TO:

TO:Mayor Larry Delgado and Santa Fe City Council

PO Box0909
Santa Fe NM 87504-0909
FROM:Zane Spiegel, Member, SFWQTF

SUBJECT:Minority Report #2 of Santa Fe Water Quality Task Force(SFWQTF)

DATE:02/02/13

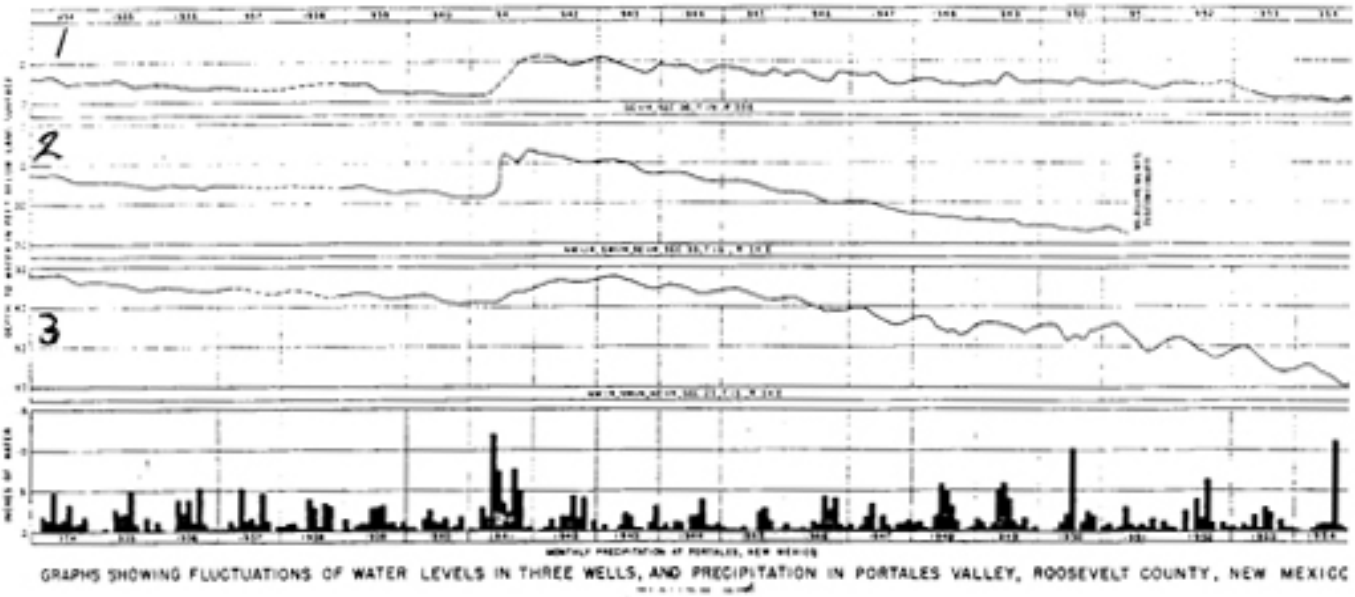
Introduction:This report is presented because the writer attempted to provide input to a Task Force committee during December on certain essential technical matters, but did not receive the committee's drafts in time for correction of (1) many erroneous terms or statements and (2) inadequate coverage of two essential technical matters, (a) the issue of leaching down to ground waters from mesa-top waste sites, and (b) the question of the confusion of the model term "boundary" with the concept of a "barrier", and the lack of true barriers to movement of ground waters east to west, or west to east, under the Rio Grande and its associated inner valley alluvium. Issues 2(a) and 2(b) aboveare discussed in detail by a qualified expert in quantitative hydrology (the writer) in the attached Appendices A and B, respectively, and summarized in the following section "General Comments".Suggestions for proper wording or deletion of some erroneous terms or statements (item (1) above) are presented in the final section, "Specific Comments". Throughout my service on the Task Force, as in my professional work for the NM State Engineer Office and private clients, I have attempted to provide facts and correct concepts to other members who did not have the opportunity or desire to learn them previously, because most other hydrologists who have worked in the Santa Fe area (or any other area in which hydrology reports are written primarily for clients with intent for personal gain, including retention of their jobs) have used concepts and made conclusions that their clients wanted, which is highly unethical, as affirmed by the only ethical hydrologist retained by AMREP for Eldorado in 1969-71.

General Comments:

2(A)Studies and observations reported by LANL scientists on Los Alamos mesa tops as proof of lack of deep recharge from such areas were made over too short a period, without recognizing that long-term records of precipitation and response of deep ground-water levels in areas of New Mexico with similar precipitation and unfavorable rock types prove that deep recharge does occur in such areas, but primarily in years or seasons of unusually heavy precipitation.This information was provided by the writer to the Task Force at two of our regular meetings, the first time as

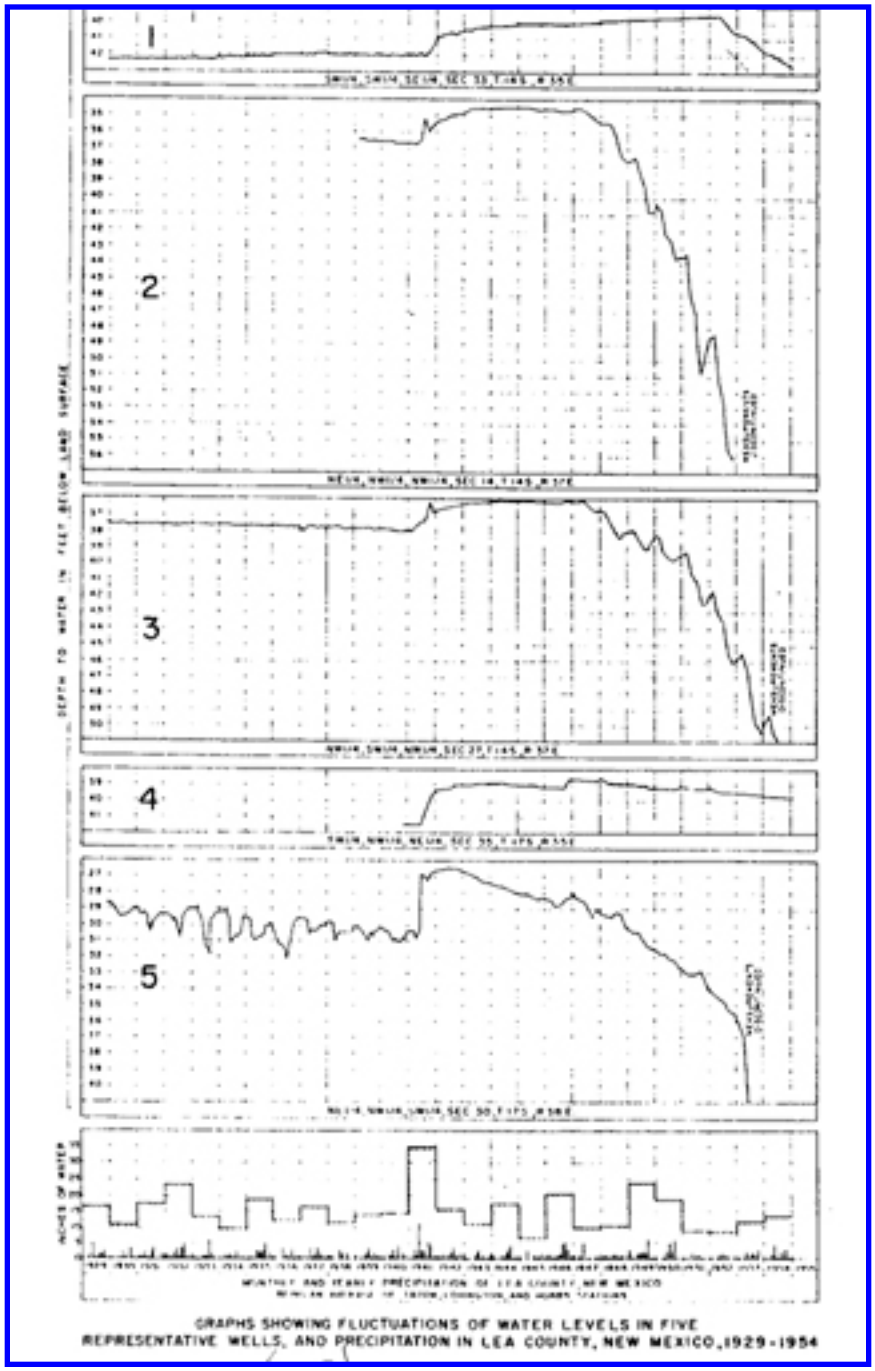
slides, the second in copies of extracts from historical records compiled by the writer in 1963 in a special report commissioned by S.E. Reynolds, State Engineer, under a Federal grant. A copy of these extracts is included with the attached Appendix A, which summarizes independent studies made in relation to a similar problem at other Federal sites of radioactive and chemical waste deposits, where initially recharge was denied, but later affirmed.LANL information provided to the Task Force refers to none of the data supporting my conclusion that deep recharge occurs primarily in wet periods, some of which were public information more than thirty years ago, and confirmed by recent independent works published in1984, 1990, 1998, and 2001 (this last based on an October 2000 public address in Denver COto the most prestigious professional association of geologists in the world, Geological Society of America).

2(B)Appendix B, attached, presents a summary of the special field of mathematics (Boundary Value Problems, BVP) that must be relied on in any modelling of the flow of ground water, emphasizing that the use of the word ”boundary” technically does not usually imply impermeability of aquifer materials, or any other sort of barrier to flow.Proponents of the concept that the Rio Grande is a **barrier to ground water flow and contained dissolved contaminants under the river** cited irrelevant information about the relationship of Buckman wells to the level of the nearby Rio Grande**.All that matters are (1) pumping water levels in the Buckman wellfield or other wells east of the Rio Grande are below the level of the river, (2)the Rio Grande has zero penetration of the deep aquifers, and (3) ground water moves in the direction of lower total hydraulic heads (not pressures alone, and not necessarily “downhill” and/or “downdip”).**Water-level contours of the Espanola Valley aquifer system in 1951, prior to most of the heavy withdrawals of deep ground water, may appear to suggest the existence of a “boundary” surface that is a barrier to ground-water flow, but this is merely the result of water moving to its ultimate natural destination, the inner valley alluvium and related river, before substantial interference by deep wells.



GRAPHS SHOWING FLUCTUATIONS OF WATER LEVELS IN THREE WELLS, AND PRECIPITATION IN PORTALES VALLEY, ROOSEVELT COUNTY, NEW MEXICO

TO:



(Click on Image to see larger version)

Specific comments:

PAGE PAR LINE COMMENTS

123For “20” read “10”.

227After “in” insert “undesirable quantities in”.(

228-10Replace “...the Rio .....flow.” with “plumes of dissolved wastes originating in the Los Alamos area or upstream are greatly diluted upon entering any wells in deep aquifers, by waters entering the wells from other directions.The Rio Grande is not a barrier to deep ground-water flow or waste plumes from any direction because it does not penetrate any of the deep aquifer elements.The river affects deep underground flow only to the extent that it’s water levels (total

hydraulic heads, not pressures) are lower than those in the underlying aquifers, and when artificial withdrawals of water from wells cause great lowering of well water levels, to below river levels, deep ground waters will move toward those wells, and Rio Grande and associated alluvial waters will leak downward toward the deeper aquifer elements.

23AllDelete all because of numerous incorrect terms/concepts, and the correct concepts are stated in the previous comment (2/2/8-10) and in the following:(a) the “water table” is a surface, and cannot be “depleted”--it is aquifer storage that is depleted; (b) there is no“underground void” under the Rio Grande--all pores are filled with water, and underground flow already from west to east already occurs locally because drawdown cones at Buckman, Espanola, and San Ildefonso Puebloalready have deepened to levels below the Rio Grande and former natural water levels in deep aquifers (ground water moves down the gradient--slope--of the aquifer water levels, irrespective of river levels, land forms, or aquifer dips).

Replace by “The aforementioned movements of waste plumes under the Rio Grande would only be unlikely if withdrawals from all deep wells east of the river were substantially reduced. In the next decade or so, as noted above, the risks to (a) the Collector Well and (b) deep wells associated with LANL contaminants are minimized, respectively, by river dilution of shallow alluvial waters, or by radial flow into deep wells. However, in the forseeable long-term future, upstream flows of the Rio Grande cannot be relied upon to provide a firm source of potable water (or dilution of other supplies) for Santa Fe’s continued growth because of the probability that San Juan waters will be depleted by in-basin increases in demand, polluted by mining, agriculture, industry, and municipal waste waters, recycled waters,and future droughts, as well as by the probability of similar events within the Rio Grande basin, plus competition for water by other municipalities, Texas, and Mexico (see Spiegel, 2000, “Apples and Oranges--”, previously submitted to the Task Force).

31 EndInsert “A major cause of this error may be the false assumption that all waters travel at the same velocity.Non-unformity of aquifer permeability, and the more rapid travel of some waters and contained solutes through zones of greater than average permeability, causes one of the phenomena--more rapid than average velocity--known collectively as longitudinal dispersion.”

35endPhrase (or more) missing.

536After “discussed,” insert “as well as to surface-water quality below the mouth of Los Alamos Canyon,”

544After “... wells...” insert “and possible surface diversion at Buckman”.

9#24After “Well” insert comma and “but to much lesser degree to proposed surface diversion at Buckman.”

10#41After “4.” insert “LANL staff believe the following:”

10#5-11After “5.” insert “LANL staff and one Task Force member believe the following:”

10#5-2endInsert “See General Comments above and Spiegel, Appendix A, attached.”

1113-4For “direction.” read “direction, which is likely under conditions of large withdrawals from present and future wells east of the Rio Grande (see AppendixB of Spiegel minority report).”Delete parenthetical sentence.

TO:

112AllDelete all--first 3 sentences are based on false or irrelevant concepts;
Fourth sentence is false:Replace by “The Buckman wellfield drawdown cone has already spread to the east and west physical limits of the Santa Fe Group in Espanola Valley, and far upstream and down, and some pumping levels are already below the level of the nearby Rio Grande., according to data and calculations by the NM State Engineer Office, which uses the information in the administration of the area under the “Aamodt et al.” water rights adjudication.”
1229-14Delete all, for reasons given above (see comments re pages 3, 10, 11).If lines are not deleted, add this comment to the “dissenting view” in paragraph 4.
1324+For “pressure” read “total”.Delete last two sentences in paragraph.
1425For “These three PRSs” read “There are three PRSs that...”
163endAdd “However, if the scour removes or damages a horizontal screen, the intake port would have to be shut off permanently, or the entire Collector shut down while a new intake screen is installed.”
1833, 4After “of” insert “solutes and”; For “Another” read “The same”.
1837After “However,” insert “The surface water has about the same amount of dissolved TOC as the alluvial ground water, which means the potential for health hazard remains--or is increased. The City...”
183EndNo City plan was advanced to cover the dissolved TOC problem.
1938After “formation” insert “of”.
2022For “issue.” read “issue, except on those numerous days when the winds do not “prevail” to the north.”
202endFor “elevates” read “elevated”.
21Pw12endAdd “However, at least one waste site was noted in a swale that received surface drainage in storms and snowmelt events, and probably others exist, leading to transport by other pathways.”