

1 DOWNEY BRAND LLP
KEVIN M. O'BRIEN (Bar No. 122713)
2 MEREDITH E. NIKKEL (Bar No. 254818)
621 Capitol Mall, 18th Floor
3 Sacramento, CA 95814-4731
Telephone: 916.444.1000
4 Facsimile: 916.444.2100
kobrien@downeybrand.com
5 mnikkel@downeybrand.com

6 Attorneys for North Delta Water Agency

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8 BEFORE THE CALIFORNIA STATE WATER RESOURCES CONTROL BOARD

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10 In the matter of 2016 SWRCB Hearing re
11 CalWaterFix Petition for Change

**REBUTTAL TESTIMONY OF
GOMATHISHANKAR
PARVATHINATHAN, MBK ENGINEERS**

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DOWNEY BRAND LLP

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PROFESSIONAL BACKGROUND AND QUALIFICATIONS

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2 1. I am a registered civil engineer in the State of California. I specialize in
3 hydrologic modeling. I am an engineer at MBK Engineers, located at 455 University Avenue,
4 Suite 100, Sacramento, CA 95825. MBK Engineers specializes in water resources engineering
5 and performs these engineering services for local public agencies and private clients principally in
6 the Delta and the Sacramento Valley. MBK Engineers was formed in 1967 (then known as
7 Murray, Burns and Kienlen) and currently employs approximately 23 engineers. Exhibit NDWA-
8 6, which has been previously admitted into evidence in this proceeding, is a true and correct copy
9 of my professional qualifications.

10 2. Exhibit NDWA-5 is a true and correct copy of my written testimony in this
11 proceeding, which was previously admitted into evidence. On October 28, 2016 I provided oral
12 testimony in support of the case in chief of North Delta Water Agency and its member districts.

13 3. I have reviewed the testimony submitted by Petitioners in support of the case-in-
14 chief in this proceeding, together with the supporting exhibits, and my findings and observations
15 are included herein.

SUMMARY OF TESTIMONY

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17 4. In DWR 66, Dr. Tehrani testifies “[m]odel results at times show modeling
18 anomalies. A small fraction of these anomalies represent modeled exceedances at some
19 locations.” DWR-66, p. 3. Dr. Tehrani restated during his oral presentation and cross-
20 examination that the modeled exceedances of D-1641 water quality objectives under both
21 baseline and proposed Cal WaterFix operations are modeling anomalies and are not expected to
22 occur in reality.

23 5. From the standpoint of a professional modeler, modeling anomalies are
24 deficiencies that arise as a result of the inherent limitations and uncertainties in the model’s
25 mathematical representation of the real-time processes.

26 6. CalSim II and DSM2, like any other models, are not perfect in simulating reality
27 and can produce anomalous results. However, Dr. Tehrani’s conclusion that all exceedances are
28 due to modeling anomalies has not been scientifically demonstrated in a quantitative manner.

1 7. My rebuttal testimony will demonstrate a need to investigate the modeled
2 exceedances in detail before they can be dismissed as modeling anomalies.

3 8. To illustrate, DWR Exhibit 513 Figure C1 presents the probability of exceedance
4 of D-1641 water quality objectives at Emmaton under different scenarios. Based on this figure,
5 D-1641 compliance is shown to be approximately 88 percent under the No Action Alternative
6 (NAA) and approximately 78 percent under the Boundary 1 Scenario. In other words, the
7 probability of exceeding the D-1641 water quality objectives under the baseline is 12 percent
8 whereas it is approximately 22 percent under Boundary 1, an increase of 10 percent under
9 Boundary 1.

10 9. The issue is whether the increase in modeled exceedances of 10 percent is a
11 realistic potential effect of the proposed Cal WaterFix operations or a modeling anomaly.

12 10. The Petitioners have testified that the increase in modeled exceedances is not a
13 realistic potential effect of the proposed Cal WaterFix operations, because in real time the
14 operators will be able to meet the D-1641 water quality objectives. *See* Hearing Transcript, Vol.
15 14, pp. 47-50.

16 11. While it is plausible that the operators could meet the D-1641 water quality
17 objectives even under the proposed Cal WaterFix operating conditions, the ability to do would
18 depend on the volume of freshwater that could be made available in the Delta which further
19 depends on several factors such as: (i) the severity of Delta salinity conditions under the proposed
20 Cal WaterFix operations; (ii) the availability of water upstream; and (iii) other physical and
21 operational constraints to release stored water or to take other actions. In reality, it is quite
22 plausible that there could be a scenario in the future when, under Cal WaterFix operations Delta
23 water quality exceeds D-1641 objectives and a large quantity of freshwater would be required to
24 be released from upstream storages in order to comply with D-1641 objectives, but the water may
25 not be physically available or allowed to be released.

26 12. Even if one were to assume that the operators would somehow meet the D-1641
27 water quality objectives by additional release of stored water or other actions, the Petitioners'
28 operations modeling does not assess whether additional freshwater is available to meet the water

1 quality objectives during the periods when the modeling shows exceedances. By not accounting
2 for the additional volume of stored water that may be required to meet water quality objectives,
3 the modeling may have under-estimated water supply impacts to water users which could be
4 significant depending on the salinity conditions, water supply and demand.

5 13. The volume of freshwater required to eliminate the additional modeled
6 exceedances of the D-1641 water quality objectives due to Cal WaterFix operations has not been
7 determined by Petitioners at this time. However, it is possible to determine how much additional
8 freshwater would be needed to eliminate these exceedances through an iterative modeling process
9 where the system can be re-operated using CalSim II either by releasing more stored water or by
10 other actions to provide additional freshwater flows and simulate water quality conditions in the
11 Delta using DSM2 based on revised boundary flows. This process can be performed iteratively
12 until the water quality results show compliance is with water quality objectives is achieved. This
13 iterative process would demonstrate the most likely frequency of meeting the objectives in the
14 future under the proposed Cal WaterFix operations and also quantify impacts to water supplies.

15 14. To conclude, the petitioners have not explained in detail what these modeling
16 anomalies are and how these anomalies can cause modeling exceedances in a detailed quantitative
17 manner. Even if one were to assume that the all of the modeled exceedances are modeling
18 anomalies and are not expected to occur in reality due to more efficient real-time operations of
19 the system, the operations modeling fails to account for the additional volume of water that may
20 be required to obtain compliance under the proposed Cal WaterFix operations. In other words, by
21 allowing violation of D-1641 water quality objectives in some months, the petitioners may have
22 under-estimated the cost to meet compliance under D-1641.

23 15. Until further technical details are presented on the modeling exceedances and how
24 these exceedances may indicate a water supply impact that is not currently evaluated, it is not
25 reasonable to dismiss the modeled exceedances as a modeling anomaly.
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