Public Comment
Draft Construction Permit
Deadline: 6/11/08 by 12 p.m.

HydroDynamics

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June 10, 2008

Ms. Jeanine Townsend, Clerk to the Board
State Water Resources Control Board
1001 I Street, 24th Floor
Sacramento, CA 95814

RE: Comments on Draft Construction Permit

Attached, you will find my comments concerning technical assessments of the Draft Construction Permit, which are summarized below:

- A possible copyright issue exists with the theory for calculating Numeric Action Levels (NAL) and sizing sediment basins. The theories for both of these topics use material from my published work, but have not been cited in State documentation. Fortunately, it appears that your agency and my publisher are working to address this issue.
- There is an error in the logic of calculating runoff.
- Much work needs to occur on the sediment basin sizing attachment to ensure designers complete their work in a correct and professional manner.

It is especially gratifying knowing that your agency recognizes the following professional are Qualified SWPPP Developers.

- A California registered civil engineer, geologist, or landscape architect,
- A Professional Hydrologist registered through the American Institute of Hydrology,
- A certified professional soil scientist registered through the Soil Science Society of America,
- A CPESC or CPSWQ registered through Certified Professional in Erosion and Sediment Control, Inc., and
- A certified professional in erosion and sediment control registered through the National Institute for Certification in Engineering Technologies.

I recommend the adoption of regulations that require the following from professional organizations whose registrants are Qualified SWPPP Developers:

- Each year, registrants demonstrate an accountability of SWPPP activities to their professional organization,
- Every three years, all of the above professional organizations demonstrate accountability of their Qualified SWPPP Developer programs to the State Water Board, and
- After each accountability review, the State Water Board publicly identifies those professional organizations whose registrants can continue to be classified as Qualified SWPPP Developers for the next three years.

Lastly, HydroDynamics Incorporated conducts SWPPP developer classes throughout the nation and would welcome an opportunity to develop similar training sessions for the State Water Board. Additional information on our program can be found in the attached brochure.

Thank you for the opportunity to submit this material.

Yours truly,

HydroDynamics Incorporated

Jerald S. Fifield, Ph.D.
Professional Hydrologist
CPESC No. 477

JSF/saf

Attachments

RECEIVED
JUN 10 2008
SWRCB EXECUTIVE

*This **advanced course** provides the technical tools for designers to develop effective sediment and erosion control plans for contractors to implement on construction sites. The two-day course **does not** dwell on BMPs available for implementation. Instead, participants having experience in sediment and erosion control will use their background in science and engineering to learn about BMP selection, designing effective sediment containment systems, identifying performance goals, and evaluating plan effectiveness.*

DAY 1 (8:30 a.m. to 4:30 p.m.)

Introductory Material

- Regulatory Requirements
  - Clean Water Act
  - What is the "CGP?"
  - Colorado requirements
- Assessing Apparent Conflicting Regulatory Requirements
- Review of the Grading and Construction Process
- Understanding Erosion, Sediment, and Sedimentation
  - Water
  - Wind
- Plan Development
  - Importance of communication and cooperation
  - Assessing existing site conditions
  - Narrative report
  - Sediment and erosion control drawings for the contractor

Developing Effective and Practical S&EC Drawings

- Why Hydrologic Assessments are Necessary
- Identifying Effective BMPs to Implement
- What Should Appear in S&EC Plans for
  - Pre and during grading/construction conditions
  - After grading/construction conditions
  - Post construction conditions for water quality

Evaluating Commonly Used BMPs and Their Limitations

- Barriers
  - Sheet flow structures
  - Drain inlets, culverts, and outlet structures
  - Check structures
  - Maintenance requirements
- Sediment Containment Systems
  - Sizing and location
  - Effectiveness
  - Outlet structures
  - Maintenance requirements
- Erosion Control Methods
  - Temporary/perennial vegetation
  - Soil binders and mulches
  - RECPs, ECBs, and TRMs
  - Maintenance requirements

DAY 2 (8:30 a.m. to 4:30 p.m.)

Applying Scientific and Engineering Principles to Selected BMPs

- Developing an Effective Sediment Containment System
  - Components of an effective SCS
  - Design parameters for capturing untreated suspended particles
  - Design parameters for capturing polymer treated suspended particles
- Slope Drains
  - Contributing watersheds
  - Roadways
- Establishing Vegetation
  - Understanding soil and climatic requirements
  - Assessing planting methods
  - Developing seed mixtures for temporary/perennial vegetation
  - Importance of soil binders, mulches, and RECPs
- Assessing "Soft Armoring" Techniques for Channel Protection
  - The role of shear stress and flow velocity
  - Channel flows and criteria for selecting TRMs

Performance Goals and Effectiveness of an S&EC Plan

- Developing Performance Goals at Critical Discharge Points
- Assessing Plan Effectiveness

Updating the S&EC Drawings and the SWMP/SWPPP

- Compiling and Presenting Pertinent BMP Information for the Contractor
- Importance of Notes on S&EC Drawings and Schedule Development

Team Projects (time permitting)

INSTRUCTORS

Dr. Jerald S. Fifield, CPESC, CISEC

Since earning his doctorate degree in engineering from Utah State University in 1979, Dr. Fifield has provided services as a consultant, expert witness, and educator. In addition to designing sediment and erosion control plans, he has authored numerous papers and researched over 40 different erosion control products in the semi-arid environment of Colorado and written sediment and erosion control manuals for designers, inspectors, and contractors.

Tina R. Evans, PE, CISEC

Since earning her degrees in Civil and Mechanical Engineering from the Colorado School of Mines in 1999, Ms. Evans has been working as a consultant at HydroDynamics Incorporated. She assists with research for expert testimony, develops sediment & erosion control and drainage plans, and completes construction site inspections.

Vendors include: Arkansas Seed, Bowman Construction, Nilex, Sharp Seed, Watersavers

DESIGNING FOR EFFECTIVE SEDIMENT AND EROSION CONTROL ON CONSTRUCTION SITES

March 25 & 26, 2008

at

Holiday Inn

Denver International Airport
15500 E. 40th Avenue
Denver, CO 80239-5071
(303) 371-9494

Registration begins at 7:30 a.m. on Day 1

- ***Continental Breakfast***
- ***Hot Buffet Lunch (let us know if you require a vegetarian entree)***
- ***Textbook:*** ***Designing for Effective Sediment and Erosion Control on Construction Sites by Jerald S. Fifield, Ph.D.***
- ***Access to BMP Vendors***

Registration Form (make copies as necessary)

Name: ______________________________

Organization: ______________________________

Mailing Address: ______________________________

____

Phone: ______________ Fax: ______________

E-mail: ______________________________

Register by 3/12/2008, _____ at $385 per person = $________

Register after 3/12/2008, _____ at $425 per person = $ ________

Payment Information: ☐ Check ☐ VISA ☐ MasterCard ☐ American Express

Please fill out the following if you are paying by credit card

______________________ ____________
Credit Card Number Expiration Date

Exact name on the credit card: ______________________________

Exact mailing zip code on the credit card: ______________________________

______________________ ____________
Authorized Signature Date

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Phone: 303-841-0377
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Web: www.hdi-consultants.com

HydroDynamics Incorporated
P.O. Box 1327
Parker, CO 80134

Taught by designers who strive to develop effective sediment and erosion control drawings for contractors to implement on construction sites

DESIGNING FOR EFFECTIVE SEDIMENT AND EROSION CONTROL ON CONSTRUCTION SITES

Comments from Jerald S. Fifield, Ph.D., PH, CISEC, and CPESC (303-841-0377)

Turbidity Numeric Action Level Spreadsheet

1. It is gratifying to see my works on Loading Factors and sediment yields are being incorporated into the new California standards for Numeric Action Levels (NAL). However, I am disturbed to find my work has not received any credit. Fortunately, it is my understanding that this issue is being addressed with my publisher and will be corrected in the final and official version of the standards.

   In order to prevent potential copyright problems, I recommend adding the following words appear within the title found in the Loading Factor tab:

   Loading Factors based on the Modified Universal Soil Loss Equation (MUSLE) ***and work by Fifield (2001 and 2004)***

   This same change also needs to occur in the Turbidity MUSLE Calculator worksheet. I assume somewhere within the documentation, the following reference will appear:

   Fifield, Jerald. 2001 and 2004. Designing for Effective Sediment and Erosion Control on Construction Sites. ForesterPress, Santa Barbara, CA. 325 pages.

2. Although different from what appears in my Chapter 9 (see Fifield, 2004), the concepts of associating TOTAL historic sediment yields with NTUs is plausible. Usually, NTUs are associated with net TSS since heavier suspended particles deposit rapidly and will not appear within the water column when sampling occurs. The proposed NTU method does provide another technique to represent gross TSS values for total sediment yields generated from bare ground conditions due to rainfall events.

   While 100% of all sediments generated from a site will not remain suspended within a water column, the proposed NTU concept does provide a simple method to identify threshold sediment discharges values. However, it must be noted that this concept is not meant to address more serious pollution problems associated with net TSS such as public health issues, drinking water standards, chemical and pesticide conveyance problems, etc.

3. In calculating runoff, the SCS Curve Number method that appears in the Hydrology and Erodibility Tab needs one correction. Runoff cannot occur until the amount of precipitation exceeds the initial abstraction losses. Thus, Cell B5 of the Hydrology and Erodibility Tab needs a logic decision so that runoff occurs only when:

   $$PPT > 0.2S$$

   where PPT = precipitation, S = (1000/RCN) – 10, and RCN = Runoff Curve Number.

   This correction also needs to occur in the Turbidity MUSLE Calculator and Volume Calculator Excel worksheets.

4. Will the C-Factor value of 0.50 and P-Factor value of 0.10 be applicable in all parts of the state? My concern about this lies around the following:
   a) When C-Factor = 0.50, there is an implication that stabilization methods exist that will be 50% effective in preventing erosion. How realistic is this for desert climatic conditions?
   b) When P-Factor = 0.10, there is an implication that structural methods exist that will remove 90% of the suspended particles. Again, how realistic is this for desert conditions? In addition, this may not be feasible for high clay content soils.

5. Should consideration be given to having turbidity action level C-Factor and P-Factor values vary for different parts of the state?

Sediment Basin Sizing Attachment

1. As with the NAL concept, it is gratifying to see my work on sediment containment systems (a.k.a., sediment basins/ponds/traps) are being incorporated into the new California standards. However, I continue to be disturbed in finding my work does has not received any credit. As with the NAL situation, it is my understanding this is being addressed with my publisher to avoid future copyright problems.

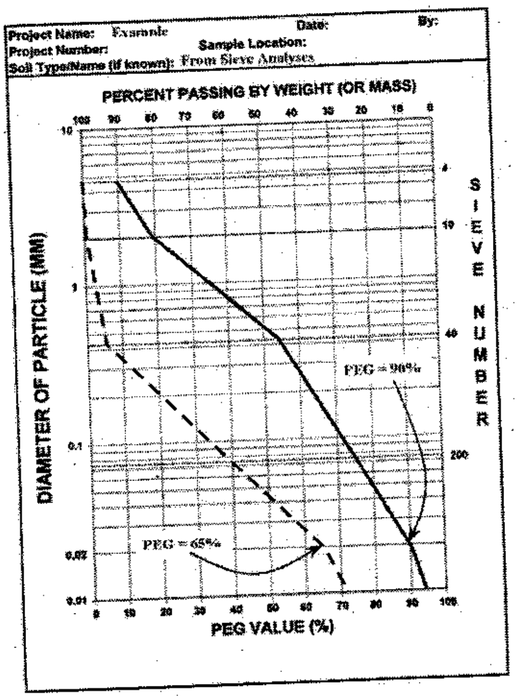
   I recommend the following words appear under the title:

   Based Upon Work by Fifield (2001 and 2004)

   Also, located somewhere within the documentation, a reference needs to appear as follows:

   Fifield, Jerald. 2001 and 2004. Designing for Effective Sediment and Erosion Control on Construction Sites. ForesterPress, Santa Barbara, CA. 325 pages.

2. There is a conflict with the goal of capturing design size particles appearing in Attachment D (which is on the website) or Attachment H (which appears in the Preliminary Draft). For this comment letter, I will assume one is trying to capture 90% of the particles that are 0.02 mm and larger.



   a) When trying to capture 90% of the particles that are 0.02 mm and larger, NEff ≠ 90%. Instead, AEff = 90%. As found in Fifield, 2004, NEff values are directly proportional to the product of AEff and PEG. Thus, if a PEG value is 90% (e.g., sandy soils), then NEff = 90% x 90% = 81%.

   b) As a comparison, when a PEG value is 65% (e.g., loamy soils), then NEff = 90% x 65% = 58.5%. The only way to make the system more effective when NEff = 58.5% is to contain runoff waters for long periods of time (e.g., up to 48 or more hours) or introduce a polymer into the inflow waters.

   c) It should be noted that it is possible that the design size particle may not be 0.02 mm. It can be larger (e.g., sand particles) or smaller (e.g., clay particles) and should be decided upon by a professional assessment of PEG values.

   d) Attached to this comment letter is a PDF copy of the above graph for inclusion into your material.

3. I suggest adding wording that indicates discharge waters from a sediment basin are based upon a design storm event. When greater than design storm events occur, significant amounts of sediment may discharge from the system depending upon the composition of upstream soils, effectiveness of the containment structure, as well as the magnitude of flows out of the system.

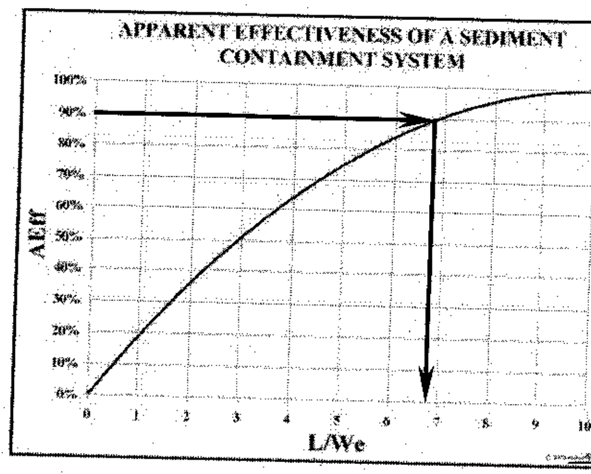
Comments from Jerald S. Fifield, Ph.D., PH, CISEC, and CPESC (303-841-0377)

4. I suggest including PEG charts (see attached) in the example, one with an illustration of a soil data curves that indicate PEG values for the design size particle and a second clean copy for use by the designer.

5. The Apparent Effectiveness graph title should be:

Apparent Effectiveness of a Sediment Basin to Capture Suspended Design-Size Particles

6. It would be wise to illustrate in the example that when AEff = 90%, then L/We = 6.9 as shown in the graph at the right. Also, I suggest including AEff charts (see attached) with the example; one that illustrates how AEff = 90% results in an $L:W_e = 6.9$ and a second clean copy for use by the designer.



DIAMETER (MM)	TERMINAL VELOCITY FOR SUSPENDED PARTICLES IN WATER (FEET PER SECOND) 32	40	50	60	70	80	90	PARTICLE
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	VERY FINE SILT
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	FINE SILT
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	MEDIUM SILT
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	COARSE SILT
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
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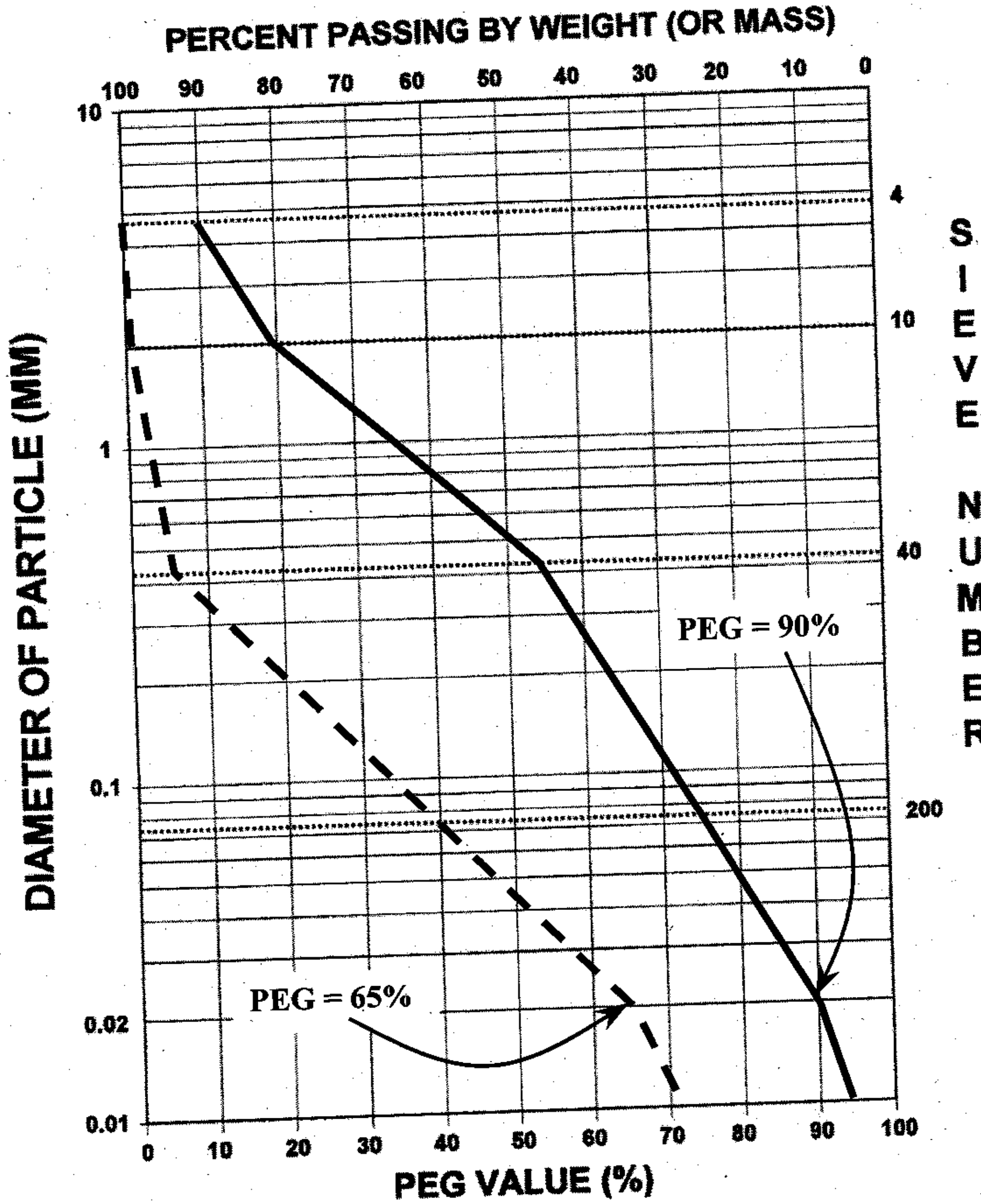
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	VERY FINE SAND
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
DEG C	0.0	4.4	10.0	15.6	21.1	26.7	32.2	

7. I suggest providing a list of parameters along with their accompanying units.

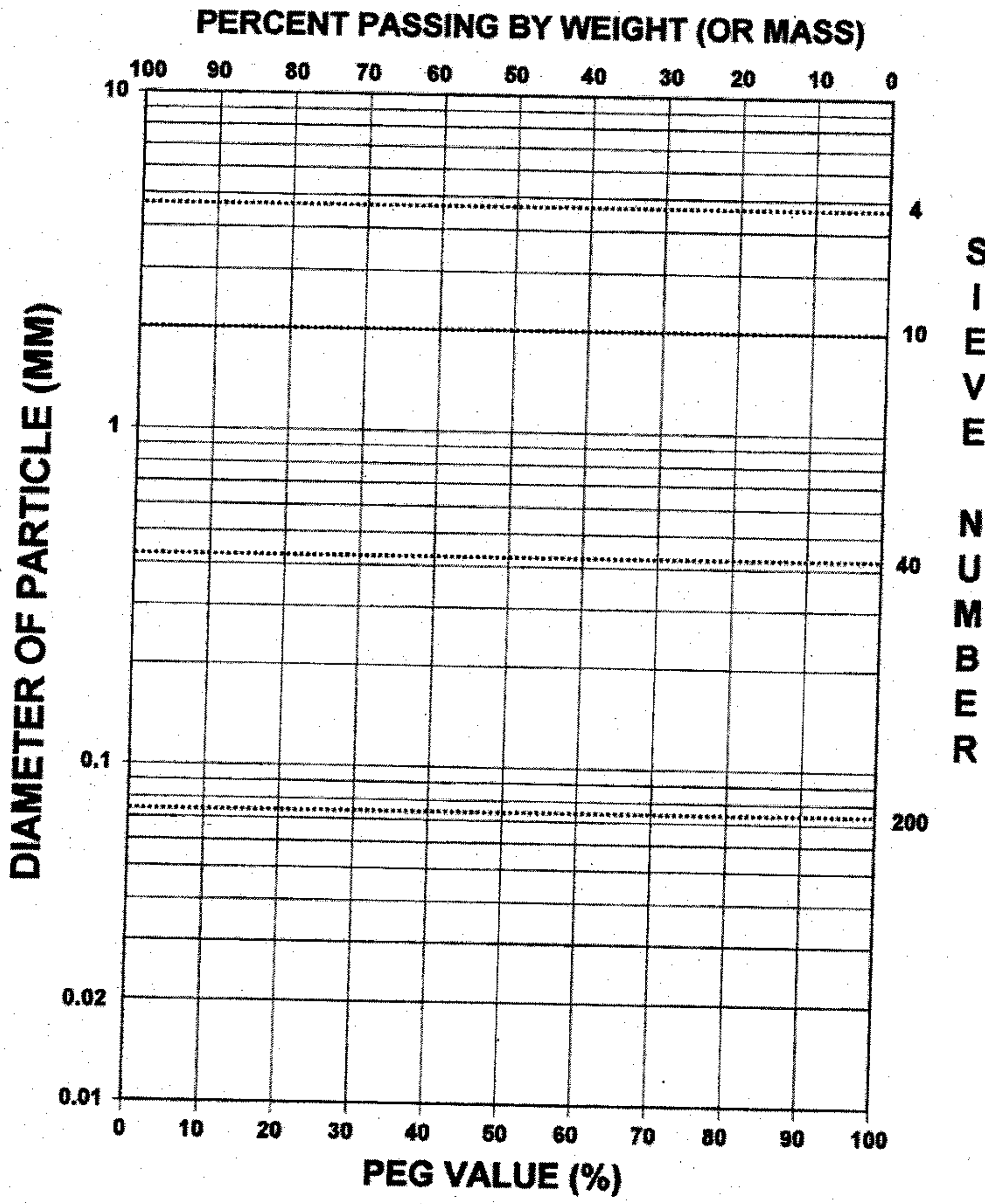
8. I suggest the design size particle settling velocity be based upon a water temperature of 32 degrees Fahrenheit, which is when maximum viscosity exists. Otherwise, someone could design a system at temperatures of 100 degrees Fahrenheit, which means a faster terminal velocity that results in a smaller pond surface area. I have included a chart illustrating terminal velocity values for different temperatures.

9. The "=" sign is not in a correct position for Equation 4.

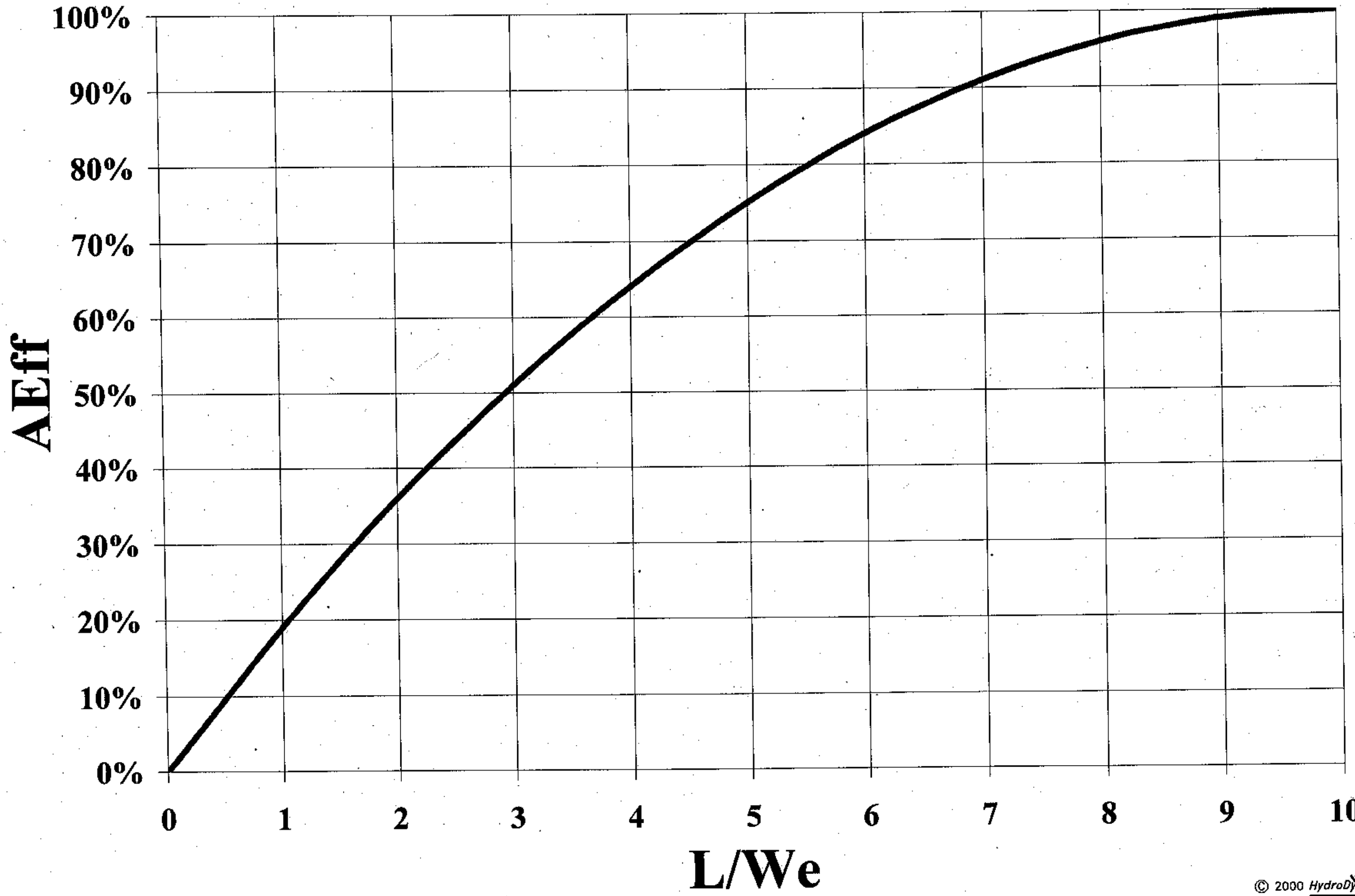
Project Name: Example **Date:** **By:**
Project Number: **Sample Location:**
Soil Type/Name (if known): From Sieve Analyses



Project Name: **Date:** **By:**
Project Number: **Sample Location:**
Soil Type/Name (if known):



APPARENT EFFECTIVENESS OF A SEDIMENT CONTAINMENT SYSTEM



DIAMETER	TERMINAL VELOCITY FOR SUSPENDED PARTICLES IN WATER (FEET PER SECOND)							
(MM)	32	40	50	60	70	80	90	PARTICLE
0.005	0.00004	0.00005	0.00005	0.00006	0.00008	0.00010	0.00012	VERY FINE SILT
0.010	0.00016	0.00018	0.00022	0.00025	0.00030	0.00039	0.00049	FINE SILT
0.015	0.00036	0.00042	0.00049	0.00057	0.00068	0.00087	0.00111	
0.020	0.00064	0.00074	0.00087	0.00102	0.00120	0.00155	0.00197	
0.025	0.00100	0.00116	0.00137	0.00159	0.00188	0.00243	0.00308	MEDIUM SILT
0.030	0.00144	0.00166	0.00197	0.00229	0.00270	0.00349	0.00443	
0.035	0.00196	0.00227	0.00268	0.00312	0.00368	0.00476	0.00603	
0.040	0.00256	0.00296	0.00350	0.00407	0.00481	0.00621	0.00788	
0.045	0.00324	0.00375	0.00443	0.00515	0.00608	0.00786	0.00997	COARSE SILT
0.050	0.00400	0.00462	0.00546	0.00636	0.00751	0.00971	0.01231	
0.055	0.00484	0.00560	0.00661	0.00770	0.00909	0.01175	0.01489	
0.060	0.00576	0.00666	0.00787	0.00916	0.01082	0.01398	0.01772	
0.065	0.00676	0.00782	0.00924	0.01075	0.01270	0.01641	0.02080	VERY FINE SAND
0.070	0.00784	0.00906	0.01071	0.01247	0.01472	0.01903	0.02412	
DEG C	0.0	4.4	10.0	15.6	21.1	26.7	32.2	