# Use of Activated Carbon Derived from Almond Shells to Filter Municipal Drinking Water Supplies

**Project Leader: Craig Ledbetter**
USDA/ARS, 9611 S. Riverbend Ave., Parlier, CA 96348
(559) 596-2817, craig.ledbetter@ars.usda.gov

## PROJECT SUMMARY

### Objectives:

- Ascertain the effectiveness of using activated carbon made from almond shells to remove various concentrations of Dibromochloro-propane (DBCP), formerly a widely used soil fumigant, from municipal water systems.
- Compare the effectiveness of almond shell-based activated carbon with that of the currently used standard form of activated carbon in terms of their ability to meet both USEPA and local contamination-reduction requirements.

### Background:

Alternative and productive uses of almond by-products such as shells would allow further diversification of business options for the almond industry. This project is a pilot study follow-up to a lab study showing that activated carbons can be made as physically strong as coal-based carbons from either hard or soft-shell almonds, and that 'varietal' activated carbons made from either 'Nonpareil' or 'Padre' shells removed water contaminants such as DBCP equally well compared to Calgon F-300 coal-based carbon.

Decades have passed since DBCP was last used in California, but the compound still persists in San Joaquin Valley groundwater. Activated carbon is considered a best technology treatment technique by the EPA for DBCP removal from water. In the City of Fresno alone, 30+ activated carbon filtration sites account for the utilization of nearly 700,000 pounds of activated carbon. One of the DBCP-contaminated wells operated by the Fresno Dept. of Public Utilities' Water Division was utilized in this study to compare the performance of activated carbon prepared from almond shells with coal-based Calgon F-300 activated carbon.

### Discussion:

Pilot-scale columns of almond shell and F-300 activated carbons were installed at a DBCP-contaminated well site and challenged continuously over a six month period with flow rates matching full-scale filtration vessels. Flow rate changes during the operation period were insignificant, demonstrating the physical stability of the almond shell carbon under standard operating conditions.

After 13 weeks of continuous operation, DBCP was first detected in almond shell filter effluent. The filter remained operational for another 90 days prior to the effluent reaching ½ the DBCP inlet concentration, at which time the study ended. Actual column life was very close to its calculated lifespan based on lab analyses. However, due to the lower density of carbon in the activated carbon derived from almond shells, the columns did not remain effective as long as the coal-based activated carbon. These results demonstrate the effectiveness of almond shell-based carbon in municipal water filtration. Adoption of this technology could lead to an additional revenue source for almond shellers.

---

**Project Cooperators:** K. Thomas Klasson, USDA/ARS, New Orleans; Bob Little, Fresno Department of Public Utilities, Water Division

**For More Details, Visit**

- Poster location 47, Exhibit Hall A & B during conference; or on the web (after January 2013) at www.almondboard.com/researchreports
- 2011.2012 Annual Report CD (10.WATER5.Ledbetter); or on the web (after January 2013) www.almondboard.com/researchreports