The direct and indirect costs of Stage V CPM will not be estimated by HDR.

Costs for the “bottom-up” program will be estimated for each layer. Many of the cost elements will be taken directly from reports by HDR to the EARIP. More specifically, costs for Stage V CPM will not be calculated by HDR, costs for the Dry-Year Option and SAWS ASR will be derived using procedures identical to those used in previous technical evaluations for the EARIP, and costs for conservation will be based on estimates in an August 31, 2010 White Paper developed by the Conservation Work Group.