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Site Selection for Nuclear Power Plants in China

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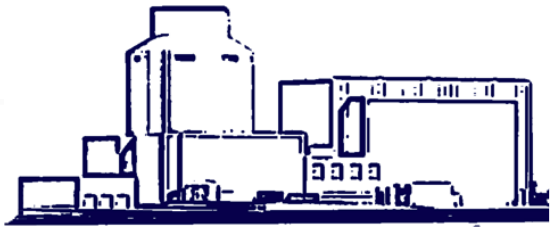
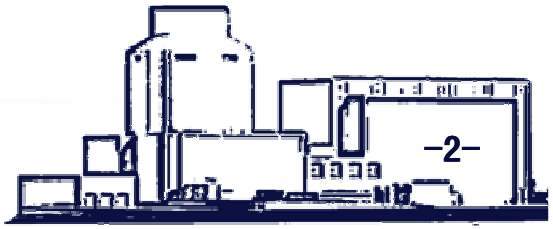


About SNERDI

- Established in February of 1970, the Shanghai Nuclear Engineering Research and Design Institute (SNERDI) is a leading technology research and design institute for nuclear power in China.
- Upon completion of the self-design of the first Nuclear Power Plant, the Qinshan NPP, in mainland China, SNERDI has performed again excellent design of Chashma Nuclear Power Plants (CHASNUPP unit 1 and 2) in Pakistan.

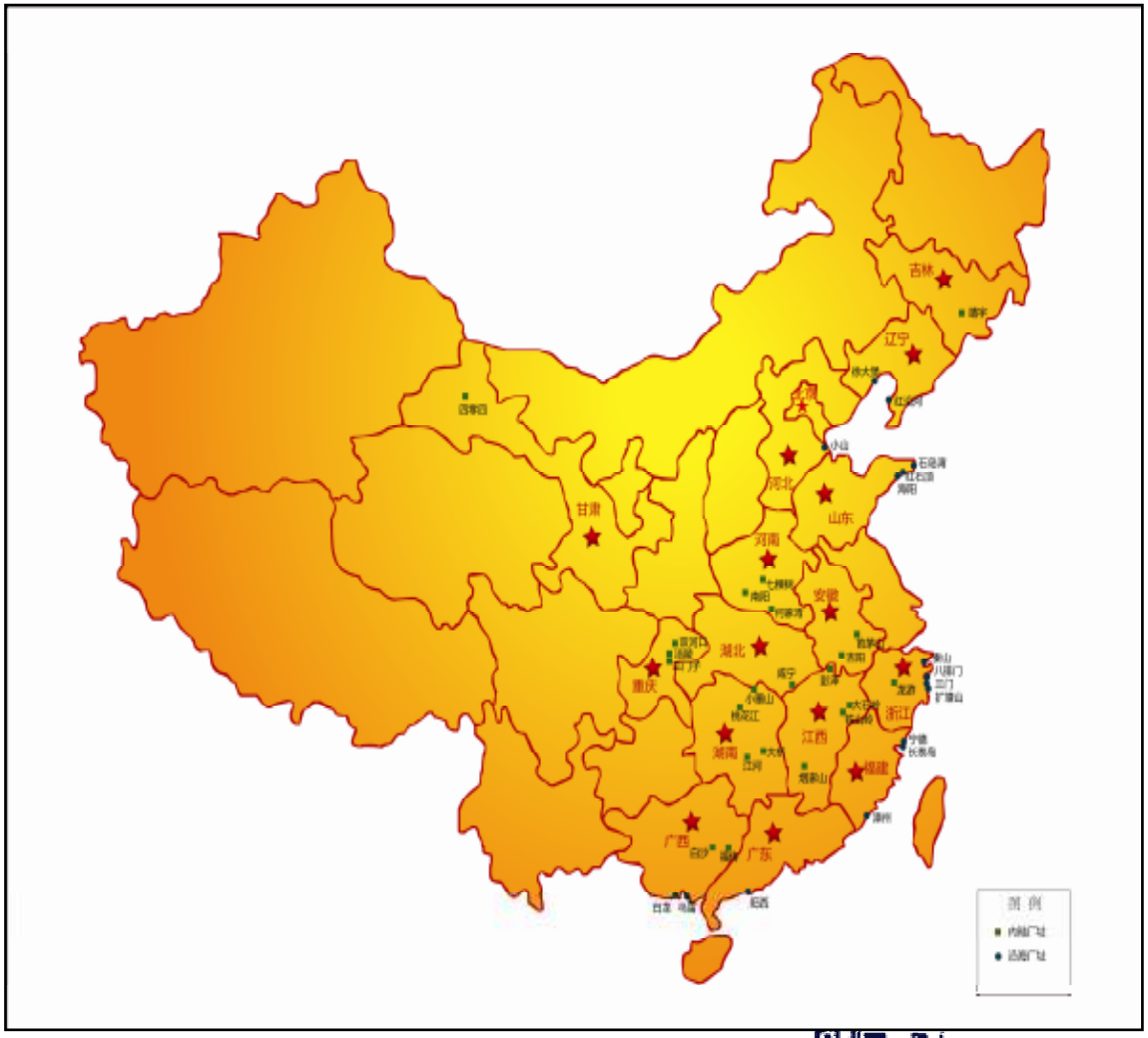


About SNERDI

- At present, SNERDI is committed to introduction, absorption and innovation of Generation III technology, and responsible for the overall design of Sanmen and Haiyang nuclear power self-reliance supporting projects .
- Besides, SNERDI has also engaged with AP1000 follow-up projects and Advanced Large Size PWR projects.

About SNERDI

In recent years, SNERDI has accomplished site selection for about 50 seaside and in land nuclear power plants in China, with an output of hundreds of assessment and research report, involving project techniques of CNP1000, M310, AP1000, etc.



About SNERDI

Sanmen Nuclear Power Plant in Zhejiang Province

(Seaside site)

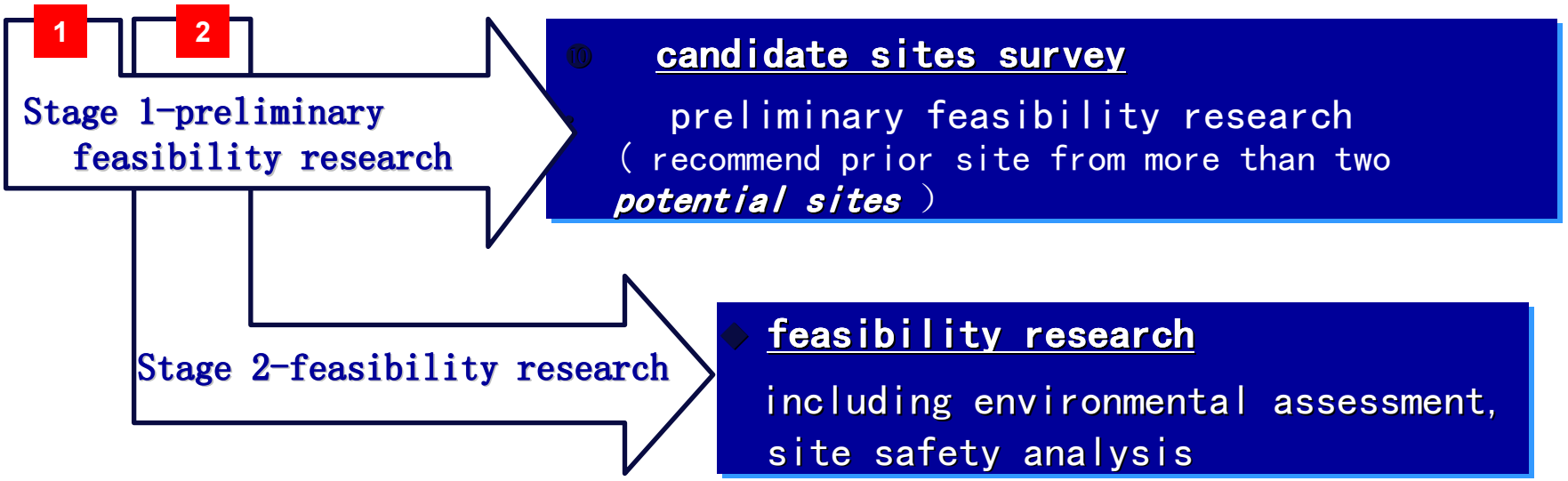
Pengze Nuclear Power Plant in Jiangxi Province

(riverside site)

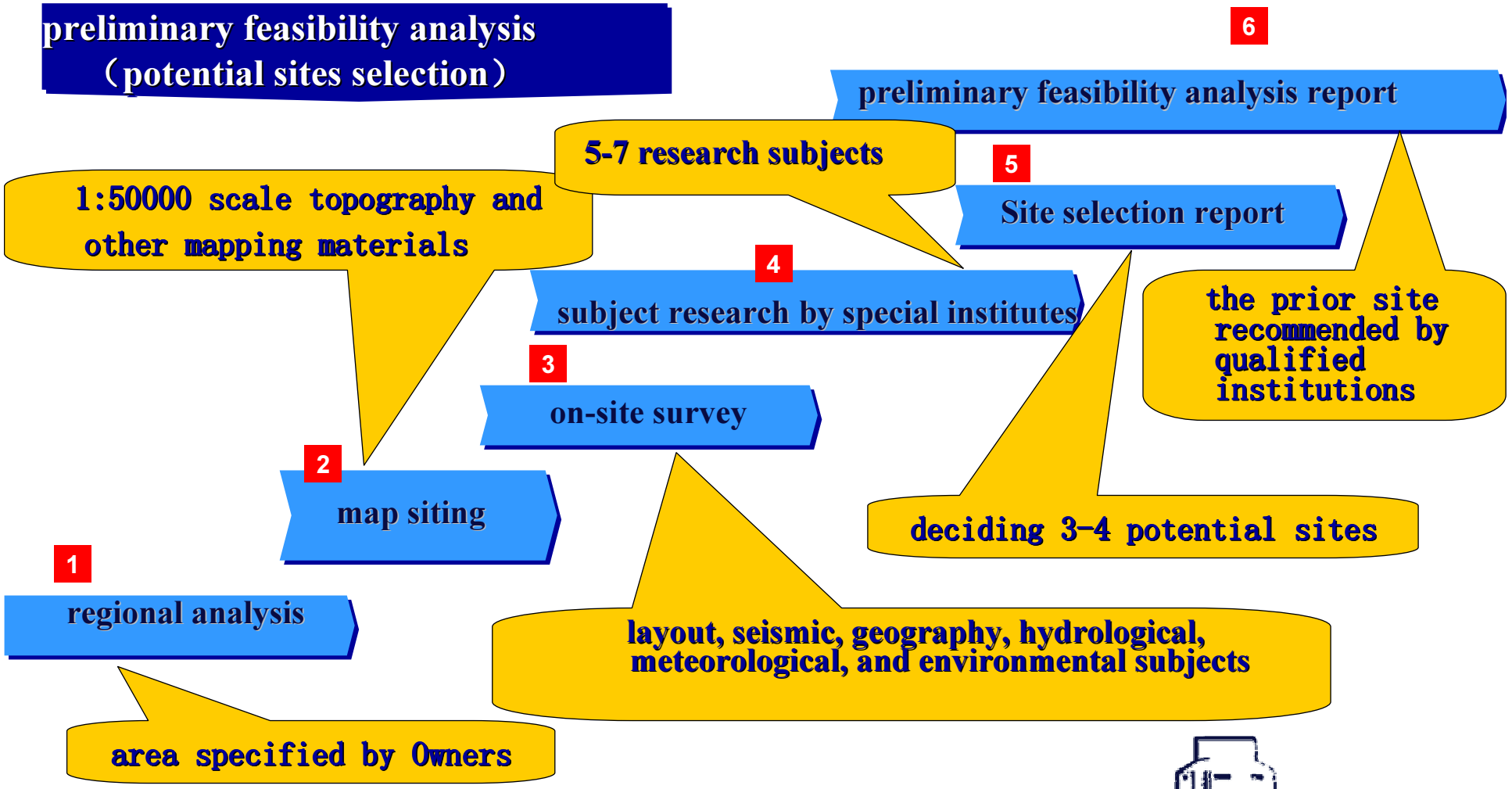
Outline

- Procedure of Site Selection of NPPs in China
- Trends of Distribution of NPPs in China
- Challenges to Inland Site Selection in China
- Countermeasures to Inland Site Selection

Procedure of Site Selection of NPPs in China



Procedure of Site Selection of NPPs in China



Procedure of Site Selection of NPPs in China

feasibility research

atmosphere dispersion, water dispersion, population and other factors

6 project application report

5 feasibility research report

about 30 research subjects

4 environmental impact assessment

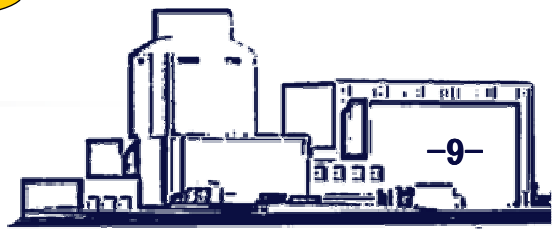
3 Site safety analysis

2 subject research by institutes

reactor selection, technical analysis, and economic and social assessment

1 overall layout planning for NPP

seismic, geographical, hydrological, meteorological, and environmental subjects, external human events



Trends of Distribution of NPPs in China

- ✓ Nuclear power plants in operation are placed in the seaside regions.
- ✓ NPPs (FCD) are placed in the seaside regions.
- ✓ The first batch of inland NPPs have been approved and are in the stage of site preparation.
- ✓ In the future, more and more NPPs will be constructed in inland China.

Challenges to Inland Site Selection in China

1. Water supply V.S. direct cooling system
2. Environmental impact on receiving water body
3. Poor dispersion resulting in high nuclides concentration
4. High population density leading to large population in EAB and low population zone
5. Poor atmospheric dispersion leading to larger EAB and accident population dose exceeding limits
6. Lack of selection standards related to inland sites

Countermeasures to Inland Site Selection

1. Revising existing and compiling new standards

2. Improving existing nuclear power plant

3. Special design satisfying site requirements

Example—Site A

Characteristics:

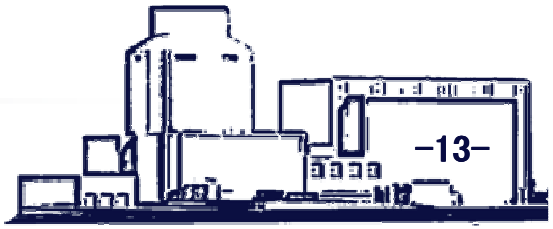
1.Located near a large river

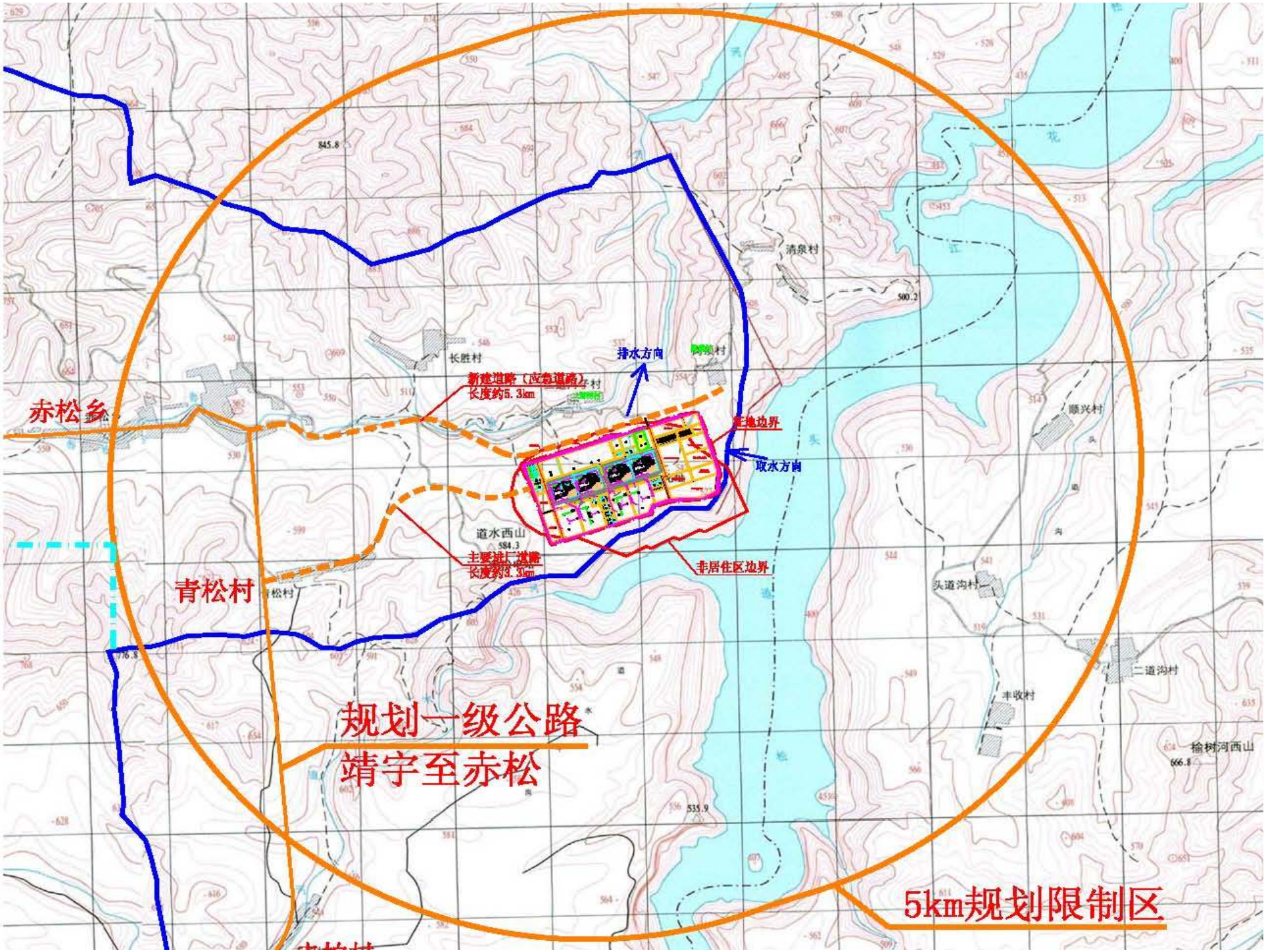
2.Sufficient water supply for MPP water usage and dispersion

3.River course located in the national natural preserving area, not allowed to set discharge facilities in the river course according to legislation

Countermeasures:

1. Discharge facilities set in the tributary outside the national natural preserving area
2. More water supply introduced to dilute the affluent to ensure H-3 concentration within the limit




赤松乡
青松村
长胜村
清泉村
顺兴村
头道沟村
二道沟村
丰收村
道水西山
584.3
榆树河西山
666.8
845.8
500.2
535.9
新建道路（应急道路）
长度约5.3km
主要进厂道路
长度约1.3km
排水方向
取水方向
厂地边界
非居住区边界
规划一级公路
靖宇至赤松
5km规划限制区

Example—Site B

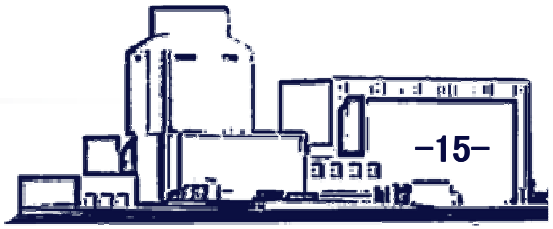
Characteristics:

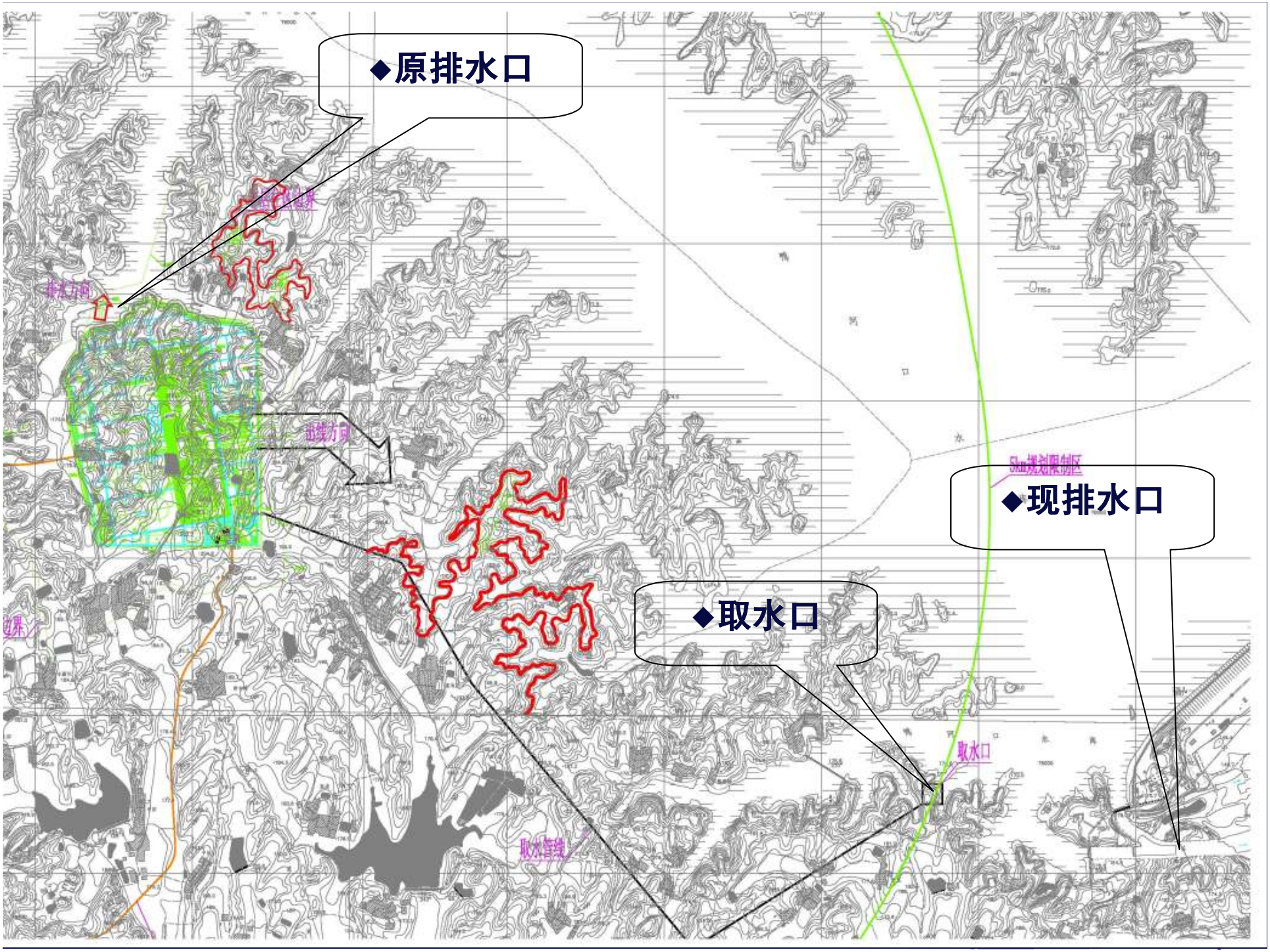
located near a large reservoir, used for agricultural irrigation and for backup water supply of drinking water

Poor dispersion condition cannot meet NPP effluent discharge due to low flow rate in downstream river during the non-flooding season

Countermeasures:

1. Set the discharge facilities at the downstream of the reservoir
2. Increase storing capacity for radioactive effluent, discharging only during the flooding season




◆原排水口
◆现排水口
◆取水口
排水方向
进线方向
取水口
取水管线

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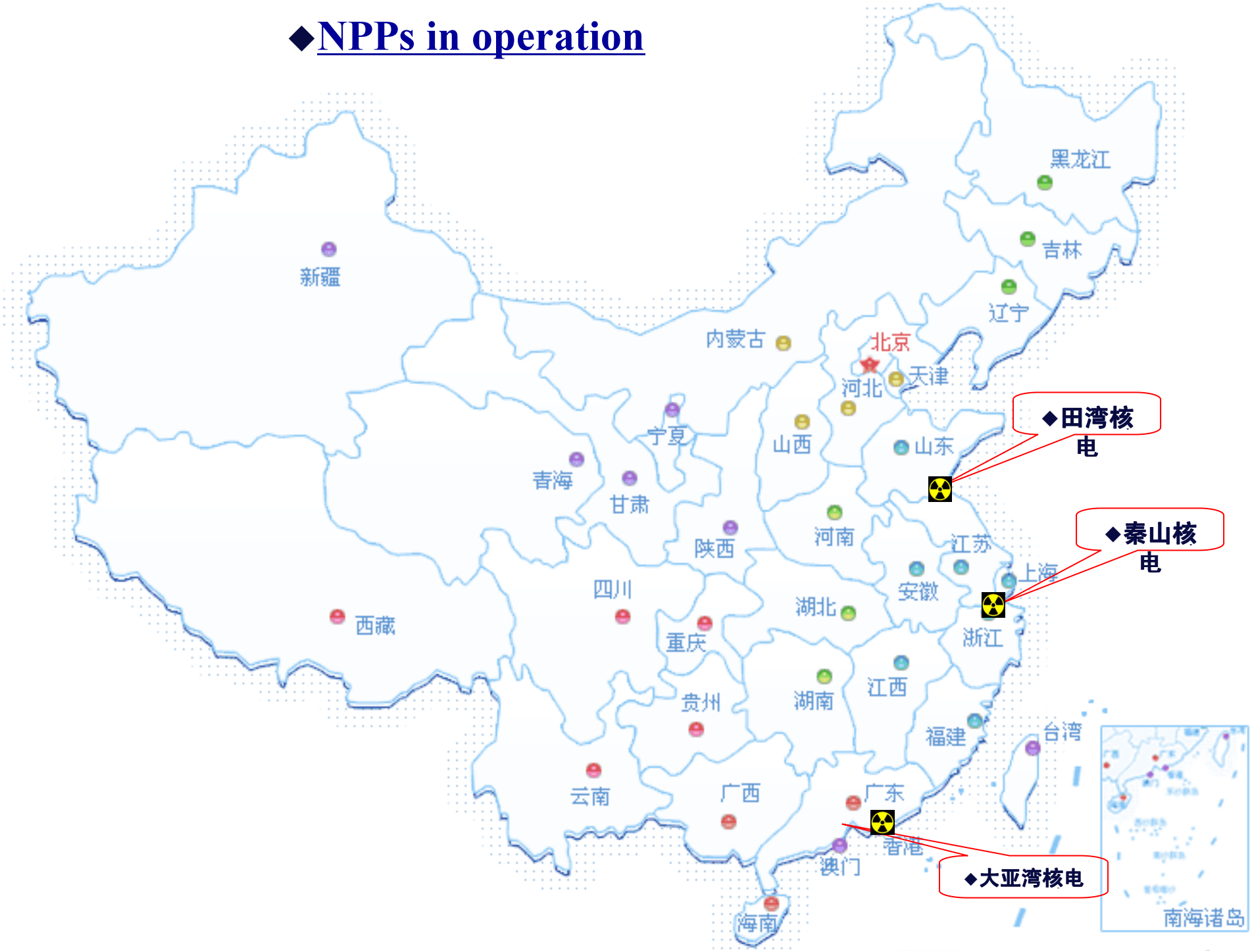
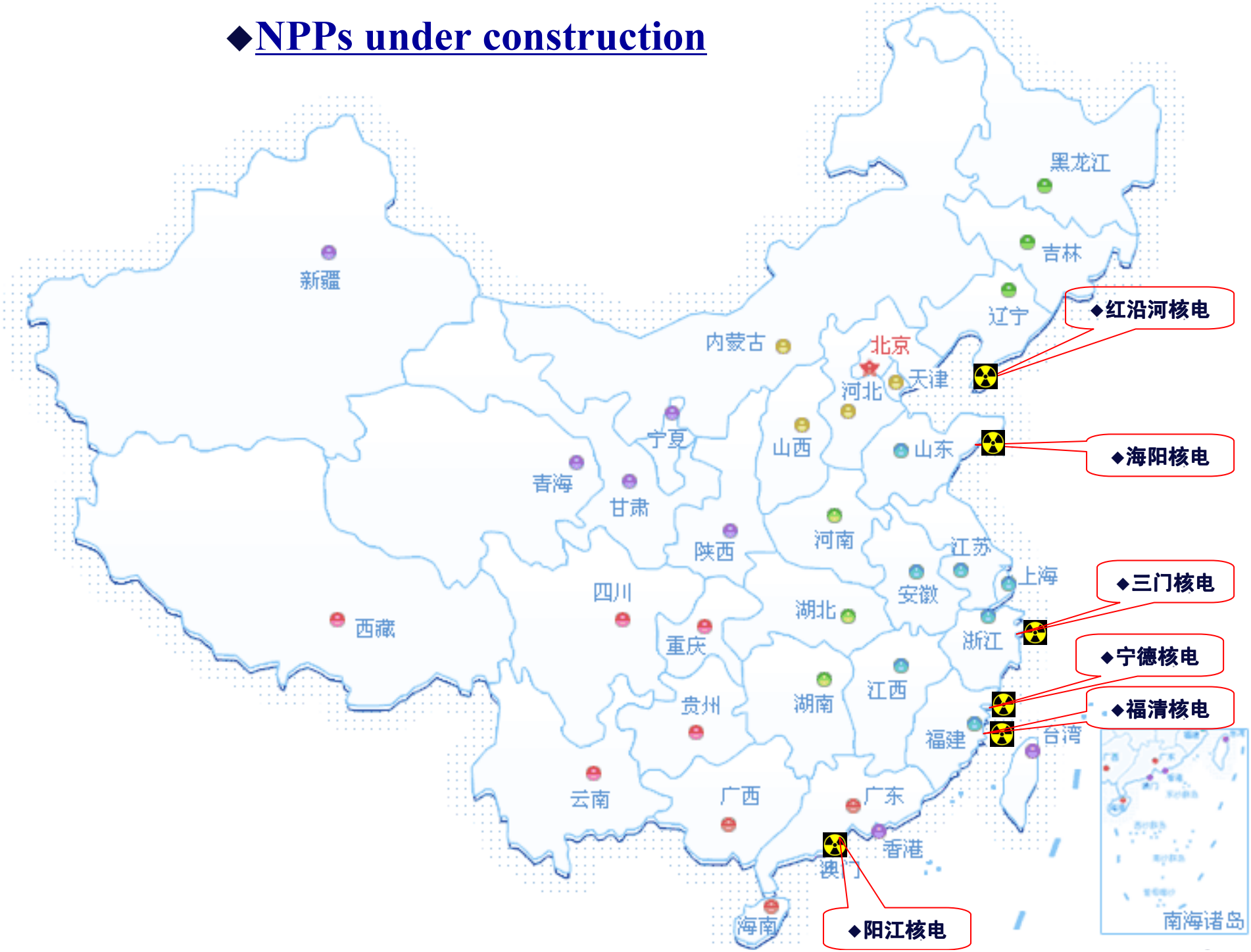
Thank you!

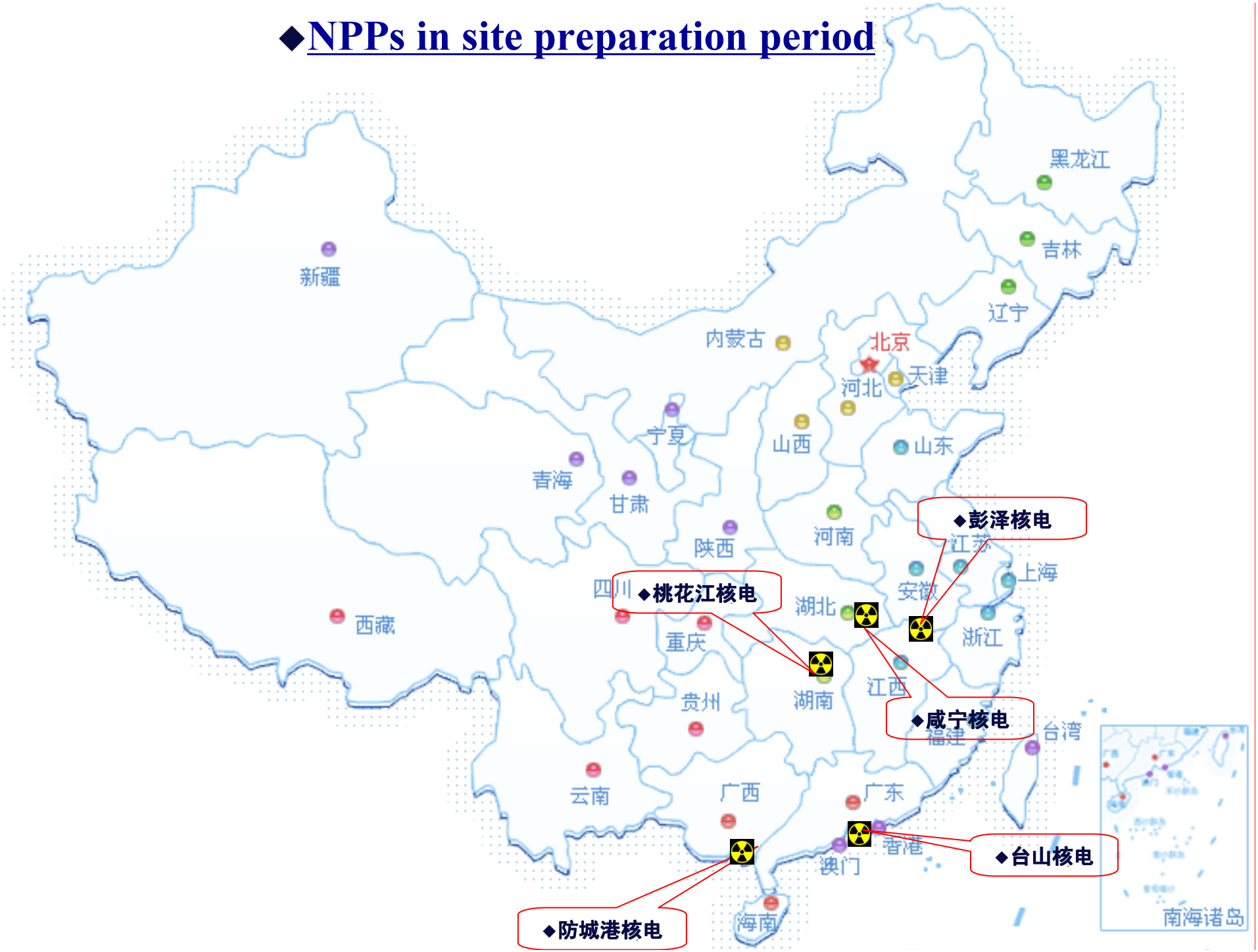
◆NPPs in operation



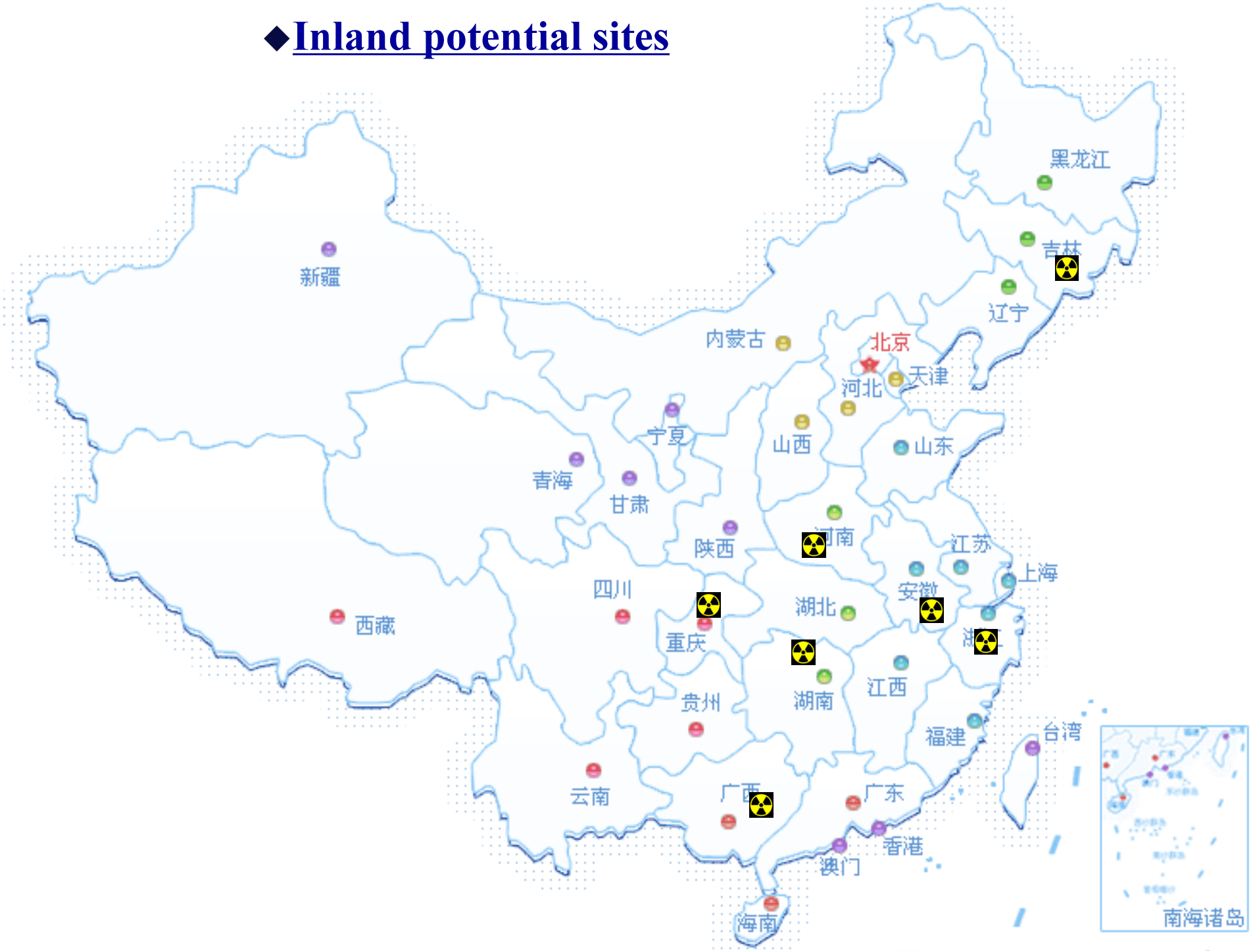
◆NPPs under construction



◆NPPs in site preparation period



◆Inland potential sites



Examples for standard revising

Regulations for environmental radiation protection of nuclear power （GB6249－86）

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Examples for standard revising

Content		Present standards	Revised version
Concentration limited for radioactive effluent		No specified standards	**Seaside sites** •≤1000Bq/L(H-3 excluded) at discharge points **Inland sites** •≤100Bq/L (H-3 excluded) at discharge points •<1Bq/L (H-3 excluded) 1 km from discharge points •H-3 concentration ≤100Bq/L 1 km from discharge points
Dose limits for maximum credible accident	Individual dose limit at EAB	0-8 hours effective dose≤0.25Sv 0-8 hours thyroid dose≤2.5Sv	0-2 hours effective dose≤0.25Sv 0-2 hours thyroid dose≤2.5Sv
	Population dose limit within 80km	Effective dose <20,000Sv Thyroid dose<20,000Sv	Effective dose <20,000Sv

Example for technical improvement

1. Cooling system changing from direct cooling to recycled cooling, applying cooling towers

2. Improving radioactive liquid treatment technology