Selected Environmental and Geohydrologic Reports For the Fort Wainwright and Fairbanks Areas, Alaska As of July 1995

By Michael R. Lilly, Keri L. DePalma *and* Sonja L. Benson

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Selected Environmental and Geohydrologic Reports For the Fort Wainwright and Fairbanks Areas, Alaska As of July 1995

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INTRODUCTION

The U.S. Army, Alaska (USARAK), the U.S. Army Corps of Engineers, Alaska District (COE), and the U.S. Geological Survey (USGS) are conducting a cooperative project to characterize the geohydrology and assess the environmental status of the Fort Wainwright area. The project is part of an effort to support activities of the USARAK conducted under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The study area is located within the Fairbanks D-2 SE quadrangle (fig. 1). The environmental assessment study area includes the area south of Birch Hill and north of the Tanana River, and extends west to the Steese Highway and east to Lakloey Hill.

As part of its effort to help collect data and gather information for geohydrologic investigations, the USGS collects and reviews environmental and technical reports relating to geology, hydrology, and geohydrology. The USGS investigation efforts are coordinated with ongoing technical investigations by the Water Research Center (WRC) of the University of Alaska Fairbanks and the U.S. Army Cold Regions Research and Engineering Laboratory (CRREL). One project objective for Fort Wainwright includes maintaining a library of report references for USGS project use and for use by the USARAK, USARAK contractors, and other Federal and State agencies. The purpose of this report is to present an annotated bibliography of reports relating to the project study area or geohydrologic processes important to investigations in the study area.

ORGANIZATION OF THIS REPORT

This report is organized into sections of related reports, including environmental contractor reports, USGS geohydrologic investigative reports, WRC publications, and a brief list of other miscellaneous reports relevant to the Fort Wainwright project.

Environmental Reports

The environmental contractor reports collected for this project were assigned numbers as they were received and processed at the Fairbanks USGS office. The reports vary in technical content; some reports contain no data but provide quality assurance work plans for specific projects. Many of the reports are related to investigations of specific sites or buildings, whereas other environmental reports pertain to generalized areas or operable units on the post. The distribution and general locations of the sites of the reports are illustrated in plate 1. Most reports also include index maps of the specific study areas. The report numbers do not indicate author, contents, or type of report, but only represent the order in which reports were received and reviewed. Reports that have been updated were given a new number and previous versions of the report were archived. There

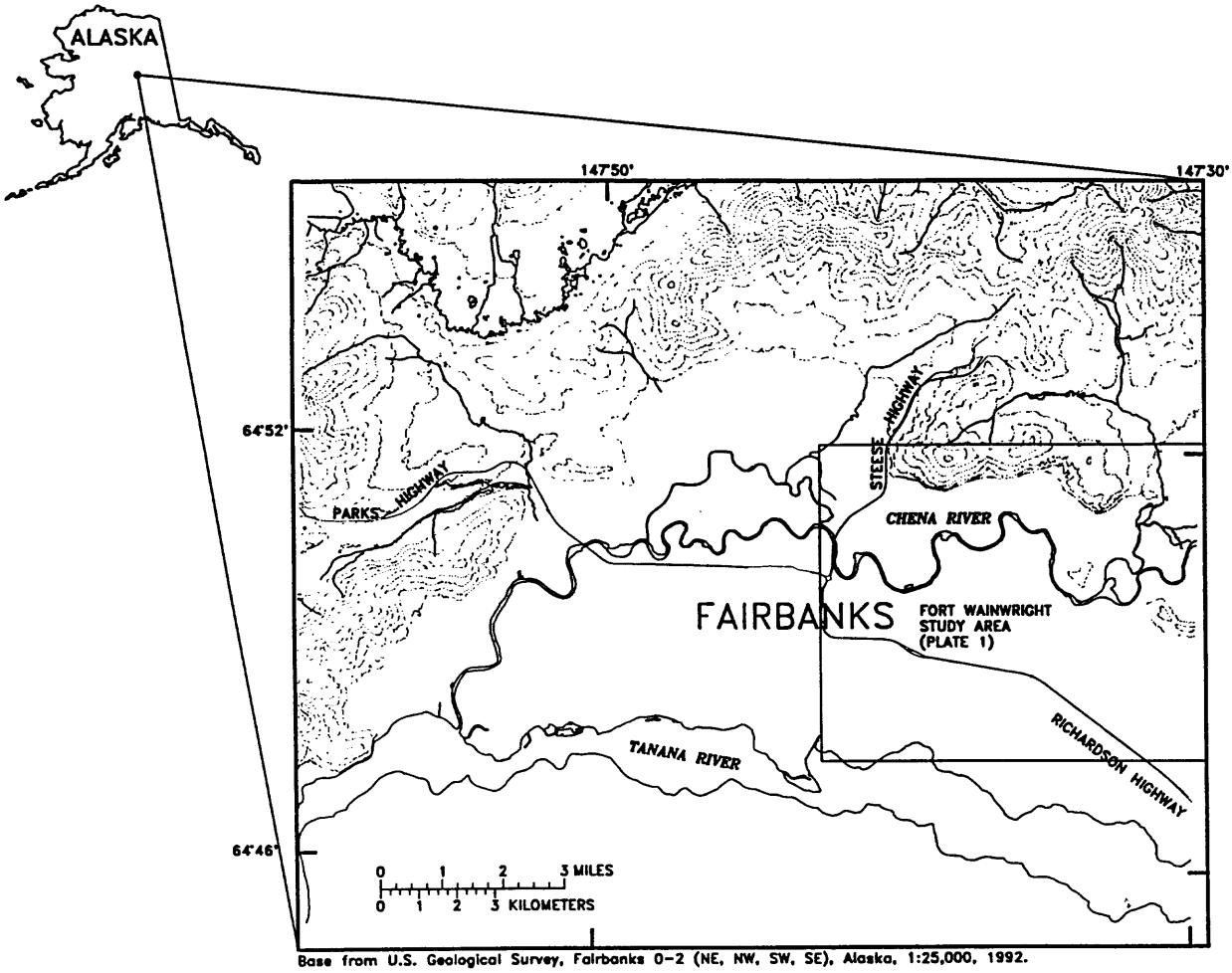

Figure 1. Location of Fairbanks, Alaska and Fort Wainwright study area.

are a total of 127 environmental reports. Following the alphabetical listing is a numerical listing of reports, included for ease of cross-referencing reports for locations shown on plate 1. Environmental contractor reports are filed by report number and available from the Fairbanks office of the U.S. Geological Survey, 800 Yukon Drive, Fairbanks, Alaska 99775.

U.S. Geological Survey Reports and Data Bases

The USGS has been conducting hydrologic investigations in the interior of Alaska since the early 1900s. The USGS is continuing to collect ground-water and surface-water data at monthly intervals for use in its regional investigations and for support of site-specific environmental studies (Claar and Lilly, 1995; Kriegler and Lilly, 1995; see USGS reports listing). Data are also collected at more frequent time intervals as needed. Report series containing information useful for environmental investigations include annual data reports of hydrologic information, geologic and hydro-

logic maps, and geologic and hydrologic reports. U.S. Geological Survey reports concerning the geohydrology of the Fort Wainwright area are included in this bibliography.

In addition to maintaining a file of reports, the USGS maintains a distributed National Water Information System (NWIS) to hold hydrologic information from data-collection activities across the country. Most of the historical data are stored in the NWIS and are available to all researchers. Two components of NWIS are being used for Fort Wainwright data: the Ground-Water Site Inventory (GWSI) data base and the Automatic Data Acquisition and Processing (ADAPS) data base. Ground-water data collected by the USGS or other organizations and turned in to the Fort Wainwright water-level tracking system are stored in the GWSI. Surface-water data collected by the USGS or other organizations and turned in to the Fort Wainwright water-level tracking system are stored in ADAPS. The ADAPS also contains data from continuously recording observation wells. Figure 2, which shows the correlations between the fluctuations of the Chena River and a long-term observation well at Fort Wainwright, demonstrates the value of the data bases to provide information on trends and correlations. Data from the USGS data bases may be obtained from the USARAK Department of Public Works office on Fort Wainwright, the U.S. Army Corps of Engineers Environmental Section office in Anchorage, and the USGS offices in Fairbanks and Anchorage.

University of Alaska Water Resources Center Reports

The University of Alaska's WRC has also investigated many hydrologic processes and areas in interior Alaska. Results of these investigations are reported in university theses, report series, and outside journal and professional publications. This document includes a section listing reports on the activities of the WRC in the Fairbanks area or concerning arctic hydrologic processes in general; these reports are available at the WRC. The WRC was previously named the Institute of Water Resources (IWR), thus the WRC Series reports are continued with the same numbering scheme as the IWR Series reports.

Appendixes

The American Society for Testing and Materials (ASTM) is currently under an accelerated standards and methods development process relating to ground-water investigations. The process has been jointly supported by the USGS, U.S. Department of Defense, U.S. Environmental Protection Agency, and industry representatives. Appendix 1 presents selected standards related to environmental investigations and guidelines for producing environmental and geotechnical reports. This information is included as supplemental reference material on procedures and methods for ground-water investigations. These standards are available from the ASTM, or may be found in Volumes 4.08 and 4.09 of the Annual Book of ASTM Standards.

Appendix 2 consists of part of a section from the National Water Information System User's Manual (Luckey and Rogers, 1989; see USGS reports listing). A listing of the fields and field codes for GWSI is included in the appendix, with information on how to formulate the local numbering system used by the USGS in Alaska

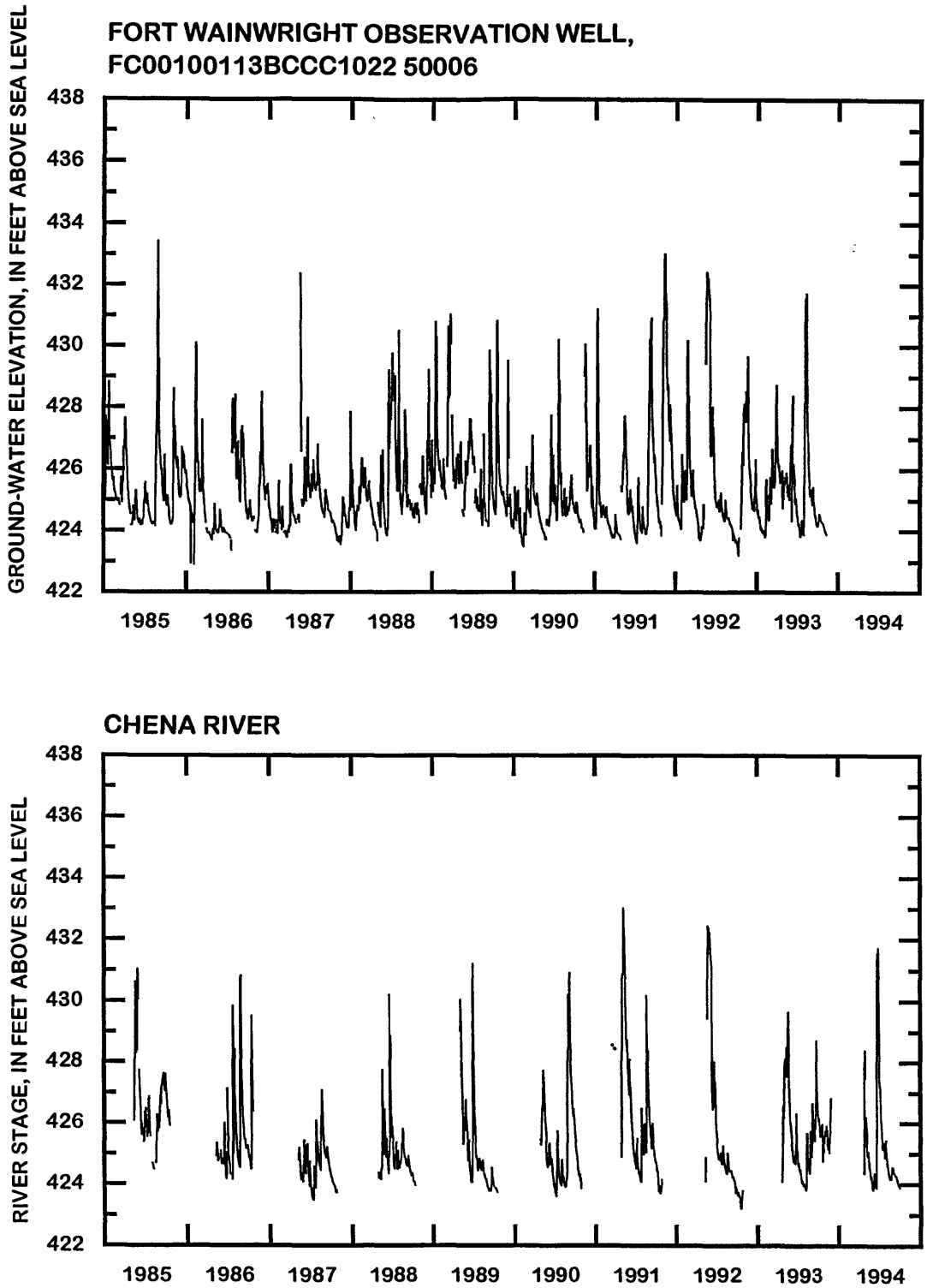

Figure 2. Hydrographs showing ground-water elevation at a Fort Wainwright observation well and river stage at the Chena River at Fairbanks gaging station, calendar years 1985-94.

ENVIRONMENTAL REPORTS—ALPHABETICAL ORDER

Report Number	Report Title
116	AGRA Earth and Environmental, 1995, Fort Wainwright drilling, sampling, and well installation—Draft, February, 1995: Anchorage, Alaska, prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [contract no. DACA85-94-D-0011, delivery order no. 0001].
30	America North/EMCON Inc., 1993, Final quarterly groundwater monitoring report, June 1993, sampling event picket wells, Fort Wainwright, Alaska: Anchorage, Alaska, prepared for the U.S. Army Engineer District, Alaska, variously paged [contract no. DACA85-91-D-0002, delivery order no. 0013].
34	America North/EMCON Inc., 1993, Trip report—December [1992], sample collection, picket wells, Fort Wainwright, Alaska: Anchorage, Alaska, prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [with attached memoranda and field log, contract no. DACA85-91-D-0002, delivery order no. 0013].
31	America North/EMCON Inc., 1993, Trip report—March [1993], sample collection, picket wells, Fort Wainwright, Alaska: Anchorage, Alaska, prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [with attached memorandum and field log, delivery order no. 0013, contract no. DACA85-91-D-0002].
33	America North/EMCON Inc., 1993, Trip report—September [1993], sample collection, picket wells, Fort Wainwright, Alaska: Anchorage, Alaska, prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [with attached memorandum and field log, contract no. DACA85-91-D-0002, delivery order no. 0013].
66	Ballestero, T.P., and French, S.C., 1993 (sic; should be 1994), Final report on microwell investigations at Fort Wainwright, Alaska, Summer, 1993—Draft, January, 1993 (sic): Hanover, New Hampshire, University of New Hampshire Environmental Research Group, prepared for U.S. Army CRREL, v. II of II (first volume is report no. 65, although title and authors are not the same), 90 p. (plus 2 appendixes).
68	CH2M HILL, 1993, Draft preliminary assessment, Wainwright—September, 1993: Anchorage, Alaska, prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [contract no. DACA85-92-D-0007, delivery order no. 0007].
71	CH2M HILL, 1993, Site release investigation plan, delivery order 2, Fort Wainwright, Alaska: Anchorage, Alaska, prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [contract no. DACA85-92-D-0007].
19	CH2M HILL, 1993, Site release investigation plan, delivery order 2, Fort Wainwright, Alaska—Draft, May, 1993: Anchorage, Alaska, prepared for U.S. Army Corps of Engineers, Alaska District, variously paged [contract no. DACA85-92-D-0007].

52 CH2M HILL, 1993, Site release investigation report, delivery order 2, Fort Wainwright, Alaska—Draft, December, 1993: Anchorage, Alaska, v. 1 (text, tables, and figures), prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [contract no. DACA85-92-D-0007].

53 CH2M HILL, 1993, Site release investigation report, delivery order 2, Fort Wainwright, Alaska—Draft, December, 1993: Anchorage, Alaska, v. 2 (appendixes), prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [contract no. DACA85-92-D-0007].

80 CH2M HILL, 1993, Site release investigation plan, delivery order 3, Fort Wainwright, Alaska: Anchorage, Alaska, prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [contract no. DACA85-92-D-0007].

55 CH2MHILL, 1993, Site release investigation report, delivery order 3, Fort Wainwright, Alaska—Draft, December, 1993: Anchorage, Alaska, v. 1, prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [contract no. DACA85-92-D-0007].

56 CH2MHILL, 1993, Site release investigation report, delivery order 3, Fort Wainwright, Alaska—Draft, December, 1993: Anchorage, Alaska, v. 2 (appendixes), prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [contract no. DACA85-92-D-0007].

20 CH2M HILL, 1993, Site release investigation plan, delivery order 3, Fort Wainwright, Alaska—Draft, May, 1993: Anchorage, Alaska, prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [contract no. DACA85-92-D-0007, same report as no. 45].

21 CH2M HILL, 1993, Site release investigation plan, delivery order 4, Fort Wainwright, Alaska: Anchorage, Alaska, prepared for U.S. Army Engineer District, Alaska, variously paged [contract no. DACA85-92-D-0007, same report as no. 81].

46 CH2M HILL, 1993, Site release investigation report, delivery order 4, Fort Wainwright, Alaska—Draft, December, 1993: Anchorage, Alaska, v. 1 (text, tables, and figures—v. 2 is no. 51), prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [contract no. DACA85-92-D-0007, delivery order no. 0004].

51 CH2M HILL, 1993, Site release investigation report, delivery order 4, Fort Wainwright, Alaska—Draft, December, 1993: Anchorage, Alaska, v. 2 (appendixes—v. 1 is no. 46), prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [contract no. DACA85-92-D-0007].

70 CH2M HILL, 1993, Technical memorandum, preliminary release investigation report, delivery order 3: Anchorage, Alaska, prepared for the U.S. Army Corps of Engineers, Alaska District, 16 p. (plus 14 figures).

78 CH2M HILL, 1994, Appendix-microwell evaluation [Fort Wainwright, Alaska]: Anchorage, Alaska, prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [appendix to reports no. 65 and no. 66].

85 CH2M HILL, 1994, Building 1060, treatability study plan, delivery order 10, Fort Wainwright, Alaska: Anchorage, Alaska, prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [contract no. DACA85-92-D-0007, delivery order no. 0010].

108 CH2M HILL, 1994, Corrective action plan, delivery order 3, Fort Wainwright, Alaska—Draft, June, 1994: Anchorage, Alaska, prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [contract no. DACA85-92-D-0007, delivery order no. 0003].

107 CH2M HILL, 1994, Corrective action plan, delivery order 4, Fort Wainwright, Alaska—Draft, July, 1994: Anchorage, Alaska, prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [contract no. DACA85-92-D-0007, delivery order no. 0004].

43 CH2M HILL, 1994, Fort Wainwright underground storage tank sites investigation, delivery order 9—Draft, February, 1994: Anchorage, Alaska, v. 1 (text, tables, and figures), prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [contract no. DACA85-92-D-0007, same report as no. 62].

44 CH2M HILL, 1994, Fort Wainwright underground storage tank sites investigation, delivery order 9—Draft, February, 1994: Anchorage, Alaska, v. 2 (appendixes A through I), prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [contract no. DACA85-92-D-000, same report as no. 63].

99 CH2M HILL, 1994, Site release investigation report, delivery order 2, Fort Wainwright, Alaska: Anchorage, Alaska, v. 1 (text, tables, and figures), prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [contract no. DACA85-92-D-0007, delivery order no. 0002].

100 CH2M HILL, 1994, Site release investigation report, delivery order 2, Fort Wainwright, Alaska: Anchorage, Alaska, v. 2 (appendixes),.prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [contract no. DACA85-92-D-0007, delivery order no. 0002].

89 CH2M HILL, 1994, Site release investigation report, delivery order 3, Fort Wainwright, Alaska: Anchorage, Alaska, v. 1 (text, tables, and figures), prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [contract no. DACA85-92-D-0007, same as report no. 105].

90 CH2M HILL, 1994, Site release investigation report, delivery order 3, Fort Wainwright, Alaska: Anchorage, Alaska, v. 2 (appendixes), prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [contract no. DACA85-92-D-0007, same as report no. 106].

91 CH2M HILL, 1994, Site release investigation report, delivery order 4, Fort Wainwright, Alaska: Anchorage, Alaska, v. 1 (text, tables, and figures), prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [contract no. DACA85-92-D-0007].

92 CH2M HILL, 1994, Site release investigation report, delivery order 4, Fort Wainwright, Alaska: Anchorage, Alaska, v. 2 (appendixes), prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [contract no. DACA85-92-D-0007].

94 Dames & Moore, 1994, Final report [for limited site investigation], Farmer's Loop dump site, Fairbanks, Alaska: Anchorage, Alaska, prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [contract no. DACA85-93-D-0008].

3 Ecology and Environment Inc., 1991, Fort Wainwright landfill report, Fairbanks, Alaska: Anchorage, Alaska, prepared for the U.S. Army Engineer District, Alaska, variously paged [contract no. DACA85-88-D-0014, delivery order no. 0011].

16 Ecology and Environment Inc., 1992, Draft management plan for remedial investigation/feasibility study at operable unit 3, Fort Wainwright, Fairbanks, Alaska: Anchorage, Alaska, prepared for U.S. Army Corps of Engineers, Alaska District, variously paged.

2 Ecology and Environment Inc., 1992, Work plan documents, Birch Hill underground storage tank site, Fort Wainwright, Fairbanks, Alaska—Draft, February, 1992: Anchorage, Alaska, prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [contract no. DACA85-91-D-0003, delivery order no. 0013].

59 Ecology and Environment Inc., 1993, Area wide community relations plan, Fort Wainwright, Fairbanks, Alaska: Anchorage, Alaska, prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [contract no. DACA85-91-D-0003, delivery order no. 0016].

4 Ecology and Environment Inc., 1993, Draft final management plan for remedial investigation/feasibility study at operable unit 4, Fort Wainwright, Fairbanks, Alaska—Draft, March, 1993: Anchorage, Alaska, prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [contract no. DACA85-91-D-0003, delivery order no. 0020].

28 Ecology and Environment, Inc., 1993, Final management plan for remedial investigation/feasibility study at operable unit 3, Fort Wainwright, Fairbanks, Alaska: Anchorage, Alaska, prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [contract no. DACA85-91-D-0003, delivery order no. 0017].

29 Ecology and Environment Inc., 1993, Final management plan for remedial investigation/feasibility study at operable unit 4, Fort Wainwright, Fairbanks, Alaska: Anchorage, Alaska, prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [contract no. DACA85-91-D-0003, delivery order no. 0020].

18 Ecology and Environment Inc., 1993, Soil and groundwater assessment, additional underground storage tank sites, Fort Wainwright, Fairbanks, Alaska: Anchorage, Alaska, prepared for U.S. Army Corps of Engineers, Alaska District, variously paged [contract no. DACA85-91-D-0003, delivery order no. 0035].

79 Ecology and Environment Inc., 1993, Soil and groundwater assessment, additional underground storage tank sites, Fort Wainwright, Fairbanks, Alaska—Draft, April, 1993: Anchorage, Alaska, prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [contract no. DACA85-91-D-0003, delivery order no. 0035]

77 Ecology and Environment Inc., 1994, Summary report of the Fort Wainwright technical information transfer meeting: Anchorage, Alaska, prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [with attached memorandum, contract no. DACA85-93-D-0009, delivery order no. 0001].

109 Ecology and Environment Inc., 1994, Work plan documents, Birch Hill underground storage tank, site no. 355, Fort Wainwright, Alaska: Anchorage, Alaska, prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [contract no. DACA85-93-D-0009, delivery order no. 0019].

111 EMCON Alaska, Inc., 1994, Fort Wainwright 1993 groundwater summary report, Fairbanks, Alaska—Final: Anchorage, Alaska, v. 1 of 2 (text, tables, illustrations, and appendixes), prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [contract no. DACA85-93-D-0013, delivery order no. 0010].

112 EMCON Alaska, Inc., 1994, Fort Wainwright 1993 groundwater summary report, Fairbanks, Alaska—Final: Anchorage, Alaska, v. 2 of 2 (boring logs), prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [contract no. DACA85-93-D-0013, delivery order no. 0010].

122 ENSR Consulting and Engineering, 1995, Supplemental data, railroad off-loading facility, Building 5110, Fort Wainwright—Draft, April, 1995: Anchorage, Alaska, prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [contract no. DACA85-94-D-0010, delivery order no. 0003, ENSR project no. 9000-043].

10 Harding Lawson Associates, 1992, Operable unit 2, preliminary source evaluation 2, phase 1, Fort Wainwright, Alaska—Draft, November, 1992: Anchorage, Alaska, v. I of III, prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [contract no. DACA85-91-0008, delivery order no. 0002].

11 Harding Lawson Associates, 1992, Operable unit 2, preliminary source evaluation 2, phase 1, Fort Wainwright, Alaska—Draft, November, 1992: Anchorage, Alaska, v. II of III (appendixes A through F), prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [contract no. DACA85-91-0008, delivery order no. 0002].

74 Harding Lawson Associates, 1992, Work plan, defense reutilization, marketing office, operable unit 2, preliminary source evaluation 2, phase 2, Fort Wainwright, Alaska: Anchorage, Alaska, prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [contract no. DACA85-91-D-0008, delivery order no. 0004].

42 Harding Lawson Associates, 1993, Final report, operable unit 2, preliminary source evaluation 2, phase 1, Fort Wainwright, Alaska: Anchorage, Alaska, prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [7 sections & 5 appendixes, contract no. DACA85-91-0008, delivery order no. 0002].

72 Harding Lawson Associates, 1993, Final report, operable unit 2, preliminary source evaluation 2, phase 1, Fort Wainwright, Alaska: Anchorage, Alaska, prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [DACA85-91-0008, delivery order no. 0002].

12 Harding Lawson Associates, 1993, Final report, operable unit 2, preliminary source evaluation 2, phase 2, defense reutilization marketing office, Fort Wainwright, Alaska: Anchorage, Alaska, v. I of II, prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [contract no. DACA85-91-D-0008, delivery order no. 0004].

13 Harding Lawson Associates, 1993, Final report, operable unit 2, preliminary source evaluation 2, phase 2, defense reutilization marketing office, Fort Wainwright, Alaska: Anchorage, Alaska, v. II of II (appendixes A through J), prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [contract no. DACA85-91-D-0008, delivery order no. 0004].

5 Harding Lawson Associates, 1993, Final report, operable unit 2, preliminary source evaluation 2, phase 2, defense reutilization marketing office, Fort Wainwright, Alaska—Draft, February, 1993: Anchorage, Alaska, prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [contract no. DACA85-91-D-0008, delivery order no. 0004].

6 Harding Lawson Associates, 1993, Maintenance facility audit, operable unit 1, Fort Wainwright, Alaska—Draft, March, 1993: Anchorage, Alaska, prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [contract no. DACA85-91-D-0008, delivery order no. 0009].

27 Harding Lawson Associates, 1993, Operable unit 2, remedial investigation/feasibility study management plan, Fort Wainwright, Alaska—Draft final, November, 1993: Anchorage, Alaska, prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [contract no. DACA85-91-D-0008, delivery order no. 0011].

1 Harding Lawson Associates, 1993, Site safety and health plan, chemical agent dump, operable unit 1, preliminary source evaluation 2, Fort Wainwright, Alaska: Anchorage, Alaska, prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [contract no. DACA85-91-D-0008, delivery order no. 0013].

76 Harding Lawson Associates, 1993, Site safety and health plan, phase II site investigation, Building 1565, Fort Wainwright, Alaska: Anchorage, Alaska, prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [contract no. DACA85-91-D-0008, delivery order no. 0013].

7 Harding Lawson Associates, 1993, Work plan, Fort Wainwright Federal facility agreement, operable unit 1, preliminary source evaluation 2, Fort Wainwright, Alaska: Anchorage, Alaska, prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [contract no. DACA85-91-D-0008, delivery order no. 0010, same as report no. 75].

38 Harding Lawson Associates, 1993, Work plan, Fort Wainwright, Federal facility agreement, operable unit 1, preliminary source evaluation 2, Fort Wainwright, Alaska—Draft, March, 1993: Anchorage, Alaska, prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [contract no. DACA85-91-D-0008, delivery order no. 0010].

73 Harding Lawson Associates, 1993, Work plan, operable unit 2, preliminary source evaluation 2, support work, Fort Wainwright, Alaska: Anchorage, Alaska, prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [contract no. DACA85-91-D-0008, delivery order no. 0014].

9 Harding Lawson Associates, 1993, Work plan, operable unit 2, preliminary source evaluation 2, support work, Fort Wainwright, Alaska—Draft, June, 1993: Anchorage, Alaska, prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [contract no. DACA85-91-D-0008, delivery order no. 0014, same as report no. 17].

69 Harding Lawson Associates, 1994, Final management plan, operable unit 2, remedial investigation/feasibility study, Fort Wainwright, Alaska: Anchorage, Alaska, prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [contract no. DACA85-91-D-0008, delivery order no. 0011].

60 Harding Lawson Associates, 1994, Operable unit 1, preliminary source evaluation 2, Fort Wainwright, Alaska: Anchorage, Alaska, v. I of II (text, tables, and illustrations), prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged (same as reports no. 88, 97, and 102).

61 Harding Lawson Associates, 1994, Operable unit 1, preliminary source evaluation 2, Fort Wainwright, Alaska: Anchorage, Alaska, v. II of II (appendixes A through H), prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged (same as reports no. 98 and 103).

36 Harding Lawson Associates, 1994, Operable unit 1, preliminary source evaluation 2, Fort Wainwright, Alaska—Draft, January, 1994: Anchorage, Alaska, v. I of II (text, tables, and figures), variously paged.

37 Harding Lawson Associates, 1994, Operable unit 1, preliminary source evaluation 2, Fort Wainwright, Alaska—Draft, January, 1994: Anchorage, Alaska, v. II of II (appendixes A through G), prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged.

47 Harding Lawson Associates, 1994, Operable unit 1, preliminary source evaluation 2, Fort Wainwright, Alaska—Draft, January, 1994: Anchorage, Alaska, v. I of II (text, tables, and illustrations), prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged.

48 Harding Lawson Associates, 1994, Operable unit 1, preliminary source evaluation 2, Fort Wainwright, Alaska—Draft, January, 1994: Anchorage, Alaska, v. II of II (appendixes A through G), prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged.

60 Harding Lawson Associates, 1994, Operable unit 1, preliminary source evaluation 2, Fort Wainwright, Alaska: Anchorage, Alaska, v. I of II (text, tables, and illustrations), prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged.

35 Harding Lawson Associates, 1994, Operable unit 2, preliminary source evaluation 2, support work, Building 1168, Fort Wainwright, Alaska—Draft, February, 1994: Anchorage, Alaska, prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged [contract no. DACA85-91-D-0008, delivery order no. 0014, same as report no. 50].

86 Harding Lawson Associates, 1994, Operable unit 2, preliminary source evaluation 2, support work, Building 1168, Fort Wainwright, Alaska: Anchorage, Alaska, prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged (same as report no. 95).

40 Harding Lawson Associates, 1994, Phase II site investigation, Building 1565, Fort Wainwright, Alaska—Draft, January, 1994: Anchorage, Alaska, prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged (same as report no. 54).

41 Harding Lawson Associates, 1994, Preliminary source evaluation 2, support work, 801 drum burial site, Fort Wainwright, Alaska—Draft, February, 1994: Anchorage, Alaska, prepared for the U.S. Army Corps of Engineers, Alaska District, variously paged (same as report no. 58).

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APPENDIX 1

Selected ASTM Standards Relating to Ground Water and Vadose Zone Investigations

These standards are available from the ASTM individually at 1916 Race Street, Philadelphia, PA 19103, or may be found in Volumes 4.08 and 4.09 of the Annual Book of ASTM Standards. Draft documents will be published as they become ASTM standards. Where official publication numbers are available, they are provided.

Number	Title
Draft	Guide for Preparing Hydrologic and Geologic Reports
Draft	Guide for Planning Ground Water Projects
Draft	Guide for Site Characterization for Environmental Purposes
D5549	Guide for Reporting Geostatistical Site Investigations
Draft	Guide for Preparing Hydrologic and Geologic Investigation Reports
Draft	Guidelines for Ground Penetrating Radar
Draft	Design of Filter Pack Grain Size Monitoring Well Screen Slot Sizes in Aquifers
Draft	Development of Ground Water Monitoring Wells in Aquifers
Draft	Practice for Use of Aquifer Identification Code
Draft	Guide for Presentation of Ground Water Level Data
D5609	Guide for Defining Boundary Conditions in Ground-Water Modeling
D5610	Guide for Defining Initial Conditions in Ground-Water Modeling

(pages A-5 follows)

APPENDIX 2

Ground-Water Site Inventory components list

8.11 List of Components (by number)

Component Number	Description and Coding Manual Page Number	Coding Manual Article
C001	Site ID (station number), p. 2-10	1.2
C002	Type of site, p. 2-26	1.36

C - Collector or Ranney type well
D - Drain (dug: intercept water table/potentiometric surface; to lower water level or serve as water supply)
E - Excavation
H - Sinkhole
I - Interconnected wells (interconnected via an underground lateral)
M - Multiple wells (pumped through a single header)
O - Outcrop
P - Pond (dug: intercept water table/potentiometric surface; serve as water supply
S - Spring (used only on spring schedule)
T - Tunnel, shaft, or mine from which ground water is obtained
W - Well (single well other than collector or Ranney type)
X - Test hole, not completed as a well

C003	Record classification, p. 2-25	1.34

C - Data have been field checked by the reporting agency.
L - Location not accurate.
M - Minimal data.
U - Data have not been field checked by the reporting agency, but the reporting agency considers the data reliable.

C004	Source agency code, p. 2-9	1.1
C005	Project number, p. 2-35	1.49
C006	District code, p. 2-13	1.7
C007	State code, p. 2-13	1.8
C008	County code, p. 2-13	1.9
C009	Latitude, p. 2-12	1.4
C010	Longitude, p. 2-12	1.5

Component Number	Description and Coding Manual Page Number	Coding Manual Article
C011	Lat-long accuracy code, p. 2-12	1.6
	S - The measurement is accurate to + 1 second. F - The measurement is accurate to + 5 seconds. T - The measurement is accurate to + 10 seconds. M - The measurement is accurate to + 1 minute.	
C012	Local well number, p. 2-11	1.3
C013	Land-net location, p. 2-13	1.10
C014	Name of location map, p. 2-14	1.11
C015	Scale of location map, p. 2-14	1.12
C016	Altitude of land surface, p. 2-14	1.13
C017	Method altitude determined, p. 2-14	1.14
	A - Altimeter L - Level or other surveying method M - Interpolated from topographic map - Blank field implies that the method is unknown.	
C018	Altitude accuracy, p. 2-15	1.15
	nn - Possible error in feet.	
C019	Topographic setting, p. 2-16	1.18
	A - Alluvial fan B - Playa C - Stream channel D - Local depression E - Dunes F - Flat surface G - Flood plain H - Hilltop K - Sinkhole L - Lake, swamp, or marsh M - Mangrove swamp O - Offshore (estuary) P - Pediment S - Hillside (slope) T - Alluvial or marine terrace U - Undulating V - Valley flat (valleys of all sizes) W - Upland draw	

Component Number	Description and Coding Manual Page Number	Coding Manual Article
C020	Hydrologic unit code, p. 2-15	1.16
C021	Date well constructed, p. 2-26	1.37
C023	Primary use of site, p. 2-27	1.38

A - Anode
C - Standby emergency supply
D - Drain
E - Geothermal
G - Seismic
H - Heat reservoir
M - Mine
O - Observation
P - Oil or gas well
R - Recharge
S - Repressurize
T - Test
U - Unused
W - Withdrawal of water
X - Waste disposal
Z - Destroyed

C024	Primary use of water, p. 2-30	1.41

A - Air conditioning
B - Bottling
C - Commercial
D - Dewater
E - Power
F - Fire
H - Domestic
I - Irrigation
J - Industrial (cooling)
K - Mining
M - Medicinal
N - Industrial
P - Public supply
Q - Aquaculture
R - Recreation
S - Stock
T - Institutional
U - Unused
Y - Desalination
Z - Other

C025	Secondary use of water (see list w/C024), p. 2-33	1.42
C026	Tertiary use of water (see list w/C024), p. 2-33	1.43
C027	Hole depth (depth drilled), p. 2-34	1.46
C028	Depth of well (finished depth), p. 2-34	1.47
C029	Source of depth data, p. 2-35	1.48

A - Reported by another government agency.
B - From driller's log or report.
G - Private geologist-consultant or university associate.
L - Depth interpreted from geophysical logs by personnel of source agency.
M - Memory (owner, operator, driller).
O - Reported by the owner of the well.
R - Reported by other than owner, driller, or another government agency.
S - Measured by personnel of reporting agency.
Z - Other.

C030	Water level, p. 2-35	1.50
C031	Date water level measured, p. 2-36	1.51
C033	Source of water-level data (see list w/C029), p.2-37	1.54

Component Number	Description and Coding Manual Page Number	Coding Manual Article
C034	Method water level measured, p. 2-36	1.52

A - Airline measurement
B - Analog or graphic recorder
C - Calibrated airline measurement
E - Estimated
G - Pressure-gage measurement
H - Calibrated pressure-gage measurement
L - Interpreted from geophysical logs
M - Manometer measurement
N - Nonrecording gage
R - Reported, method not known
S - Steel-tape measurement
T - Electric-tape measurement
V - Calibrated electric-tape measurement
Z - Other

C037	Site status at water-level measurement, p. 2-37	1.53

D - The site was dry (no water level is recorded).
E - The site was flowing recently.
F - The site was flowing, but the head could not be measured (no water level is recorded).
G - A nearby site that taps the same aquifer was flowing.
H - A nearby site that taps the same aquifer had been flowing recently.
I - Injector site (recharges water being injected into the aquifer).
J - Injector site monitor (a nearby site that taps the same aquifer is injecting recharge water).
N - The measurement was discontinued.
O - An obstruction was encountered in the well above the water surface (no water level is recorded).
P - The site was being pumped.
R - The site had been pumped recently.
S - A nearby site that taps the same aquifer was being pumped.
T - A nearby site that taps the same aquifer had been pumped recently.
V - A foreign substance was present on the surface of the water.
W - The well was destroyed.
X - The water level was affected by stage in nearby surface-water site.
Z - Other conditions that would affect the measured water level.

Component Number	Description and Coding Manual Page Number	Coding Manual Article
C038	Date lift data collected, p. 2-44	2.6.1.2
C040	Date site record last updated, p. 2-23	1.26
C043	Type of lift, p. 2-42	2.6.1.1
	A - Air lift B - Bucket C - Centrifugal pump J - Jet pump P - Piston pump R - Rotary pump S - Submergible pump T - Turbine pump U - Unknown Z - Other	
C044	Depth to intake, p. 2-44	2.6.1.3
C045	Type of power, p. 2-44	2.6.1.4
	D - Diesel engine E - Electric motor G - Gasoline engine H - Hand L - LP-gas engine N - Natural-gas engine W - Windmill Z - Other	
C046	Horsepower rating, p. 2-44	2.6.1.5
C048	Manufacturer of lift device, p. 2-45	2.6.1.6
C049	Serial number of lift device, p. 2-45	2.6.1.7
C050	Name of power company, p. 2-45	2.6.1.8
C051	Power company account number, p. 2-45	2.6.1.9
C052	Power meter number, p. 2-45	2.6.1.10
C053	Pump rating, p. 2-45	2.6.1.11
C054	Company that maintains lift device, p. 2-46	2.6.1.13
C056	Type of standby power, p. 2-46	2.6.1.15
C057	Horsepower of standby power source (see list w/C045), p. 2-46	2.6.1.16
C059	Parent sequence number for HOLE subrecord of CONS file, p. 2-53	2.6.3.1
C060	Date of construction, p. 2-47	2.6.2.1
C063	Name of contractor, p. 2-48	2.6.2.2
C064	Source of construction data (see list w/C029), p. 2-48	2.6.2.3
C065	Method of construction, p. 2-48	2.6.2.4
	A - Air-rotary B - Bored or augered C - Cable-tool D - Dug H - Hydraulic rotary J - Jetted P - Air percussion R - Reverse rotary T - Trenching V - Driven W - Drive and wash Z - Other	

Component Number	Description and Coding Manual Page Number	Coding Manual Article
C066	Type of finish, p. 2-50 C - Porous concrete F - Gravel pack w/perforations G - Gravel pack w/screen H - Horizontal gallery O - Open end P - Perforated or slotted S - Screen T - Sand point W - Walled X - Open hole Z - Other	2.6.2.5
C067	Type of surface seal, p. 2-51 B - Bentonite C - Clay or cuttings G - Cement grout N - None Z - Other	2.6.2.6
C068	Depth to bottom of seal, p. 2-52	2.6.2.7
C069	Method of development, p. 2-52 A - Pumped w/air lift B - Bailed C - "Blown" or surged N - None P - Pumped	2.6.2.8
C070	Hours of development, p. 2-52	2.6.2.9
C071	Special treatment during development, p. 2-52 C - Chemical (acid, and so forth) D - Dry ice E - Explosives F - Deflocculent H - Hydrofracturing M - Mechanical abrasion Z - Other	2.6.2.10
C073	Depth to top of this hole interval, p. 2-53	2.6.3.2
C074	Depth to bottom of this hole interval, p. 2-54	2.6.3.3
C075	Diameter of this hole interval, p. 2-54	2.6.3.4
C077	Depth to top of this casing string, p. 2-55	2.6.4.2
C078	Depth to bottom of this casing string, p. 2-55	2.6.4.3
C079	Diameter of this casing string, p. 2-55	2.6.4.4

Component Number	Description and Coding Manual Page Number	Coding Manual Article
C080	Casing material, p. 2-56	2.6.4.5
	B - Brick C - Concrete D - Copper G - Galvanized iron I - Wrought iron M - Other metal P - PVC, fiberglass, other plastic R - Rock or stone S - Steel T - Tile U - Coated steel W - Wood Z - Other material	
C081	Wall thickness of this casing, p. 2-56	2.6.4.6
C083	Depth to top of this open interval, p. 2-58	2.6.5.2
C084	Depth to bottom of this open interval, p. 2-58	2.6.5.3
C085	Type of openings in this interval, p. 2-59	2.6.5.6
	F - Fractured rock L - Louvered or shutter-type screen M - Mesh screen P - Perforated, porous, or slotted casing R - Wire-wound screen S - Screen, type not known T - Sand point W - Walled or shored X - Open hole Z - Other	
C086	Material in this interval, p. 2-58	2.6.5.5
	B - Brass or bronze C - Concrete G - Galvanized iron I - Wrought iron M - Other metal P - PVC, fiberglass, or other plastic R - Stainless steel S - Steel T - Tile Z - Other	
C087	Diameter of this open interval, p. 2-58	2.6.5.4
C088	Width of openings, p. 2-59	2.6.5.8
C089	Length of openings, p. 2-59	2.6.5.7
C091	Depth to top of geohydrologic interval, p. 109	6.7.1.1
C092	Depth to bottom of geohydrologic interval, p. 109	6.7.1.2
C093	Aquifer code (see Appendix F in the WATSTORE User's Guide), p. 2-109	6.7.1.3
C095	Aquifer date -geohydrologic, p. 113	6.7.2.1

Component Number	Description and Coding Manual Page Number	Coding Manual Article
C096 Lithology code, p. 2-109		6.7.1.4

Alluvium	ALVM	Lignite	LGNT
Anhydrite	ANDR	Limestone	LMSN
Anorthosite	ANRS	Limestone and Dolomite	LMDM
Arkose	ARKS	Loam	LOAM
Basalt	BSLT	Loess	LOSS
Bentonite	BNTN	Marble	MRBL
Boulders	BLDR	Marl	MARL
Boulders and Sand	BLSD	Marlstone	MRLS
Boulders, silt, clay	BLSC	Metamorphis (undifferentiated)	MMPC
Breccia	BRCC	Muck	MUCK
Calcite	CLCT	Mud	MUD
Caliche (hard pan)	CLCH	Mudstone	MDSN
Chalk	CHLK	Other	OTHR
Chert	CHRT	Outwash	OTSH
Clay	CLAY	Overburden	OBDN
Clay, some sand	CLSD	Peat	PEAT
Claystone	CLSN	Quartzite	QRTZ
Coal	COAL	Residium	RSDM
Cobbles	COBB	Rhyolite	RYLT
Cobbles and sand	COSD	Rock	ROCK
Cobbles, silt, clay	COSC	Rubble	RBBL
Colluvium	CLVM	Sand	SAND
Conglomerate	CGLM	Sand and clay	SDCL
Coquina	CQUN	Sand and gravel	SDGL
Diabase	DIBS	Sand and silt	SDST
Diorite	DORT	Sand, gravel, clay	SGVC
Dolomite	DLMT	Sand, some clay	SNCL
Drift	DRFT	Sandstone	SNDS
Evaporite	EVPR	Sandstone and shale	SDSL
Gabbro	GBBR	Saprolite	SPRL
Glacial (undifferentiated)	GLCL	Schist	SCST
Gneiss	GNSS	Sedimentary (undifferentiated)	SDMN
Granite	GRNT	Serpentine	SRPN
Granite, gneiss	GRGN	Shale	SHLE
Gravel	GRVL	Silt	SILT
Gravel and clay	GRCL	Silt and clay	STCL
Gravel, cemented	GRCM	Siltstone	SLSN
Gravel, sand, silt	GRDS	Slate	SLTE
Gravel, silt, clay	GRSC	Soil	SOIL
Graywacke	GRCK	Syenite	SYNT
Greenstone	GNST	Till	TILL
Gypsum	GPSM	Travertine	TRVR
Hard pan	HRDP	Tuff	TUFF
Igneous (undifferentiated)	IGNS	Volcanic (undifferentiated)	VLCC

Component Number	Description and Coding Manual Page Number	Coding Manual Article
C097	Description of material, p. 2-112	6.7.1.7
C099	Parent sequence number -hydraulic, p. 2-118	8.5
C100	Hydraulic unit id (see Appendix F in the WATSTORE User's Guide, p. 2-120)	8.7.1.1
C101	Test interval -top, p. 2-120	8.7.1.2
C102	Test interval -bottom, p. 2-120	8.7.1.3
C103	Hydraulic unit type, p. 120	8.7.1.4
	A - Aquifer C - Confining layer	
C104	Hydraulic remarks, p. 2-120	8.7.1.5
C106	Sequence number for COEF subrecord of HYDR file, p. 2-118	8.4
C107	Transmissivity, p. 2-122	8.7.2.1
C108	Horizontal conductivity, p. 2-122	8.7.2.2
C109	Vertical conductivity, p. 2-122	8.7.2.3
C110	Storage coefficient, p. 2-122	8.7.2.4
C111	Leakance, p. 2-122	8.7.2.5
C112	Diffusivity, p. 2-123	8.7.2.6
C113	Specific storage, p. 2-123	8.7.2.7
C115	Begin year of data collection, p. 2-94	5.6.7.2
C116	End year of data collection, p. 2-94	5.6.7.3
C117	Source agency for network data p. 2-95	5.6.7.5
C118	Frequency of data collection, p. 2-95	5.6.7.6

A - Annually
B - Bimonthly (every 2 months)
C - Continuously (recorder)
D - Daily
F - Semimonthly (twice a month)
I - Intermittently
M - Monthly
O - One time only
Q - Quarterly
S - Semiannually
W - Weekly
Z - Other
2 - Biannually
3 - Every 3 years
4 - Every 4 years
5 - Every 5 years
X - Every 10 years

Component Number	Description and Coding Manual Page Number	Coding Manual Article

C120 Type of analyses - QW network, p. 2-95 5.6.7.4

A - Physical properties
B - Common ions
C - Trace elements
D - Pesticides
E - Nutrients
F - Sanitary analysis (organisms)
G - Pesticides and common ions
H - Nutrients and common ions
I - Common ions/trace elements
J - Sanitary analysis and common ions
K - Pesticides and nutrients
L - Trace elements, pesticides, and nutrients
M - All or most of the above
N - Common ions, trace elements and radioactive
P - Common, trace, and physical
Z - Other

C126 Aquifer static level, p. 2-114 6.7.2.2
C132 Aquifer contribution (percent), p. 2-114 6.7.2.3
C133 Method of data collection, p. 2-96 5.6.7.7

C - Calculated from power-consumption records
E - Estimated
M - Metered
U - Unknown
Z - Other

C147 Record sequence number, p. 2-76 4.3
C148 Date discharge measured, p. 2-76 4.4
C150 Discharge, p. 2-77 4.7
C151 Source of discharge data (see list w/C029), p. 2-77 4.8
C152 Method discharge measured, p. 2-77 4.9

A - Accoustic meter (transient-time meter)
B - Bailer
C - Current meter
D - Doppler meter
E - Estimated
F - Flume
M - Totaling meter
O - Orifice
P - Pitot-tube meter, includes Cox meter, Collins meter, and the like.
R - Reported, method not known
T - Trajectory method (free-fall method)
U - Venturi meter
V - Volumetric measurement: bucket or barrel and stopwatch
W - Weir
Z - Other

Component Number	Description and Coding Manual Page Number	Coding Manual Article
C153	Production level, p. 2-78	4.10
C154	Static water level, p. 2-78	4.11
C155	Source of water-level data (see list w/C029), p. 2-78	4.12
C156	Method water level measured (see list w/C034), p. 2-78	4.13
C157	Duration of discharge before producing level, p. 2-78	4.14
C159	Date of ownership, p. 2-83	5.6.1.1
C161	Owner, p. 2-83	5.6.1.2
C165	Record number for repairs subrecord, p. 2-40	2.4
C166	Nature of repairs, p. 2-60	2.6.6.1

B - Blocked off
C - Cleaned
D - Deepened
I - Pump intake lowered
O - Slotted or perforated
P - Plugged back
S - Screen replaced
Z - Other

C167	Date of repairs, p. 2-61	2.6.6.2
C169	Name of contractor who made repairs, p. 2-61	2.6.6.3
C170	Percent change in performance after repairs, p. 2-61	2.6.6.4
C172	Name of spring, p. 2-62	2.6.7.1
C173	Type of spring, p. 2-63	2.6.7.2

A - Artesian
B - Perched and contact
C - Contact
D - Depression
E - Perched and depression
F - Fracture
G - Geyser
H - Perched and tubular
J - Artesian and depression
K - Artesian and seepage or filtration
L - Fracture and depression
P - Perched
O - Perched and fracture
R - Perched and seepage or filtration
S - Seepage or filtration
T - Tubular—cave
Z - Other

C174	Permanence of spring, p. 2-65	2.6.7.3

E - Periodic, ebb and flow
G - Geyser
I - Intermittent
P - Perennial
R - Response to precipitation
S - Seasonal
Z - Other

C175	Sphere of discharge, p. 2-65	2.6.7.4

A - Subaerial
W - Subaqueous

Component Number	Description and Coding Manual Page Number	Coding Manual Article
C176	Improvements, p. 2-66	2.6.7.5

B - Boxed or small covered basin
C - Concrete basin
G - Gallery
H - Spring house
L - Lined
N - None
P - Pond
R - Pipe (not for conduction of water from spring)
T - Trough
Z - Other

C177	Number of spring openings, p. 2-66	2.6.7.6
C178	Flow variability, p. 2-66	2.6.7.7

$V = 100 \times [(a-b)/c]$

where: V = Variability, in percent
a = Maximum discharge
b = Minimum discharge
c = Average discharge

C179	Accuracy of flow variability, p. 2-67	2.6.7.8

A - Calculated from less than 1 year of continuous discharge record.
B - Calculated from 1 to 5 years of continuous discharge record.
C - Calculated from more than 5 years of continuous discharge record.
D - Calculated from intermittent measurements made over a period of more than 1 year.
E - Calculated from less than 1 year of record, or estimated.
Z - Determined by other method.

C181	Other data type, p. 2-85	5.6.3.1
C182	Other data location, p. 2-86	5.6.3.2

C - Cooperator's office
D - District office (USGS only)
R - Reporting agency office
Z - Other

C184	Remark-date, p. 2-104	5.6.11.1
C185	Remarks -misc, p. 2-104	5.6.11.2
C187	Date of visit, p. 2-87	5.6.4.1
C188	Person who made visit, p. 2-87	5.6.4.2

Component Number	Description and Coding Manual Page Number	Coding Manual Article
C190	Other identifier, p. 2-84	5.6.2.1
C191	Assignor of other identifier, p. 2-84	5.6.2.2
C193	Date of water-quality measurement, p. 2-88	5.6.5.1
C195	Aquifer sampled (see Appendix F in the WATSTORE User's Guide), p. 2-89	5.6.5.2
C196	Water-quality parameter code, p. 2-89	5.6.5.3
C197	Value of water-quality parameter, p. 2-90	5.6.5.4
C199	Type of log, p. 2-92	5.6.6.1

A - Drilling time
B - Casing collar
C - Caliper
D - Drillers
E - Electric
F - Fluid-conductivity
G - Geologists or sample
H - Magnetic
I - Induction
J - Gamma ray
L - Lateral log
M - Microlog
N - Neutron
O - Microlateral log
P - Photographic
Q - Radioactive-tracer
S - Sonic
T - Temperature
U - Gamma-gamma
V - Fluid velocity
X - Core
Z - Other

C200	Depth to top of logged interval, p. 2-92	5.6.6.2
C201	Depth to bottom of logged interval, p. 2-92	5.6.6.3
C202	Source of log data (see list w/C029), p. 2-92	5.6.6.4
C204	Number of wells/laterals in a group, p. 2-97	5.6.8.1
C205	Depth of deepest well in group, p. 2-98	5.6.8.2
C206	Depth of shallowest well in group, p. 2-98	5.6.8.3
C207	Method wells in group constructed, p. 2-98	5.6.8.4

D - Drilled
J - Jetted
V - Driven
W - Drive-wash
Z - Other

C209	Length of pond, tunnel, or drain, p. 2-98	5.6.8.6
C210	Width of pond, tunnel, or drain, p. 2-98	5.6.8.7
C211	Depth of pond, tunnel, or drain, p. 2-99	5.6.8.8
C213	Cooperator's id -misc, p. 2-102	5.6.10.1
C214	Registration number, p. 2-102	5.6.10.2
C215	Inspection status -misc, p. 2-103	5.6.10.3
C216	Reason unapproved -misc, p. 2-103	5.6.10.4
C217	Date inspected -misc, p. 2-103	5.6.10.5
C218	Cooperator's remarks, p. 2-103	5.6.10.6
C220	Number of wells/laterals in a group, p. 2-97	5.6.8.1
C221	Depth of lateral in collector well, p. 2-99	5.6.8.11

Component Number	Description and Coding Manual Page Number	Coding Manual Article
C222	Length of lateral in collector well, p. 2-99	5.6.8.12
C223	Diameter of lateral in collector well, p. 2-99	5.6.8.13
C224	Mesh of screen in lateral, p. 2-100	5.6.8.14
C235	Water-level measurement date, p. 2-71	3.3
C236	Date accuracy code -water level, p. 2-74	3.10
	M - to nearest month Y - to nearest year D - to nearest day	
C237	Water level, p. 2-71	3.5
C238	Water-level status (see list w/C037), p. 2-71	3.6
C239	Water-level method (see list w/C034), p. 2-73	3.7
C240	Water-level reference code, p. 2-73	3.8
	M - Water level shown is a daily maximum. N - Water level shown is a daily minimum. A - Water level is 12 noon reading. P - Water level is 12 midnight reading.	
C251	Value-1 -misc, p. 2-100	5.6.9.1
C252	Value-2 -misc, p. 2-101	5.6.9.2
C253	Value-3 -misc, p. 2-101	5.6.9.3
C254	Record number for lift subrecord, p. 2-40	2.4
C255	Additional lift (above land surface), p. 2-46	2.6.1.12
C256	Parent sequence number f/AQFR subrecord, p. 2-107	6.5
C257	Primary network, p. 2-96	5.6.7.9
	1 - National 3 - Project 2 - District 4 - Cooperator	
C261	Format of other data, p. 2-86	5.6.3.3
	F - Files (raw data) P - Published M - Machine readable Z - Other	
C262	Diameter of well group, p. 2-98	5.6.8.5
C263	Bearing (azimuth) of pond, tunnel, drain, p. 2-99	5.6.8.9
C264	Dip of tunnel, p. 2-99	5.6.8.10
C268	Rated pump capacity, p. 2-46	2.6.1.14
C270	Well heading line -observation, p. 2-116	7.5
C271	Barometric efficiency, p. 2-123	8.7.2.8
C272	Specific capacity -disch, p. 2-79	4.15

Component Number	Description and Coding Manual Page Number	Coding Manual Article
C276	Accuracy code, p. 2-74	3.9
	0 - Water-level accuracy to nearest foot 1 - Water-level accuracy to nearest tenth of a foot 2 - Water-level accuracy to nearest one-hundredth of a foot	
C278	Certificate number, p. 2-125	9.5
C279	Water use, legal diversion, cfs, p. 2-126	9.9
C280	Application Number, p. 2-125	9.7
C281	Water-use permit number, p. 2-125	9.8
C282	Priority date, p. 2-125	9.6
C285	Legal irrigation seasons begins, p. 2-126	9.12
C286	Legal irrigation season ends, p. 2-126	9.13
C288	Water use, irrigated acreage, p. 2-126	9.10
C298	Water use, legal allowance, p. 2-126	9.11
C301	Secondary use of site (see list w/C023), p. 2-29	1.39
C302	Tertiary use of site (see list w/C023), p. 2-29	1.40
C303	Date site record created, p. 2-23	1.25
C304	Contributing unit, p. 2-112	6.7.1.5
C305	Hydraulic source agency, p. 2-121	8.7.1.6
C306	Porosity, p. 2-123	8.7.2.9
C307	Agency that analyzes samples, p. 2-96	5.6.7.8
C309	Water-level drawdown, p. 2-79	4.16
C311	Sequence no. f/RMKS subrecord of MISC file, p.2-81	5.4
C312	Sequence no. f/OTDT subrecord of MISC file, p.2-81	5.4
C313	Sequence no. f/MSVL subrecord of MISC file, p.2-81	5.4
C314	Value-4 -miscellaneous, p. 101	5.6.9.4
C315	Sequence number -observation, p. 115	7.3
C321	Begin date for use of this measuring point, p.2-68	2.6.8.1
C322	End date for use of this measuring point, p.2-68	2.6.8.2
C323	Height of this measuring point, p. 2-69	2.6.8.3
C324	Description of this measuring point, p. 2-69	2.6.8.4
C702	Last update -discharge, p. 2-76	4.5
C703	Discharge type, p. 2-76	4.6
	P - Pumped discharge F - Flow discharge	
C706	Network data type -miscellaneous, p. 2-94	5.6.7.1
	QW - Water-quality network station WL - Water-levels network station WD - Pumpage or withdrawals network station	

Component Number	Description and Coding Manual Page Number	Coding Manual Article
C707	Last update -obs, p. 2-116	7.4
C708	Network secondary -misc (see list w/C257), p. 2-96	5.6.7.10
C709	Measurement time -wl, p. 2-71	3.4
C711	Date site established/inventoried, p. 2-22	1.24
C712	Data availability in other GW files, p. 2-25	1.35

Y, in a position - Yes, file exists.
Blank - No, file does not exist.

Position 1 - Construction (GW.CONS) data for site.
2 - Miscellaneous (GW.MISC) data for site.
3 - Discharge (GW.DISC) data for site.
4 - Geohydrologic (GW.GEOH) data for site.
5 - Hydraulic (GW.HYDR) data for site.
6 - Water-level (GW.LEV) data for site.
7 - Observation-heading (GW.OBS) data for site.
8 - State water-use (GW.STWU) data for site.

C713	Aquifer type code, p. 2-33	1.44

U - Unconfined single aquifer
N - Unconfined multiple aquifers
C - Confined single aquifer
M - Confined multiple aquifers
X - Mixed (confined and unconfined) multiple aquifers

C714	Aquifer code (see Appendix F in the WATSTORE User's Guide,) p. 2-34	1.45
C715	Water-use record number, p. 2-125	9.3
C716	Water-use date of last update, p. 2-125	9.4
C718	Sequence no. f/QWNR subrecord of MISC file, p. 2-81	5.4
C721	Sequence no. f/GEOH subrecord of GEOH file, p. 2-107	6.4
C723	Record number for construction subrecord, p. 2-40	2.4
C724	Record number for hole subrecord, p. 2-40	2.4
C725	Record number for casing subrecord, p. 2-40	2.4
C726	Record number for openings subrecord, p. 2-40	2.4
C727	Record number for spring subrecord, p. 2-40	2.4
C728	Record number f/measuring point subrecord, p. 2-40	2.4
C729	Sequence no. f/SPEC subrecord of MISC file, p. 2-81	5.4
C730	Sequence no. f/NETW subrecord of MISC file, p. 2-81	5.4
C734	Sequence no. f/COOP subrecord of MISC file, p. 2-81	5.4
C736	Sequence no. f/OTID subrecord of MISC file, p. 2-81	5.4
C737	Sequence no. f/VIST subrecord of MISC file, p. 2-81	5.4
C738	Sequence no. f/QUAL subrecord of MISC file, p. 2-81	5.4

Component Number	Description and Coding Manual Page Number	Coding Manual Article
C739	Sequence no. f/LOGS subrecord of MISC file, p. 2-81	5.4
C742	Sequence no. f/AQFR subrecord of GEOH file, p. 2-107	6.4
C744	Record type f/HYDR subrecord of HYDR file, p. 2-118	8.3
C745	Last update f/HYDR subrecord of HYDR file, p. 2-119	8.6
C746	Record type f/COEF subrecord of HYDR file, p. 2-119	8.6
C747	Last update f/COEF subrecord of HYDR file, p. 2-119	8.6
C748	Record type f/GEOH subrecord of GEOH file, p. 2-107	6.3
C749	Last update f/GEOH subrecord of GEOH file, p. 2-108	6.6
C750	Record type f/AQFR subrecord of GEOH file, p. 2-107	6.3
C751	Last update f/AQFR subrecord of GEOH file, p. 2-108	6.6
C752	Record type f/LIFT subrecord of CONS file, p. 2-40	2.3
C753	Last update f/LIFT subrecord of CONS file, p. 2-41	2.5
C754	Record type f/CONS subrecord of CONS file, p. 2-40	2.3
C755	Last update f/CONS subrecord of CONS file, p. 2-41	2.5
C756	Record type f/HOLE subrecord of CONS file, p. 2-40	2.3
C757	Last update f/HOLE subrecord of CONS file, p. 2-41	2.5
C758	Record type f/CSNG subrecord of CONS file, p. 2-40	2.3
C759	Last update f/CSNG subrecord of CONS file, p. 2-41	2.5
C760	Record type f/OPEN subrecord of CONS file, p. 2-40	2.3
C761	Last update f/OPEN subrecord of CONS file, p. 2-41	2.5
C762	Record type f/REPR subrecord of CONS file, p. 2-40	2.3
C763	Last update f/REPR subrecord of CONS file, p. 2-41	2.5
C764	Record type f/SPNG subrecord of CONS file, p. 2-40	2.3
C765	Last update f/SPNG subrecord of CONS file, p. 2-41	2.5
C766	Record type f/MPNT subrecord of CONS file, p. 2-40	2.3
C767	Last update f/MPNT subrecord of CONS file, p. 2-41	2.5
C768	Record type f/OWNR subrecord of MISC file, p. 2-81	5.3
C769	Last update f/OWNR subrecord of MISC file, p. 2-82	5.5
C770	Record type f/OTID subrecord of MISC file, p. 2-81	5.3
C771	Last update f/OTID subrecord of MISC file, p. 2-82	5.5
C772	Record type f/OTDT subrecord of MISC file, p. 2-81	5.3
C773	Last update f/OTDT subrecord of MISC file, p. 2-82	5.5
C774	Record type f/VIST subrecord of MISC file, p. 2-81	5.3
C775	Last update f/VIST subrecord of MISC file, p. 2-82	5.5
C776	Record type f/QUAL subrecord of MISC file, p. 2-81	5.3
C777	Last update f/QUAL subrecord of MISC file, p. 2-82	5.5
C778	Record type f/LOGS subrecord of MISC file, p. 2-81	5.3
C779	Last update f/LOGS subrecord of MISC file, p. 2-82	5.5
C780	Record type f/NETW subrecord of MISC file, p. 2-81	5.3
C781	Last update f/NETW subrecord of MISC file, p. 2-82	5.5
C782	Record type f/SPEC subrecord of MISC file, p. 2-81	5.3
C783	Last update f/SPEC subrecord of MISC file, p. 2-82	5.5
C784	Record type f/MSVL subrecord of MISC file, p. 2-81	5.3

Component Number	Description and Coding Manual Page No.	Coding Manual Article
C785	Last update f/MSVL subrecord of MISC file, p. 2-82	5.5
C786	Record type f/COOP subrecord of MISC file, p. 2-81	5.3
C787	Last update f/COOP subrecord of MISC file, p. 2-82	5.5
C788	Record type f/RMKS subrecord of MISC file, p. 2-81	5.3
C789	Last update f/RMKS subrecord of MISC file, p. 2-82	5.5
C790	Sequence no. f/HYDR subrecord of HYDR file, p. 2-118	8.4
C801	Drainage basin code (not presently functional), p. 2-16	1.17
C802	Station type codes, p. 2-20	1.19

Y, in a position - Yes, this is the site type.
Blank - No, this is not the site type.

Position 1 - Stream
2 - Lake or reservoir
3 - Estuary
4 - Coastal other than estuary
5 - Spring
6 - Ground water other than spring
7 - Meteorological

C803	Agency use of site code, p. 2-21	1.20

A - Active data-collection site
I - Inactive or discontinued data-collection site
O - Inventory data site only

Component Number	Description and Coding Manual Page Number	Coding Manual Article

C804 Flags type of data collected (30), p. 2-21 — 1.21

A - Active data-collection site
I - Inactive or discontinued data-collection
O - Inventory data
Blank - Data type not applicable

Position 1 - Stage or water levels—continuous
2 - Stage or water levels—intermittent
3 - Water quality—continuous
4 - Water quality—intermittent
5 - Precipitation—continuous
6 - Precipitation—intermittent
7 - Evaporation—continuous
8 - Evaporation—intermittent
9 - Wind velocity
10 - Tide—continuous
11 - Tide—intermittent
12 - Sediment concentration
13 - Sediment particle size
14 - Peak flows
15 - Low flows
16 - State water use

C805 Flags instruments at site, p. 2-22 — 1.22

Y, in a position - Yes, this instrument is at site.
Blank - No, this instrument is not at site.

Position 1 - Digital recorder
2 - Graphic recorder
3 - Telemetry—land line
4 - Telemetry—radio
5 - Telemetry—satellite relay
6 - AHDAS
7 - Crest-stage gage
8 - Tide gage
9 - Deflection meter
10 - Bubble gage
11 - Stilling well
12 - CR-type recorder
13 - Weighing rain gage
14 - Tipping-bucket rain gage

Component Number	Description and Coding Manual Page Number	Coding Manual Article
C806	Station remarks field, p. 2-22	1.23
C807	Base discharge, p. 2-23	1.27
C808	Drainage area, p. 2-23	1.28
C809	Contributing drainage area, p. 2-24	1.29
C810	Crest stage upstream elevation, p. 2-24	1.30
C811	Crest stage downstream elevation, p. 2-24	1.31
C812	Gage height of zero flow, p. 2-24	1.32
C813	Mean Greenwich time offset, p. 2-24	1.33
C814	Local standard time flag, p. 2-38	1.55
C815	Station locator sequence number, p. 2-38	1.56
C900	Station name, p. 2-11	1.3
C901	Parent sequence number for CSNG subrecord of CONS file, p. 2-55	2.6.4.1
C902	Parent sequence number for OPEN subrecord of CONS file, p. 2-57	2.6.5.1