Declaration of Dr. John Talberth

In the Matter of Fort Huachuca’s Liability for the
Groundwater Deficit in the Sierra Vista Subwatershed

I, John Talberth, declare and state as follows:

1. My name is John Talberth. I currently serve as President and Senior Economist for the Center for Sustainable Economy (CSE) in Santa Fe, New Mexico. CSE is a non-profit organization that provides expertise in economic analysis, conservation planning, and environmental law for non-profit, business, and government clients.

2. I hold a Ph.D. in Economics from the University of New Mexico and a Masters of Urban and Regional Planning from the University of Oregon. My areas of expertise include environmental economics, sustainability metrics, international economics, land use planning, and regulatory compliance. I’ve attached, hereto as Exhibit A, a copy of my current vita.

3. In July 2007 the Center for Sustainable Economy (CSE) completed a critique of the methods currently being used to determine Fort Huachuca’s liability for the groundwater deficit in the Sierra Vista subwatershed. I’ve attached, hereto as Exhibit B, a copy of the report which bears the title “Fort Huachuca and the San Pedro River: Improving Water Deficit Liability Calculations Through Economic Modeling.” The report was authored by me, Associate Professor Janie Chermak and Research Assistant Jason Hansen. Professor Chermak and Jason Hansen are affiliated with the University of New Mexico and CSE.

4. In preparing Exhibit B and this declaration, we reviewed the following documents: (a) the 2002 and 2006 Programmatic Biological Assessments (BA) prepared by Fort Huachuca (FH 2002; FH 2006); the 2002 and 2007 Biological Opinions (BO) prepared by the U.S. Fish and Wildlife Service (USFWS 2002; USFWS 2007), and (c) the study “Economic and
Demographic Analysis in Support of the U.S. Fish and Wildlife Service Biological Opinion Regarding the Impact of Fort Huachuca,” prepared by the Center for Economic Research (CER 2006). Our findings include the following:

5. Fort Huachuca’s obligations under both the National Environmental Policy Act (NEPA) and the Endangered Species Act (ESA) require consideration of all direct, indirect, induced, interrelated, and interdependent effects on the groundwater deficit in the Sierra Vista subwatershed that would not occur but for the presence of the Fort in a rigorous fashion. In documents prepared to satisfy both NEPA and ESA requirements, Fort Huachuca recognizes that to be complete, groundwater deficit calculations must address water used on-post in base operations, water used by people who live in the Sierra Vista sub-watershed due to the presence of Fort Huachuca, and water use associated with off-post induced economic development that would not occur but for the presence of Fort Huachuca in the Sierra Vista subwatershed (Exhibit B at 3). Both Fort Huachuca and the U.S. Fish and Wildlife Service also recognize that information relied upon to determine Fort Huachuca’s liability for groundwater deficits must satisfy ESA’s obligation to consider the “best scientific and commercial data available” (50 CFR § 402.14(d)).

6. Both biological assessments prepared by Fort Huachuca, both biological opinions prepared by the U.S. Fish and Wildlife Service, and the study prepared by CER use population-based methods for calculating Fort Huachuca’s liability for the groundwater deficit in the Sierra Vista subwatershed. In 2002, Fort Huachuca and the U.S. Fish and Wildlife Service relied on a method that had three essential steps: (1) estimating the population attributable to Fort Huachuca; (2) dividing this population by the total population in the Sierra Vista watershed, and (3) applying the resulting percentage (54.12%) to the presumed groundwater deficit at the time...
(5,144 acre feet) to arrive at the liability figure of 2,784 acre feet in 2002. The population attributable to Fort Huachuca was calculated through a combination of direct counts, economic modeling, and adjustments made to eliminate double counting. A combination of economic and population modeling was used to estimate “an interrelated and interdependent population of induced employees and family members” of 7,093 (FH 2002, Appendices I and J). The 2006 Fort Huachuca BA and 2007 U.S. Fish and Wildlife Service BO relied on a different population-based approach, again involving three basic steps: (1) estimating the population attributable to Fort Huachuca and segmenting this population into incorporated area and unincorporated area groups; (2) multiplying the population in each group by an assumed per capita water use in each area to arrive at a groundwater demand figure attributable to Fort Huachuca of 5,928 acre feet, and (3) adjusting the Fort Huachuca attributable water demand down to account for attributable aquifer recharge to arrive at a liability figure of 1,942 acre feet in 2005 (FH 2006, Appendix K at 5). As in 2002, the population attributable to Fort Huachuca included an estimate of an interrelated and interdependent population of induced employees and family members, estimated to be 6,781 in 2005 (Id.).

The CER report relied on yet another population-based method, based largely on direct counts of military personnel, civilian employees and contractors, retirees, and family members adjusted for double counting. CER did not estimate an interrelated and interdependent population of induced employees and family members through economic modeling or any other technique. CER did not directly estimate deficit liability, however, if one uses the formula applied in FH (2002) and USFWS (2002) the implied deficit liability is roughly 1,378 acre feet (Exhibit B at 5 – 6).
8. For reasons set forth in Exhibit B, the population-based methods used by Fort Huachuca, U.S. Fish and Wildlife Service, and Center for Economic Research are inadequate for the task of estimating all direct, indirect, induced, interrelated, and interdependent effects on the groundwater deficit in the Sierra Vista subwatershed that would not occur but for the presence of the Fort in a rigorous fashion and can in no way be considered the best scientific and commercial data available. There are several reasons why this is the case, explained in more detail in Exhibit B. Since the USFWS (2007) concurs with our conclusions set forth in Exhibit B that the CER study is facially inadequate (Exhibit B at 8; USFWS 2007 at 116) I will concentrate on the shortcomings of the USFWS (2007) and Fort Huachuca (2006) analyses.

9. One important reason why the population method used by Fort Huachuca (2006) and USFWS (2007) is invalid is that it fails to account for the enormous increase in economic activity and associated water use attributable to Fort Huachuca that has occurred since 2002 as the Fort increased its local expenditures from $569.7 million to $830.6 million, an increase of nearly 46% (Exhibit B at 9). Despite this increase, both the BA and BO found that water deficit liability actually decreased during this time frame from roughly 54% in 2002 to 18% in 2005. (Fort Huachuca 2006, Appendix K at 4 – 5).¹

10. One key reason for this result is use of a seriously flawed technique for calculating the interrelated and interdependent population of induced employees and family members. In 2002, Fort Huachuca used a combination of economic and population modeling to arrive at a figure of 7,093 for this population based in part on its Cochise County expenditures at that time ($569.7 million according to the Fort’s 2003 Annual Economic Report). However, in 2006, Fort Huachuca did not conduct new economic modeling based on its 2005 Cochise County expenditures.

¹ According to FH 2006, Appendix K at 4, the groundwater deficit now averages 10,962 acre feet. Fort Huachuca’s presumed liability of 1,942 represents 17.7% of this total.
expenditures, reported by the Fort to be $830.6 million. Instead, the Fort estimated the population of induced employees and family members in an illogical, arbitrary, and erroneous fashion that failed to address this significant increase in local expenditures.

11. In 2002, the ratio of induced employees and family members (7,093) to military, government civilian, contractors, retirees survivors and family members (26,531) was .267 according to figures published in the 2002 BA (FH 2002 at 89). In 2006, the Fort simply multiplied this fraction (.267) by its estimate of Fort Huachuca personnel (25,396) to arrive at a figure of 6,781 induced employees and family members (FH 2006, Appendix K at 5). In other words, the Fort estimated the size of an economically-determined group (induced employees and family members) without using any economic modeling, just unfounded assumptions about how that population relates to Fort Huachuca personnel based on an arbitrary fraction from the 2002 BA. As such, the estimate of 6,781 is a meaningless number that has no basis in fact, and one that is completely divorced from economic analysis and completely insensitive to increases or decreases in Fort Huachuca’s expenditures.

12. Moreover, the BA and BO misrepresent the technique that was actually used to arrive at this figure. The BA and BO state that the 6,781 figure was generated by the Economic Income Forecasting Model (EIFM) which has a “firm basis in regional economic theory” (FH 2006 at 101; USFWS 2007 at 116). The BA even included an “Appendix I” that purported to display the results from the EIFM model run. EIFM may be a rigorous model, but it was not used at all. Instead, Fort Huachuca employed the arbitrary method described above. By failing to use EIFM or any other reasonable economic modeling technique to estimate the current population of induced employees and family members based on current expenditures, the BA and BO significantly understate water deficit liability.
13. If we assume – as any reasonable economic model would – that the population of
induced employees and family members rises with the Fort’s expenditures then it is easy to show
that the BA and BO’s water demand figures and associated water deficit liability figures are
erroneous. For example, if we assume that the population of induced employees and family
members rises and falls proportionally with the Fort’s expenditures, then the correct figure ought
to be roughly 10,355 (7,093 from the 2002 BA plus 46% - the percentage increase in the Fort’s
local expenditures between 2002 and 2005) not 6,781. Replicating the same technique set forth
in Appendix K to FH 2006, this translates into an annual water demand figure of 6,573 acre feet,
not 5,928 and an associated liability of 2,297 acre feet rather than 1,942. However, there are
many other problems with the population-based method adopted by Fort Huachuca and the
USFWS that would put this deficit figure far higher.

14. As set forth in detail by Exhibit B, another problem with the population-based
approach is its failure to account for water use associated with the vast majority of off post
induced economic development on both sides of the border that would not occur but for the
Fort’s presence. In particular, while the population-based approach tallies water used by Fort
Huachuca’s attributable population, it fails to tally water use associated with their expenditures
as they circulate through the regional economy or the direct, indirect, and induced water use
associated with non-personnel expenditures the Fort makes in the local economy on goods and
services (Exhibit B at 6 – 8).

15. Yet another problem with the population-based approach is its failure to capture
significant variations in water use intensity. There is no reason to believe that individuals,
businesses, or institutions whose presence is attributable to Fort Huachuca maintain water use at
the 160 gallon per day rate for incorporated areas or the 118 gallon per day rate for
unincorporated areas assumed by the BA and BO (USFWS 2007 at 116) day after day, year after year regardless of what demographic or socio-economic group they belong to (for individuals) or economic sector they fall into (for businesses and institutions). In fact, water use intensity varies considerably, both through time and with respect to demography, socio-economic status, and economic sector, and a proper model of water demand would account for this variation.

16. Another significant problem is the arbitrary manner in which important population sub-groups were omitted. As explained by Exhibit B, water use associated with tens of thousands of visitors and tourists to Sierra Vista and Fort Huachuca who would not make the trip but for the presence of the Fort was arbitrarily omitted from consideration, as was water use associated with Fort Huachuca’s direct or indirect beneficiaries who may live on the Mexican side of the border (Exhibit B at 9-10).

17. Yet another problem with the population-based approach applied by Fort Huachuca and USFWS is the slew of unwarranted and unjustified assumptions relied upon (Exhibit B at 10 – 13). For example, in calculating per capita water use rates, water used in the agricultural sector was arbitrarily excluded. According to the BO, “agricultural water use in the Sierra Vista Subwatershed is not likely attributable to the presence of Fort Huachuca” (USFWS at 116). To exclude any water use in the agricultural sector implies that not a single member of Fort Huachuca’s attributable population or anyone else who benefits economically from the Fort’s presence consumed a single item of locally produced fruits, vegetables, dairy or meat products – clearly, an erroneous assumption.

18. Economic-based methods are feasible alternatives to the population-based methods employed by Fort Huachuca, USFWS, and CER. Economic based methods tie water deficit liability to the share of economic activity in the region attributable to Fort Huachuca’s
expenditures and overall presence in the subwatershed, and are far more likely to capture all of
the direct, indirect, induced, interrelated, and interdependent effects contemplated by NEPA and
the ESA.

19. Three variations include a model based on Fort Huachuca’s share of gross
regional product, a water intensity model that emphasizes water use by labor market sector, and
an econometric model that links Fort Huachuca’s expenditures to groundwater pumping
activities throughout the subwatershed (Exhibit B at 14-19).

20. All of these models are likely to find a water deficit liability greater than the 54%
assumed by the 2002 BA and BO or far greater than the 18% figure assumed by the 2006 BA
and 2007 BO. In fact, preliminary data suggest that a model based on share of economic activity
may find the Fort’s water deficit liability to be as high as 80%.

21. Pursuant to 28 USC § 1746 I declare under penalty of perjury that the foregoing is
true and correct. Executed this 24th day of August, 2007, at Santa Fe, New Mexico.

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John Talberth