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TO: GOVERNANCE COMMITTEE
FROM: GEORGE OAMEK, EXECUTIVE DIRECTOR'S OFFICE
JERRY KENNY, EXECUTIVE DIRECTOR
SUBJECT: J2 REGULATING RESERVOIR DISCUSSION
DATE: APRIL 5, 2016

Issue

This memorandum is a follow up on the March 10, 2016 Memorandum from the Executive Director's Office (EDO) distributed to the Governance Committee (GC) subsequent to the discussion of the economic and financial implications of the Amended and Restated Water Service Agreement held at the March 2016 GC Meeting in Kearney, Nebraska.

The current J2 Regulating Reservoir (J2) single-reservoir configurations being considered will significantly reduce the reservoir's potential to provide hydro-cycle mitigation, in particular the irrigation season operations benefit, for the Central Nebraska Public Power and Irrigation District (CNPPID or Central). The two cell reservoir concept allowed hydropower operations during the irrigation season to run at peak flow capacity of roughly 1675 cfs. Increasing Phelps County Canal capacity from the current 1000 cfs to 1675 cfs to the Regulating Reservoir allowed 1000 cfs to continue past the reservoir to serve irrigation and the remaining 675 cfs to be stored. The stored hydropower releases in excess of irrigation flows would be subsequently released back into the canal for irrigation purposes when canal capacity was available. This benefit has both hydro-cycle mitigation and irrigation supply benefit components, but will hereafter in this memo generally be referenced simply as hydro-cycle mitigation under the initial two cell reservoir concept. With the single cell concept this irrigation season operations benefit component for Central is not possible and the hydro-cycle mitigation benefit is reduced to primarily spring and fall operations.

Central estimates that the 30-year present value of future mitigation and water supply benefits is reduced from about \$2.5 million for a larger two-cell reservoir to \$0.40 million under options currently being considered. Facilities specifically needed to provide these hydro-cycle mitigation and irrigation season benefits that are not required to achieve reduction to target flow deficit benefits, primarily related to expanding the Phelps Canal, are estimated to cost approximately between \$7.4 million and \$12.5 million to construct, depending on the size of reservoir constructed.

The reduced benefit results in Central's proposing that their share of reservoir capital costs be reduced from 5% to 0.5%, as specified by Central in the Draft J2 Water Services Agreement. The Platte River Recovery Implementation Program (PRRIP or Program)



and the Nebraska Department of Natural Resources (DNR) would have to cover the reduction in Central's share of capital cost. In effect, the Program and DNR would have to pay for proportionately more of the J2 Regulating Reservoir, including expenditures specifically for facilities needed to accommodate hydro-cycle mitigation, whose cost greatly exceed their current economic benefit. Although apparently questionable, this situation evolved from rational actions described below.

J2 Cost Allocation, Getting from 5% to 0.5%

Cost allocations for the J2 Regulating Reservoir were developed when a two-celled reservoir was a preferred option. Central had stated at the time that they would pay capital cost up to their estimated long-term hydro-cycle mitigation (including the irrigation season operations) benefits, about \$2.5 million, equivalent to about 5% of total J2's estimated capital cost at the time.

Concurrently, the EDO's office was using the Separable Cost Remaining Benefit cost allocation method (SCRB) to allocate J2 capital cost. This method is commonly used and accepted for multi-purpose federal projects, most notably Bureau of Reclamation water projects. This method determined that Central's share of capital cost should be in the range of 3% to 6.5%, depending on assumptions regarding "joint" and "separable" costs. Although it's uncertain whether the method of cost allocation was ever agreed upon, in light of Central's offer being near the mid-point of the SCRБ analysis, all parties appeared to agree that Central's offer to pay 5% of total costs was reasonable and the project moved forward with 5% in the initial draft of the Water Service Agreement.

It should be reiterated that Central's benefits are based on hydro-cycle mitigation and the estimates are Central's own. The calculations are performed consistently between initial and current iterations, and appear to be based on reasonable numbers. The one cell reservoir doesn't appear to provide any summer season mitigation, so any benefit is during the spring and fall. The dollar benefit itself is based on the purchase cost of power (\$/kwh) from an alternative source. Central estimates this cost as \$0.043/kwh in 2020, increasing in nominal terms to \$0.0768/kwh by 2049. However, even if these purchase prices doubled in the analysis, Central's benefit would barely exceed 1% of estimated J2 costs because only spring and fall mitigation is possible.

J2 Regulating Reservoir benefits accruing to Central such as compliance with vague mitigation obligations under current FERC license terms, greater ease in future FERC re-licensing, and the potential to have a major asset like the J2 Regulating Reservoir on one's books (with minimal capital cost) are not hard to imagine. However, no attempt was made to quantify these benefits for purposes of this analysis.



If the SCRB cost allocation method continues to be used and Central's benefits are assumed to be exclusively limited to spring and fall hydro-cycle mitigation, their 0.5% allocation of cost would be reasonable.

Hydro-Cycle Component of J2's Estimated Cost

Since the hydro-cycling benefit to Central is so greatly exceeded by the cost of providing it, one could reasonably question whether the reservoir could be constructed and operated independent of hydro-cycle mitigation or independent of the Central system.

The EDO office has estimated that not expanding the Phelps Canal from 1,000 cfs to 1,675 cfs, would have minor impacts to Program yield score. At a capacity of 10,500 acre-feet, program yield is only reduced from 26,340 acre-feet per year to 25,900 acre-feet.

However, even when the expanded Phelps Canal is included in the costs, the J2 Regulating Reservoir is most cost effective with fewer environmental impacts when gravity fed through Central's Supply Canal and Phelps Canal. Bypassing the Central system by developing a new diversion between the J2 return and a proposed single cell J2 Regulating Reservoir has been roughly analyzed and found to have greater capital costs, greater O&M costs (because the water would need to be pumped from the river), and higher permitting costs compared to using the Central system.

Further, one could reasonably question the continuing desire and political will of Central to take on the responsibility of building and operating the J2 Regulating Reservoir with so little hydro-cycling benefit. If the hydro-cycle mitigation components are removed, it is a certainty that Central would no longer be a sponsor for the project. The J2 Regulating Reservoir project appears to be more cost effective using the Central system than not, even with the non-economic hydro-cycling components.

The J2 Regulating Reservoir as a Water Supply Option

Whether Central pays 5% of J2's capital cost or less than 1%, the J2 Regulating Reservoir remains the most economical source of controllable water the Program can develop that has been identified to date. Table 1 provides some very preliminary estimates of the Program's water acquisition options and their costs. Table 1 is contained in a Technical Memorandum under review by the EDO which is anticipated to be distributed in the near future. However, despite its preliminary nature, Table 1 is sufficiently accurate to demonstrate the relative difference in Water Action Plan sources. Current reservoir costs are included in Table 1, as well as the current assumption that Central pays 0.5% of total capital cost.

Although J2 Regulating Reservoir is shown to be slightly more expensive than the recharge projects, the quantity of J2 water available in a given year will be known with



some certainty and will be highly controllable, making this water source quite valuable. Although apparently slightly less expensive, there is sufficient uncertainty surrounding recharge projects' operations, scores, and time lags that make this source less desirable than J2. Analyses and field tests are underway to reduce these uncertainties, but it will be several months before the uncertainties can be reduced significantly.

Despite concerns about a possible financial windfall to Central due to perceived generous cost allocation assumptions, the J2 Regulating Reservoir is still the most attractive water supply option to the Program, even with only 0.50% of the cost allocated to Central.

Table 1. Summary of WAP costs per acre-foot of Program Score				
Measure	Discounted total expenditures @3% (million)	Annual equivalent expenditures (million)	Estimated annual Program yield (acre-feet)	Cost per acre-foot of Program yield
J2 Reservoir, Program share, evaluated at 10,500 acre-feet capacity and \$9,600 per acre for land	\$ 87.34	\$ 3.39	\$ 26,342	\$ 129
Recharge projects				
Phelps Cty Canal Groundwater Recharge (Program share)	\$4.56	\$0.18	2,700	\$ 66
Groundwater Recapture (Phelps, Elwood)	\$1.33	\$0.05	400	\$ 130
Elwood Reservoir Seepage	\$5.44	\$0.21	2,000	\$ 106
Broad-Scale Recharge Projects	\$56.40	\$2.19	20,000	\$ 110
Recharge project subtotal	\$67.74	\$2.63	25,100	\$ 105
Pathfinder Municipal Account	\$6.30	\$0.24	4,000	\$61
Net controllable conserved water	\$ -	\$ -	300	\$ -
Water leases				
CPNRD Surface Water Lease	\$7.50	\$0.29	1,800	\$ 162
NPPD Water Lease	\$2.71	\$0.11	381	\$ 277
CNPPID Water Lease (Irrigator)	\$12.18	\$0.47	2,025	\$ 234
CPNRD Groundwater Market	\$12.35	\$0.48	1,760	\$ 273
Lease subtotal	\$ 34.74	\$ 1.35	5,965	\$ 226
Totals	\$ 196.12	\$ 7.62	61,707	\$ 123.52