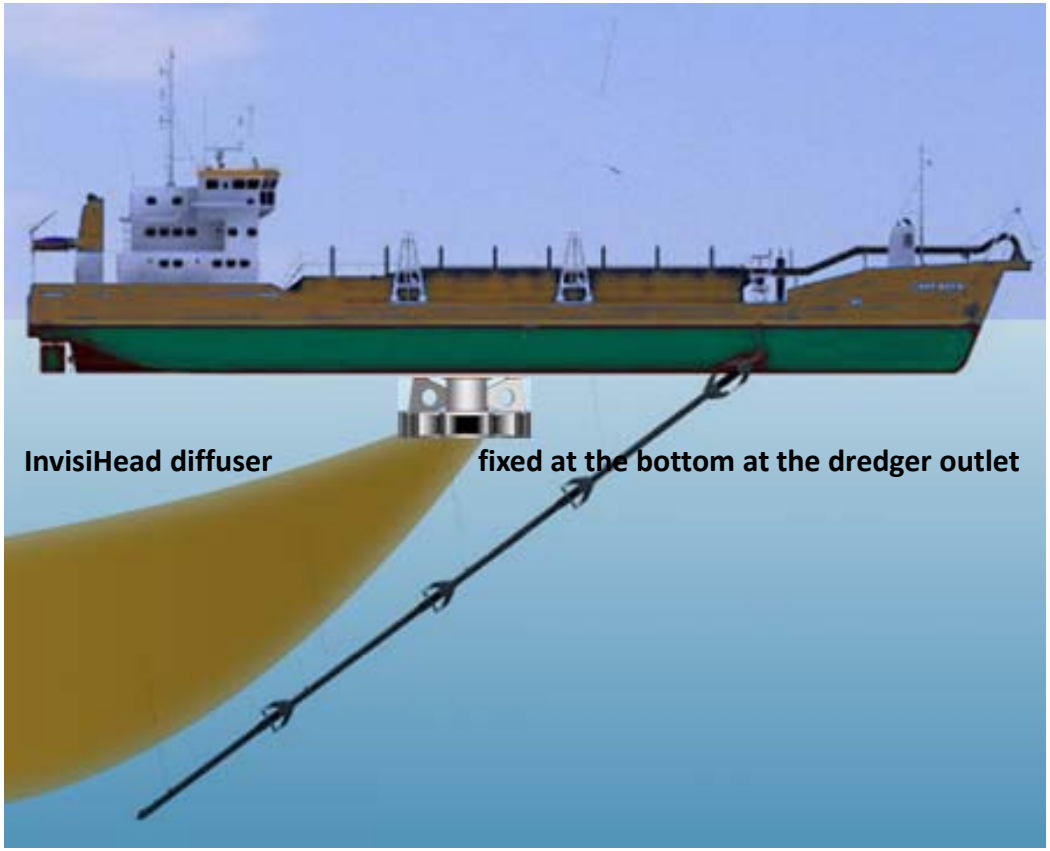
Turbidity Diffusion and Decay Modeling using US EPA VP UM3

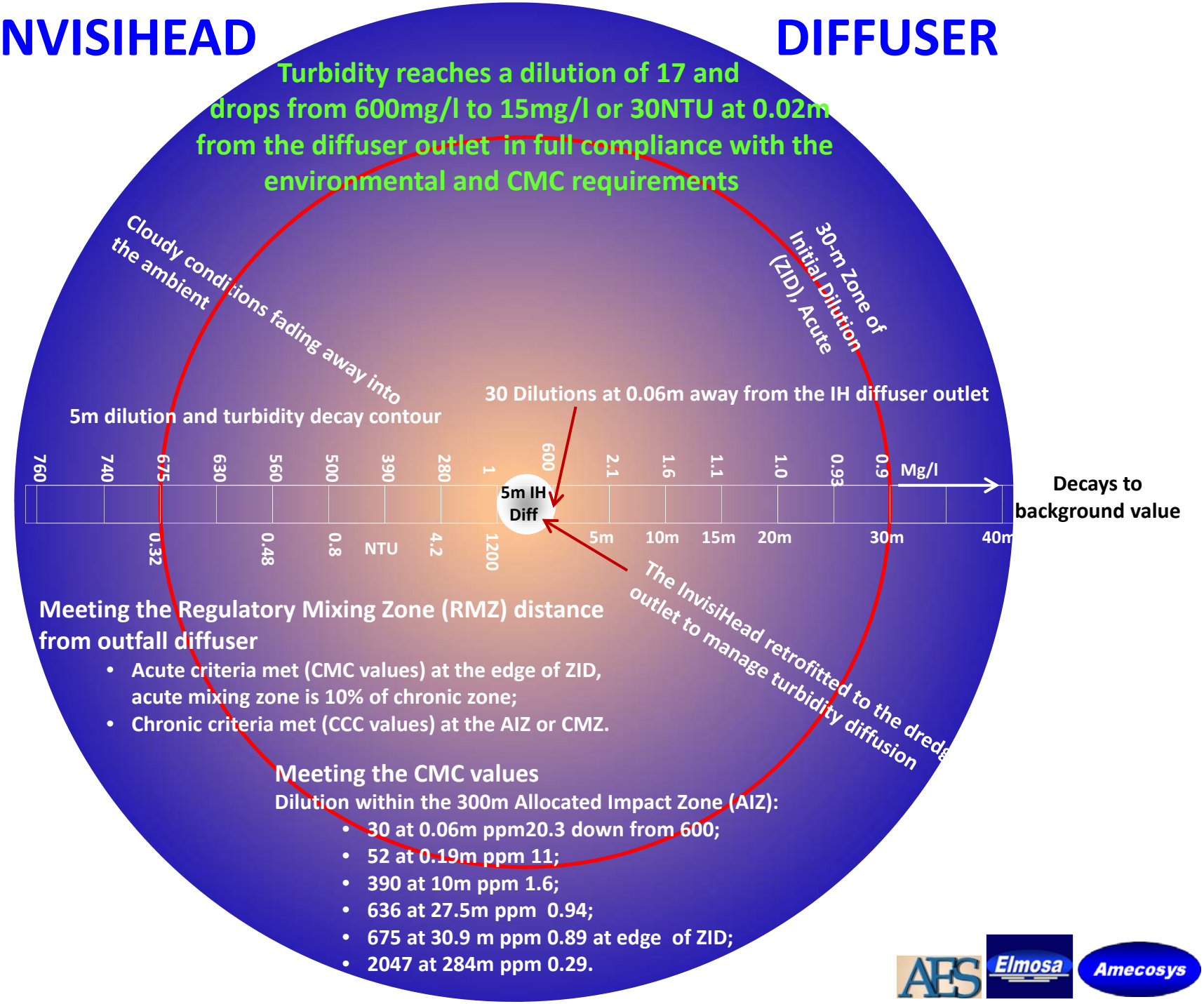
By nature of the design, the InvisiHead diffuser releases effluent in a spatial and temporal fashion or in a 4-D (space plus time) domain that makes the flow funnel out in a 360° round surround, 180° up, sideways, straight, and down. It discharges, funnels out and disperses, spreads, mixes and dilutes effluents to reach the required dilution within the vicinity of the diffuser early in the mixing zones; radial diffusion of effluents with multi directionality is what the InvisiHead exactly made to do.

Efficient turbidity diffusion can be achieved by an InvisiHead diffuser fixed at the bottom of the dredger to operate as an outlet to the dredged material. The 5m IH diffuses, disperses, spreads, mixes and dilutes turbidly as shown in the US EPA VP UM3 model below.



Turbidity decays from 1200 NTU to 30-the required level just after leaving the diffuser, and reaches 0.8 NTU at the edge of the ZID or acute zone

THE INVISIHEAD DIFFUSER



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/ Windows UM3. 8/24/2018 8:45:47 PM
Case 1; ambient file C:\Plumes\Turbidity Decay.001.db; Diffuser table record 1: ----------

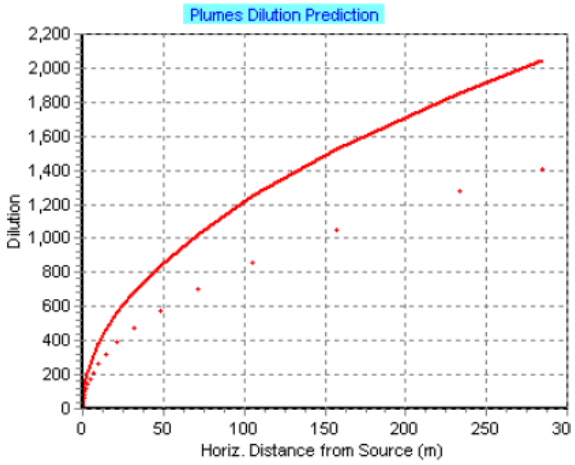
Depth	Amb-cur	Amb-dir	Amb-sal	Amb-tem	Amb-pol	Solar rad	Far-spd	Far-dir	Disprsn
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2
0.0	0.05	90.0	38.0	25.0	0.0	0.000632	0.01	0.0	0.0003
12.0	0.05	90.0	38.0	25.0	0.0	0.000632	0.01	0.0	0.0003

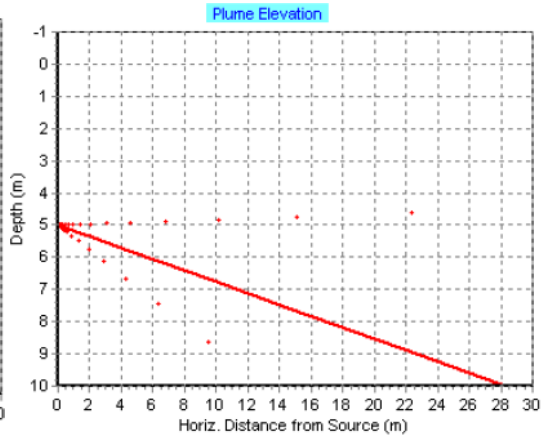
P-dia	P-elev	V-angle	H-angle	Ports	Spacing	AcuteMZ	ChrncMZ	P-depth	Ttl-flo	Eff-sal	Temp	Polutnt
(m)	(m)	(deg)	(deg)	()	(m)	(m)	(m)	(m)	(m3/s)	(psu)	(C)	(ppm)
6.00E-7	10.0	-10.0	90.0	1.68E+7	9.96E-9	30.0	300.0	5.0	2.04	38.0	25.0	600.0

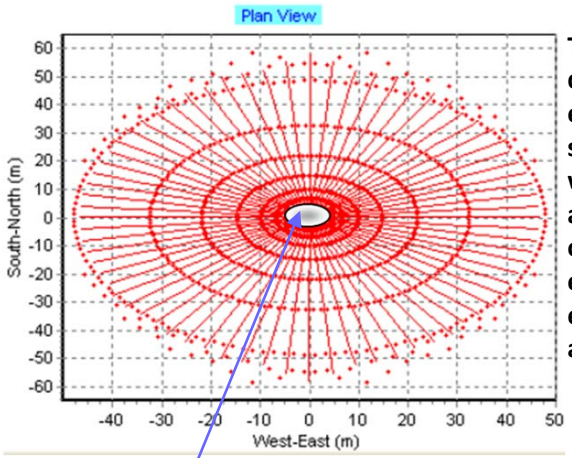
Or about **1200 NTU**

Froude number: pure jet

Step	Amb-cur (m/s)	Amb-dir (deg)	Amb-pol (ppm)	P-dia (m)	Temp (C)	Polutnt (ppm)	4/3Eddy (ppm)	Dilutn ()	x-posn (m)	y-posn (m)	
0	0.05	90.0	0.0	6.000E-7	25.0	600.0	600.0	1.0	0.0	0.0	
Potential for more dilution											
100	0.05	90.0	0.0	0.0014	25.0	82.82	82.82	7.245	0.0	0.00349	
171	0.05	90.0	0.0	0.0234	25.0	20.3	20.3	29.55	0.0	0.0592	max dilution reached
200	0.05	90.0	0.0	0.0737	25.0	11.43	11.43	52.48	0.0	0.187	
300	0.05	90.0	0.0	3.867	25.0	1.578	1.578	380.2	0.0	9.808	
326	0.05	90.0	0.0	10.83	25.0	0.943	0.943	636.3	0.0	27.47	bottom hit,
329	0.05	90.0	0.0	12.2	25.0	0.889	0.889	675.2	0.0	30.93	acute zone,
385	0.05	90.0	0.0	112.0	25.0	0.293	0.293	2046.8	0.0	284.2	surface,







The InvisiHead diffuser discharges effluent in a round surround, side ways, up, straight, and down funneling out flow, and efficiently manages effluent diffusion and dispersion

The InvisiHead diffuser

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