EIM Help – Grain Size

Version 1.2
May 2026

Background

Definition

Grain size (aka particle size) is the diameter of individual particles of sediment or soil.

Grain size affects sediment transport and deposition, contaminant fate and transport, interpretation of sediment toxicity data, or benthic macroinvertebrate abundance data.

Grain size scales classify grain size by dividing particles into size ranges. Standard scales and methods based on them include Phi/Wentworth and ASTM. General grain size divisions include boulders, cobbles, gravel, sand, silt, and clay. Fines include both silt and clay. The division between sand and fines is usually important for sediment-related studies.

Regulatory Considerations

Most sediment studies require grain size data. The following regulatory programs/guidance require specific grain size methods for sediment studies.

- Dredged Material Management Program (DMMP)
- Pacific Northwest Regional Sediment Evaluation Team (RSET) through the Sediment Evaluation Framework (SEF)
- Ecology Sediment Cleanup User's Manual (SCUM)

EIM Grain Size Scales, Methods, and Parameters

General Info

EIM accepts grain size measured using these scales/methods:

- Phi/Wentworth scale (PSEP-PS or PLUMB81PS methods)
- ASTM-D422 and D422M (modified) and D6913, D6913M, and D7928 scales/methods

Phi/Wentworth and ASTM scales use sieve stacks with slightly different mesh (opening) sizes, so each produces a unique set of size ranges. EIM has grain size parameters that match each size range. To match your data with EIM grain size parameters, see the sections on Phi/Wentworth Grain Size Scale (PSEP-PS or PLUMB81PS methods) or ASTM Grain Size Scales.

EIM also has general grain size parameters like “gravel,” “sand,” or “silt” that work with either Phi/Wentworth or ASTM scales. Some submitters elect to “roll up” smaller, method-specific size ranges to these broader, general grain size ranges. For example, submittals for the DMMP and RSET programs generally require general grain size parameters. See the General Grain Size Parameters section for information. Check with your program or agency contact to determine what to do.

For help transforming lab reports to the EIM Results template, see the Grain Size Data Entry Examples section.

If none of the EIM grain size parameters match your data, check with your EIM data coordinator.

For **Result Basis**, enter **Dry** for most results (sieve and hydrometer). Rarely grain size cab be **Wet**, mostly from results obtained the field.

Phi/Wentworth Grain Size Scale

The Phi/Wentworth scale methods are based on the Udden-Wentworth grain-size scale. Phi is the negative log of this scale. Larger grain sizes have smaller Phi numbers. For example, cobbles are Phi -8 to -6 and clay is Phi 8 to 10. Phi helps better visualize and analyze grain size. The Phi/Wentworth methods use a combination of sieves for larger particles and pipette/hydrometers for smaller particles.

Phi/Wentworth Result Methods

PSEP-PS is the current Phi/Wentworth method approved for use by some programs or guidance. PSEP-PS is modified from an older method, PLUMB81PS. Labs sometimes send a combined version of these methods, like "PSEP Plumb 1981." In these cases, use "PSEP-PS" to submit your data to EIM.

Table 1: EIM Result Methods for the Phi/Wentworth grain size scale.

Result Method Code	Result Method Description	Reference	Notes
PSEP-PS	Puget Sound Estuary Protocols, Conventional Sediment Variables, Particle/Grain Size by Sieve-Pipet, 1986, Minor Rev. 2003.	Puget Sound Estuary Program (PSEP), 1986, Minor Rev. 2003. Recommended Protocols for Measuring Conventional Sediment Variables in Puget Sound. Prepared by Tetra Tech, Inc. for US EPA Region 10 and Puget Sound Water Quality Authority, Olympia, WA.	Based on Plumb, 81. Accepted method for USACE DMMP and SEF and Ecology SCUM.
PLUMB81PS	Sediment Grain/Particle Size by Sieve/Electronic Counter or Sieve/Pipet, Plumb, 1981 (EPA/CE-81-1).	Plumb, R.H. 1981. Procedures for handling and chemical analysis of sediment and water samples. Technical Report EPA/CE-81-1, Section 3, Analytical Methods. U.S. Army Corps of Engineers, Vicksburg, MS.	This is an older method. Some labs still refer to it because the two methods are similar.

Phi/Wentworth Parameters

EIM bases Phi/Wentworth scale parameter names for grain size on the Phi scale.

For example, "Particle/Grain Size, Wentworth, Phi Scale 1 to 2" represents material retained in the No. 60 sieve (Table 2).

EIM also has synonyms (aka aliases) for each parameter. Synonyms represent size ranges (e.g., "Particle/Grain Size 0.25-0.5 mm") and the Wentworth name (e.g., "Particle/Grain Size Medium Sand (Wentworth Scale)").

Use these parameters when the method is PSEP-PS (PSEP) or PLUMB81PS (PLUMB).

Note: Use either the primary name or a synonym to submit data to EIM. In EIM Search, you can search on primary names or synonyms. However, when you export data from EIM Search, only the primary name displays.

*Table 2: EIM parameters for the Phi/Wentworth grain size scale (PSEP-PS or PLUMB81PS methods). Key: *Lower size is retained sieve size/smallest size for each range. **See section on "rolling up" results into EIM general grain size parameters.*

Lower Size*	Phi/Wentworth (PSEP/PLUMB) Parameter Name	Synonyms/Aliases	General Grain Size Parameter Name for Rollups**
>10 in. >256 mm	Particle/Grain Size, Wentworth, Phi Scale <-8	Particle/Grain Size >256 mm Particle/Grain Size Boulder (Wentworth Scale)	None
2.5 in. 64 mm	Particle/Grain Size, Wentworth, Phi Scale -8 to -6	Particle/Grain Size 64-256 mm Particle/Grain Size Cobble (Wentworth Scale)	Particle/Grain Size, Cobbles
1 1/4 in. 32 mm	Particle/Grain Size, Wentworth, Phi Scale -6 to -5	Particle/Grain Size 32-64 mm Particle/Grain Size Very Coarse Gravel (Wentworth Scale)	Particle/Grain Size, Gravel
5/8 in. 16 mm	Particle/Grain Size, Wentworth, Phi Scale -5 to -4	Particle/Grain Size 16-32 mm Particle/Grain Size Course Gravel (Wentworth Scale)	Particle/Grain Size, Gravel
5/16 in. 8 mm	Particle/Grain Size, Wentworth, Phi Scale -4 to -3	Particle/Grain Size 8-16 mm Particle/Grain Size Medium Gravel (Wentworth Scale)	Particle/Grain Size, Gravel

Lower Size*	Phi/Wentworth (PSEP/PLUMB) Parameter Name	Synonyms/Aliases	General Grain Size Parameter Name for Rollups**
No. 5 4 mm	Particle/Grain Size, Wentworth, Phi Scale <-2	Particle/Grain Size >4 mm	Particle/Grain Size, Gravel
No. 5 4 mm	Particle/Grain Size, Wentworth, Phi Scale -3 to -2	Particle/Grain Size 4-8 mm Particle/Grain Size Fine Gravel (Wentworth Scale)	Particle/Grain Size, Gravel
No. 10 2 mm	Particle/Grain Size, Wentworth, Phi Scale <-1	Particle/Grain Size >2 mm Particle/Grain Size >=Gravel (Wentworth Scale)	Particle/Grain Size, Gravel
No. 10 2 mm	Particle/Grain Size, Wentworth, Phi Scale -2 to -1	Particle/Grain Size 2-4 mm Particle/Grain Size Very Fine Gravel (Wentworth Scale)	Particle/Grain Size, Gravel
No. 18 1 mm	Particle/Grain Size, Wentworth, Phi Scale -1 to 0	Particle/Grain Size 1-2 mm Particle/Grain Size 1000-2000 microns Particle/Grain Size Very Coarse Sand (Wentworth Scale)	Particle/Grain Size, Sand
No. 35 0.5 mm	Particle/Grain Size, Wentworth, Phi Scale 0 to 1	Particle/Grain Size 0.5-1 mm Particle/Grain Size 500-1000 microns Particle/Grain Size Coarse Sand (Wentworth Scale)	Particle/Grain Size, Sand
No. 60 0.25 mm	Particle/Grain Size, Wentworth, Phi Scale 1 to 2	Particle/Grain Size 0.25-0.5 mm Particle/Grain Size 250-500 microns Particle/Grain Size Medium Sand (Wentworth Scale)	Particle/Grain Size, Sand

Lower Size*	Phi/Wentworth (PSEP/PLUMB) Parameter Name	Synonyms/Aliases	General Grain Size Parameter Name for Rollups**
No. 120 0.125 mm	Particle/Grain Size, Wentworth, Phi Scale 2 to 3	Particle/Grain Size 0.125-0.25 mm Particle/Grain Size 125-250 microns Particle/Grain Size Fine Sand (Wentworth Scale)	Particle/Grain Size, Sand
No. 230 0.0625 mm	Particle/Grain Size, Wentworth, Phi Scale 3 to 4 ----------  Cutoff between sand and fines (0.0625 mm)	Particle/Grain Size 0.0625-0.125 mm Particle/Grain Size 62.5-125 microns Particle/Grain Size Very Fine Sand (Wentworth Scale)	Particle/Grain Size, Sand
0.031 mm	Particle/Grain Size, Wentworth, Phi Scale 4 to 5	Particle/Grain Size 0.0313-0.0625 mm Particle/Grain Size 31.3-62.5 microns Particle/Grain Size Coarse Silt (Wentworth Scale)	Particle/Grain Size, Silt OR Particle/Grain Size, Fines (Silt/Clay)
0.016 mm	Particle/Grain Size, Wentworth, Phi Scale 5 to 6	Particle/Grain Size 0.0156-0.0313 mm Particle/Grain Size 15.6-31.3 microns Particle/Grain Size Medium Silt (Wentworth Scale)	Particle/Grain Size, Silt OR Particle/Grain Size, Fines (Silt/Clay)
0.008 mm	Particle/Grain Size, Wentworth, Phi Scale 6 to 7	Particle/Grain Size 0.0078-0.0156 mm Particle/Grain Size 7.8-15.6 microns Particle/Grain Size Fine Silt (Wentworth Scale)	Particle/Grain Size, Silt OR Particle/Grain Size, Fines (Silt/Clay)

Lower Size*	Phi/Wentworth (PSEP/PLUMB) Parameter Name	Synonyms/Aliases	General Grain Size Parameter Name for Rollups**
0.004 mm	Particle/Grain Size, Wentworth, Phi Scale 7 to 8	Particle/Grain Size 0.0039-0.0078 mm Particle/Grain Size 3.9-7.8 microns Particle/Grain Size Very Fine Silt (Wentworth Scale)	Particle/Grain Size, Silt OR Particle/Grain Size, Fines (Silt/Clay)
0.002 mm	Particle/Grain Size, Wentworth, Phi Scale 8 to 9	Particle/Grain Size 0.002-0.0039 mm Particle/Grain Size 2-3.9 microns Particle/Grain Size Coarse Clay	Particle/Grain Size, Clay OR Particle/Grain Size, Fines (Silt/Clay)
0.001 mm	Particle/Grain Size, Wentworth, Phi Scale 9 to 10	Particle/Grain Size 0.001-0.002 mm Particle/Grain Size 1-2 microns Particle/Grain Size Medium Clay	Particle/Grain Size, Clay OR Particle/Grain Size, Fines (Silt/Clay)
N/A	Particle/Grain Size, Phi Scale >10	Particle/Grain Size <0.001 mm Particle/Grain Size <1 micron Particle/Grain Size <=Fine Clay	Particle/Grain Size, Clay OR Particle/Grain Size, Fines (Silt/Clay)

ASTM Grain Size Scales

ASTM Result Methods

ASTM-D422/D422M

ASTM-D422 uses sieves for larger particles and hydrometers for smaller particles. The modified version (ASTM-D422M) is required for most sediment studies. The modified version moves the division between sand and fines from the No. 200 (0.075 mm) sieve to the No. 230 (0.062 mm) sieve, by adding the No. 230 sieve. This matches the division between sand and fines in the PSEP-PS and PLUMB91 methods.

Some organizations follow the D422M method but use Phi/Wentworth (PSEP/PLUMB) sieves instead of ASTM sieves. In this case, report EIM's Phi/Wentworth parameter names (e.g., Particle/Grain Size, Wentworth, Phi Scale 0 to 1) combined with the ASTM-D422M result method.

ASTM withdrew D422 in 2016, but the DMMP, SEF, and Ecology SCUM still approve it for grain size analyses.

ASTM currently doesn't have a replacement combined method, although they have plans for one in the future.

ASTM-D6913, ASTM-D6913M and ASTM-D7928

ASTM has two separate, current methods for grain size analyses – ASTM-D6913 for sieving and ASTM-D7928 for sedimentation/hydrometer. (ASTM-D6913M in EIM follows the same protocol as ASTM-D422M). The DMMP allows these methods for grain size analyses. For other programs or agencies, check before you use these methods.

Note: D6913/D6913M adds the No. 100 sieve to the stack, between the No. 60 and No. 140 sieves. This creates two additional divisions. We recently added two new ASTM parameters to EIM to cover this scenario.

Table 3: ASTM grain size methods.

Result Method Code	Result Method Description	Reference	Notes
ASTM-D422	Standard Test Method for Particle/Grain Size Analysis of Soils by Sieve and Hydrometer	ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA, 19428-2959 USA. http://www.astm.org/	

Result Method Code	Result Method Description	Reference	Notes
ASTM-D422M	Standard Test Method for Particle/Grain Size Analysis of Soils by Sieve and Hydrometer, modified method.	ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA, 19428-2959 USA. http://www.astm.org/	Modification moves division between sand and fines from No. 200 (0.075 mm) to No. 230 (0.062 mm) sieve. Accepted method for USACE DMMP and SEF and Ecology SCUM.
ASTM-D6913	Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis, Version 2017.	ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA, Version 2017. http://www.astm.org/	This method adds the No. 100 sieve to the stack.
ASTM-D6913M	Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis, Version 2017, Modified Method (modification is addition of No. 230 sieve).	ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA, Version 2017. http://www.astm.org/	Modification moves division between sand and fines from No. 200 (0.075 mm) to No. 230 (0.062 mm) sieve. No. 200 sieve is retained in the stack.
ASTM-D7928	Standard Test Method for Particle-Size Distribution (Gradation) of Fine-Grained Soils Using the Sedimentation (Hydrometer) Analysis, Version 2021.	ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA, 19428-2959 USA. http://www.astm.org/	There is no modified version of this method because it's run the same with D6913 or D6913M.

ASTM Parameters

ASTM-D422 and D6913 sieve sizes are slightly offset from Phi/Wentworth sieve sizes. EIM has parameter names for the ASTM sieve offsets. For example, “Particle/Grain Size, ASTM, Phi Scale 1.25 to 2,” for sand-sized material retained in the No. 60 sieve (synonym “Particle/Grain Size 0.259-0.425 mm”).

Because of the sieve offset, the boundary between sand and fines is also offset. However, labs usually run modified versions of ASTM-D422 and ASTM-D6913, which adds the No. 230 sieve to the stack. This matches the division between sand and fines for sediment that is accepted by USACE DMMP and SEF and Ecology SCUM. The table below shows you how to report using either case. For ASTM-D422M or ASTM-D6913M, use parameters in the green rows – skip the yellow row. For ASTM-D422 or ASTM-D6913, use the parameters in the orange row – skip the green rows. (Text in table also says what to use).

Also, ASTM-D6913 adds the No. 100 sieve to the stack, between the No. 60 and No. 140 sieves. For ASTM-D6913 or ASTM-D6913M, use the parameters in the blue rows below – skip the orange row. For ASTM-D422 or ASTM-D422M, use the parameter in the orange row – skip the blue rows (Text in table also says what to use).

Note: Use either the primary name or a synonym to submit data to EIM. In EIM Search, you can search on primary names or synonyms. However, when you export data from EIM Search, only the primary name displays.

*Table 4: ASTM-D422/D422M, D6913/D6913M, and D7928 grain size parameters. *Lower grain size is retained sieve size (smallest size that stays in the sieve) for each range. **See section on "rolling up" results into EIM general grain size parameters.*

Lower Grain Size*	ASTM Method Parameter Name	Synonym/Alias	General Grain Size Parameter Name for Rollups**
No. 4 4.75 mm	Particle/Grain Size, ASTM, Phi Scale <-2.25	Particle/Grain Size >4.75 mm	Particle/Grain Size, Gravel
No. 10 2 mm	Particle/Grain Size, ASTM, Phi Scale -2.25 to -1	Particle/Grain Size 2-4.75 mm	Particle/Grain Size, Gravel
No. 20 0.85 mm	Particle/Grain Size, ASTM, Phi Scale -1 to 0.25	Particle/Grain Size 0.85-2 mm	Particle/Grain Size, Sand
No. 40 0.425 mm	Particle/Grain Size, ASTM, Phi Scale 0.25 to 1.25	Particle/Grain Size 0.425-0.85 mm	Particle/Grain Size, Sand
No. 60 0.25 mm	Particle/Grain Size, ASTM, Phi Scale 1.25 to 2	Particle/Grain Size 0.25-0.425 mm	Particle/Grain Size, Sand
No. 100 0.15 mm	Particle/Grain Size, ASTM, Phi Scale 2 to 2.75 **Use only for D6913 or D6913M** (where No. 100 sieve is in the stack)	Particle/Grain Size 0.15-0.25 mm	Particle/Grain Size, Sand
No. 140 0.106 mm	Particle/Grain Size, ASTM, Phi Scale 2.75 to 3.25 **Use only for D6913 or D6913M** (where No. 100 sieve is in the stack)	Particle/Grain Size 0.106-0.15 mm	Particle/Grain Size, Sand
No. 140 0.106 mm	Particle/Grain Size, ASTM, Phi Scale 2 to 3.25 **Use only for D422 or D422M** (goes from No. 60 to No 140 sieve)	Particle/Grain Size 0.106-0.25 mm	Particle/Grain Size, Sand

Lower Grain Size*	ASTM Method Parameter Name	Synonym/Alias	General Grain Size Parameter Name for Rollups**
No. 200 0.075 mm	Particle/Grain Size, ASTM, Phi Scale 3.25 to 3.75 --- **D422 and D6913** cutoff between sand and fines (0.075 mm). Does not match PSEP.	Particle/Grain Size 0.075-0.106 mm	Particle/Grain Size, Sand
No. 230 0.0625 mm	Particle/Grain Size, ASTM Modified, Phi Scale 3.75 to 4 --- **Use only for D422M and D6913M** (where No. 230 sieve is in the stack). Cutoff between sand and fines (0.0625 mm). Matches PSEP.	Particle/Grain Size 0.0625-0.075	Particle/Grain Size, Sand
0.005 mm	Particle/Grain Size, ASTM, Phi Scale 4 to 7.75 **Use only for D422M and combo D6913M/D7928** (end of stack is No. 230 sieve).	Particle/Grain Size 0.005-0.0625 mm	Particle/Grain Size, Silt OR Particle/Grain Size, Fines
0.005 mm	Particle/Grain Size, ASTM, Phi Scale 3.75 to 7.75 **Use only for D422 and combo D6913/D7928** (end of stack is No. 200 sieve).	Particle/Grain Size 0.005-0.075 mm	Particle/Grain Size, Silt OR Particle/Grain Size, Fines
0.001 mm	Particle/Grain Size, ASTM, Phi Scale 7.75 to 10	Particle/Grain Size 0.001-0.005 mm	Particle/Grain Size, Clay OR Particle/Grain Size, Fines

General Grain Size Parameters

"Rolling up" to General Grain Size Ranges

We sometimes combine or "roll up" method-specific grain size ranges into larger, more general ranges called "rollups." These ranges include gravel, sand, silt, and clay (or fines).

Cases where you might want to use rollups include:

- Grain size ranges don't fit EIM's Phi/Wentworth or ASTM parameters. Check with your EIM data coordinator if your data doesn't match the existing parameters.
- Silt and clay (or combined fines) measurements. Labs often don't break these down into smaller size groups.
- Your regulatory program or guidance prefers general grain size ranges instead of finer resolution data. Check with your program or guidance contact to determine what to do.
- Labs sometimes report data in general grain size ranges.

Note: When you look at general grain size data in EIM Search, the Result Method indicates which scale/method was used.

EIM General Grain Size Parameters

Table 5 shows the parameters to use for rollups. Although divisions between Phi/Wentworth and ASTM size ranges are offset, they roll up to the same EIM general grain size parameters.

Table 5: EIM general grain size parameters and size range cutoffs.

Parameter Name	General Grain Size Range (upper to lower size limit in mm)	Phi Scale
Particle/Grain Size, Cobbles	256 to 64	-8 to -6
Particle/Grain Size, Gravel	64 to 2	-6 to -1
Particle/Grain Size, Sand	2 to 0.062 (PSEP/D422M/D6913M) 2 to 0.075 (D422/D6913)	-1 to 4 -1 to 3.75
Particle/Grain Size, Fines **Note:** report Fines (Silt+Clay) or Silt and Clay parameters.	0.062 to < 0.004 (PSEP) 0.062 to < 0.005 (D422M/D6913M) 0.075 to < 0.005 (D422/D6913)	4 to > 8 4 to > 7.75 3.75 to 7.75
Particle/Grain Size, Silt	0.062 to 0.004 (PSEP) 0.62 to 0.005 (D422M/D6913M) 0.075 to 0.005 (D422/D6913)	4 to 8 4 to 7.75 3.75 to 7.75
Particle/Grain Size, Clay	< 0.004 (PSEP) < 0.005 (D422/D422M/ D6913/ D6913M)	> 8 > 7.75

Replicates

Lab Replicates

Labs often analyze grain size in replicate or triplicate. You can either enter the averaged replicate or triplicate grain size data or each individual result into EIM. Check with your program or agency contact to determine what they require.

If you do enter replicates or triplicates, each set should have the same Sample ID. Enter a Lab Replicate ID (Column BB) to differentiate them (e.g., LR1, LR2, LR3).

Field Replicates

Fill out the Sample Replicate Flag (Column T) for each replicate with "Y." Field replicates can have the same or different Sample IDs. If your Sample IDs are the same among replicates, use the Sample Field Replicate ID (Column S) to differentiate them (e.g., FR1, FR2, etc.).

Reporting Limit

Labs should report a Reporting Limit (Column AO) and Reporting Limit Type (Column AP) for each result value. If they didn't provide this information, ask them for it.

For grain size, a typical reporting limit is 0.1%. For non-detects, enter the reporting limit value into the Result Value field (Column AM). Enter "U" into the Result Data Qualifier field (Column AS).

If you can't get reporting limits from the lab, don't enter zero ("0") for a grain size result value. Instead, enter a Reporting Limit (Column AO) of "0.1" and a Reporting Limit Type (Column AP) of "MRL." Enter a Result Comment (Column AZ) of "Lab did not provide a reporting limit so entered the default value of 0.1."

Grainsize Data Entry Examples

Download the Results Template to enter grain size data. Use the examples in this document in combination with the Results Help.

How to Enter Phi/Wentworth or ASTM Data

Labs usually report grain size results as percentage retained in each sieve. This tells you what percentage of the original sample was between that sieve and the sieve above it. To enter this data, look at the sieve size for the percent retained and the next largest sieve size. For example, if there was 5.1 percent retention in the Phi 0 sieve, and the Phi -1 sieve is above it, use the parameter name "Particle/Grain Size, Phi Scale -1 to 0." Enter "5.1" as the result value. **Note that Phi values increase as particle size decreases.** Table 6 shows a typical example of a lab output. Table 7 shows how you enter this data into EIM.

Examples

Lab Dataset

Table 6 is an example of a lab dataset with grain size measurements. To see how to put data like this into EIM, see Table 7.

Table 6: Lab data example. Analyzed by a Phi/Wentworth method.

Phi	Opening or Lowest Grain Size (mm)	Percent Retained	Percent Passing	Method
-2	4.00	0.2	99.8	PSEP Plumb 1981
-1	2.00	1.6	97.3	PSEP Plumb 1981
0	1.00	5.1	93.1	PSEP Plumb 1981
+1	0.50	6.2	86.9	PSEP Plumb 1981
+2	0.25	36.3	50.6	PSEP Plumb 1981
+3	0.125	45.4	5.2	PSEP Plumb 1981
+4	0.063	0.9	5.11	PSEP Plumb 1981
+5	0.032	0.4	4.71	PSEP Plumb 1981
+6	0.016	0.5	4.21	PSEP Plumb 1981
+7	0.008	0.7	3.51	PSEP Plumb 1981

Phi	Opening or Lowest Grain Size (mm)	Percent Retained	Percent Passing	Method
+8	0.004	2.1	1.41	PSEP Plumb 1981
+9	0.002	0.4	1.01	PSEP Plumb 1981
+10	0.001	0.2	0.81	PSEP Plumb 1981
>+10	<.0001	<0.1	0.71	PSEP Plumb 1981

EIM Results Template

Table 7 shows how to enter data from the lab in Table 6. Use this along with the Results Help to enter your data.

Table 7: EIM Results template example.

Result Parameter Name (AH)	Result Value (AM)	Result Value Units (AN)	Result Reporting Limit (AO)	Result Reporting Limit Type (AP)	Result Data Qualifier (AS)	Result Method (AY)
Particle/Grain Size, Wentworth, Phi Scale <-2.00	0.2	%	0.1	MRL		PSEP-PS
Particle/Grain Size, Wentworth, Phi Scale 2 to -1	1.6	%	0.1	MRL		PSEP-PS
Particle/Grain Size, Wentworth, Phi Scale 1 to 0	5.1	%	0.1	MRL		PSEP-PS
Particle/Grain Size, Wentworth, Phi Scale 0 to 1	6.2	%	0.1	MRL		PSEP-PS
Particle/Grain Size, Wentworth, Phi Scale 1 to 2	36.3	%	0.1	MRL		PSEP-PS
Particle/Grain Size, Wentworth, Phi Scale 2 to 3	45.4	%	0.1	MRL		PSEP-PS

Result Parameter Name (AH)	Result Value (AM)	Result Value Units (AN)	Result Reporting Limit (AO)	Result Reporting Limit Type (AP)	Result Data Qualifier (AS)	Result Method (AY)
Particle/Grain Size, Wentworth, Phi Scale 3 to 4	0.9	%	0.1	MRL		PSEP-PS
Particle/Grain Size, Wentworth, Phi Scale 4 to 5	0.4	%	0.1	MRL		PSEP-PS
Particle/Grain Size, Wentworth, Phi Scale 5 to 6	0.5	%	0.1	MRL		PSEP-PS
Particle/Grain Size, Wentworth, Phi Scale 6 to 7	0.7	%	0.1	MRL		PSEP-PS
Particle/Grain Size, Wentworth, Phi Scale 7 to 8	2.1	%	0.1	MRL		PSEP-PS
Particle/Grain Size, Wentworth, Phi Scale 8 to 9	0.4	%	0.1	MRL		PSEP-PS
Particle/Grain Size, Wentworth, Phi Scale 9 to 10	0.2	%	0.1	MRL		PSEP-PS
Particle/Grain Size, Wentworth, Phi Scale >10	0.1	%	0.1	MRL	U	PSEP-PS

How to Enter General Grain Size Data

How to Calculate and Enter Rollups

Labs usually report Phi/Wentworth or ASTM size ranges as percent retained in each sieve. You can submit these to EIM as general grain size ranges for reasons discussed in the Using Rollups section.

Sum the percentages that fall under each general grain size parameter. For example, sum coarse, medium, and fine sand percentages and report under “Particle/Grain Size, Sand.”

If your general grain size divisions don’t match those in Table 5 (EIM General Grain Size parameters), add a Result Additional Comment about it.

Examples

Lab Dataset

Table 8 is an example of a lab dataset with grain size measurements analyzed by a Phi/Wentworth method. Use Table 5 (EIM General Grain Size Parameters) to see the size range divisions. See Tables 9 and 10 for what this should look like in the Results Template.

Table 8: Lab data example. Analyzed by a Phi/Wentworth method.

Phi	Opening or Lowest Grain Size (mm)	Percent Retained	Percent Passing	Method	EIM General Grain Size
-2	4	0.2	99.8	PSEP Plumb 1981	Gravel
-1	2	1.6	97.3	PSEP Plumb 1981	Gravel
0	1	5.1	93.1	PSEP Plumb 1981	Sand
1	0.5	6.2	86.9	PSEP Plumb 1981	Sand
2	0.25	36.3	50.6	PSEP Plumb 1981	Sand
3	0.125	45.4	5.2	PSEP Plumb 1981	Sand
4	0.063	0.9	5.11	PSEP Plumb 1981	Sand
5	0.032	0.4	4.71	PSEP Plumb 1981	Silt or Fines
6	0.016	0.5	4.21	PSEP Plumb 1981	Silt or Fines
7	0.008	0.7	3.51	PSEP Plumb 1981	Silt or Fines
8	0.004	2.1	1.41	PSEP Plumb 1981	Silt or fines
9	0.002	0.4	1.01	PSEP Plumb 1981	Clay or Fines
10	0.001	0.2	0.81	PSEP Plumb 1981	Clay or Fines
>+10	<.0001	<0.1	0.71	PSEP Plumb 1981	N/A

EIM Results Template

Table 9: Example of EIM Results Template with grain sizes rolled up into general grain size parameters, with silt and clay differentiated.

Result Parameter Name (AH)	Result Value (AM)	Result Value Units (AN)	Result Reporting Limit (AO)	Result Reporting Limit Type (AP)	Result Method (AY)
Particle/Grain Size, Gravel	1.8	%	0.02	MRL	PSEP-PS
Particle/Grain Size, Sand	93.9	%	0.02	MRL	PSEP-PS
Particle/Grain Size, Silt	3.7	%	0.02	MRL	PSEP-PS
Particle/Grain Size, Clay	0.6	%	0.02	MRL	PSEP-PS

Table 10: Example of EIM Results Template with grain sizes rolled up to general grain size parameters, with silt and clay combined into fines.

Result Parameter Name (AH)	Result Value (AM)	Result Value Units (AN)	Result Reporting Limit (AO)	Result Reporting Limit Type (AP)	Result Method (AY)
Particle/Grain Size, Gravel	1.8	%	0.02	MRL	PSEP-PS
Particle/Grain Size, Sand	93.9	%	0.02	MRL	PSEP-PS
Particle/Grain Size, Fines	4.3	%	0.02	MRL	PSEP-PS

How to Enter General Grain Size Data from Lab

Labs sometimes report grain size data using general grain size ranges rather than the percent retained in each sieve. Table 10 shows a typical lab report. Use the following example along with the Results Help to enter your data into EIM.

Examples

Lab Dataset

If a lab reports data that looks like Table 11, follow the example in Table 12 to enter it into EIM.

Table 11: Lab grain size data reported in general size ranges.

Analyte	Result Value	Qualifier	Units	Method	Date Analyzed
Cobbles	0		%	ASTM D422	9/22/2022 1:34
Gravel	0.1	ND	%	ASTM D422	9/22/2022 1:34
Sand	81.6		%	ASTM D422	9/22/2022 1:34
Silt	18.4		%	ASTM D422	9/22/2022 1:34
Clay	0.1	ND	%	ASTM D422	9/22/2022 1:34

EIM Results Template

Table 12 shows how to enter the data from Table 11 into EIM. Use this along with the Results Help to enter your data into EIM.

*Table 12: Example of how to enter general grain size data into EIM. *Results Template column.*

Result Parameter Name (AH)*	Result Value (AM)	Result Value Units (AN)	Result Reporting Limit (AO)	Result Reporting Limit Type (AP)	Result Data Qualifier (AS)	Result Method (AY)
Particle/Grain Size, Cobbles	0.1	%	0.1	MRL	U	ASTM-D422
Particle/Grain Size, Gravel	0.1	%	0.1	MRL	U	ASTM-D422
Particle/Grain Size, Sand	81.6	%	0.1	MRL		ASTM-D422

Result Parameter Name (AH)*	Result Value (AM)	Result Value Units (AN)	Result Reporting Limit (AO)	Result Reporting Limit Type (AP)	Result Data Qualifier (AS)	Result Method (AY)
Particle/Grain Size, Silt	18.4	%	0.1	MRL		ASTM-D422
Particle/Grain Size, Clay	0.1	%	0.1	MRL	U	ASTM-D422

Document Revision History

Revision Date	Revision No.	Summary of Changes	Reviser(s)
2/21/2023	1.0	Original Document	KC/GS/CN
07/22/2025	1.1	Text updates in the Reporting Limit section	KC
05/11/2026	1.2	Added two new ASTM grain size parameters to cover adding the No. 100 sieve (ASTM-D6913 and ASTM-D6913M). Updated the parameter and guidance for the No. 230 sieve, that it's added vs. used instead of the No. 200 sieve. Clarified coding for the ASTM-D6913 and ASTM-D6913M methods. Added info about reporting Result Basis (Dry or Wet).	CN