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# RELEASE INSTRUCTIONS (RI)

DOCUMENT NO.: WHC-CM-7-7

PAGE 1 OF 1

TO: DEBRA A ISOM
H6-08

0176

TITLE: Environmental Investigations and Site Characterization

RELEASE NO.: 98

DATE PREPARED: 08/28/95

I have entered this release into the document per instructions.

Debra A. Isom 9/1/95
Signature Date

If you have any questions about this release contact:

Jean Feaster
Phone: 372-2340


## INSTRUCTIONS

1. REMOVE AND/OR INSERT INDICATED SECTIONS INTO DOCUMENT AS SHOWN BELOW.
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| | PAGES | REV | DATE | PAGES | REV | DATE |
| Table of Contents | 1 - 4 | 97 | 08/07/95 | 1 - 4 | 98 | 08/31/95 |
| REMOVE ICA 073 to EII 5.4 | 1 of 1 | -- | 06/25/93 | -- | -- | -- |
| REMOVE ICA 089 to EII 5.4 | 1 of 1 | -- | 02/08/94 | -- | -- | -- |
| REPLACE EII 5.4, Field Cleaning and/or Decontamination of Equipment | 1 - 7 | 5 | 04/05/93 | 1 - 7 | 5, Chg 2 | 08/31/95 |
| ADD ICA 096 to EII 5.8, Groundwater Sampling | -- | -- | -- | 1 of 1 | -- | 08/21/95 |
| REMOVE ICA 090 to EII 9.1 | 1 of 1 | -- | -- | -- | -- | -- |
| REPLACE EII 9.1, Geologic Logging | 1 - 13 | 3 | 03/15/93 | 1 - 12 | 3, Chg 2 | 08/31/95 |

## IMPLEMENTATION NOTICE

(ROUTE A COPY OF THE IMPLEMENTATION NOTICE TO ALL USERS OF THIS COPY OF THE MANUAL)

**EII 5.4, Field Cleaning and/or Decontamination of Equipment, Rev 5, Change 2 and EII 9.1, Geologic Logging, Rev 3, Change 2:**

Procedures reformatted to current controlled manual (CM) standards. Designated reviewing organization sections added. The one-time ICAs are no longer in use.

**ICA 096 added to EII 5.8, Groundwater Samping, Rev 4** to proceduralize use of Chain of Custody/Sample Analysis Request form A-6001-500.

RETURN TO

**POSTAL MAIL:**
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A-6001-683 (07/95) GEF307

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Table of Contents

ICA = INSTRUCTION CHANGE AUTHORIZATION, (P) = PERMANENT (BLUE SHEET), (T) = ONE TIME (GOLDENROD SHEET)

## 1.0 PURPOSE

This Environmental Investigations Instruction (EII) establishes methods for cleaning and/or decontaminating tools and equipment used in site characterization and monitoring activities.

## 2.0 SCOPE

This EII applies to equipment cleaning and/or decontamination activities.

## 3.0 RESPONSIBILITIES

### 3.1 Decontamination Personnel

Cleaning and/or decontamination personnel may include, but are not limited to, drilling personnel and laborers who are responsible for conducting activities in accordance with this EII.

### 3.2 Site Safety Officer

1. Notifies the Field Team Leader (FTL)/Field Team Coordinator (FTC) of potential nonradiological health and safety hazards.

2. Has the authority to halt decontamination activities for nonradiological health and safety hazards.

### 3.3 Health Physics Technician (HPT)

1. Performs surveys to determine the radiological status of areas, materials, and equipment.

2. Has the authority to halt decontamination activities for radiological hazards.

3. Prepares Radiation Work Permits (RWPs) for regulated equipment and assists in the direction of specific radiological cleaning/decontamination activities.

## 4.0 REQUIREMENTS

### 4.1 Safety Requirements

All activities shall comply with the applicable site-specific safety documents (e.g., Hazardous Waste Operations Plan [HWOP], Job Safety Analysis, site-specific safety plan) for access control, monitoring hazards, and personnel protective equipment.

*Editorial and reformatting are the only changes to Rev 5, Change 2.

### 4.2 Documentation

The person performing the cleaning and/or decontamination activity shall complete and sign the Field Cleaning and/or Decontamination form, Figure 1.

### 4.3 General Cleaning and/or Decontamination Requirements

#### 4.3.1 Cleaning Requirements

Cleaning shall comply with WAC-173-160-530. This requires that the drill rig and all downhole equipment used when drilling in known contaminated or potentially contaminated sites be steam cleaned before and after each use.

1. The drill rig and all downhole equipment shall be steam cleaned prior to mobilization to any site. Previously cleaned drilling equipment (documented as clean) normally does not require re-cleaning prior to use.

2. Steam cleaning of the drill rig is not required when drilling more than a single borehole at the same hazardous waste site (e.g., crib, trench, pond and/or landfill). However, all downhole equipment shall be decontaminated between boreholes on the same hazardous waste site.

3. Rinsate generated during steam cleaning is exempt from collection if generated outside the boundaries of a known waste site and if the equipment being cleaned was not associated with soil/drill cuttings collected as suspected hazardous or radioactive waste.

4. Rinsate from steam cleaning of regulated equipment will be collected until released by HPT.

5. Cleaning shall include the removal of all marking compounds and coatings from the downhole equipment, permanent casing, and the inside of temporary casing.

#### 4.3.2 Decontamination Requirements

Decontamination is required after operating in a known waste site or if detectable hazardous and/or radioactive material are encountered. Decontamination is conducted to minimize the potential for cross contamination.

1. Radiological decontamination shall be performed prior to nonradiological decontamination.

2. Decontamination fluids shall be collected and the material managed in accordance with the applicable procedure (EII 4.2 or EII 4.3).

3. Decontamination fluids will be collected when drilling is conducted in a known hazardous waste site or when drill cuttings/soils are labeled suspect hazardous or radioactive waste.

## 5.0 PROCEDURE

### 5.1 Steam Cleaning

The following applies for steam cleaning (washing) the drill rig when decontamination is not required. Steam cleaning (washing) requirements are a minimum of 80 psi and 180°F.

1. Each drill rig will be steam cleaned between potentially hazardous waste sites. The rinsate from this steam cleaning (washing) does not require collection except as noted in 4.3.1, step 4 of this EII. The FTL/FTC will determine if an absorbent pad is required during steam cleaning operations.

2. Equipment that has been successfully decontaminated may be washed at the discretion of the FTL/FTC. In this case the fluids do not have to be collected.

### 5.2 Decontamination

Decontamination of the drill rig and drilling equipment is required if operating inside a known waste site or if the equipment being cleaned was associated with soils/drill cuttings collected as suspected hazardous or radioactive waste.

Field decontamination activities are described below.

1. Radiological decontamination consisting of wiping and other nonsteam cleaning or pressure washing methods.

2. Nonradiological decontamination consisting of scrubbing, wiping, flushing, rinsing and steam cleaning methods.

3. Steam cleaning/pressure washing can be done on chemically and fixed radiologically contaminated equipment when a method is available to collect rinsate.

4. Sampling equipment used to obtain physical samples shall be decontaminated in accordance with this EII before it is transported to the 1706 KE decontamination facility for decontamination in accordance with EII 5.5 of this manual. Equipment that is not successfully decontaminated will not be transported to the facility and must be stored in accordance with EII 4.4 of this manual.

5. All water used for decontamination activities shall be potable water (for example, Hanford System or City of Richland water) or Columbia River raw water drawn from Hanford Site raw water supply points.

6. All decontaminated materials and equipment shall be stored in a manner to minimize the possibility of recontamination.

7. Decontamination fluids shall be designated and managed in accordance with EII 4.2 or EII 4.3 of this manual.

### 5.2.1 Radiological Decontamination

Survey and unconditional radiological release is the criterion for successful radiological decontamination.

If unable to eliminate fixed radioactive contamination, the FTL/FTC will decide whether to control the equipment as radioactive material or dispose of it as radioactive waste.

Before it is taken from the site, equipment designated for disposal shall be decontaminated to remove nonradiological hazards.

The following methods may be used to perform radiological decontamination.

1. **Wiping.** This method consists of wiping the contaminated equipment with clean paper towels and/or clean rags. It is often performed to prevent the spread of radioactive contaminants as the equipment (drill string, sampler, casing, or drill line) is being removed from the borehole. When all smearable radiological contamination has been removed, the equipment will be cleaned or decontaminated to remove chemical contaminants as required before it is reused or transported to another site.

2. **Abrasive Method.** This method is used in the field to remove fixed radioactive contamination after all the smearable radioactive contamination has been eliminated. The abrasive cleaning method is used to remove small isolated areas of fixed radioactive contamination on equipment. It consists of scrubbing the contaminated area with a wire brush, sandpaper or other mechanical means using an approved cleaner or removing a thin layer of metal using a metal file, sandpaper (garnet, silicon dioxide grit). The equipment will be cleaned or decontaminated to remove chemical contaminants as required before it is reused or transported offsite.

### 5.2.2 Nonradiological Decontamination

Nonradiological field decontamination is accomplished by using one or more of the following techniques and occurs if the HPT has determined that smearable radiological contaminants are not present.

The criterion for nonradiological field decontamination is successful completion of one or more of the following methods with no visible residues remaining.

1. **Steam Cleaning/Pressure Washing Decontamination.** All exposed surfaces of the equipment are steam cleaned or pressure washed with an approved cleaner, such as Built Laundry Detergent[1] or Simple Green[2]. The equipment is then rinsed with water.

---

[1]Klix Corporation, San Francisco, CA

[2]Sunshine Makers, Huntington Harbor, CA

2. **Wash Basin Decontamination.** Decontamination activities using tanks or other fluid containment vessels shall be done so that all contaminated dirt or potentially contaminated rinsate is collected. The equipment can be brushed, wiped, or swabbed using an approved cleaner, such as Built Laundry Detergent or Simple Green. The equipment is then rinsed with water.

3. **Rinsing/Flushing Decontamination.** Pumps used for well development are decontaminated by flushing water through the pump assembly. Connect the pump to the discharge tubing, submerge the pump in potable water or Columbia River raw water, energize the pump, and run approximately 30 gallons through the pump and tubing. The water flushed through the pump shall be contained and handled in the same manner as well development waste water as specified in EII 10.3 of this manual.

4. **Wiping.** This method consists of wiping the contaminated equipment with clean paper towels, or clean rags, using approved cleaners, such as Built Laundry Detergent or Simple Green. It is often performed to prevent the spread of contamination as the equipment (drill string, sampler, casing, drill line, etc.) is being removed from the borehole.

## 5.3 Decontamination Fluids

Decontamination wash and rinse fluids shall be collected when required and contained in impoundment reservoirs consisting of one or more of the following:

1. **Plastic sheeting.** Used in the field when decontaminating drill rigs or other large pieces of equipment. Plastic sheeting must be arranged to collect fluids if this method is used.

2. **Wash basins.** Tanks or other fluid containment vessels used in hand washing, rinsing/flushing, and scrubbing/brushing methods in the field.

3. **Fluid collection sumps.** Usually associated with wash pads at a specialty facility where equipment would be transported for steam cleaning and/or pressure washing operations.

## 5.4 Records

Records generated during implementation of this EII are processed as follows:

| **Name**, Filing Unit or Description | **Record Type*** | **Retention Period** | **Disposal Authority** | **Cut-off and Retirement Instructions** |
|---|---|---|---|---|
| Field Cleaning and/or Decontamination (BC-6000-292) | QA | TBD | TBD | Transmit to FC upon completion for submittal to IRM permanent storage per approved RIDS. Copies for project file are obtained prior to transmittal to permanent storage. |

* QA = Quality Assurance; TBD = to be determined

## 6.0 DESIGNATED REVIEWING ORGANIZATION

The organization designated to review changes to this document is Hanford Technical Services (HTS), the process owner. Comments from other organizations are welcome; however, comments are dispositioned at the option of HTS.

## 7.0 FORM

Field Cleaning and/or Decontamination (BC-6000-292)

## 8.0 BIBLIOGRAPHY

HSRCM-1, *Hanford Site Radiological Control Manual.*

WAC-173-160, "Minimum Standards for Construction and Maintenance of Water Wells."

WHC-CM-3-5, *Document Control and Records Management Manual,* Section 5, "Records Storage, Retrieval, and Destruction."

WHC-CM-7-5, *Environmental Compliance.*

Figure 1. Field Cleaning and/or Decontamination. (BC-6000-292)

| Well ID | FIELD CLEANING AND/OR DECONTAMINATION |
|---|---|

Project: _____

Location of Cleaning/Decontamination: _____ Borehole: _____

Destination: _____

The following equipment has been decontaminated following WHC-CM-7-7 EII 5.4 Rev. _____

List types of detergent: ☐ Non-phosphate ☐ Other _____

**Rigs**

| | Equipment | ID No. |
|---|---|---|
| ☐ | _____ | _____ |
| ☐ | _____ | _____ |
| ☐ | _____ | _____ |
| ☐ | _____ | _____ |

Cleaning ☐ Yes ☐ No

Decontamination ☐ Yes ☐ No

**Downhole Equipment**

| | | | Size | Date |
|---|---|---|---|---|
| ☐ | _____ | _____ Ea. | _____ | _____ |
| ☐ | _____ | _____ Ea. | _____ | _____ |
| ☐ | _____ | _____ Ea. | _____ | _____ |
| ☐ | _____ | _____ Ea. | _____ | _____ |
| ☐ | _____ | _____ Ea. | _____ | _____ |
| ☐ | _____ | _____ Ea. | _____ | _____ |
| ☐ | _____ | _____ Ea. | _____ | _____ |
| ☐ | _____ | _____ Ea. | _____ | _____ |
| ☐ | _____ | _____ Ea. | _____ | _____ |
| ☐ | _____ | _____ Ea. | _____ | _____ |
| ☐ | _____ | _____ Ea. | _____ | _____ |
| ☐ | _____ | _____ Ea. | _____ | _____ |
| ☐ | _____ | _____ Ea. | _____ | _____ |
| ☐ | _____ | _____ Ea. | _____ | _____ |

Remarks: _____

Person Conducting Decontamination (Print/Sign Name) _____ Date _____

Reviewed By FTL/Designee _____ Date _____

DISTRIBUTION: White - Field File Custodian, Yellow - Group Files Pink - Field Team Leader

BC-6000-292 (02/95)

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# INSTRUCTION CHANGE AUTHORIZATION

ICA No. 096

| Instruction (EII) No. | Rev. No. | |
|---|---|---|
| EII 5.8, Groundwater Sampling | 4 | Page 1 of 1 |

Description of Change

Approval Designator Q

The Chain of Custody/Sample Analysis Request form A-6001-500 (7/95) may be used instead of COC forms listed in this procedure. This form is currently being set up for use on Siteforms. This format will replace the existing format of COC/SAR form BC-6000-828.

[X] One Time [ ] Permanent

Justification

The 7/95 version of form A-6001-500 fulfills the needs of other facilities such as 222-S while maintaining the COC and SAR requirements.

Approvals: (Print/Sign Name and Date)

| | | | |
|---|---|---|---|
| D. M. Day | 8-21-95 | D. G. Horton | 8/21/95 |
| ICA Author | Date | ICA Author's Manager | Date |
| D. G. Horton | 8/21/95 | W. R. Thackaberry | 8.21.95 |
| EII Author's Manager | Date | Quality Assurance (If Required) | Date |
| N/R | | N/R | |
| Other | Date | Safety (If Required) | Date |

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## 1.0 PURPOSE

The purpose of this Environmental Investigations Instruction (EII) is to establish methods and documentation format for geologic logging of boreholes in soil and consolidated materials.

## 2.0 SCOPE

This EII applies to the geologic logging of boreholes drilled by Westinghouse Hanford Company (WHC) or subcontractors in accordance with contract documents for geologic sampling, installation of wells, installation of instrumentation or other reasons. It also applies to holes drilled in rock formations (e.g., basalt flows). Relogging of previously drilled material is not covered by this procedure.

This EII may also be used to describe and classify geologic materials regardless of how samples are obtained including pit and trench sampling.

## 3.0 RESPONSIBILITIES

### 3.1 Well Site Geologist

1. Making detailed geologic observations during borehole construction.
2. Describing and logging samples.
3. Completing the Borehole Log and Well Summary Sheet in compliance with the requirements of this EII.

## 4.0 PROCEDURE

The sections in this logging procedure are not necessary for every sample in a given boring nor is the number sequence relevant.

### 3.1 Completion of the Borehole Log

Geologic logging shall be conducted concurrently with the drilling operation for each shift. Logs shall be completed for each shift. Borehole Logs (A-6000-382) shall contain the following:

1. Borehole or well number (permanent, if known) and sheet number.
2. Location (descriptive location) and project identification.
3. Geologist's name (prepared by), signature and date.

*Editorial and reformatting are the only changes to Rev 3, Change 2.

4. Reviewer's name (reviewed by), signature and date.

5. Depths to sample intervals. Record to nearest 0.1 foot if split spoon is used, otherwise record to nearest foot. Delineate depth on depth scale.

6. Number and type of samples retrieved (e.g., split spoon, drive barrel). If split spoon is run; percent recovery, and top and bottom depths should be recorded.

### 4.1.1 Geologic Logging Information

Grain size nomenclature describing geologic material from the borehole shall be in accordance with Table 1 (modified Folk) and Table 2, unless specifically directed by the work plan or groundwater monitoring plan. Health and safety restrictions may also determine the amount of information collected from the borehole material. All new material from the borehole should be examined by the geologist. Detailed descriptions should be made at major lithologic changes. All depths are from ground surface unless otherwise noted. The following items may be determined for each sample:

1. Graphic representation of stratigraphy using Figure 1 as a guideline.

2. Soil types and narrative sample descriptions:

   a. Soil type name. Use Tables 1 and 2 to determine grain size percentage and soil type.

   b. Soil color. Use the Munsell soil color chart as a guide. Natural moisture color should be obtained. If the color represents a dry or wet condition, state it in the log.

   c. Moisture content (e.g., dry, moist, wet) in accordance with Table 3.

   d. Sorting estimate from Figure 2.

   e. Particle angularity. In accordance with Table 4. Describe the angularity of sand (coarse sizes only), gravel, cobbles, and boulders. A range of angularity may be stated, such as subangular to angular.

   f. Minor soil constituents. Descriptive adjectives for minor soil constituents (e.g., mica). When descriptive adjectives are used, include estimates of percentages.

   g. Lithology. Lithology of gravel and sand (e.g., basalt, quartz, feldspar). Estimate percentages of constituents (e.g., sand is 40% basalt and 60% quartz and feldspar). Separate lithologic estimates should be made for gravel and sand fractions.

   h. Maximum particle size. Record the maximum size particle found in the sample.

i. Carbonate content. Presence of carbonate as indicated by relative reaction with dilute hydrochloric acid; estimate from Table 5.

j. Other appropriate information. These may include fractures, cementation, facies type, secondary precipitates such as gypsum and carbonate, iron stain, solution cavities, stratification, discontinuities, water-bearing zones, organic content, field screening instrument readings including instrument type and identification number and any suspected contaminants.

3. Depth to apparent water table, if encountered, using an electric tape or steel tape; record at the beginning of the shift to the nearest 0.1 foot, before drilling starts. Note reference point and measuring point. Decontaminate tape between different boreholes to preclude cross contamination.

4. If more than 5% of the soil is finer than 0.062 mm (very fine sand) and is workable, the plasticity (putty-like properties) of the fine fraction should be estimated, if possible; and recorded, see Table 6. Plasticity is not deemed necessary unless the fines are relatively easy to separate. If material can be rolled into a thread, it is considered plastic. The geologist should determine whether the fines are silt or clay. Clay can be made to exhibit plasticity and exhibits considerable strength when air-dry. Silt is nonplastic or very slightly plastic and exhibits little or no strength when air-dry. Dry strength and dilatancy tests may be performed.

5. Record drilling progress systematically and sequentially including details relevant to drilling rate, casing size and type, bit size, depth of casing and water level; relevant anomalies should also be documented. If drilling observations are recorded elsewhere (e.g., Field Activity Report), it is not necessary to record it on the borehole log.

6. Depth of hole (to nearest 0.1 foot) and depth of casing upon reaching total depth.

### 4.2 Completion of the Well Summary Sheet

The Well Summary Sheet (A-6000-384) is used to record general lithology and construction data in a concise format using Figure 3 as a guideline. The Well Summary Sheet is used for boreholes and wells, and typically contain the following information:

1. Borehole or well number (permanent, if known) and sheet number.

2. Location (descriptive location) and project identification.

3. Geologist's name(s) (prepared by) and date page completed.

4. The following items identify brief descriptions of the construction data that may be recorded (not all inclusive):

   a. Type and diameter of temporary casing used in borehole.

b. Bottom of temporary casing (in feet below ground surface).

c. Use of casing shoe.

d. Hole diameter (if no temporary casing used).

e. Construction diagram showing temporary casings in borehole, permanent casings, and annular seal (or backfill material).

5. Depth in feet (or meters).

6. The following items identify brief descriptions of the geologic/hydrologic data that may be recorded (not all inclusive):

a. General graphic log of lithology.
b. General lithologic description.
c. Depth to water (in feet below ground surface) and location of any high moisture zones.
d. Total depth of the borehole.

### 4.3 Records

Record processing and disposition is in accordance with the following:

| **Name,** Filing Unit Title or Description | **Record type** | **Retention Period** | **Disposal Authority** | **Cut-off and Retirement Instructions** |
|---|---|---|---|---|
| Borehole Logs (A-6000-382) | QA | TBD | TBD | Upon completion transmit to FC. FC places copy in appropriate project file and transmits record copy to permanent storage in accordance with approved RIDS. |
| Well Summary Sheet (A-6000-384) | R | TBD | TBD | Upon completion transmit to FC for inclusion in project file, maintain and disposition in accordance with approved RIDS, pending development of Environmental Record Schedules. |

QA = Quality Assurance; R = Other Record Material; TBD = To Be Determined

## 5.0 DESIGNATED REVIEWING ORGANIZATION

The organization designated to review changes to this document is Hanford Technical Services (HTS), the process owner. Comments from other organizations are welcome; however, comments are dispositioned at the option of HTS.

## 6.0 REFERENCES

WHC-CM-3-5, *Document Control and Records Management Manual,* Section 5, "Records Storage, Retrieval, and Destruction."

"Journal of Geology," Folk, R.L., Vol. 62, pages 345-351, 1954.

"Manual of Field Geology," Compton, R.R., 1962

## 7.0 BIBLIOGRAPHY

Munsell Soil Color Chart (1975). Munsell Color, Baltimore, Maryland.

Figure 1. Lithologic Symbols for Borehole Log and Well Summary Sheet.

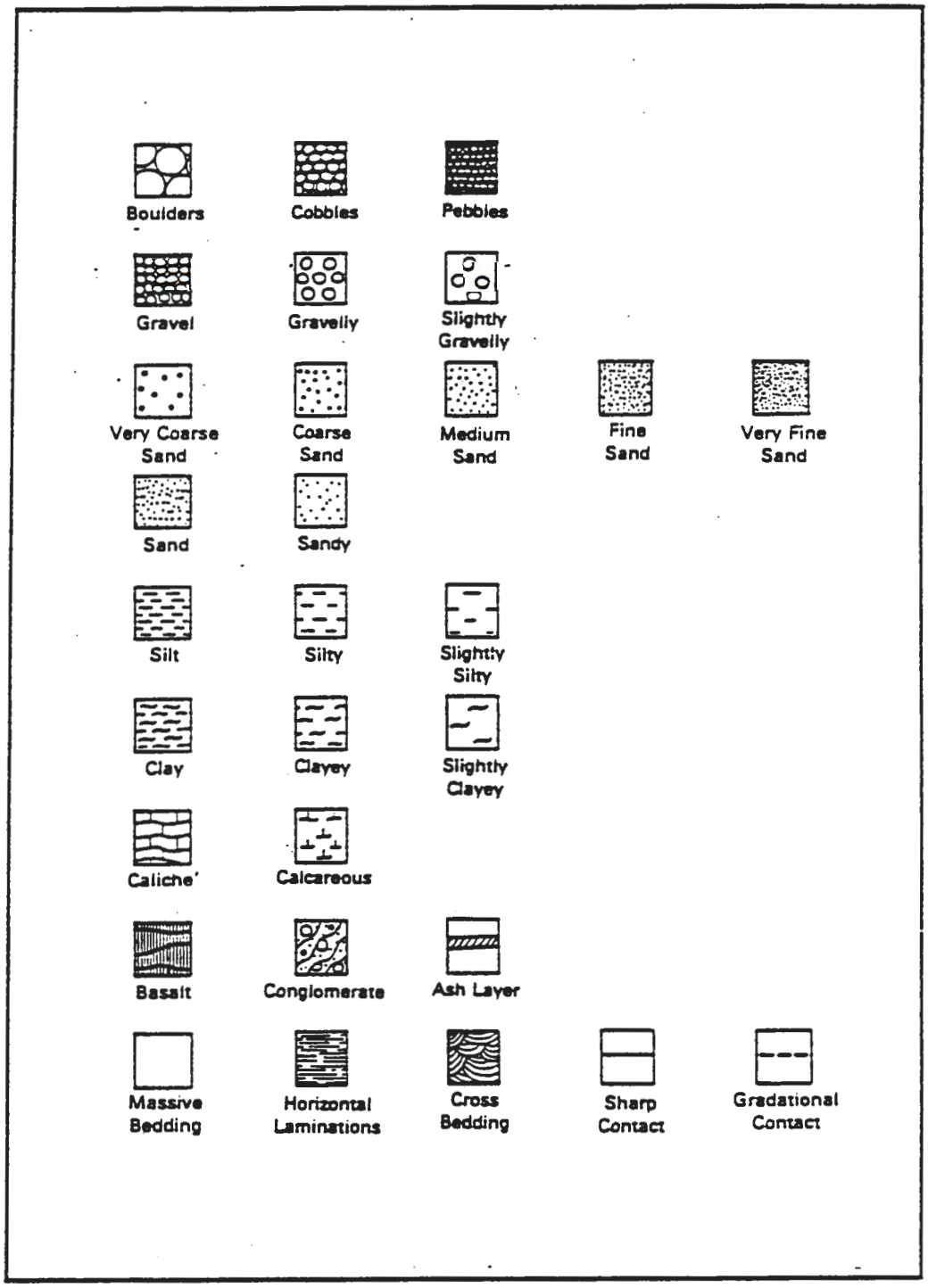
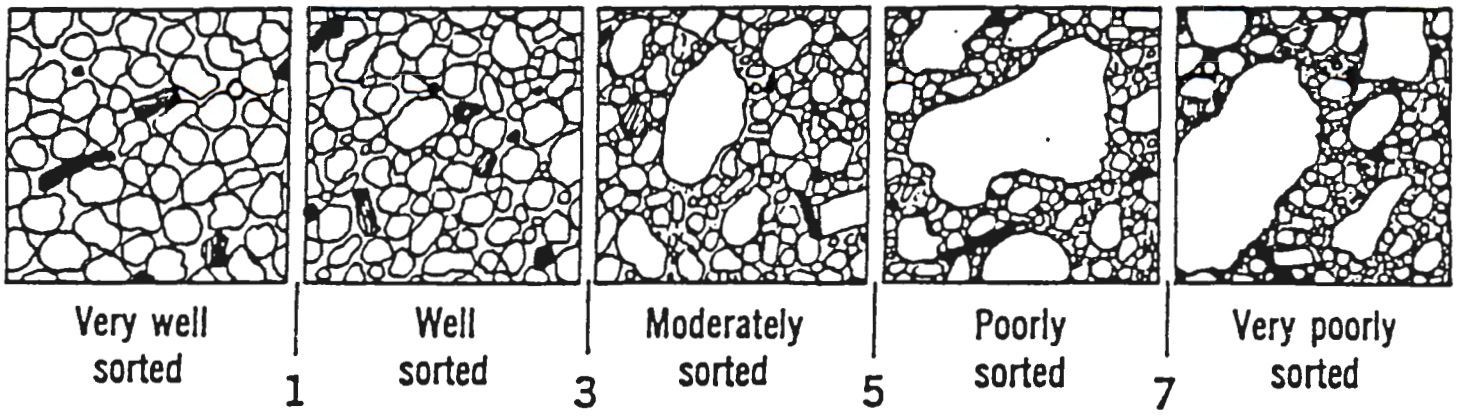


Figure 2. Terms for Degrees of Sorting.




The numbers indicate the number of size classes included by the great bulk (80) of the material. The drawing represent sediments as seen with a hand lens.

Taken from: Compton, R.R., 1962, "Manual of Field Geology."

Figure 3. Well Completion Symbols for Well Summary Sheet.

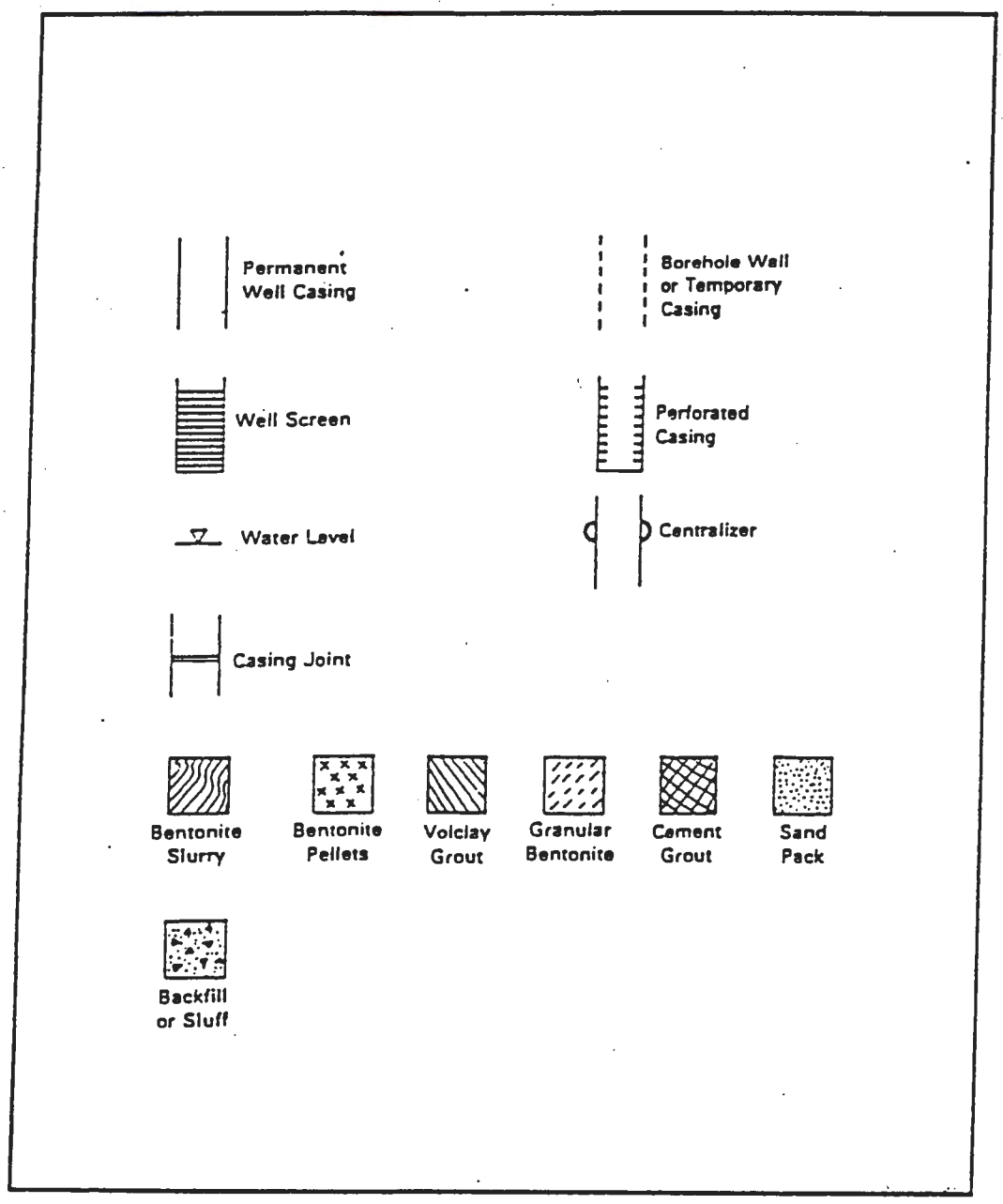
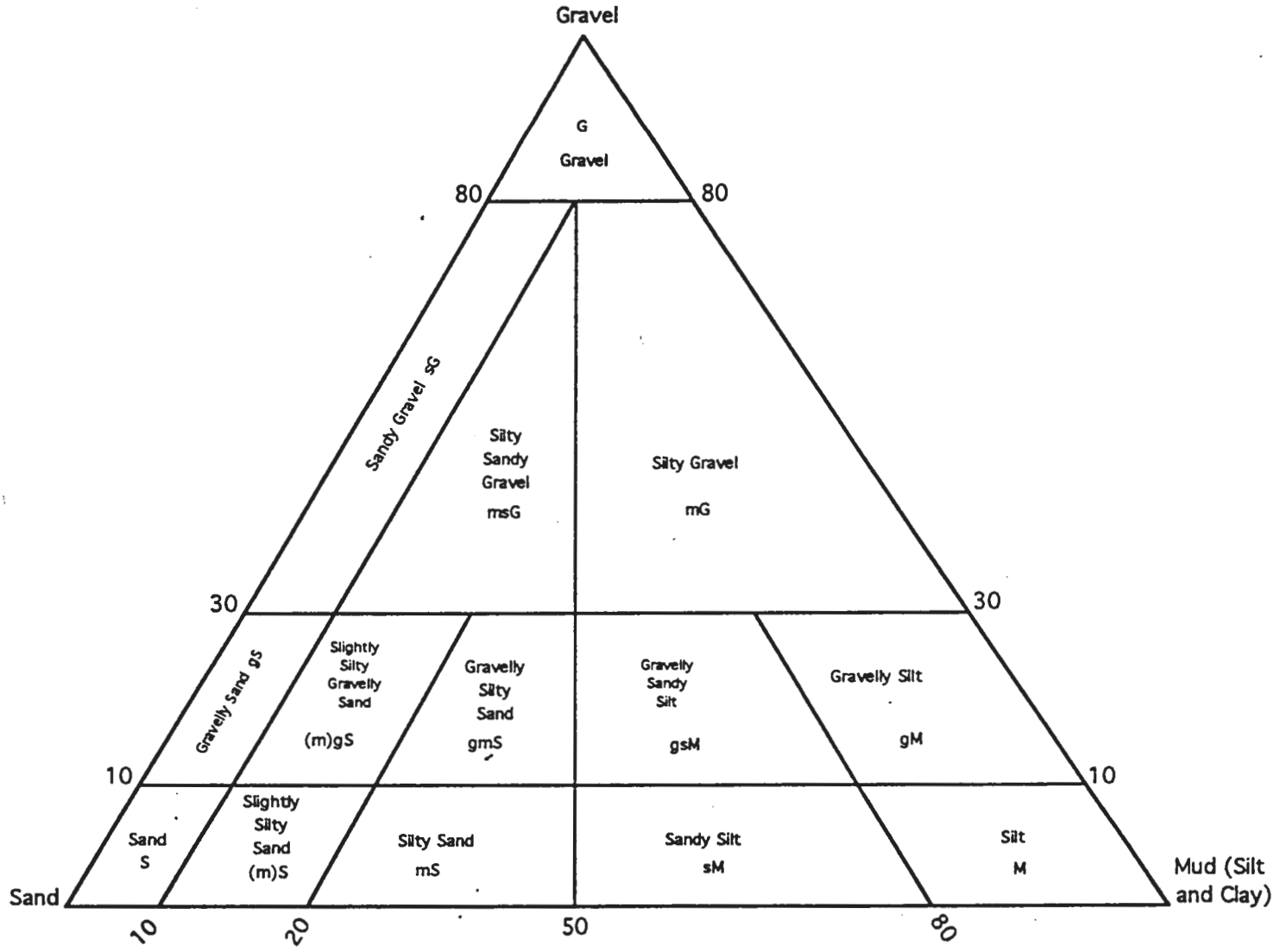


Table 1. Soil Classification Scheme.




Modified from: Folk, R. L., 1954 Journal of Geology (Volume 62, P. 345-351)

Table 2. Grain Size Nomenclature.

| Particle Designation | | Particle Diameter (mm) |
|---|---|---|
| | Boulder | >256 |
| Cobble | large | 256-128 |
| | small | 128-64 |
| Pebble | very coarse | 64-32 |
| | coarse | 32-16 |
| | medium | 16-8 |
| | fine | 8-4 |
| | very fine | 4-2 |
| Sand | very coarse | 2-1 |
| | coarse | 1-0.5 |
| | medium | 0.5-0.25 |
| | fine | 0.25-0.125 |
| | very fine | 0.125-0.0625 |
| Silt/Clay | | <0.0625 |

Table 3. Criteria for Describing Moisture Condition.

| Description | Criteria |
|---|---|
| Dry | Absence of moisture, dusty, dry to the touch |
| Moist | Damp, but no visible water |
| Wet | Visible free water, usually soil is below water table |

Table 4. Criteria for Describing Angularity of Coarse-Grained Particles.

| Description | Criteria |
|---|---|
| Angular | Particles have sharp edges and relatively plane sides with unpolished surfaces |
| Subangular | Particles are similar to angular description but have rounded edges |
| Subrounded | Particles have nearly plane sides but have well-rounded corners and edges |
| Rounded | Particles have smoothly curved sides and no edges |

Table 5. Criteria for Describing the Reaction with HCl.

| Description | Criteria |
|---|---|
| None | No visible reaction |
| Weak | Some reaction, with bubbles forming slowly |
| Strong | Violent reaction, with bubbles forming immediately |

Table 6. Criteria for Describing Plasticity.

| Description | Criteria |
|---|---|
| Nonplastic | A 1/8-in (3-mm) thread cannot be rolled at any water content |
| Low | The thread can barely be rolled and the lump cannot be formed when drier than the plastic limit |
| Medium | The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit. |
| High | It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit. |