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ARSENIC IN CHURCHILL COUNTY, NEVADA DOMESTIC WATER SUPPLIES

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NON TECHNICAL SUMMARY: In Churchill County, Nevada, arsenic concentrations in shallow, domestic wells exceed the standards set to protect public health in about 85% of groundwater sources sampled. The Churchill County office of University of Nevada Cooperative Extension is developing a comprehensive response to community concerns and inquiries through a senior volunteer program, Nevada G.O.L.D. (Guarding Our Local Drinking Water). In order to benefit the largest number of people in Churchill County, the G.O.L.D. volunteers must have reliable information about (a) how many domestic well owners actually consume water from the wells, (b) chemical quality of tap water, as opposed to water pumped from naturally contaminated aquifers and (c) socioeconomic and educational factors that are important in making choices about water consumption. The purposes of this project are: 1) Carry out exposure and educational needs assessments among Churchill County residents, 2) Assess the mechanisms and spatial and temporal distributions of As(III) associated with the shallow alluvial aquifer system used for private domestic water supply in Churchill County, and 3) Provide information useful for understanding the significance of exposure and selection of appropriate treatment devices or alternative supplies.

OBJECTIVES: The project objectives are to: 1. carry out exposure and educational needs assessment related to occurrence of arsenic in private wells in Churchill County, Nevada, 2. assess the mechanisms and spatial and temporal distributions of arsenite associated with the shallow alluvial aquifer system and, 3. provide information to private domestic well owners and local government about the significance of exposure and selection of appropriate treatment devices or alternative supplies

APPROACH: This three-year effort will focus on research and public education about occurrence of arsenic in drinking water supplies from private, domestic wells. Tasks include: a). Characterizing human exposure to arsenic and arsenite (As (III)) in tap water from shallow wells used for domestic water supplies in Churchill County, using a water consumption habits survey and tap water analysis, b). Characterizing fluctuations in total arsenic and arsenite associated with irrigation water delivery and application, c). Organizing workshops and developing information about water quality issues, and d). Establishing a help line and water treatment learning center in University of Nevada's Churchill County Cooperative Extension office. The proposed activities will help focus extension efforts related to domestic water quality and health protection. Information produced by this project will be provided to all counties in Nevada through existing web sites and annual training carried out for county-based extension educators by the investigators. Anticipated products include county level characterization of actual exposure to arsenic from private water supplies in Churchill County, laboratory and field characterization of temporal fluctuations in As(III) concentrations in shallow wells, laboratory characterization of simulated microscale processes that affect release of arsenic from sediments, printed materials related to domestic water quality, workshops, a dedicated help line to promote consistency in responses to questions about water quality in Churchill County, a learning center for information about domestic water treatment devices and web sites with information about water quality issues.

CRIS NUMBER: 0193336 **SUBFILE:** CRIS
PROJECT NUMBER: NEV052LB **SPONSOR AGENCY:** NIFA
PROJECT TYPE: OTHER GRANTS **PROJECT STATUS:** TERMINATED **MULTI-STATE PROJECT NUMBER:** (N/A)
START DATE: Sep 15, 2002 **TERMINATION DATE:** Sep 14, 2007

GRANT PROGRAM: IP-EWQI/WATER QUALITY
GRANT PROGRAM AREA: Integrated Programs

CLASSIFICATION

Knowledge Area *(KA)*	Subject *(S)*	Science *(F)*	Objective *(G)*	Percent
111	0210	2050	6.1	10%
723	0210	2050	2.3	90%

CLASSIFICATION HEADINGS
KA723 - Hazards to Human Health and Safety
KA111 - Conservation and Efficient Use of Water
S0210 - Water resources
F2050 - Hydrology
G2.3 - Provide Risk Management and Financial Tools
G6.1 - Ensure Clean Water and Air

RESEARCH EFFORT CATEGORIES

BASIC	10%
APPLIED	90%
DEVELOPMENTAL	(N/A)%

KEYWORDS: water quality; drinking water; human health; education; arsenic; water pollution; water supply; exposure; water conservation; aquifers; well water; spatial distribution; temporal distribution; consumer surveys; water consumption; water analysis; public health; social economics

PROGRESS: Sep 15, 2002 TO Sep 14, 2007
OUTPUTS: This project supported 4 MS thesis projects (3 completed, 1 continuing), produced 8 Extension Fact Sheets, produced an interactive web site for interpreting water quality test results for domestic wells and produced 6 peer-reviewed journal articles, with 3 published and 3 in draft form. It also supported a full-time water quality specialist and helped to establish an agreement with Nevada's State Health Laboratory to transport and process water samples from rural communities. PARTICIPANTS: R. Seiler. U.S. Geological Survey. L. Castro. University of Hawaii Cooperative Extension. TARGET AUDIENCES: Private well owners in rural areas of Nevada; the web-based water quality test interpretation tool is being adapted for use in Hawaii and the Pacific Islands and Trust Territories. PROJECT MODIFICATIONS: The project received two no-cost extensions of one year to complete work.

IMPACT: 2002-09-15 TO 2007-09-14 The fact sheets are distributed by the Nevada State Health Laboratory to accompany testing results. The web site is used by people throughout the world. Information from the fact sheets related to shock chlorination is widely applied. The level of awareness about arsenic in water supplies has been substantially increased, in part because of our contribution to several ongoing investigations of water quality in Churchill County.

PUBLICATION INFORMATION: 2002-09-15 TO 2007-09-14
Walker, M., R. Seiler, M. Meinert. 2008. Effectiveness of household reverse osmosis systems in a Western U.S. region with high arsenic in groundwater. Science of the Total Environment (in press)

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