

# COMPUTER MODELING

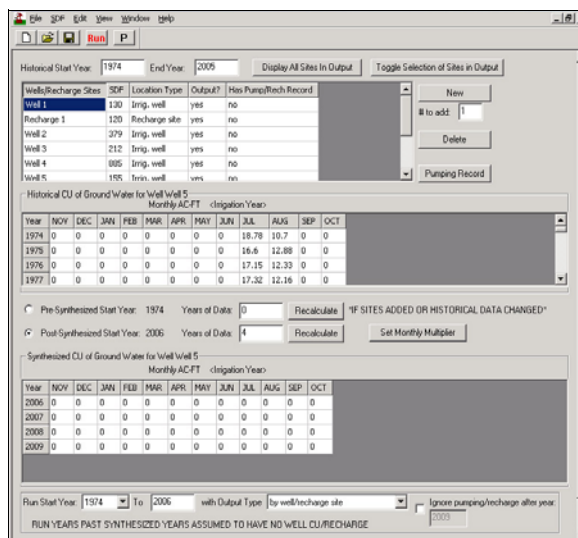
## Stream Depletion Modeling

### Substitute Water Supply Plan

On behalf of a farmer in the Lower South Platte River basin near the City of Sterling, Colorado, Martin and Wood submitted a substitute water supply plan to the State Engineer which determined the lagged depletions to the South Platte River from thirty years of well pumping for agricultural use.

Martin and Wood determined the lagged depletions to the river for seven irrigation wells utilizing SDF View, a computer modeling program developed by the Integrated Decision Support Group at Colorado State University. This computer model integrates irrigation consumptive use from well water, as determined by the user, with Stream Depletion Factors (“SDF’s”) to determine the lag time from when well water is pumped from an alluvial unconfined aquifer to

when depletion occurs at the river. The State Engineer thereupon approved the plan.



SDF input data screen

### Premier Paving, Inc. - Wildlife Pit II

Premier Paving, Inc. had previously conducted dry mining (above the ground water table) on a gravel pit located in Adams County, Colorado. The gravel pit is located in the alluvium at the confluence of Clear Creek and South Platte River. The water contained in the alluvium at this location is considered to be tributary or hydraulically connected to both stream systems.

In order to maximize the gravel resources at the Wildlife Pit II site, Premier wished to continue mining below the water table. In the State of Colorado, any gravel mining that is done below the ground water table in the alluvium must have a substitute water supply plan or an augmentation plan if ground water is to be exposed at the surface in order to replace out-of-priority depletions to the stream system. Martin and Wood submitted a substitute water supply plan on Premier’s behalf.

Part of the substitute water supply plan included calculation of the effects to the two streams resulting from the mining activities. The depletions were expected to occur as a result of evaporation from exposed ground water at the surface and loss of water retained in the gravel removed from the site. Because these depletions are not considered to affect the river system instantaneously, unless the gravel pit is located within 100 feet of the river, then the timing of the depletions must also be calculated. Martin and Wood personnel used the Glover Stream Depletion program that incorporates the geometry of the gravel pit in relation to the river, the extent of the alluvium, and the local hydro-geologic characteristics to calculate the timing of the stream depletions.

The State Engineer approved the plan.

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