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Revision 0

100-KR-4 Groundwater Operable Unit New Well Installation Sampling and Analysis Plan

Addendum 2: 199-K-203, 199-K-204, 199-K-207, 199-K-208, 199-K-209, 199-K-210, 199-K-211, and 199-K-212

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Contractor for the U.S. Department of Energy
under Contract DE-AC06-08RL14788

CH2MHILL
Plateau Remediation Company
P.O. Box 1600
Richland, Washington 99352

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100-KR-4

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J. V. Borghese
CH2M HILL Plateau Remediation Company

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CH2MHILL
Plateau Remediation Company
P.O. Box 1600
Richland, Washington 99352

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Briant Charboneau

U.S. Department of Energy, Richland Operations Office

Signature 10-24-13 Date

Chris Guzzetti

U.S. Environmental Protection Agency

Signature 10/28/13 Date

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Contents

1 Introduction **1**

2 Reference **1**

Figures

Figure 1. Wells 199-K-203, 199-K-204, 199-K-207, 199-K-208, 199-K-209, 199-K-210, 199-K-211, and 199-K-212 Location 2

Figure 2. Monitoring and Potential Extraction Well 199-K-203 General Stratigraphy and Split Spoon Sample Collection Intervals 3

Figure 3. Monitoring and Potential Extraction Well 199-K-204 General Stratigraphy and Split Spoon Sample Collection Intervals 5

Figure 4. Monitoring Well 199-K-207 General Stratigraphy and Split Spoon Sample Collection Intervals 7

Figure 5. Monitoring and Potential Extraction Well 199-K-208 General Stratigraphy and Split Spoon Sample Collection Intervals 9

Figure 6. Monitoring and Potential Extraction Well 199-K-209 General Stratigraphy and Split Spoon Sample Collection Intervals 11

Figure 7. Well 199-K-210 General Stratigraphy and Split Spoon Sample Collection Intervals 13

Figure 8. Monitoring and Potential Extraction Well 199-K-211 General Stratigraphy and Split Spoon Sample Collection Intervals 15

Figure 9. Extraction Well 199-K-212 General Stratigraphy and Split Spoon Sample Collection Intervals 17

Tables

Table 1. Monitoring and Potential Extraction Well 199-K-203 Sample Collection 4

Table 2. Monitoring and Potential Extraction Well 199-K-204 Sample Collection 6

Table 3. Monitoring Well 199-K-207 Sample Collection 8

Table 4. Monitoring and Potential Extraction Well 199-K-208 Sample Collection 10

Table 5. Monitoring and Potential Extraction Well 199-K-209 Sample Collection 12

Table 6. Extraction Well 199-K-210 Sample Collection 14

Table 7. Monitoring and Potential Extraction Well 199-K-211 Sample Collection 16

Table 8. Extraction Well 199-K-212 Sample Collection 18

Terms

bgs	below ground surface
RUM	Ringold Upper Mud

1 Introduction

Addendum 2 for *100-KR-4 Groundwater Operable Unit Well Installation Sampling and Analysis Plan* (DOE/RL-2013-36) contains site-specific field sampling plans for the proposed Wells 199-K-203, 199-K-204, 199-K-207,199-K-208, 199-K-209, 199-K-210, 199-K-211, and 199-K-212. The objectives and requirements were defined in *Recommendations and Technical Justification for New and Replacement Wells and Re-alignment of Existing Wells Associated with Interim Remedial Actions at 100-K Area* (SGW-54543). Well construction information is presented in Section 3.2.4 and Figures 3-1 and 3-2 of the DOE/RL-2013-36.

The following figures and tables are provided in this addendum:

- Figure 1. Wells 199-K-203, 199-K-204, 199-K-207, 199-K-208, 199-K-209, 199-K-210, 199-K-211, and 199-K-212 Location
- Figure 2. Monitoring and Potential Extraction Well 199-K-203 General Stratigraphy and Split Spoon Sample Collection Intervals
- Figure 3. Monitoring and Potential Extraction Well 199-K-204 General Stratigraphy and Split Spoon Sample Collection Intervals
- Figure 4. Monitoring Well 199-K-207 General Stratigraphy and Split Spoon Sample Collection Intervals
- Figure 5. Monitoring and Potential Extraction Well 199-K-208 General Stratigraphy and Split Spoon Sample Collection Intervals
- Figure 6. Monitoring and Potential Extraction Well 199-K-209 General Stratigraphy and Split Spoon Sample Collection Intervals
- Figure 7. Extraction Well 199-K-210 General Stratigraphy and Split Spoon Sample Collection Intervals
- Figure 8. Monitoring and Potential Extraction Well 199-K-211 General Stratigraphy and Split Spoon Sample Collection Intervals
- Figure 9. Extraction Well 199-K-212 General Stratigraphy and Split Spoon Sample Collection Intervals
- Table 1. Monitoring and Potential Extraction Well 199-K-203 Sample Collection
- Table 2. Monitoring and Potential Extraction Well 199-K-204 Sample Collection
- Table 3. Monitoring Well 199-K-207 Sample Collection
- Table 4. Monitoring and Potential Extraction Well 199-K-208 Sample Collection
- Table 5. Monitoring and Potential Extraction Well 199-K-209 Sample Collection
- Table 6. Extraction Well 199-K-210 Sample Collection
- Table 7. Monitoring and Potential Extraction Well 199-K-211 Sample Collection
- Table 8. Extraction Well 199-K-212 Sample Collection

2 Reference

SGW-54543, 2013, Recommendations and Technical Justification for New and Replacement Wells and Re-alignment of Existing Wells Associated with Interim Remedial Actions at 100-K Area, Technical Memorandum, Rev. 0, CH2M HILL Plateau Remediation Company, Richland, Washington. Document can be found at: http://www5.hanford.gov/arpir/?content=findpage&AKey=0087906

Figure 1. Wells 199-K-203, 199-K-204, 199-K-207, 199-K-208, 199-K-209, 199-K-210, 199-K-211, and 199-K-212 Location

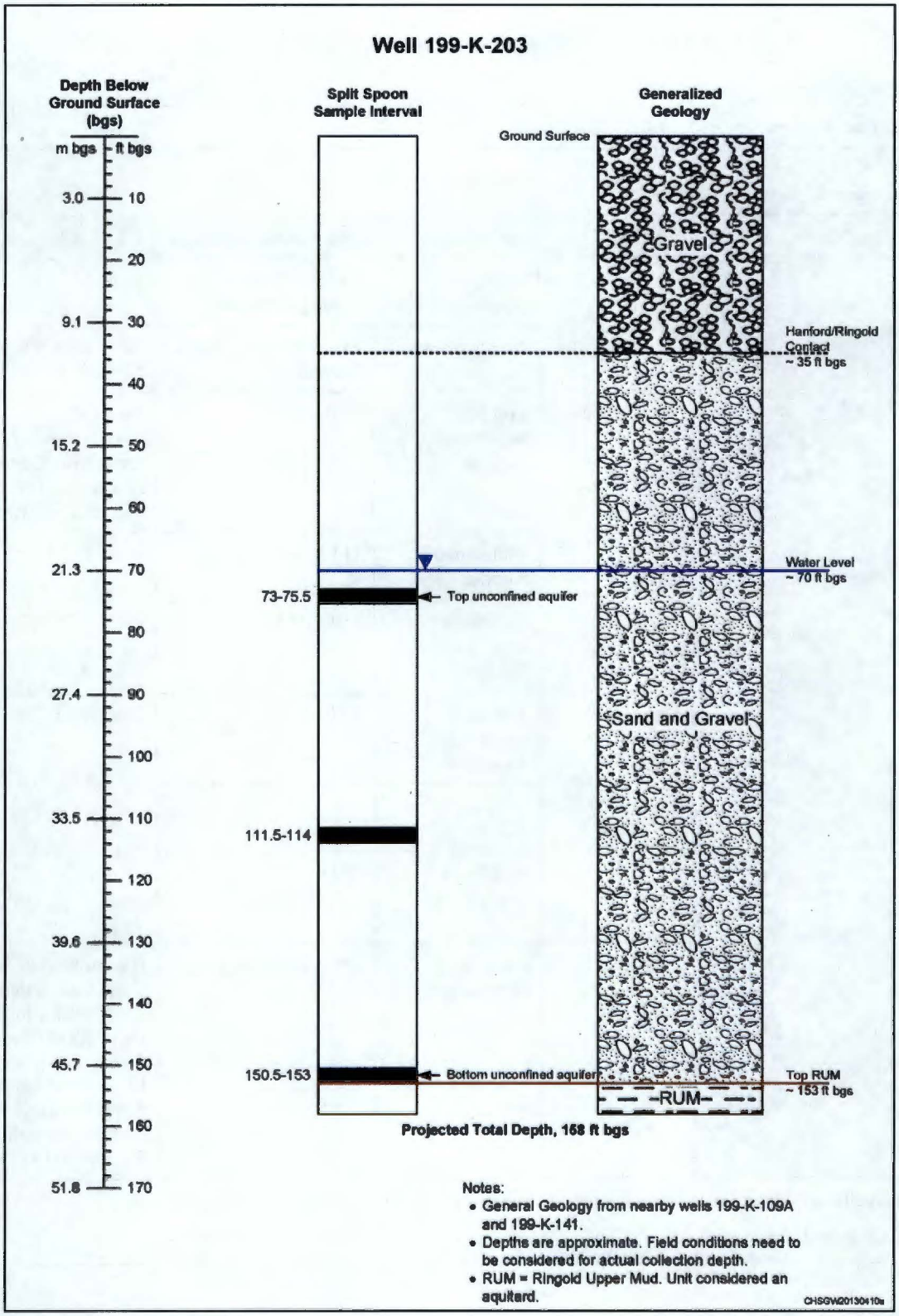

Figure 2. Monitoring and Potential Extraction Well 199-K-203 General Stratigraphy and Split Spoon Sample Collection Intervals

Table 1. Monitoring and Potential Extraction Well 199-K-203 Sample Collection

Sample Location	199-K-203			
Estimated depth to water	70 ft			
Projected Total Depth	158 ft bgs, or 5 ft into the RUM			
Media	**Sample Type**	**Comments**	**Estimated Depth (ft)**	**Analytes**
Geologic	Grab	Archival purposes	Every 5 ft and at lithologic changes	none
		Screen Selection	Every 5 ft of screened interval	Grain Size (Field Measurement)
	Split Spoon	Top of unconfined Aquifer	73.0-75.5	Hydraulic Conductivity, Total Carbonate, Carbon-14, Hexavalent Chromium, Nitrate, and Tritium
		Midpoint of Aquifer	111.5-114.0	
		Bottom of unconfined Aquifer	150.5-153.0	
Water	During Drilling	Top of unconfined Aquifer	73.0	Carbon-14
		Midpoint of Aquifer	111.5	
		Bottom of unconfined Aquifer	150.0	
	Pumped	After Well Development	Screened Interval	Bicarbonate, Carbonate, Calcium, Carbon-14, Chloride, Hexavalent Chromium, Total Chromium, Fluoride, Magnesium, Nitrate, Potassium, Sodium, Strontium-90, Sulfate, and Tritium

Note: Depths are approximate. Field conditions need to be considered for actual collection depth.

RUM = Ringold Upper Mud

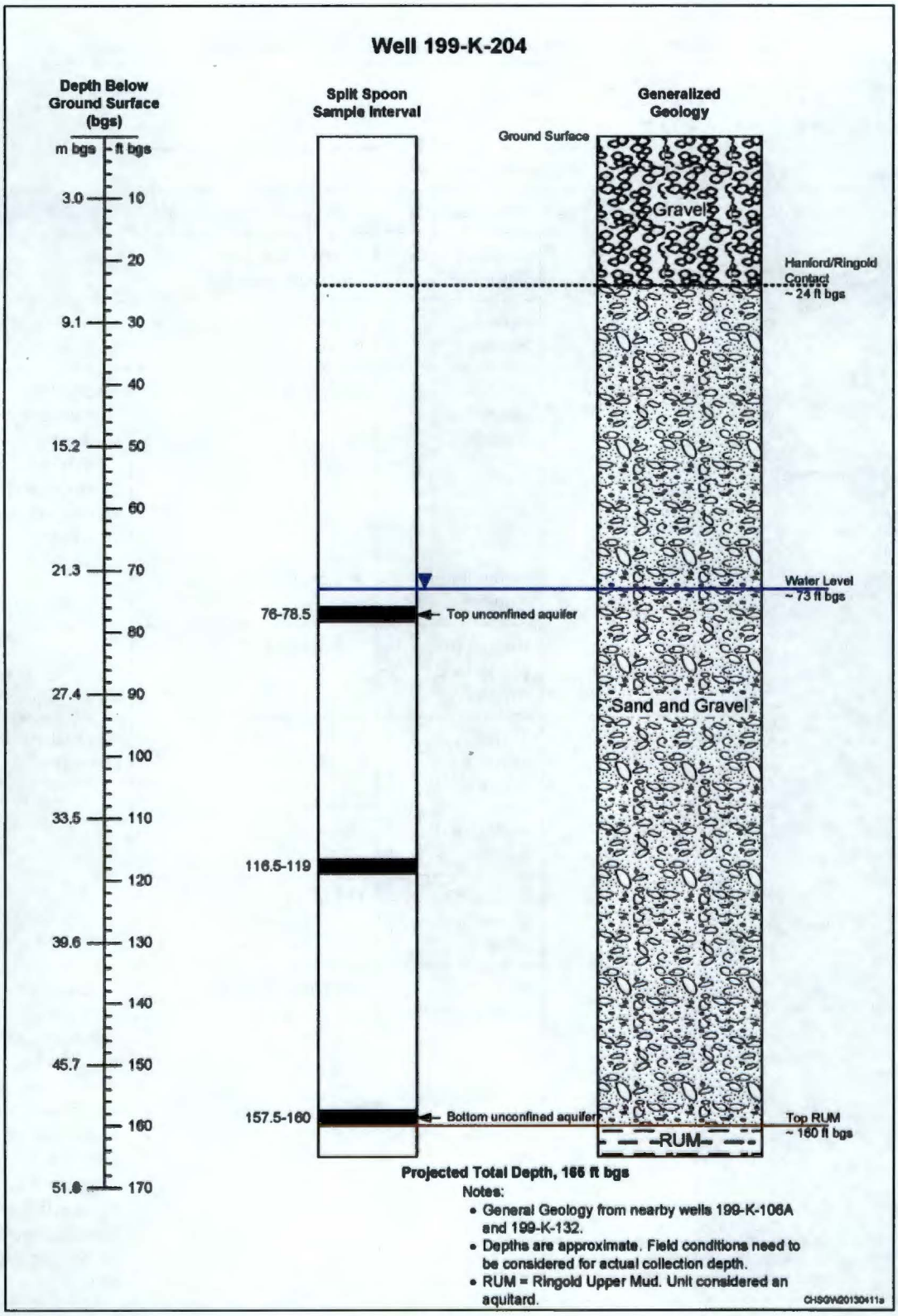

Figure 3. Monitoring and Potential Extraction Well 199-K-204 General Stratigraphy and Split Spoon Sample Collection Intervals

Table 2. Monitoring and Potential Extraction Well 199-K-204 Sample Collection

Sample Location	199-K-204			
Estimated depth to water	73 ft			
Projected Total Depth	165 ft bgs, or 5 ft into the RUM			
Media	**Sample Type**	**Comments**	**Estimated Depth (ft)**	**Analytes**
Geologic	Grab	Archival purposes	Every 5 ft and at lithologic changes	none
		Screen Selection	Every 5 ft of screened interval	Grain Size (Field Measurement)
	Split Spoon	Top of unconfined Aquifer	76.0-78.5	Hydraulic Conductivity, Total Carbonate, Carbon-14, Hexavalent Chromium, Nitrate, and Tritium
		Midpoint of Aquifer	116.5-119.0	
		Bottom of unconfined Aquifer	157.5-160.0	
Water	During Drilling	Top of unconfined Aquifer	76.0	Hexavalent Chromium
		Midpoint of Aquifer	116.5	
		Bottom of unconfined Aquifer	157.0	
	Pumped	After Well Development	Screened Interval	Bicarbonate, Carbonate, Calcium, Carbon-14, Chloride, Hexavalent Chromium, Total Chromium, Fluoride, Magnesium, Nitrate, Potassium, Sodium, Strontium-90, Sulfate, and Tritium

Note: Depths are approximate. Field conditions need to be considered for actual collection depth.

RUM = Ringold Upper Mud

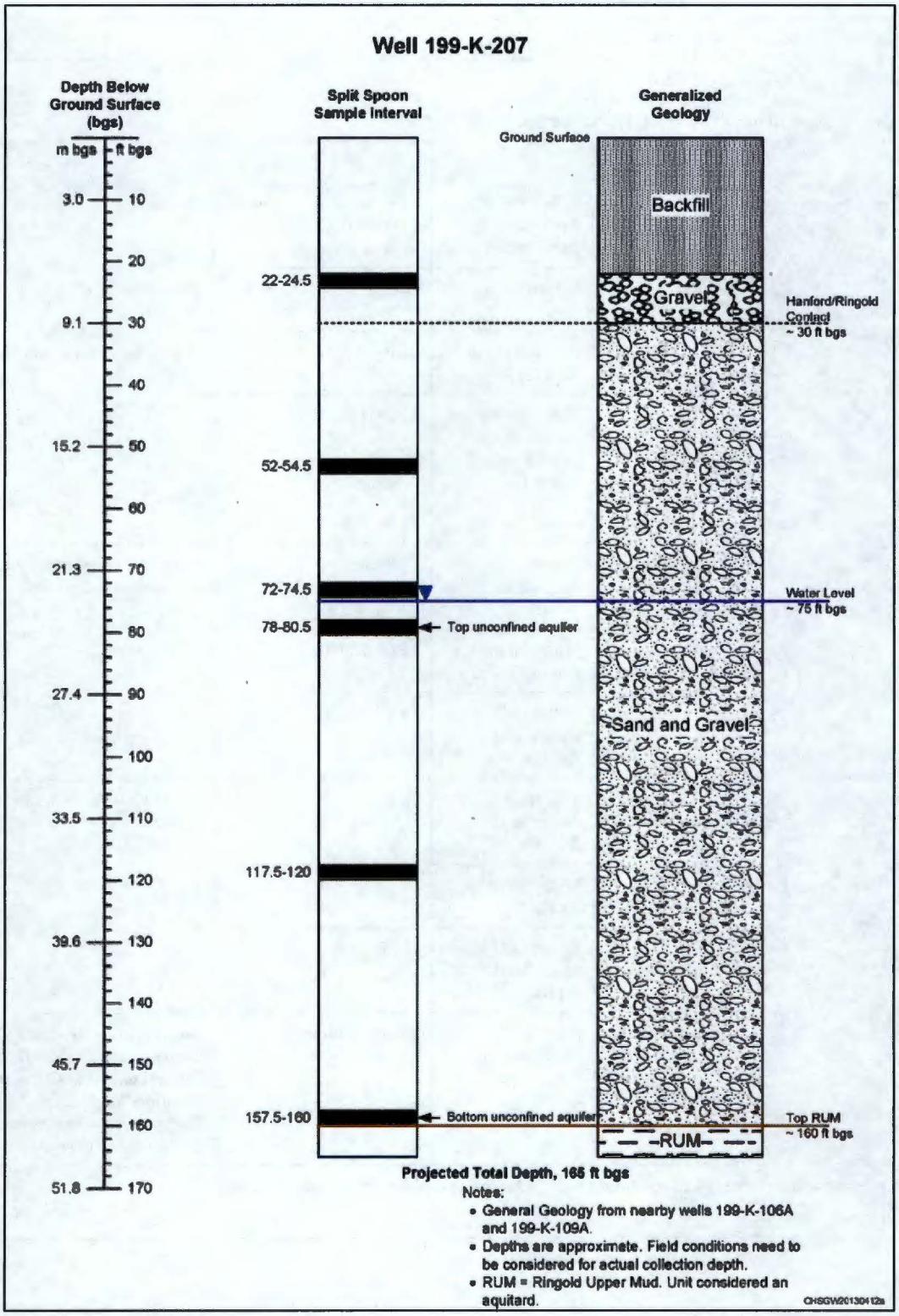

Figure 4. Monitoring Well 199-K-207 General Stratigraphy and Split Spoon Sample Collection Intervals

Table 3. Monitoring Well 199-K-207 Sample Collection

Sample Location	199-K-207			
Estimated depth to water	75 ft			
Projected Total Depth	165 ft bgs, or 5 ft into RUM			
Media	**Sample Type**	**Comments**	**Estimated Depth (ft)**	**Analytes**
Geologic	Grab	Archival purposes	Every 5 ft and at lithologic changes	none
		Screen Selection	Every 5 ft of screened interval	Grain Size (Field Measurement)
	Split Spoon	Below Bottom of Backfill	22.0-24.5	Hexavalent Chromium and Tritium
		Midway Between Bottom of Backfill and Water Table	52.0-54.4	
		Lower Vadose	72.0-74.5	
		Top of unconfined Aquifer	78.0-80.5	Hydraulic Conductivity, Hexavalent Chromium, and Tritium
		Midpoint of Aquifer	117.5-120.0	
		Bottom of unconfined Aquifer	157.5-160.0	
Water	During Drilling	Top of unconfined Aquifer	78.0	Hexavalent Chromium and Tritium
		Midpoint of Aquifer	117.5	
		Bottom of unconfined Aquifer	157.0	
	Pumped	After Well Development	Screened Interval	Bicarbonate, Carbonate, Calcium, Carbon-14, Chloride, Hexavalent Chromium, Total Chromium, Fluoride, Magnesium, Nitrate, Potassium, Sodium, Strontium-90, Sulfate, and Tritium

Note: Depths are approximate. Field conditions need to be considered for actual collection depth.

RUM = Ringold Upper Mud

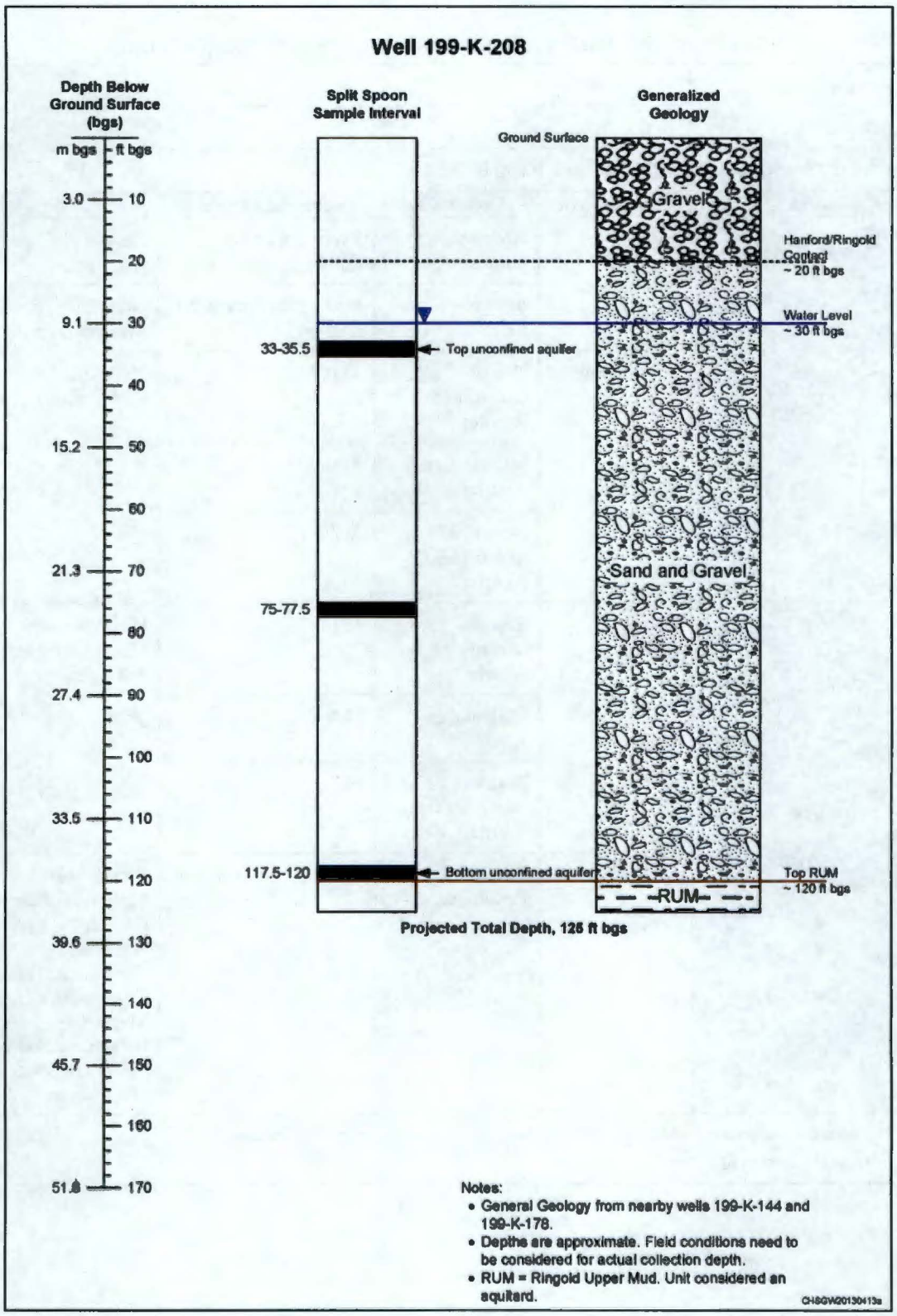

Figure 5. Monitoring and Potential Extraction Well 199-K-208 General Stratigraphy and Split Spoon Sample Collection Intervals

Table 4. Monitoring and Potential Extraction Well 199-K-208 Sample Collection

Sample Location	199-K-208			
Estimated depth to water	30 ft			
Projected Total Depth	125 ft bgs, or 5 ft into RUM			
Media	**Sample Type**	**Comments**	**Estimated Depth (ft)**	**Analytes**
Geologic	Grab	Archival purposes	Every 5 ft and at lithologic changes	none
		Screen Selection	Every 5 ft of screened interval	Grain Size (Field Measurement)
	Split Spoon	Top of unconfined Aquifer	33.0-35.5	Hydraulic Conductivity
		Midpoint of Aquifer	75.0-77.5	
		Bottom of unconfined Aquifer	117.5-120.0	
Water	During Drilling	Top of unconfined Aquifer	33.0	Hexavalent Chromium, Nitrate, and Tritium
		Midpoint of Aquifer	75.0	
		Bottom of unconfined Aquifer	117.0	
	Pumped	After Well Development	Screened Interval	Bicarbonate, Carbonate, Calcium, Carbon-14, Chloride, Hexavalent Chromium, Total Chromium, Fluoride, Magnesium, Nitrate, Potassium, Sodium, Strontium-90, Sulfate, and Tritium

Note: Depths are approximate. Field conditions need to be considered for actual collection depth.

RUM = Ringold Upper Mud

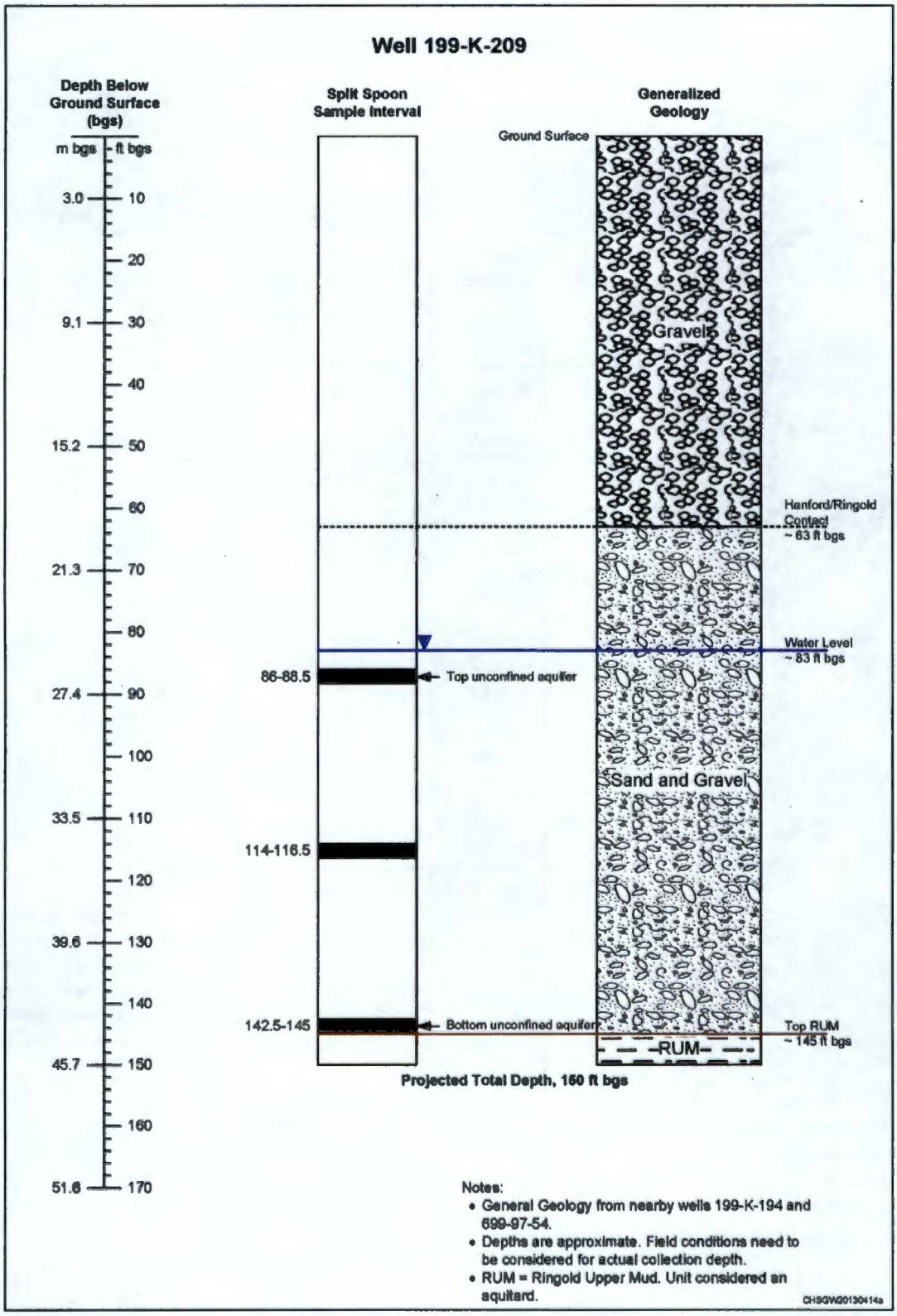

Figure 6. Monitoring and Potential Extraction Well 199-K-209 General Stratigraphy and Split Spoon Sample Collection Intervals

Table 5. Monitoring and Potential Extraction Well 199-K-209 Sample Collection

Sample Location	199-K-209			
Estimated depth to water	83 ft			
Projected Total Depth	150 ft bgs, or 5 ft into the RUM			
Media	**Sample Type**	**Comments**	**Estimated Depth (ft)**	**Analytes**
Geologic	Grab	Archival purposes	Every 5 ft and at lithologic changes	none
		Screen Selection	Every 5 ft of screened interval	Grain Size (Field Measurement)
	Split Spoon	Top of unconfined Aquifer	86.0-88.5	Hydraulic Conductivity
		Midpoint of Aquifer	114.0-116.5	
		Bottom of unconfined Aquifer	142.5-145.0	
Water	During Drilling	Top of unconfined Aquifer	86.0	Hexavalent Chromium
		Midpoint of Aquifer	114.0	
		Bottom of unconfined Aquifer	142.0	
	Pumped	After Well Development	Screened Interval	Bicarbonate, Carbonate, Calcium, Chloride, Hexavalent Chromium, Total Chromium, Fluoride, Magnesium, Nitrate, Potassium, Sodium, Sulfate, and Trichloroethene

Note: Depths are approximate. Field conditions need to be considered for actual collection depth.

RUM= Ringold Upper Mud

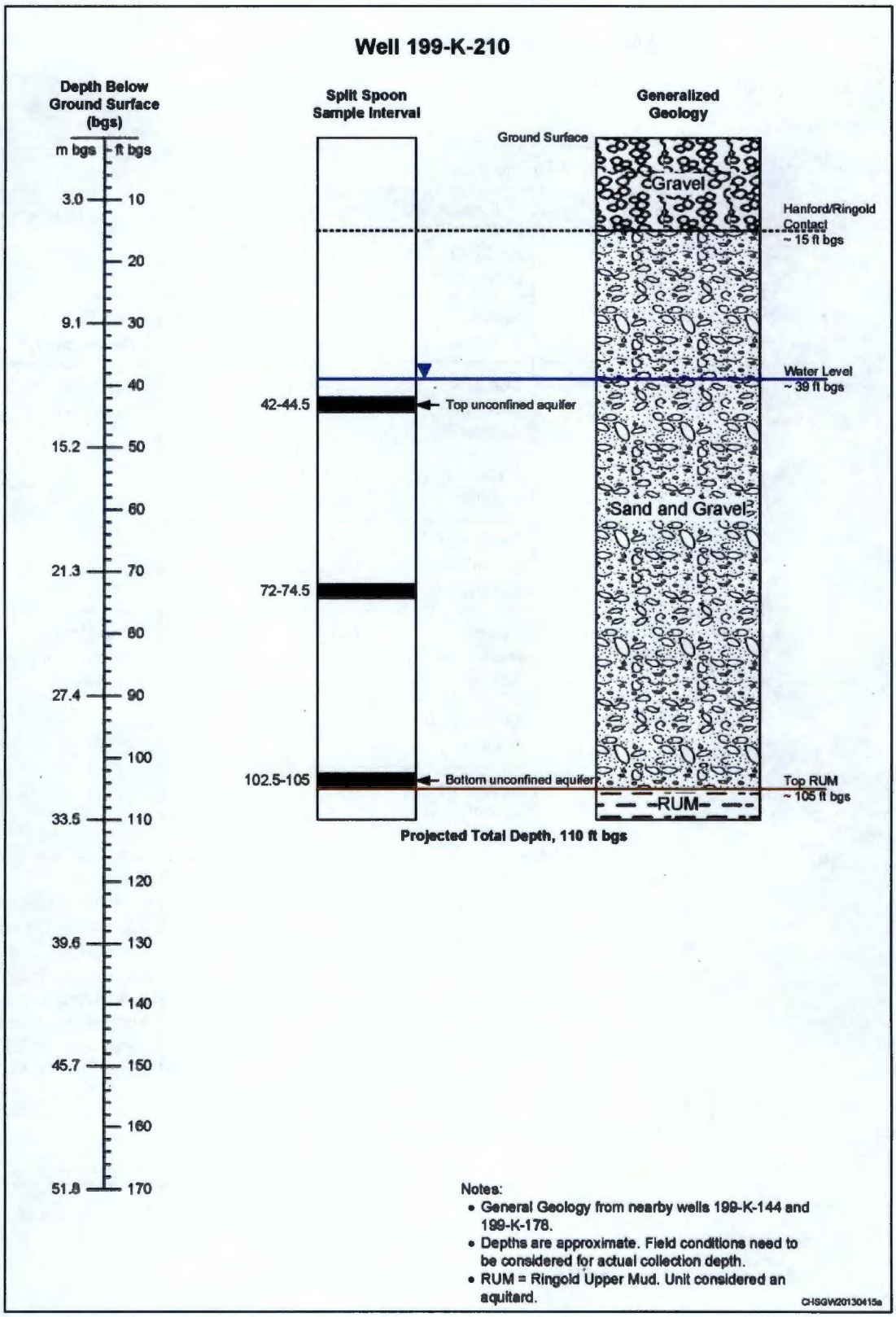

Figure 7. Extraction Well 199-K-210 General Stratigraphy and Split Spoon Sample Collection Intervals

Table 6. Extraction Well 199-K-210 Sample Collection

Sample Location	199-K-210			
Estimated depth to water	39 ft			
Projected Total Depth	110 ft bgs, or 5ft into RUM			
Media	**Sample Type**	**Comments**	**Estimated Depth (ft)**	**Analytes**
Geologic	Grab	Archival purposes	Every 5 ft and at lithologic changes	none
		Screen Selection	Every 5 ft of screened interval	Grain Size (Field Measurement)
	Split Spoon	Top of unconfined Aquifer	42.0-44.5	Hydraulic Conductivity
		Midpoint of Aquifer	72.0-74.5	
		Bottom of unconfined Aquifer	102.5-105.0	
Water	During Drilling	Top of unconfined Aquifer	42.0	Hexavalent Chromium, Nitrate, and Tritium
		Midpoint of Aquifer	72.0	
		Bottom of unconfined Aquifer	102.0	
	Pumped	After Well Development	Screened Interval	Bicarbonate, Carbonate, Calcium, Carbon-14, Chloride, Hexavalent Chromium, Total Chromium, Fluoride, Magnesium, Nitrate, Potassium, Sodium, Strontium-90, Sulfate, and Tritium

Note: Depths are approximate. Field conditions need to be considered for actual collection depth.

RUM = Ringold Upper Mud

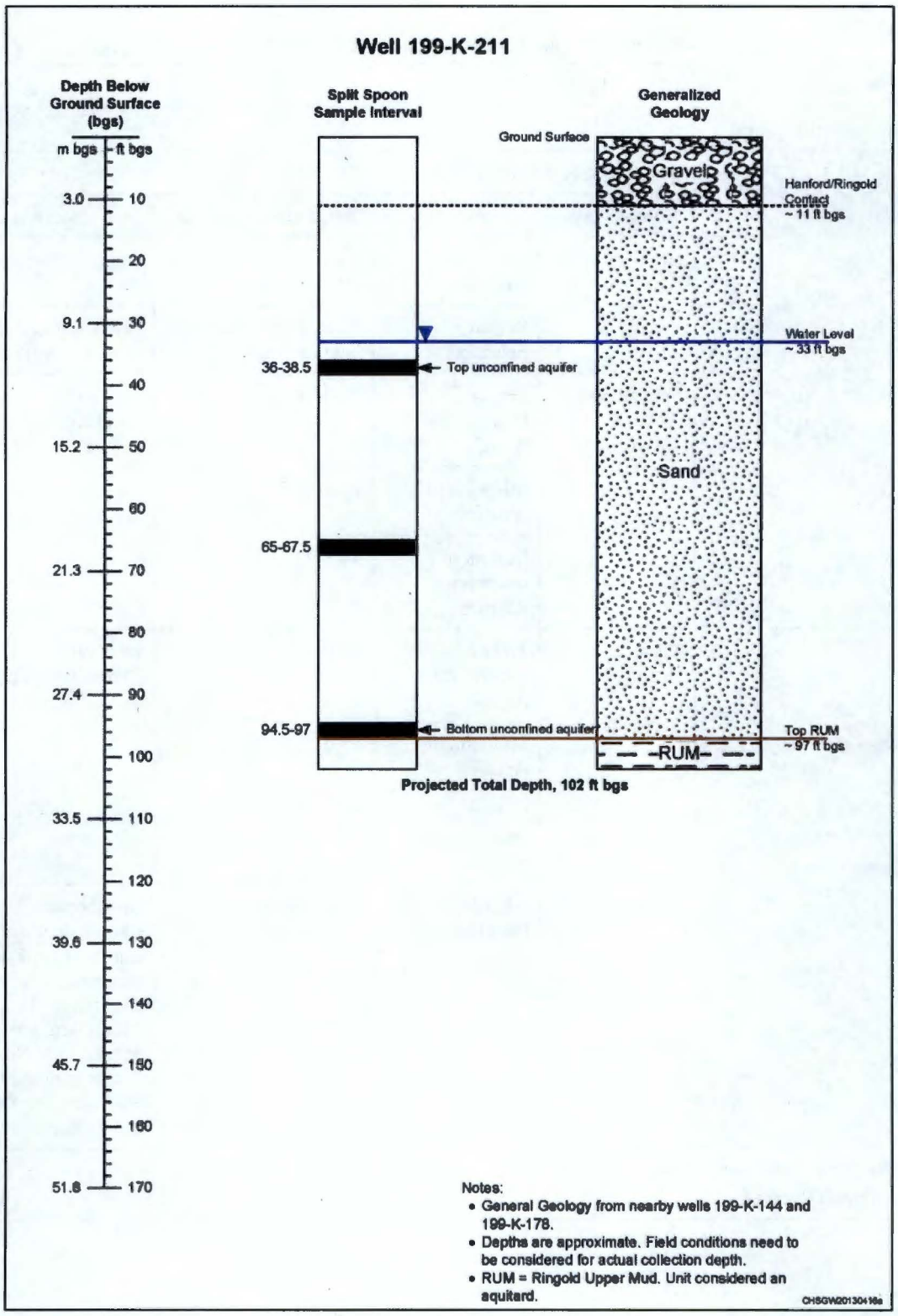

Figure 8. Monitoring and Potential Extraction Well 199-K-211 General Stratigraphy and Split Spoon Sample Collection Intervals

Table 7. Monitoring and Potential Extraction Well 199-K-211 Sample Collection

Sample Location	199-K-211			
Estimated depth to water	33 ft			
Projected Total Depth	102 ft bgs, or 5 ft into RUM			
Media	**Sample Type**	**Comments**	**Estimated Depth (ft)**	**Analytes**
Geologic	Grab	Archival purposes	Every 5 ft and at lithologic changes	none
		Screen Selection	Every 5 ft of screened interval	Grain Size (Field Measurement)
	Split Spoon	Top of unconfined Aquifer	36.0-38.5	Hydraulic Conductivity
		Midpoint of Aquifer	65.0-67.5	
		Bottom of unconfined Aquifer	94.5-97.0	
Water	During Drilling	Top of unconfined Aquifer	36.0	Hexavalent Chromium, Nitrate, and Tritium
		Midpoint of Aquifer	65.0	
		Bottom of unconfined Aquifer	94.0	
	Pumped	After Well Development	Screened Interval	Bicarbonate, Carbonate, Calcium, Carbon-14, Chloride, Hexavalent Chromium, Total Chromium, Fluoride, Magnesium, Nitrate, Potassium, Sodium, Strontium-90, Sulfate, and Tritium

Note: Depths are approximate. Field conditions need to be considered for actual collection depth.

RUM = Ringold Upper Mud

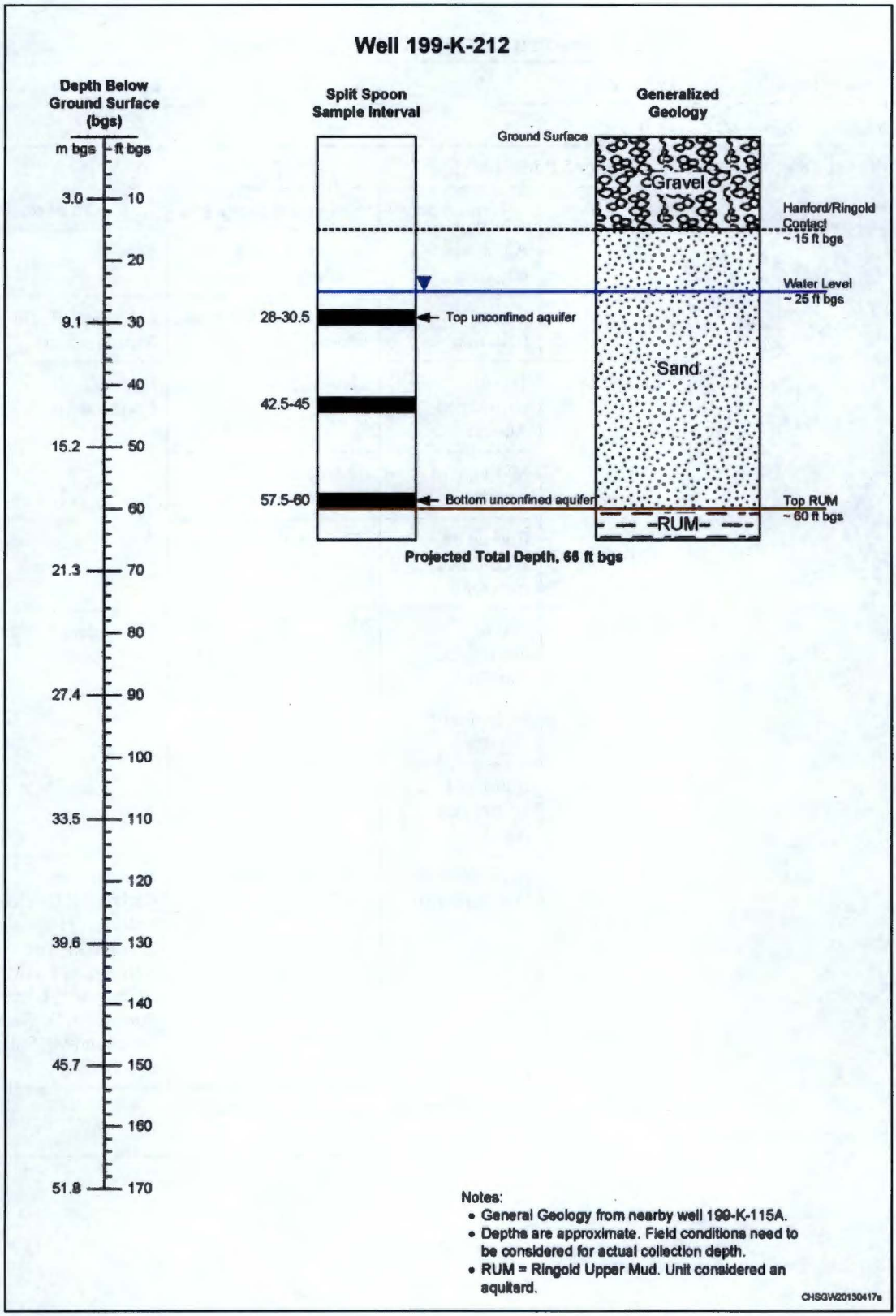

Figure 9. Extraction Well 199-K-212 General Stratigraphy and Split Spoon Sample Collection Intervals

Table 8. Extraction Well 199-K-212 Sample Collection

Sample Location	199-K-212			
Estimated depth to water	25 ft			
Projected Total Depth	65 ft bgs, or 5 ft into RUM			
Media	**Sample Type**	**Comments**	**Estimated Depth (ft)**	**Analytes**
Geologic	Grab	Archival purposes	Every 5 ft and at lithologic changes	none
		Screen Selection	Every 5 ft of screened interval	Grain Size (Field Measurement)
	Split Spoon	Top of unconfined Aquifer	28.0-30.5	Hydraulic Conductivity
		Midpoint of Aquifer	42.5-45.0	
		Bottom of unconfined Aquifer	57.5-60.0	
Water	During Drilling	Top of unconfined Aquifer	28.0	Hexavalent Chromium
		Midpoint of Aquifer	42.5	
		Bottom of unconfined Aquifer	57.0	
	Pumped	After Well Development	Screened Interval	Bicarbonate, Carbonate, Calcium, Chloride, Hexavalent Chromium, Total Chromium, Fluoride, Magnesium, Nitrate, Potassium, Sodium, Strontium-90, Sulfate, and Tritium

Note: Depths are approximate. Field conditions need to be considered for actual collection depth.

RUM = Ringold Upper Mud