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Water Quality Information Center

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1. **Analytical modelling of pesticide transport from the soil surface to a drinking water well.**
   Beltman, W. H. J., Boesten, J. J. T. I., and Zee, S. E. A. T. M. van der.
   J hydrol. 169: 1/4 209-228. (July 1995).
   NAL Call #: 292.8-J82
   Descriptors: pesticides- leaching- water-flow drinking-water wells- water-quality groundwater-pollution mathematical-models
   Abstract: Pesticide transport through the unsaturated zone was modelled with an analytical solution of the convection-dispersion equation assuming steady water flow, a linear sorption isotherm and first-order transtormation kinetics. Pesticide behaviour in the saturated zone was described with an analytical solution of the mass balance equation for

a cylindrical flow system assuming steady flow, no dispersion, linear sorption and first-order transformation. This simplified model for the unsatu rated-saturated soil system was developed to identify the processes and parameters with the greatest impact on the fraction of applied pesticide reaching a drinking water well. Leaching from the unsaturated zone was highly sensitive to the parameters desc ribing travel time and transformation rate.

2. **Application of petroleum geophysical well logging and sampling techniques for evaluating aquifer characteristics.**
   Temples, T. J. and Waddell, M. G.
   Ground-water. Columbus, Ohio : Ground Water Pub. Co. May/June 1996. v 34 (3) p. 523-531.
   NAL Call #: TD403.G7
   Descriptors: aquifers- wells- sampling- groundwater- data-collection geology- analytical-methods porosity- permeability- saturated-hydraulic-conductivity water-quality south-carolina transmissivity-
   Abstract: The Hilton Head Island Test Well #1 was drilled to a depth of 3833 feet to evaluate the upper Cretaceous section as a potential ground-water source for Hilton Head Island, South Carolina. The initial plan was to analyze continuous co nventional cores. The interval to be analyzed extended from the top of the Eocene to the base of the Cretaceous (approximately 3500 feet). However, due the high cost ($400,000), the decision was made to evaluate aquifer potential using advanced geophysica l logs with sidewall cores for calibration. The logging suite consisted of a dual induction resistivity, spontaneous potential, compensated neutron, density log, gamma ray, spectral gamma, multipole array acoustic log, caliper, high resolution dipmeter, a nd a circumferential borehole imaging log. In addition to the wireline logs, 239 sidewall cores and 12 Formation Multi-Test samples were obtained. The log, sidewall core, and FMT information were integrated into an interpretive package using computer gene rated logs and simple spreadsheets to calculate aquifer properties. Porosity, hydraulic conductivity, transmissivity, and lithogic data derived from this integrated analysis were then used to select screen zones. Water quality in relation to drinking wate r standards exceeded expectations. The information obtained from the integrated program allowed estimates to be made about the well's productivity without the expense of conventional coring, flow testing, and completion of the well.
3. **Assessing the ground water quality characteristics of the Hamlet of Carseland.**
   Saint Fort, R.
   J Environ Sci Health Part A Environ Sci Eng. A28: 5 995-1003. (1993).
   NAL Call #: TD172.J6
   Descriptors: drinking-water groundwater- water-quality ions- geochemistry- public-health risk- alberta- maximum-acceptable-limits.
4. **Chemical composition of hard- and softrock groundwaters from central Norway with special consideration of fluoride and Norwegian drinking water limits.**
   Saether, O. M., Reimann, C., Hilmo, B. O., and Taushani, E.
   Environ geol 26: 3 147-156. (Oct 1995).
   NAL Call #: QE1.E5
   Descriptors: groundwater- aquifers- water-quality fluoride- anions- cations- alluvium-glacial-deposits quaternary-deposits wells- drinking-water norway- crystalline-rocks

metamorphic-rocks

Abstract: Groundwaters from crystalline and metamorphic rocks (hardrocks) and from Quaternary deposits, i.e., alluvial and glacial deposits (softrocks) from the counties of Nord-Trondelag and Sor-Trondelag were analyzed for major and minor ele ments and ions including fluoride. The median concentration of F- in water from the hardrock aquifers is 0.28 mg/1 (14.7 microequivalents/l) in contrast to water from softrock aquifers in which it is found to be 0.05 mg/1 (2.6 microequivalents/l). More im portantly, ca. 15% of the locations where water was abstracted from hardrock wells contain 1.5 mg/l (78.9 microequivalents/l) F- or more. Thus, 15% of all hardrock wells returned F- results that are at or above the maximum recommended value for drinking w ater. Of the softrock wells, none are above 1 mg/l. Geologists would normally expect higher F- contents in groundwaters derived from acid rocks, e.g., in granitic or gneissic areas. When comparing the host lithology with the observed F- contents, however, no clear relationship between F- content and lithology is visible. The highest observed F- values actually occur in gneissic host rocks. However, wells drilled in amphibolites/greenstones, mica schists, calcareous rocks, and sedimentary rocks all returne d some analytical results above 1.5 mg/l F-. These results suggest that all hardrock wells drilled should be tested for F- and the users informed about the results and advised to take any necessary precautions.

5. **Clean well water? Not always.**
Henderson, Z. P.
Hum ecol forum. 23: 3 5-7. (Summer 1995).
NAL Call #: HV1.H8
Descriptors: drinking-water wells- septic-tanks microbial-contamination toxic-substances water-management site-factors leaching- soil-types-structural soil-types-textural waste-water waste-water-treatment monitoring- education- water-quality new-y ork surveys-

6. **Cooperative Extension System's extension educational materials : drinking water quality : well water testing : bibliography. Extension educational materials.**
USDA Extension Service Water Quality National Initiative Team.
[Washington, D.C.?] : Water Quality Initiative Team, Extension Service, U.S. Dept. of Agriculture, [1990] 46 p.
NAL Call #: aZ7935.C64--1990
Descriptors: Drinking-water-Contamination-Bibliography Groundwater-Sampling-Bibliography Water-quality-Bibliography

7. **Cotton production on the Macon Ridge: how to reduce nitrate leached into drinking water.**
Walthall, P. M., Brady, W. D., and Hutchinson, R. L.
LA agric. 39: 2 5-9. (Spring 1996).
NAL Call #: 100-L939
Descriptors: gossypium-hirsutum fields- nitrate-fertilizers nitrate-nitrogen leaching- groundwater-pollution pollution-control control-methods split-dressings cover-crops aquifers- drinking-water water-quality climatic-factors computer-simulation louisiana-

8. **Defining water quality.**
Adams, E. B.
Ext-Bull-Wash-State-Univ-Coop-Ext-Serv. Pullman, Wash. : The Service. Nov 1992. (1721) 8 p.

NAL Call #: 275.29-W27P
Descriptors: water-quality surface-water groundwater- drinking-water irrigation-water regulations- quality-standards contaminants- washington-

9. **Determination of a metabolite of the herbicide pyridate in drinking water and groundwater using high-performance liquid chromatography with amperometric detection.**
Pachinger, A., Eisner, E., Begutter, H., and Klus, H.
J Chromatogr. 558: 2 369-373. (Oct 11, 1991).
NAL Call #: 475-J824
Descriptors: water-quality drinking-water groundwater- water-pollution pyridate-metabolites- herbicide-residues hplc- determination-

10. **Development of a data base of community water-supply wells in New Jersey and a method to evaluate their sensitivity to contamination.**
Storck, Donald A., Isaacs, Kalman N., Vowinkel, Eric F., and New Jersey. Dept. of Environmental Protection. Geological Survey (U.S.).
West Trenton, N.J. : U.S. Dept. of the Interior, USGS ; Denver, CO : Branch of Information Services [distributor], 1997. vi, 53 p.
NAL Call #: GB701.W375--no.96-4132
Descriptors: New-Jersey-Bureau-of-Safe-Drinking-Water-Databases Water-quality-management-New-Jersey-Databases. Water-supply-New-Jersey-Measurement Groundwater-New-Jersey-Quality-Mathematical-models

11. **Domestic well water quality in rural Nebraska: focus on nitrate-nitrogen, pesticides, and coliform bacteria.**
Gosselin, D. C., Headrick, J., Tremblay, R., Chen, X. H., and Summerside, S.
Ground water monit remediat. 17: 2 77-87. (Spring 1997).
NAL Call #: GB1001.G76
Descriptors: drinking-water wells- groundwater- groundwater-pollution water-quality contaminants- nitrate-nitrogen pesticides- coliform-bacteria rural-areas nebraska-drinking-water-quality
Abstract: For this statewide assessment, 1808 wells were sampled and a data base compiled that included water-quality data (NO3(-1)-N, pesticides, coliform bacteria) and site-specific data collected at each location. Domestic, rural water qual ity in Nebraska varies substantially from one ground water region to another and is a function of well characteristics, distances to potential contamination sources, and hydrogeologic and site characteristics. The percentage of wells exceeding the 10 ppm MCL for NO3(-1)-N ranged from 3 to 39 percent, depending on the ground water region. This large range of values indicates the inadequacy of stating that an average of 19 percent of domestic wells in Nebraska are contaminated by nitrates. This statistic do es not describe the nature, extent, and variability of the contamination problem. Depending on the ground water region, the degree of nitrate contamination in rural domestic drinking-water wells has remained generally unchanged or has only slightly increa sed since the last statewide assessment conducted from 1985 to 1989. Bacterial contamination has either remained the same or has decreased. The percentage of wells affected by bacteria ranged from 8 to 26 percent, depending on the ground water region.

12. **Drinking recycled wastewater: can groundwater recharge safely address the drinking-water needs of rapidly growing urban areas.**

Pinholster, G.
Environ sci technol. 29: 4 174A-179A. (Apr 1995).
NAL Call #: TD420.A1E5
Descriptors: groundwater-recharge water-reuse aquifers- waste-water water-quality drinking-water

13. **Drinking water and health.**
Fundingsland, S. and Lundstrom, D.
NDSU-Ext-Serv-Publ-North-Dakota-State-Univ. Fargo, N.D. : The University. June 1988. (HE-429) 6 p.
NAL Call #: S544.3.N9C46
Descriptors: drinking-water water-quality water-intake fluoride- bacteria- nitrate- sulfate- lead- water-hardness groundwater-pollution pesticides- risk- contamination- north-dakota

14. **Drinking water contamination: understanding the risks.**
Webendorfer, B. and Jackson, G.
Publ-Univ-Wis-Coop-Ext-Serv. Madison, Wis. : The Service. 1989. (G3339) 6 p.
NAL Call #: DNAL S544.3.W6W53
Descriptors: drinking-water water-pollution water-quality pesticide-residues risk- wells- wisconsin-

15. **Drinking water in Churchill County.**
Reid, M. E.
NDSU-Ext-Serv-Publ-North-Dakota-State-Univ. Fargo, ND: The University. 1992. 4 p.
NAL Call #: S544.3.N9C46
Descriptors: drinking-water aquifers- water-quality wells- quality-standards nevada- churchill-county,-nevada

16. **Drinking water testing.**
Norris, P. E., Storm, D. E., Allen, E. R., and Smolen, M. D.
OSU-Ext-Facts-Coop-Ext-Serv-Okla-State-Univ. Stillwater, Okla. : The Service. Nov 1991. (878) 4 p.
NAL Call #: S544.3.O5O5
Descriptors: drinking-water testing- water-quality water-supply wells- oklahoma-

17. **Drinking water testing for private well owners.**
Lewis, S.
Fact-Sheet-Coll-Agric-Univ-Nev-Reno-Nev-Coop-Ext. [Reno, Nev.] : The College. Sept 1992. (92-30) 4 p.
NAL Call #: S544.3.N3C66
Descriptors: drinking-water wells- testing- water-quality contamination- coliform- bacteria.

18. **The effect of watershed, reservoir volume, and rainfall on nitrate levels in surface drinking water supplies.**
Shamblen, R. G. and Binder, D. M.
J soil water conserv. 51: 6 457-461. (Nov/Dec 1996).
NAL Call #: 56.8-J822
Descriptors: surface-water drinking-water water-supply water-quality nitrate- contamination- water-pollution nitrate-nitrogen concentration- temporal-variation catchment-hydrology rain- reservoirs- volume- agricultural-land land-management ohio- p ollutant-load

19. **Effects of agriculture on ground-water quality in five regions of the United States.**
Hamilton, P. A. and Helsel, D. R.
Ground-water. Columbus, Ohio : Ground Water Pub. Co. Mar/Apr 1995. v. 33 (2) p. 217-226.
NAL Call #: TD403.G7
Descriptors: groundwater-pollution nitrogen-fertilizers animal-manures nitrate- water-quality groundwater- aquifers- irrigated-conditions irrigated-sites delaware- maryland- virginia- new-york kansas- nebraska- connecticut- delmarva-peninsula surf icial-aquifers
Abstract: Water-quality conditions in surficial unconsolidated aquifers were assessed in five agricultural regions in the United States. The assessment covers the Delmarva Peninsula, and parts of Long Island, Connecticut, Kansas, and Nebraska, and is based on water-quality and ancillary data collected during the 1980s. Concentrations of nitrate in ground water in these areas have increased because of applications of commercial fertilizers and manure. Nitrate concentrations exceed the maximum c ontaminant level (MCL) for drinking water of 10 milligrams per liter as nitrogen established by the U.S. Environmental Protection Agency in 12 to 46 percent of the wells sampled in the agricultural regions. Concentrations of nitrate are elevated within th e upper 100 to 200 feet of the surficial aquifers. Concentrations of nitrate are greatest in areas that are heavily irrigated or areas that are underlain by well-drained sediments; more fertilizer is typically applied on land with well-drained sediments t han on poorly drained sediments because well-drained sediments have a low organic-matter content and low moisture capacity. Concentrations of other inorganic constituents related to agriculture, such as potassium and chloride from potash fertilizers, and calcium and magnesium from liming, also are significantly elevated in ground water beneath the agricultural areas.

20. **Effects of artificial recharge on ground water quality and aquifer storage recovery.**
Ma, L. and Spalding, R. F.
J Am Water Resour Assoc. 33: 3 561-572. (June 1997).
NAL Call #: GB651.W315
Descriptors: groundwater- aquifers- groundwater-recharge groundwater-pollution water-quality pollutants- nitrates- nitrate-nitrogen atrazine- water-table infiltration- nebraska- artificial-groundwater-recharge
Abstract: Ground water nitrate contamination and water level decline are common concern in Nebraska. Effects of artificial recharge on ground water quality and aquifer storage recovery (ASR) were studied with spreading basins constructed in th e highly agricultural region of the Central Platte, Nebraska. A total of 1.10 million m3 of Platte River water recharged the aquifer through 5000 m2 of the recharge basins during 1992, 1993, and 1994. This is equivalent to the quantity needed to completel y displace the ground water beneath 34 ha of the local primary aquifer with 13 m thickness and 0.26 porosity. Ground water atrazine concentrations at the site decreased from 2 to 0.2 mg L-1 due to recharge. Both NO3-N and atrazine contamination dramatical ly improved from concentrations exceeding the maximum contaminant levels to those of drinking water quality. The water table at the site rose rapidly in response to recharge during the early stage then leveled off as infiltration rates declined.

21. **Establishing and optimizing a national database for quality of groundwater and drinking water.**
Platen, F. von

Water supply. 12: 1/2 SS8-10-SS8/13. (1994).
NAL Call #: TD201.W346
Descriptors: water-quality groundwater- drinking-water databases- denmark-

22. **Evaluation of coliforms as indicators of water quality in India.**
Ramteke, P. W., Bhattacharjee, J. W., Pathak, S. P., and Kalra, N.
J Appl Bacteriol. 72: 4 352-356. (Apr 1992).
NAL Call #: 448.39-SO12
Descriptors: drinking-water fecal-coliforms strains- heat-tolerance groundwater- surface-water wells- water-quality coliform-count indicators- tropical-climate rural-areas jammu-and-kashmir sikkim- himachal-pradesh uttar-pradesh meghalaya- mizoram - tripura- west-bengal maharashtra- piped-water-supply thermotolerant-coliform-strains
Abstract: The total and thermotolerant coliform counts in rural drinking water derived from ground water, piped supplies and surface water are reported for a number of areas in India. To evaluate these counts as indicators of recent faecal con tamination the total coliforms and thermotolerant coliforms isolated have been identified. Thermotolerant Escherichia coli formed 11.7% of the total coliforms and 75.1% of the thermotolerant coliforms. Citrobacter sp. (20.4%) and Klebsiella sp. (50.9%) we re the other common total coliforms isolated and, among the thermotolerant coliforms, Klebsiella sp. (16.4%) was the only other organism frequently encountered. The total coliform counts were significantly correlated with water temperature. The applicabil ity in tropical areas of standards developed for temperate climates is discussed.

23. **Evaluation of ground-water contamination from nonpoint sources: a case study.**
Brink, C. van den and Zaadnoordijk, W. J.
Ground-water. Columbus, Ohio : Ground Water Pub. Co. May/June 1995. v. 33 (3) p. 356-365.
NAL Call #: TD403.G7
Descriptors: groundwater-pollution pollutants- contaminants- nitrate- leaching- computer-analysis computer-software computer-simulation simulation-models groundwater-flow geographical-information-systems water-quality groundwater-extraction wells- groundwater- hungary- shallow-groundwater flunit-program nitron-program fluzo-program arclinfo-program welcon-program triwaco-program nonpoint-source-pollution
Abstract: In many countries a substantial part of the drinking-water supply comes from subsurface-water resources. During the last several decades an increasing extent of diffuse pollution has endangered these water resources. Knowledge of the changes in ground-water quality is necessary in order to know if, and to what extent, ground-water quality is endangered. Changes in ground-water quality can be predicted by means of models describing both the ground-water flow and the transport of conta minants. A Geographic Information System is an efficient tool to handle the storage and manipulation of the large amount of data needed for the description of diffuse pollution. A methodology to predict changes in ground-water quality, which is called FLU NIT, has been built around the programs FLUZO, NITRON, ARC/INFO, dBASE, and WELCON, and the ground-water flow package TRIWACO. The method runs on a PC (with 386 processor). The system has been applied to a well field on Csepel Sziget (near Budapest, Hunga ry). The purpose was not so much the prediction of the ground-water quality, but

much more the evaluation of ground-water protection strategies based on risk analysis and effectivity of possible measures.

24. **Factors related to nitrate-nitrogen contamination of Ohio farm water wells.**
Rausch, J. N., Hitzhusen, F. J., Forster, D. L., and Elliot, W. J.
Econ-sociol-occas-pap. Columbus : Ohio State University, Dept. of Agricultural Economics and Rural Sociology. June 1992. (1953) 12 p.
NAL Call #: HD1411.O3
Descriptors: drinking-water water-quality wells- water-pollution nitrate- nitrogen- factor-analysis ohio-

25. **Farmstead assessment for whole farm water quality protection.**
Jackson, G. W. and Anderson, J. L.
Agricultural research to protect water quality proceedings of the conference February 21-24, 1993 Minneapolis, Minnesota, USA /. Ankeny, IA : The Society, [1993]. p. 517-519.
NAL Call #: TD427.A35A49-1993
Descriptors: groundwater- wells- drinking-water water-quality farms- risk- assessment- educational-programs educational-planning plan-implementation-and-evaluation wisconsin- minnesota- farmstead-assessment-program-farm*a*syst well-water.

26. **Florida's ground water quality monitoring program : background hydrogeochemistry.**
Maddox, Gary. and Florida Geological Survey. Florida. Bureau of Drinking Water and Ground Water Resources. Florida. Division of Resource Management.
Tallahassee, [Fla.] : Published for the Florida Geological Survey, 1992. 1 atlas.
NAL Call #: GB1025.F6F6--1992-Fo
Descriptors: Groundwater-Florida-Maps Hydrogeology-Florida Water-quality-Florida-Measurement Water-quality-monitoring-stations-Florida

27. **Good wells for safe water.**
Glanville, T.
PM-Iowa-State-Univ-Coop-Ext-Serv. Ames, Iowa : Iowa State University, Cooperative Extension Service. Mar 1993. (840,rev.) 4 p.
NAL Call #: 275.29-IO9PA
Descriptors: wells- safety- construction- water-quality drinking-water water-systems well-drainage regulations- iowa-

28. **Ground-water quality and flow in a shallow glaciofluvial aquifer impacted by agricultural contamination.**
Kehew, A. E., Straw, W. T., Steinmann, W. K., Barrese, P. G., Passarella, G., and Peng, W. S.
Ground-water. Columbus, Ohio : Ground Water Pub. Co. May/June 1996. v 34 (3) p. 491-500.
NAL Call #: TD403.G7
Descriptors: aquifers- groundwater-pollution glacial-deposits nitrate- triticum- fallout- water-quality calcite- iron- groundwater-recharge lakes- wetlands- groundwater-flow fluvioglacial-soils michigan- nonpoint-source-pollution glaciofluvial-dep osits
Abstract: The Prairie Ronde fan, a discrete glaciofluvial deposit in southwestern Michigan, contains a productive but highly vulnerable unconfined aquifer used for irrigation, municipal, and domestic supply. A comprehensive hydrogeological stu dy of

the aquifer delineated shallow, local flow systems that interact with ponds and wetlands on the fan surface, overlying a deeper intermediate/regional flow system extending to the base of the glacial drift. Ground water within the shallow flow system s contains tritium concentrations indicative of a post-bomb age and is heavily impacted by nonpoint source combination. Nitrate commonly exceeds drinking water standards in the shallow flow system. Although no continuous physical barrier separates the two flow systems, the deeper flow system is generally lacking in tritium as well as nonpoint source contaminants derived from surface land uses. High capacity pumping from the deeper flow system, however, will likely draw contaminants downward from the shall ow flow system.

29. **Groundwater: a source of Alaska's drinking water.**
Publ-Univ-Alaska-Coop-Ext-Serv. Fairbanks, Alaska : The Service. Oct 1991. (100G-00948) 2 p.
NAL Call #: 275.29-AL13P
Descriptors: groundwater- drinking-water water-supply water-quality alaska-

30. **Groundwater contamination by ricefield pesticides and some influencing factors.**
Castaneda, A. R. and Bhuiyan, S. I.
J environ sci health Part A, Environ sci eng toxic hazard substance control. A31: 1 83-99. (1996).
NAL Call #: TD172.J6
Descriptors: groundwater-pollution drinking-water water-quality

31. **Groundwater quality near two cattle feedlots in Texas high plains: a case study.**
Sweeten, J. M., Marek, T. H., and McReynolds, D.
Appl eng agric. 11: 6 845-850. (Nov 1995).
NAL Call #: S671.A66
Descriptors: groundwater- water-quality contamination- determination- cattle-feeding feedlots- environmental-impact aquifers- nitrate-nitrogen ammonia- nitrites- nitrogen-content electrical-conductance alkalinity- phosphorus- potassium- chloride- sodium- texas-
Abstract: A groundwater sampling study was conducted at two cattle feedlots with capacities of 45,000 (Feedlot A) and 42,500 head (Feedlot B), respectively, in Castro and Parmer Counties in the Southern High Plains of Texas. At both feedlots, groundwater was sampled from the Ogallala Aquifer at four water wells supplying cattle drinking water and from 10 or 11 irrigation wells within a distance of 1.07 to 1.41 km (0.67 to 0.88 mile) from the feed pens or playa basins (natural depressions) used for collection of feedlot runoff. Water table depth was 82.3 to 97.5 m (270 to 320 ft). Nitrate-nitrogen (NO3N) concentrations averaged less than 1.2 mg/L at Feedlot A (maximum value of 2.23 mg/L) and 5.21 mg/L at Feedlot B (maximum value of 9.54 mg/L). These are below the USEPA primary drinking water standard of 10.0 mg/L NO3-N. Other nutrient and salinity values were low. The well water in all feedlot wells and in farm irrigation wells appears to be suitable for irrigation, livestock watering, and huma n consumption.

32. **Groundwater quality: responsible agriculture and public perceptions.**
Goss, M. J. and Barry, D. A. J.
J agric environ ethics. 8: 1 52-64. (1995).
NAL Call #: BJ52.5.J68

Descriptors: groundwater-pollution water-quality drinking-water wells- farming-agricultural-policy canada-

33. **Groundwater resource management and environmental protection: A case study of the Pilippines.**
Munasinghe, M.
Nat Resour Forum. 15: 4 302-312. (Nov 1991).
NAL Call #: HC55.N3
Descriptors: drinking-water water-quality water-management salt-water-intrusion environmental-protection water-use water-policy population-pressure economic-development aquifers- case-studies water-costs philippines- manila,-philippines

34. **Guidance for applicants for state Wellhead Protection Program assistance funds under the Safe Drinking Water Act.**
United States. Environmental Protection Agency. Office of Ground Water Protection. Washington, D.C. : U.S. Environmental Protection Agency, Office of Water, Office of Ground-Water Protection, [1987] 1 v.
NAL Call #: TD426.G84-1987
Descriptors: Well-Head-Protection-Program Wellheads-Protection-United-States Water,-Underground-Quality Drinking-water

35. **Heterogeneities in ground-water geochemistry in a sand aquifer beneath an irrigated field.**
Kelly, W. R.
J hydrol. 198: 1/4 154-176. (Nov 1997).
NAL Call #: 292.8-J82
Descriptors: irrigated-sites water-quality groundwater-pollution
Abstract: The contamination of shallow aquifers by elevated nitrate concentrations is a common problem in many rural regions of the world. Aquifers under irrigated land are especially susceptible to this type of contamination. An intensive thr ee-dimensional investigation of water chemistry was undertaken in a shallow unconfined sand aquifer in an area of intensive irrigation in Mason County, Illinois, in order to investigate processes affecting water quality. Results reveal considerable hetero geneity in the aqueous chemistry in three spatial dimensions and temporally. Recharge is rapid in this system and the water chemistry of the recharge water is variable both spatially and temporally, being especially influenced by agricultural practices. N itrate concentrations are elevated in a zone between about 6 and 10 m beneath the surface, although in certain areas and at certain times this zone was not found. The maximum nitrate concentrations in this zone were slightly greater than 20 mg l-1 as N, w ell above the US Environmental Protection Agency's maximum contaminant level (MCL) of 10 mg l-1. Nitrate was generally absent both above and below this depth in the aquifer. Water relatively depleted in nitrate recharges the aquifer from the surface at th e site, producing a zone of dilute water near the water table.

36. **Identification of organic pollutants in Ter river and its system of reservoirs supplying water to Barcelona (Catalonia, Spain): a study by GC/MS and FAB/MS.**
Espadaler, I., Caixach, J., Om, J., Ventura, F., Cortina, M., Paune, F., and Rivera, J.
Water res. 31: 8 1996-2004. (Aug 1997).
NAL Call #: TD420.W3
Descriptors: drinking-water rivers- river-water water-reservoirs water-supply water-

quality water-pollution pollutants- organic-compounds factory-effluents gas-chromatography mass-spectrometry analytical-methods spain- closed-loop-stripping-analys is fast-atom-bombardment-mass-spectrometry

37. **The impact of land reclamation on groundwater quality and future drinking water supply in The Netherlands.**
Stuyfzand, P. J.
Water sci technol. 31: 8 47-57. (1995).
NAL Call #: TD420.A1P7
Descriptors: groundwater- water-quality reclaimed-land infiltration- surface-water rivers-polders- groundwater-recharge salt-water-intrusion netherlands-

38. **Improving home water quality.**
Langston, J.
MP-Univ-Arkansas-Coop-Ext-Serv. Little Rock, Ark. : The Service. Jan 1989. (292) 22 p.
NAL Call #: DNAL 275.29-AR4MI
Descriptors: water-quality drinking-water wells- springs- water-supply testing-treatment- chlorine- sodium-carbonate water-filters arkansas-

39. **An integrated water management concept to ensure a safe water supply and high drinking water quality on an ecologically sound basis.**
Heinzmann, B. and Sarfert, F.
Water sci technol. 31: 8 281-291. (1995).
NAL Call #: TD420.A1P7
Descriptors: groundwater-recharge water-reuse sewage-effluent drinking-water water-quality water-pollution surface-water waste-water water-management berlin- storm-water

40. **Local resource planning for water quality improvement.**
Boyd, D. A.
J Soil Water Conserv. 47: 2 136-138. (Mar/Apr 1992).
NAL Call #: 56.8-J822
Descriptors: aquifers- water-quality local-planning resource-management agricultural-chemicals application-rates irrigation-systems drinking-water illinois- mason-county,-illinois

41. **Mangement tools for preventing water pollution on farms.**
Nevers, E., Jackson, G., Castelnuovo, R., and Knox, D.
Environmentally sound agriculture proceedings of the second conference 20 22 April 1994. 30-37. (1994).
NAL Call #: S589.7.E57-1994
Descriptors: farms- groundwater-pollution risk- assessment- wells- drinking-water contamination- point-sources water-quality environmental-protection pollution-control programs- farmstead-assessment-system

42. **Methane in well water from Lake Charles, Louisiana.**
Murray, H. E. and Beck, J. N.
Bull Environ Contam Toxicol. 48: 5 768-771. (May 1992).
NAL Call #: RA1270.P35A1
Descriptors: drinking-water groundwater- wells- methane- measurement- water-quality louisiana.

43. **Migration and contamination of major and trace elements in groundwater of Madras City, India.**

Ramesh, R., Kumar, K. S., Eswaramoorthi, S., and Purvaja, G. R.
Environ geol. 25: 2 126-136. (Mar 1995).
NAL Call #: QE1.E5
Descriptors: groundwater-pollution trace-elements anions- cations- major-elements contamination- aquifers- salt-water-intrusion water-quality pollutants- infiltration- groundwater- tamil-nadu
Abstract: Groundwater samples collected from both open and bore wells in an area of about 270 km2 from Madras City, India, have been analyzed for major ions and trace elements. The study reveals that the quality of potable water has deteriorat ed to a large extent. Seawater intrusion into the aquifer has been observed in nearly 50 percent of the study area. The toxic elements (As and Se) have already exceeded the maximum permissible limits of drinking water in almost the entire city. A positive correlation of As and Se with other toxic metals such as V, Cr, Fe, B, etc., indicates that all these elements are anthropogenic in origin. Applying multivariate analysis, the source for trace elements in groundwater has been grouped into two major facto rs: pollution and mobilization factors. The groundwater in the study area is largely contaminated by organic effuents and reflects the intensity of pollution caused by the overlying soil sediment and rapid infiltration of the pollutants.

44. **Monitoring pesticide and nitrate in Virginia's groundwater--a pilot study.**
Bruggeman, A. C., Mostaghimi, S., Holtzman, G. I., Shanholz, V. O., Shukla, S., and Ross, B. B.
Trans ASAE. 38: 3 797-807. (May/June 1995).
NAL Call #: 290.9-Am32T
Descriptors: groundwater- water-quality wells- pesticides- groundwater-pollution monitoring- aquifers- nitrate- sampling- virginia-
Abstract: Between October 1992 and February 1993, a total of 359 private wells in Northampton County were sampled and data on water-quality variables (temperature, pH, and conductivity), well construction, and site characteristics were collect ed. The groundwater samples were analyzed for aldicarb, alachlor, atrazine, carbofuran, linuron, methomyl, metolachlor, metribuzin, napropamide, pendimethalin, pronamide, simazine, and nitrate. The wells were stratified into shallow wells, withdrawing wat er from the unconfined aquifer, and deep wells, withdrawing water from the deeper confined aquifers. The study was undertaken as a pilot study to demonstrate the applicability of a recently developed framework for evaluating the extent of pesticide contam ination in Virginia's groundwater. Pesticides were detected in 14% of the shallow wells and in 7% of the deep wells sampled. Pesticide detection was associated with the well depth, with a higher probability of detecting a pesticide in the shallow unconfin ed aquifer than in the deeper aquifers. Nitrate above the U.S. EPA drinking water standard of 10 mg/L was found in 17% of the shallow and 1% of the deep wells. Pesticide and nitrate detections were not significantly related to well and site characteristic s, such as crop type, location of well head, and distance to the nearest water body.

45. **National survey of pesticides in drinking water wells : phase I report. National pesticide survey.**
United States. Environmental Protection Agency. Office of Pesticides and Toxic Substances.
[Washington, D.C.] : United States Environmental Protection Agency, Office of Water,

Office of Pesticides and Toxic Substances, [1990] 1 v.
NAL Call #: TD427.P35N374-1990
Descriptors: Pesticides-Environmental-aspects-United-States Drinking-water-United-States-Contamination Wells-United-States Water-quality-United-States

46. **Natural protection of spring and well drinking water against surface microbial contamination. I. Hydrogeological parameters.**
Robertson, J. B. and Edberg, S. C.
Crit rev microbiol. 23: 2 143-178. (1997).
NAL Call #: QR1.C7
Descriptors: microbial-contamination groundwater- water-quality water-pollution
Abstract: The fate and transport of microbes in groundwater are controlled by physicochemical characteristics of the microbe and of the groundwater/aquifer media. Key characteristics of the microbe include size, inactivation (die-off) rate, an d surface electrostatic properties. Key properties of the groundwater/aquifer system include flow velocity, aquifer grain (or pore) size, porosity, solid organic carbon content, temperature, pH, and other chemical characteristics of water and mineral comp osition. Because of size and surface electrical properties, viruses are much more mobile in groundwater than Cryptosporidium and Giardia (which are about 100 times or more larger than viruses). The inactivation or die-off rate is usually the most importan t factor governing how far microbes can migrate in significant numbers in groundwater.

47. **Natural protection of spring and well drinking water against surface microbial contamination. II. Indicators and monitoring parameters for parasites.**
Edberg, S. C., Leclerc, H., and Robertson, J.
Crit rev microbiol. 23: 2 179-206. (1997).
NAL Call #: QR1.C7
Descriptors: microbial-contamination groundwater- water-quality water-pollution indicator-species pollution-indicators
Abstract: Recent outbreaks of cryptosporidiosis and reports of other newly described parasitic diseases associated with drinking water transmission prompted a reevaluation of source water monitoring criteria for public health protection. The f ield of microbial indicators was reviewed and each candidate sentinel evaluated in terms of its sensitivity, specificity, and technical feasibility. In addition, a clear distinction was made between source water monitoring and monitoring in the distributi on system. Of all potential candidate microbial sentinels, Escherichia coli is deemed the most efficacious for public health protection. Based on a conservative estimate of its half-life in groundwater for 8 d, it is recommended that at least two samples be obtained during this half-life. In addition to E. coli, two water quality indicator sentinels, which are not necessarily direct public health threats, should also be monitored at the same frequency. These are the total coliform group and the enterococc i. If E. coli is present in any source water sample, the borehole and any directly connected borehole should be embargoed. If either total coliforms or enterococci are detected, only that individual borehole should be taken off line and not used until the situation is remediated and the cause of the fecal contamination eliminated.

48. **Nitrate concentrations in Riyadh, Saudi Arabia drinking water supplies.**
Alabdula'ay, A. I.
Environ monit assess. 47: 3 315-324. (Sept 1997).

NAL Call #: TD194.E5
Descriptors: drinking-water water-supply groundwater- sea-water nitrates- contaminants- water-quality water-purification saudi-arabia

49. **Nitrate contamination of groundwater: measurement and prediction.**
Goss, M. J. and Goorahoo, D.
Fertil res. 42: 1/3 331-338. (1995).
NAL Call #: S631.F422
Descriptors: groundwater-pollution point-sources agricultural-land contamination- nitrate- farming-systems comparisons- environmental-impact groundwater- water-quality nitrate-nitrogen nitrogen-content regional-surveys budgets- estimation- ontario - non-point-source-pollution whole-farm-nitrogen-budgets
Abstract: Two approaches were adopted to evaluate management practices (within the context of the whole farming system) for their impacts on the environment: (1) measurement of the quality of groundwater under different farming systems, and (2) comparison of predictions of the impact of farming systems on water quality, obtained using whole farm N budgets, with measured values. The Ontario Farm Groundwater Quality Survey evaluated the rural groundwater quality in Ontario, with respect to commo n contaminants including NO3-. Approximately 1300 domestic farm wells were sampled, and wells were drilled in some fields of farms involved in the study. NO3- was present at concentrations above the maximum acceptable for drinking water (10 mg N l -1) in 14% of wells, including 7% of wells that also had unacceptable concentrations of coliform bacteria. Significant levels of NO3- contamination were observed under most agricultural land use practices investigated. Calculation of N budgets was simplified by assuming that there was no net change in the N content of farm assets.

50. **The nitrate content of drinking water in Portugal.**
Cardoso, S. M.
NATO-ASI-Ser-Ser-G-Ecol-Sci. Berlin, W. Ger. : Springer-Verlag. 1991. v. 30 p. 49-54.
NAL Call #: DNAL QH540.N3
Descriptors: nitrate- nitrate-fertilizers groundwater-pollution drinking-water water-quality farmland- groundwater-recharge portugal-

51. **Nitrate in rural wells of Missouri.**
Sievers, D. M. and Fulhage, C. D.
Trans A S A E. 35: 5. 1633-1637. (Sept/Oct 1992).
NAL Call #: 290.9-AM32T
Descriptors: wells- depth- nitrates- rural-areas water-quality missouri-
Abstract: Two hundred twenty six rural wells in Missouri were tested for NO3-N. Nineteen percent exceeded Environmental Protection Agency (EPA) drinking water standards. Nitrate concentrations were most strongly related to well depth. Well con struction, depth to aquifer and well age had lesser influence. Distance from well to livestock was a poor predictor of nitrate pollution.

52. **Nitrate pollution of groundwater in northern China.**
Zhang, W. L., Tian, Z. X., Zhang, N., and Li, X. Q.
Agric ecosyst environ. 59: 3. 223-231. (Oct 1996).
NAL Call #: S601.A34
Descriptors: groundwater-pollution drinking-water water-quality nitrate- contamination- nitrate-nitrogen nitrogen-content nitrogen-fertilizers application-rates environmental-

impact farm-management pollution-control china- nutrient-management best -management-practices

53. **Nutrient-loss trends for vegetable and citrus fields in west-central Florida. II. Phosphate.**
Stanley, C. D., McNeal, B. L., Gilreath, P. R., Creighton, J. F., Graham, W. D., and Alverio, G.
J environ qual. 24: 1 101-106. (Jan/Feb 1995).
NAL Call #: QH540.J6
Descriptors: phosphates- pollutants- losses-from-soil water-table groundwater- lakes-phosphatic-clay water-quality water-pollution monitoring- crop-production florida-
Abstract: Vegetable and citrus production in west-central Florida has come under suspicion as a hazard (with respect to NO3-N and ortho-P) to local groundwater and surface-water bodies, including a 33 000-ha drinking-water supply reservoir nea r Bradenton in Manatee County. Using a combination of multilevel samplers in the shallow (surficial) aquifer beneath selected vegetable fields and citrus groves, coupled with piezometric wells around each field's periphery to assess depth-integrated solut e concentrations and direction and rate of groundwater flow, ortho-P levels have been assessed at 10 sites for three vegetable-production seasons during 1990 and 1991. Some ortho-P movement from vegetable production beds to surface waters and shallow grou ndwater appears likely, but ortho-P concentrations also are elevated at a native range site that has not received P fertilizers, and in both man-made and natural surface-water retention ponds plus nearby intermittent streams throughout the area. Naturally occurring phosphatic clays appear to be introducing considerable P into local shallow groundwater and associated surface-water bodies. Regulatory strategies requiring sizeable retention ponds for tailwater-return flow capture may be contributing to P loa dings of the surface water, whenever pond construction intercepts phosphatic clay materials.

54. **Occurrence, sources, and fate of trichloroacetic acid in Swiss waters.**
Muller, S. R., Zweifel, H. R., Kinnison, D. J., Jacobsen, J. A., Meier, M. A., Ulrich, M. M., and Schwarzenbach, R. P.
Environ toxicol chem. 15: 9. 1470-1478. (Sept 1996).
NAL Call #: QH545.A1E58
Descriptors: tca- contaminants- concentration- spatial-variation temporal-variation surface-water groundwater- drinking-water waste-water rain- lakes- water-quality water-pollution switzerland-
Abstract: The occurrence, sources, and fate of trichloroacetic acid (TCA) has been investigated in surface waters, ground waters, drinking waters, wastewaters, and rainwater in Switzerland. The concentrations found in surface waters varied bet ween less than 27 ng/L (limit of quantification) and 340 ng/L, whereas the concentrations in ground water were always below 27 ng/L. It was found that the main sources of TCA in surface waters were the effluents of wastewater treatment plants (average con centration, 430 ng/L; range, 40-1060 ng/L). The average TCA concentration in rainwater was 300 ng/L range, (< 27-900 ng/L). A dynamic mathematical model revealed that TCA is not significantly degraded in a lake (half-life > 230 d). A detailed mass b alance in the catchment area of a small lake (Greifensee) and a very rough mass balance over Switzerland indicate that rain is the major source of TCA in Switzerland (> 90%), but

they also show that about 60 to 80% of the TCA deposited by rain is elimi nated, most probably in the soil.

55. **Organochlorine residues in rural drinking water sources of northern and north eastern India.**
Kumar, S., Singh, K. P., and Gopal, K.
J environ sci health, Part A, Environ sci eng A30: 6 1211-1222. (1995).
NAL Call #: TD172.J6
Descriptors: organochlorine-pesticides pesticide-residues nitrate-nitrogen pollutants- drinking-water surface-water groundwater- water-pollution water-quality rural-areas india-

56. **Patterns of water quality in rural areas of Assyut Governorate, Egypt.**
Platenburg, R. J. P. M. and Zaki, M.
Water supply and sanitation for rural areas proceedings of the IAWPRC First Middle East Conference held in Cairo, Egypt, 23-25 February, 1992 /. 1st ed. Oxford ; New York : Pergamon Press, 1993.. p. 55-65.
NAL Call #: TD420.A1P7-v.27,-no.9
Descriptors: drinking-water water-quality rural-areas rural-communities villages- geographical-variation pumps- wells- groundwater-pollution fecal-coliforms egypt- handpumps-

57. **Pesticides, drinking water, and human health.**
PM-Iowa-State-Univ-Coop-Ext-Serv. Ames, Iowa : The Service. May 1993. (1504,rev.) 4 p.
NAL Call #: 275.29-IO9PA
Descriptors: drinking-water water-quality groundwater-pollution pesticides- toxicity- dosage-effects public-health iowa-

58. **Pesticides in eastern North Carolina rural supply wells: land use factors and persistence.**
Maas, R. P., Kucken, D. J., Patch, S. C., Peek, B. T., and Van Engelen, D. L.
J environ qual. 24: 3 426-431. (May/June 1995).
NAL Call #: QH540.J6
Descriptors: pesticides- detection- wells- persistence- spatial-distribution temporal- variation nitrate-nitrogen indicators- land-use agricultural-land drinking-water water- quality water-pollution north-carolina
Abstract: Water samples were collected from 171 rural domestic well supplies in eastern North Carolina and analyzed for eight pesticides. Information on borehole depth, wet- casing depth, distance to nearest pesticide mixing area, types of pest icides used, and distance to nearest field application was obtained for each site. Four herbicides were detected in the samples, with detection frequencies of 8.8, 8.2, 3.6, and 1.8%, respectively. About 15% of the samples contained at least one of these herbicides, with resampling indicating persistence throughout the year. Only alachlor concentrations were in excess of maximum contaminant levels (MCLs; 2.0 microgram L-1) or Health Advisory Levels (HALs; 0.4 microgram L-1) established by the U.S. Environ mental Protection Agency (USEPA). Neither atrazine nor alachlor detection exhibited statistical correlation with well depth, although both were rarely detected in wells > 100 feet deep. Atrazine concentrations and detection frequencies did not correlat e with distance to nearest application site, while alachlor had a significantly greater detection frequency for

wells further from the nearest application site. For nearly one-half of the wells with detectable atrazine and alachlor, there was no reported usage of either herbicide on the same farm during the previous three years, possibly indicating herbicide transport in groundwater or long times before degrading.

59. **Pesticides in ground water: Do atrazine metabolites matter.**
    Liu, S., Yen, S. T., and Kolpin, D. W.
    Water resour bull. 32: 4 845-853. (Aug 1996).
    NAL Call #: 292.9-Am34
    Descriptors: atrazine- metabolites- pesticides- pesticide-residues groundwater- water-quality risk- land-use mathematical-models great-plains-states-of-usa north-central-states-of-usa deethylatrazine- deisopropylatrazine-
    Abstract: Atrazine and atrazine-residue (atrazine + two metabolites - deethylatrazine and deisopropylatrazine) concentrations were examined to determine if consideration of these atrazine metabolites substantially adds to our understanding of the distribution of this pesticide in groundwater of the midcontinental United States. The mean of atrazine-residue concentrations was 53 percent greater than that of atrazine alone for those observations above the detection limit (> 0.05 microgram/l). Furthermore, a censored regression analysis using atrazine-residue concentrations revealed significant factors not identified when only atrazine concentrations were used. Thus, knowledge of concentrations of these atrazine metabolites is required to obta in a true estimation of risk of using these aquifers as sources for drinking water, and such knowledge also provides information that ultimately may be important for future management policies designed to reduce atrazine concentrations in ground water.
60. **Pesticides in shallow groundwater in the Delmarva Peninsula.**
    Koterba, M. T., Banks, W. S. L., and Shedlock, R. J.
    J environ qual 22: 3 500-518. (July/Sept 1993).
    NAL Call #: QH540.J6
    Descriptors: pesticide-residues groundwater- water-quality depth- spatial-distribution wells- drinking-water groundwater-pollution delaware- maryland- virginia-
    Abstract: A regional study of the areal and depth distribution of pesticides in shallow groundwater in the Delmarva Peninsula of Delaware, Maryland, and Virginia was done to (i) relate the pesticides detected to landscape and shallow subsurfac e features, and (ii) evaluate aquifer vulnerability and the potential contamination of drinking-water supplies. Water samples collected at 100 wells from 1988 to 1990 were analyzed for concentrations of 36 pesticides, four metabolites, and other constitue nts. The most commonly detected residues were atrazine, cyanazine, simazine, alachlor, metolachlor, and dicamba. Most detections occurred in samples collected from shallow wells screened within 10 m of the overlying water table. The shallow depth distrib ution of most residues is consistent with their suspected history of use (ca. 20 yr), and patterns in shallow groundwater flow in the surficial aquifer in the study area. The areal and depth distributions of detectable residues in groundwater did not corr elate with a vulnerability index, nor any of the component scores developed to estimate that index using the DRASTIC method. The shallow depth of most detections also indicates why few samples from water-supply wells in this study had measurable concentra tions of pesticides; most supply wells are deeper than 10 m below the water table. The low number of

contaminated samples from supply wells implies that deep groundwater currently (1992) used for drinking generally does not contain detectable pesticide. residues.

61. **Physiographic and land use characteristics associated with nitrate-nitrogen in Montana groundwater.**
Bauder, J. W., Sinclair, K. N., and Lund, R. E.
J environ qual. 22: 2 255-262. (Apr/June 1993).
NAL Call #: QH540.J6
Descriptors: drinking-water wells- water-quality nitrate-nitrogen geographical-distribution dry-farming rotations- site-factors climatic-factors groundwater-pollution montana-
Abstract: Occurrence of NO3(-)-N in drinking water at concentrations > 10 mg L-1 is being reported in the literature with increasing frequency. Some occurrences of high NO3(-)-N concentrations have been attributed to irrigation and fertiliz ation practices. A private well water testing program in Montana, involving nearly 3400 well owners, found NO3-(-)N concentrations > 10 mg L-1 in nearly 6% of all tested wells. Most of the agricultural land in Montana is nonirrigated and is not subject to high rates of N fertilization. Dryland crop/fallow cereal grain rotations are the main practices. Well water test results were combined with MAPS, a geographic information system (GIS), to identify correlations between county average NO3(-)-N concentr ation in groundwater, well water sample probability of exceeding 10 mg L-1 NO3(-)-N, geographic, climatic, and geologic conditions, and land-use practices. From a list of 67 independent variables, county average well water NO3(-)-N concentration and perce ntage of tested wells in each county with NO3(-)-N concentration > 10 mg L-1 were correlated (P < 0.10) with 16 independent variables, most of which were associated with precipitation, soil properties, and land-use practices. Results of these analy ses support the hypothesis that summer fallow practices and associated mineralization of organic matter may be. contributing to regionalized NO3(-)-N contamination of shallow groundwater in Montana.

62. **Planning your well: guidelines for safe, dependable drinking water.**
Korab, H.
Land-water. Urbana-Champaign : The Service, 1982-. Apr 1990. (14) 11 p.
NAL Call #: S624.I3L36
Descriptors: wells- homes- site-factors groundwater- planning- water-requirements construction- disinfection- regulations- permits- water-quality illinois-

63. **Problem of nonpoint source agricultural water pollution: toward a hypothetical federal legislative solution.**
Caulfield, H. P. Jr.
Water Resour Bull. 27: 3 447-452. (May/June 1991).
NAL Call #: 292.9-AM34
Descriptors: groundwater-pollution agricultural-chemicals drinking-water water-quality environmental-legislation federal-government politics- decision-making
Abstract: A conceptual framework of politics is set forth in relation to the federal environmental legislative process. This framework for analysis is then related to a hypothetical public problem--ground water pollution from agricultural chem icals. The public problem from the perspective of political analysis is found to involve several

different types of difficult issues with which the legislative process must deal if legislation is to be enacted.

64. **Protecting your private well.**
Bonner, J.
Publ-Miss-State-Univ,-Coop-Ext-Serv. State College, Miss. : Cooperative Extension Service, Mississippi State University. May 1993. (1868) 4 p.
NAL Call #: 275.29-M68Ext
Descriptors: wells- drinking-water water-quality pollution-control

65. **Quality of well water on Tennessee poultry farms.**
Goan, H. C., Denton, P. H., and Draughon, F. A.
Environmentally sound agriculture proceedings of the second conference 20 22 April 1994 / 368-372. (1994).
NAL Call #: S589.7.E57-1994
Descriptors: water-quality drinking-water wells- regional-surveys nitrate-nitrogen nitrogen-content bacteria- fecal-flora poultry-farming tennessee-

66. **The regulation of agricultural practices to protect groundwater quality: the Nebraska model for controlling nitrate contamination.**
Schneider, S. A.
Articles and publications by NCALRI staff. 1988-[199-?]. Fall 1990. [5] p. 1-44.
NAL Call #: DNAL KF1682.A45A77
Descriptors: groundwater- nitrate- nitrogen-fertilizers water-quality environmental-protection models- contamination- drinking-water water-management regulations- agricultural-chemicals nebraska-

67. **Role of groundwater recharge in treatment and storage of wastewater for reuse.**
Bouwer, H.
Water Sci Technol J Int Assoc Water Pollut Res Control. 24: 9 295-302. (1991).
NAL Call #: DNAL TD420.A1P7
Descriptors: waste-water-treatment water-storage water-quality requirements- water-reuse irrigation-water irrigated-stands vegetables- microbial-contamination pathogens- groundwater-recharge application-to-land aquifers- public-health health-prote ction drinking-water

68. **A rule-based fuzzy-set approach to risk analysis of nitrate-contaminated groundwater.**
Dahab, M. F., Lee, Y. W., and Bogardi, I.
Water sci technol. 30: 7 45-52. (1994).
NAL Call #: TD420.A1P7
Descriptors: groundwater-pollution nitrate- contamination- risk- mathematics- decision-making water-quality neoplasms- methemoglobinemia- polluted-water drinking-water

69. **Rural domestic water supply.**
Vomocil, J. and Hart, J.
Ext-Circ-EC-Oreg-State-Univ-Ext-Serv. Corvallis, Or. : The Service. Feb 1991. (1374) 4 p.
NAL Call #: 275.29-OR32C
Descriptors: wells- water-use water-quality drinking-water oregon-

70. **Rural water quality database: educational program to collect information.**
Lemley, A. and Wagenet, L.

J-ext. Madison, Wis. : Extension Journal. Fall 1993. v. 31 p. 11-13.
NAL Call #: 275.28-J82
Descriptors: water-quality rural-communities databases- drinking-water extension-education contamination- testing- wells- program-evaluation program-effectiveness new-york

71. **Safe water in the home.**
Wright, S.
Guide-M-NM-State-Univ-Coop-Ext-Serv. Las Cruces, NM : The Service. Aug 1990. (108) 4 p.
NAL Call #: TX23.G85
Descriptors: drinking-water water-quality quality-standards groundwater- testing- new-mexico

72. **Seminar publication : wellhead protection : a guide for small communities.**
Center for Environmental Research Information (U.S.). United States. Environmental Protection Agency. Office of Science, Planning and Regulatory Evaluation. US EPA, Office of Ground Water Protection.
Cincinnati, OH : U.S. EPA, Office of Research and Development, Office of Science, Planning and Regulatory Evaluation, Center for Environmental Research Information [1993] ix, 144 p.
NAL Call #: TD223.S46--1993
Descriptors: Wellheads-Protection Groundwater-Quality Water-quality-management

73. **Statistical analysis of rural well contamination and effects of well construction.**
Glanville, T. D., Baker, J. L., and Newman, J. K.
Trans ASAE. 40: 2 363-370. (Mar/Apr 1997).
NAL Call #: 290.9-Am32T
Descriptors: atrazine- alachlor- metolachlor- nitrate-nitrogen chloride- coliform-bacteria wells- groundwater-pollution building-materials design- drinking-water transport-processes water-quality contamination- iowa- physical-properties-of-wells
Abstract: A previous statewide survey showed that 14% of rural wells in Iowa contained detectable concentrations of pesticides. To determine if improved private well construction regulations should be included in Iowa's State Pesticide Managem ent Plan, a two-year study was undertaken to determine: the effects of well construction on pesticide, nitrate-nitrogen, and bacterial contamination of wells; and the possible role of point sources of contamination. Eighty-eight rural water supply wells i n nine Iowa counties were sampled daily for five weeks during late spring and summer of 1993, and 20% of these were resampled in 1994. Short-term variation in nitrate-nitrogen concentrations was examined as a possible indicator of rapid inflow of shallow groundwater associated with well construction defects. Mean total coliform bacteria, nitrate-nitrogen, chloride, atrazine, alachlor, and metolachlor concentrations were statistically analyzed to determine if they were correlated, and t-tests also were use d to determine if these water quality parameters were affected significantly by physical well parameters such as depth, type of casing, grouting, location within frost pits, and proximity to various potential sources of contamination. Study results indica te that: short-term water quality fluctuations, by themselves, were not a reliable indicator of deteriorated or improperly constructed wells; although the magnitude and frequency of positive total coliform test results was noticeably higher in shallower w ells, a substantial

fraction (21%) of wells greater than 30.5 m (100 ft) deep also had positive coliform results; t-tests and correlation analysis failed to show significant differences in mean atrazine or alachlor concentrations.

74. **Survey of nitrate contamination in shallow domestic drinking water wells of the Inner Coastal Plain of Georgia.**
Stuart, M. A., Rich, F. J., and Bishop, G. A.
Ground-water. Columbus, OH: Ground Water Pub. Co. Mar/Apr 1995. v. 33 (2) p. 284-290.
NAL Call #: TD403.G7
Descriptors: groundwater-pollution nitrate- water-quality wells- surveys- coastal-plains contamination- aquifers- nitrogen- ph- water-temperature high-water-tables electrical-conductivity drinking-water georgia- nitrite- shallow-aquifers specific- conductivity
Abstract: Beginning in 1990, 2,588 wells were sampled within the Inner Coastal Plain of Georgia in an effort to assess the quality of ground water in this major farm belt. The project was one aspect of an EPA-sponsored program to assess ground -water quality statewide. Several variables were measured, including pH, specific conductivity, dissolved oxygen, temperature, nitrate, nitrite, total hardness, calcium, magnesium, and bicarbonate. In some wells sulfate, chloride, potassium, iron, and man ganese contents were also determined. Particular emphasis was placed, however, on pH, specific conductivity, temperature, and nitrite/nitrate content. Generally, pH was between 6 and 8, and temperatures were within a range of 18 degrees and 24 degrees Cel sius. Measurements of specific conductivity varied, but averaged 250-275 microsiemens/cm. Nitrite contamination was negligible, and nitrate contamination of the ground water within the shallow aquifers did not appear to be significant.

75. **Use of ground water monitoring data for pesticide regulation.**
Barrett, M. R., Williams, W. M., and Wells, D.
Weed technol. 7: 1 238-247. (Jan/Mar 1993).
NAL Call #: SB610.W39
Descriptors: water-quality groundwater-pollution pesticides- leaching- pesticide-residues drinking-water regulations- health-hazards contaminants- quality-standards monitoring-usa- maximum-contaminant levels-

76. **Valuing environmental quality changes using averting expenditures: an application to groundwater contamination.**
Abdalla, C. W., Roach, B. A., and Epp, D. J.
Land Econ. 68: 2 163-169. (May 1992).
NAL Call #: 282.8-J82
Descriptors: groundwater-pollution household-expenditure water-quality environmental-degradation costs- drinking-water regional-surveys value-theory pennsylvania- perkasie,-pennsylvania

77. **Water quality and private water supplies.**
McManus, M.
Publ-Univ-Tenn-Agric-Ext-Serv. Knoxville, Tenn. : The Service. Mar 1990. (1357) 19 p.
NAL Call #: S115.P82
Descriptors: wells- water-quality groundwater-pollution drinking-water standards-contaminants- health-hazards testing- tennessee-

78. **Well testing program yields encouraging results.**
Summer, K.
Agfocus 7-8. (July 1994).
NAL Call #: S544.3.N7A4
Descriptors: wells- water-quality drinking-water laboratory-tests new-york water-quality-incentive-program

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