

Comments on Developing a Strategy for Protection of Beneficial Uses of Groundwater in the Central Valley, CA

G. Fred Lee, PhD, PE, DEE & Anne Jones-Lee, PhD

G. Fred Lee & Associates

El Macero, CA

ph: 530-753-9630 fax: 530-753-9956

gfredlee@aol.com  www.gfredlee.com

Topics

- ❖ Need for Groundwater Protection Strategy
- ❖ Suggested Approach

Prepared for CVRWQCB Public Workshop, "Development of a Strategy to Protect the Beneficial Uses of Groundwater in the Central Valley," CVRWQCB, Rancho Cordova, CA, August 24 (2009).

Background to Comments

G. Fred Lee

- Involved in Graduate-Level Teaching, Research, Consulting in Groundwater Quality Protection in Various Areas of US Since Early 1960s
- Became Involved in California Groundwater Quality Protection as Advisor to SWRCB in 1980s as Part of Developing Chapter 15 Regulations for Landfilling of Wastes
- Developed:
 - Lee, G. F. and Jones-Lee, A., "Groundwater Quality Protection Issues," Report of G. Fred Lee & Associates, El Macero, CA, February 2007; Presented in part at CA/NV AWWA Fall Conference, Sacramento, CA, October (2007).
<http://www.gfredlee.com/Groundwater/GWProtectionIssues.pdf>
 - Lee, G. F., and Jones-Lee, A., "Groundwater Quality Protection Issues," Presented in part at CA/NV AWWA Fall Conference, Sacramento, CA, PowerPoint Slides, G. Fred Lee & Associates, El Macero, CA, October (2007).
<http://www.gfredlee.com/Groundwater/GWProtectionIssues-sli.pdf>
 - Report Submitted to CVRWQCB as Part of These Proceedings

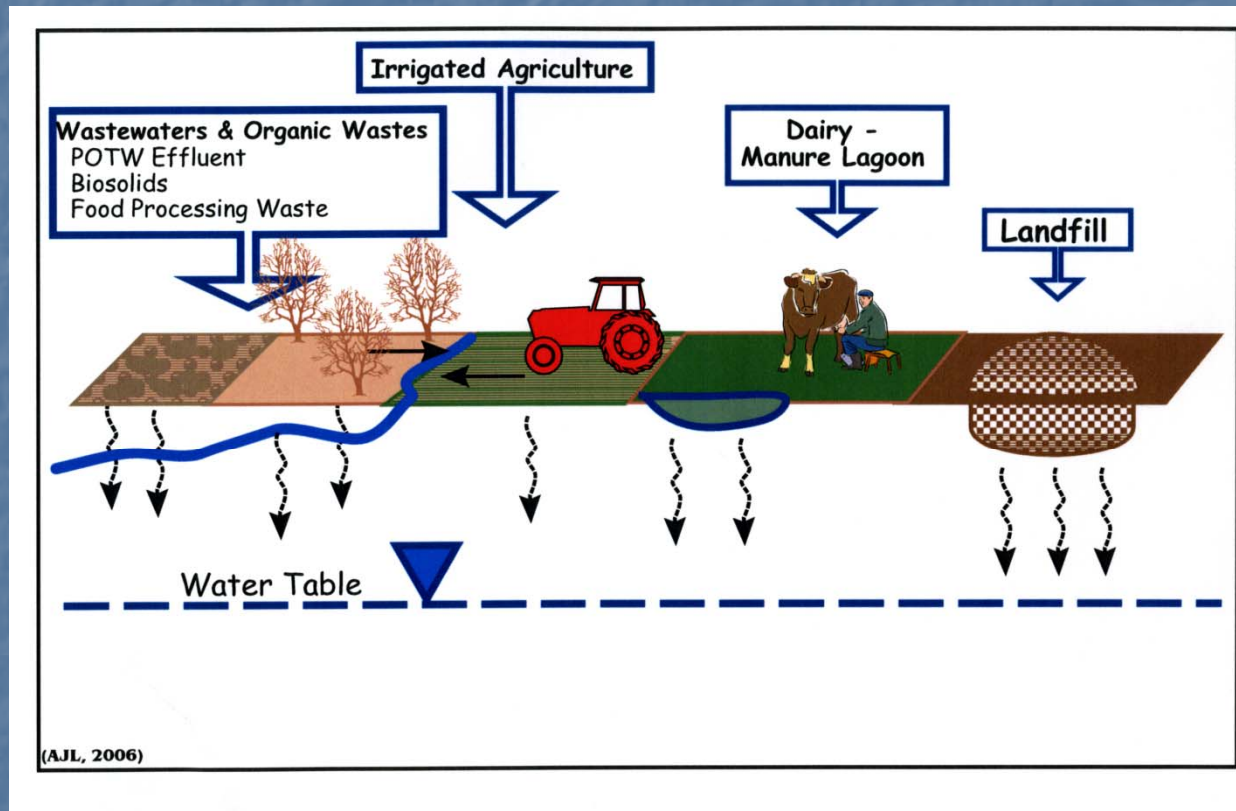
Current Groundwater Protection Activities

G. Fred Lee

- US EPA TAG Advisor to DSCSOC (Public) for the UCD/DOE LEHR Superfund Site Davis, CA
- Impact of Proposed Clinton PCB Landfill in DeWitt County, IL
- Disposal of Hurricane Katrina New Orleans Demolition Wastes
- Impact of Proposed WM Thorhild Landfill Thorhild County, Alberta, Canada
- Impact of Proposed Cortina Landfill in Colusa County, CA
- Adequacy EIR for Proposed US Gypsum Facility on Roberts Island, Port of Stockton, CA
- Advise Sierra Club on Remediation of the Sydney Tar Ponds, Nova Scotia, Canada
- Impact of Proposed Turkey Run Landfill in Meriwether County, GA
- Impact of Proposed Campo Indian Reservation in San Diego County, CA

Information on These & Other Recent Activities Is Available on Request

Groundwater Pollution Situations



Need for Strategy

as Summarized in Lee & Jones-Lee Report

- Widespread Pollution of Groundwater in CA
 - Salts
 - Some Pesticides
 - Landfill Leachate
 - Nitrate
 - VOCs
- Problem: State & Regional Water Boards Have Permitted or Allowed Facilities & Activities on Land That Would Be Expected to Lead to Groundwater Pollution
 - Landfills That Will Only Delay Groundwater Pollution
 - On-Land Disposal of Municipal, Industrial, Commercial Wastes & Wastewaters
 - Failed to Regulate Irrigated Agriculture to Minimize Groundwater Pollution
- Groundwater Pollution Problems Well-Known for Decades; Only Now Beginning to Be Addressed

California Regulatory Requirements

- Porter-Cologne Water Quality Control Act (SWRCB 2006), Division 7, Chapter 1, section 13000, states, *“The Legislature finds and declares that the people of the state have a primary interest in the conservation, control, and utilization of the water resources of the state, and that the quality of all the waters of the state shall be protected for use and enjoyment by the people of the state.”*

http://www.swrcb.ca.gov/water_laws/docs/portercologne.pdf

Regulatory Requirements (cont'd)

- Porter-Cologne Chapter 2, section 13050, paragraph (e) defines “waters of the state” as *“any water, surface or underground, including saline waters, within the boundaries of the state.”*
- *The CVRWQCB (1998) Basin Plan, in Chapter III Water Quality Objectives, on page III-10.00 under the section entitled, “Water Quality Objectives for Ground Waters,” states, “Ground waters shall not contain chemical constituents in concentrations that adversely affect beneficial uses.”*

Irrigated Agriculture

- Among Most Significant Causes of Groundwater Pollution in California
 - Nitrate & Salts
 - Pesticides
 - Although DPR Is Improving Regulation of Pesticides that Have Potential to Pollute Groundwaters
- Groundwater Pollution by Irrigated Agriculture can be Reduced, but Not Eliminated

“DILEMMA: MANAGING GROUND WATER QUALITY AND IRRIGATED AGRICULTURE”

JOHN LETEY

*Department of Soil and Environmental Sciences
University of California, Riverside, CA*

Proceedings of the 19th Biennial Conference on Ground Water, J. J. DeVries, J. Woled, editors. Water Resources Center Report No. 84, University of California, Davis, pp. 97-104, December (1994)

- Provides Good Discussion of Issues of Groundwater Pollution from Irrigated Agriculture
 - Appended to Report

Nitrate Groundwater Pollution Hazard Index

- Developed for Irrigated Agriculture in the Southwest.
- *“To provide information for farmers to voluntarily target resources for management practices that will yield the greatest level of reduced nitrogen contamination potential for groundwater by identifying the fields of highest intrinsic vulnerability.”*
- *“How it Works: The index works with an overlay of soil, crop, and irrigation information. Based on the three components, an overall potential hazard number is assigned and management practices are suggested where necessary.”*
- *Available at:*
http://lib.berkeley.edu/WRCA/WRC/wqp_hazard.html.

Groundwater Monitoring Issues

- Ideal: Monitor Groundwater Near Source to Detect Potential Pollution Before Major Pollution Occurs
- Vadose Zone (Unsaturated Part of Aquifer) Monitoring
 - Early Warning of Potential Pollution
 - Must Be Done Correctly
 - Can Indicate Whether Intercepted Percolating Water Contains High Concentrations of Potential Pollutants
 - Data Interpretation: Must Also Know Water Flux to Determine Mass Flux Rate of Pollutant(s)
 - Not Easily Accomplished – See Report for Guidance

Groundwater Monitoring Issues (cont'd)

- Saturated Groundwater Quality Monitoring
 - Monitoring of Typical Production Wells Near Pollutant Source
 - Not Reliable for Detecting Pollution Before Widespread Pollution Occurs
 - Well Location & Screen Length Issues
 - Need Specific Monitoring Wells Established to Sample Just Below Water Table Just Up- and Down-gradient of Pollutant Source
 - Considerable Seasonal Effects of Variable Water-Table Depth

Dairy and CAFO Wastes

- Wastewater & Manure Lagoons Using Clay &/or Plastic Sheeting (including single-composite liners) Not Reliable for Protection of Groundwater from Pollution by Nitrate & Salts
 - Liners Will Deteriorate & Leak
 - Cannot Reliably Monitor Groundwater for Initial Liner Leakage
 - Should Use Double-Composite Liners with Leak Detection System between the Composite Liners to Detect Upper Composite Liner Failure

Importance of Protecting Groundwater Quality

- Significant Difference in Pollution of Surface Water & Groundwater
 - Surface Waters
 - Usually Rapid Dilution
 - Photo-Decay & Greater Biological Activity
 - Rapid Recovery When Input of Pollutant Controlled
 - Groundwater
 - Limited Dilution
 - Less Bio-Activity
 - Once Polluted, Polluted Aquifer Area Likely Not Usable Again for Domestic Water Supply

Issues in Development of Groundwater Protection Strategy

- Develop & Adequately Fund Comprehensive Groundwater Quality Monitoring Program to Define Whether Past Permitted Land Activities Are Causing Groundwater Pollution
- Consider, as Part of Permitting Land Activities That Have Potential to Cause Groundwater Pollution (Especially Waste Disposal & Management Activities):
 - Are There Constituents in the Wastes & Wastewaters from Activity/Facility That Can Cause Groundwater Pollution?
 - Will Facility/Area Being Permitted Incorporate Adequate Groundwater Monitoring to Reliably Detect Incipient Groundwater Pollution?
- Require, as Part of Irrigated Agriculture Waiver Program, Representative Parties to Determine If Agricultural Activities at Certain Types of Locations Are Causing Groundwater Pollution Now & in the Future

Information on These & Related Issues Available in Lee & Jones-Lee Reports

Further Information
Consult Website of
Drs. G. Fred Lee and Anne Jones-Lee



<http://www.gfredlee.com>