

Sediment Monitoring and Sluicing Operation in Shihmen Reservoir

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CONTENTS

Shihmen Reservoir plays an important role on water supply for irrigation and domestic use of northern Taiwan.

I. Background

Landslides and soil erosion in watershed is the greatest threat to the reservoir.

I. Background

All the check dams were filled with rock and soil.

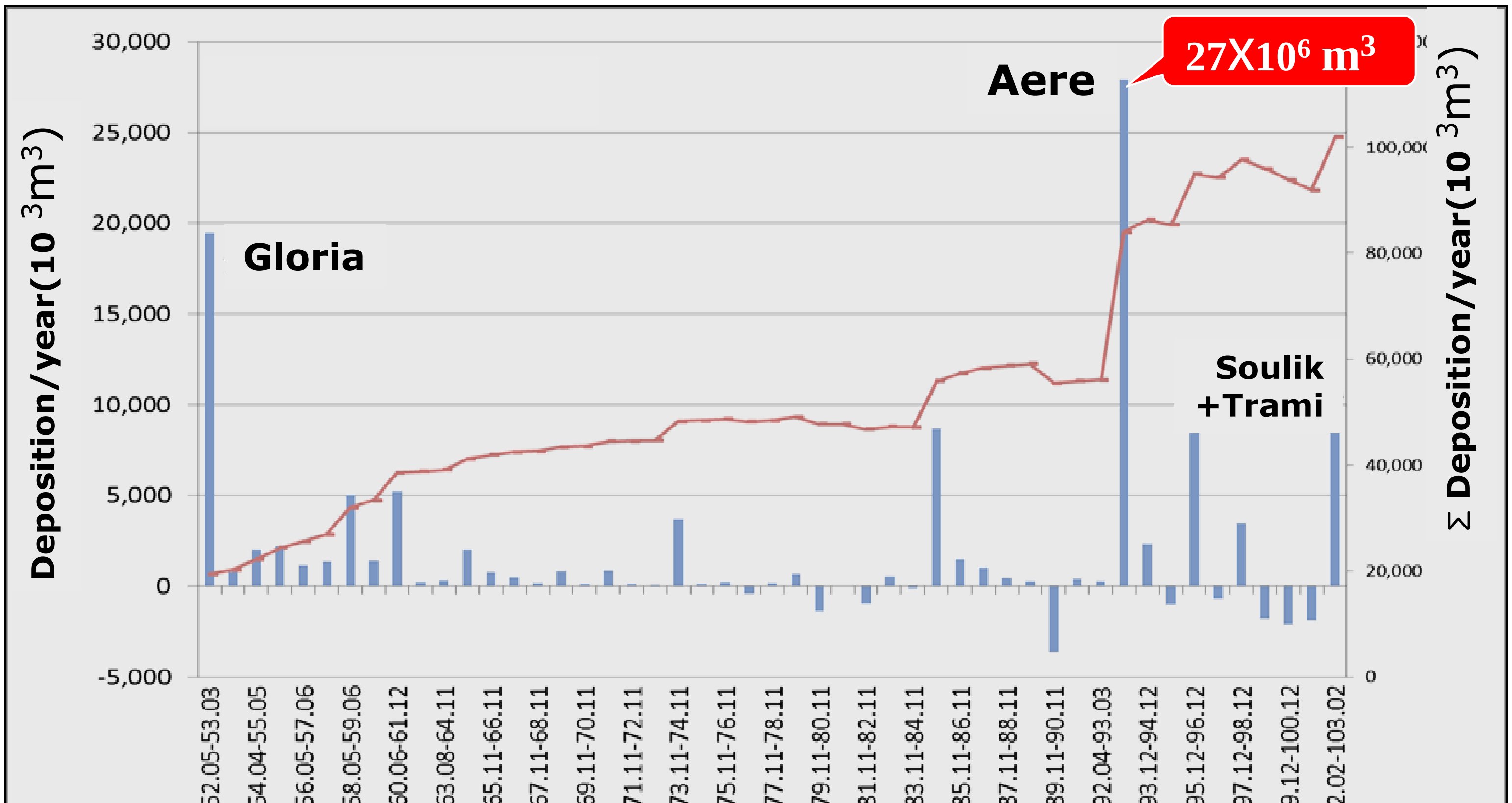
I. Background

Water was too muddy during heavy storms.

I. Background

Typhoon is the greatest factor for sedimentation.

Average deposition：$4X10^6$ m^3/yr

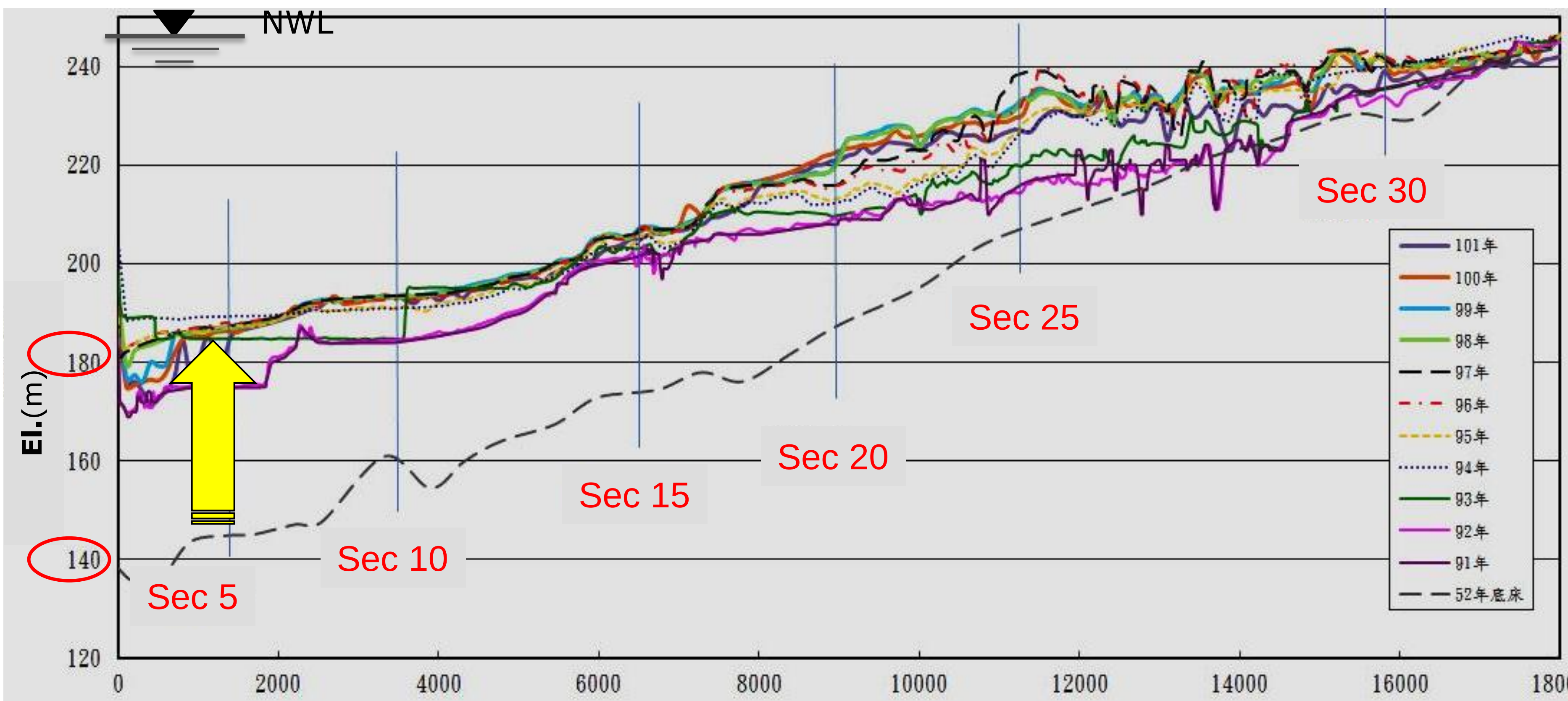


Sediment Deposition curve

I. Background

1/3 of the capacity were occupied by deposition.

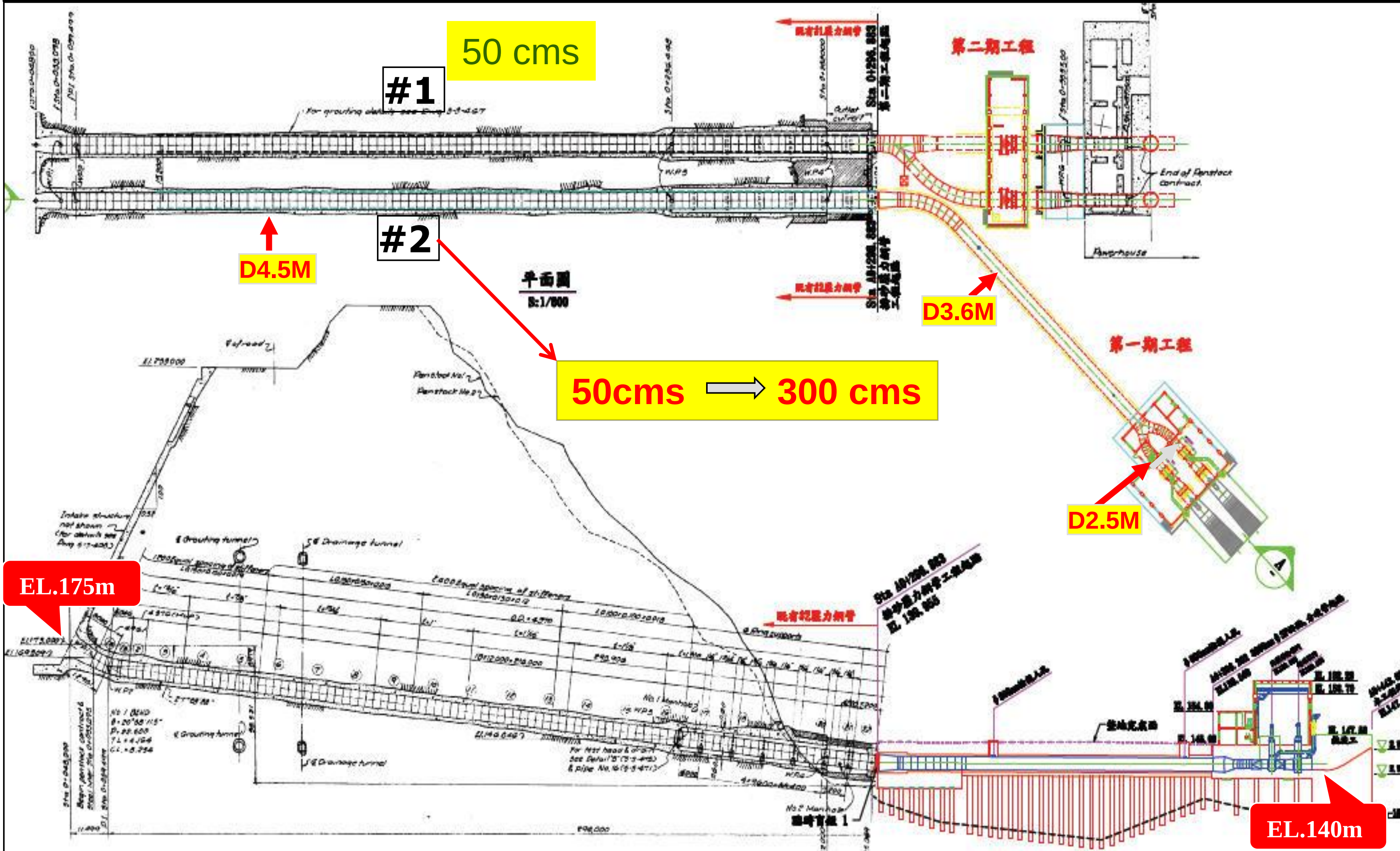
Design capacity: $309X10^6$ m^3 → **2014 capacity: $207X10^6$ m^3**



Bed profile of reservoir(m)

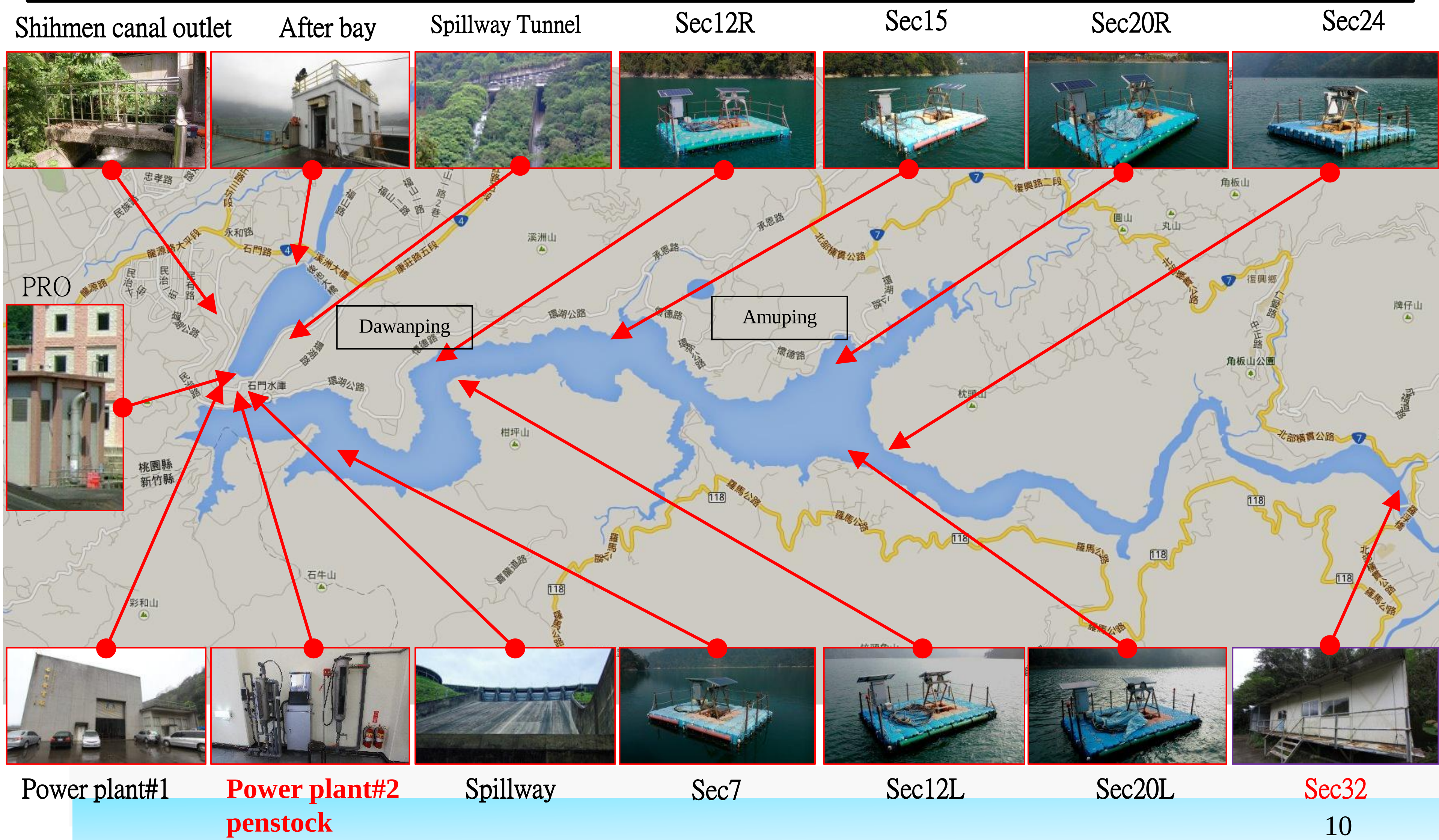
II. Reform for sluicing

1. Modifying Power Plant #2 Penstock as Sluice Tunnel.



II. Reform for sluicing

2. Building suspended solid concentration(ssc) monitoring system. (15 stations from after bay to 16km upstream)



II. Reform for sluicing

Slucing Operation during Typhoon Soulik (2013)

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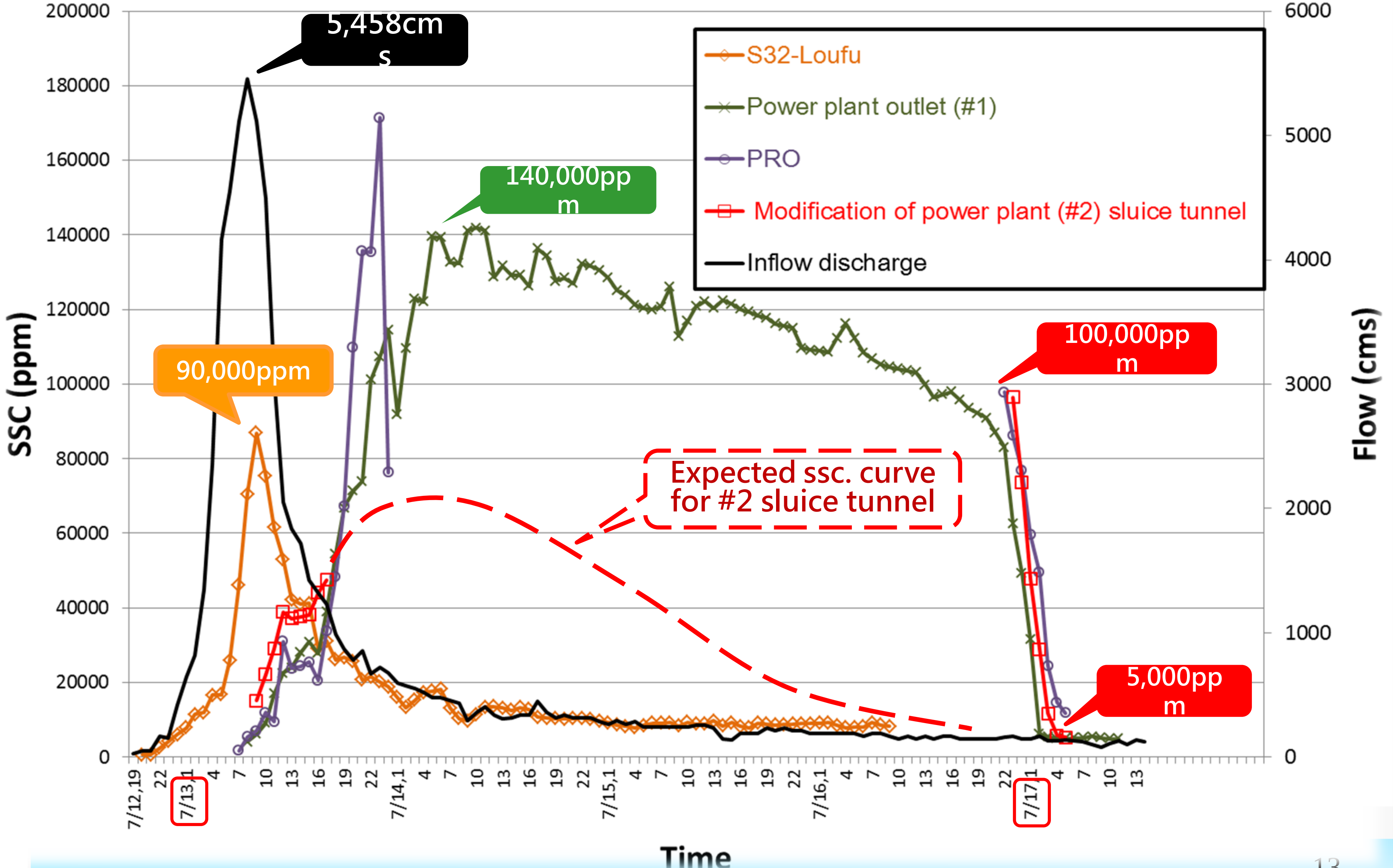
Slucing Operation during Typhoon Soulik (2013)

Sluic tunnel Q=300 cms
Concentration=37,400ppm

Spillway Q=2,292 cms
Concentration=6,100ppm

II. Reform for sluicing

Monitoring Results during Typhoon Soulik (2013)



II. Reform for sluicing

Sediment Sluicing Rate during Typhoon Soulik and Trami in 2013

	Soulik (7/12 19:00 ~ 7/17 11:00)		Trami (8/21 9:00 ~ 8/24 7:00)	
Inlet	InflowΣ V (10^6 m^3)	InflowΣ Vs (10^6 ton)	InflowΣ V (10^6 m^3)	InflowΣ Vs (10^6 ton)
	264.1	9.2	165.3	3.2
Outlet：	OutflowΣ V ($10^6$$m^3$)	OutflowΣ Vs (10^6 ton)	OutflowΣ V ($10^6$$m^3$)	OutflowΣ Vs (10^6ton)
1.spillway	126.7	0.5	70.7	0.2
2.tunnel spillway	84.0	0.2	57.8	0.1
3.penstock(#2) sluice tunnel	16.7	(15hr) 0.6	28.1	(20hr) 0.4
4. penstock(#1)power plant	17.6	(99hr) 1.6	10.7	(60hr) 0.2
5.PRO etc.	6.6	0.3	8.3	0.2
Outlet Total	251.7	3.2	175.5	1.1
Sluicing rate	35%		37%	

III. Conclusion

- **Sediment transport(density flow) monitoring data is very useful for sluicing operation.**

- **Modification of power plant penstock as sluiceway can reduce sediment deposition in Shihmen Reservoir.**

- **No matter how effective the sluiceway is, a big portion of sediment was still kept in the reservoir.**

Thank you for your attention.

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