

2.1 Analysis of source of particulate matters in the air in winter season

2.1.1 Briefing on the source of air PM analysis technology

PM, SO₂ and NO₂ are the main air pollutant in the city.

Some measures:

- 1.Reduce the emission of pollution;
- 2.Plant trees;
- 3.Plant special crops;
- 4.Draw up stricter rule on air management.



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Reasons on conducting the research:

There is a wide range of the source of particulate matters. To conduct qualitative research on source of TSP and PM₁₀ and to conduct quantitative calculation research on the contribution of various source of atmospheric PM perform as foundation to make proper control, it also perform as a foundation to make strategic decision.



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2.1.1 Briefing on the source of air PM analysis technology

Development of the technology and methods of analysis, it depends mainly on mathematical model:

1. **Diffusion model**, targets on source of pollution;
2. **Receptor model**, targets on the polluted area.
The mostly used receptor model is chemical mass balance, CMB

Since 1970s, some countries, the US and Japan use the above mentioned models to pinpoint the source of pollution by qualitative analysis and reach a conclusion on the ratio of various pollutant in the total.

The research on this subject in China started late, while some economy developed cities have conducted TSP analysis by CMB. Chinese cities need to do more work both in theory and practice.

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The application of the analysis technology in PM control

1. Integration with GIS (Geographic Information System) related disciplines.

2. Using analysis result to give reference information to guide the location on industrial projects, power structure, city infrastructure, etc. To offer suggestions and advices in control and reduce of TSP and PM10.



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2.1.2 General target

1. Analyze the source of TSP and PM10 in Changchun and the nearby cities and counties;

2. Find out the form of exist and rule of change on organic pollutants and toxic heavy metals, pinpoint the relationship between different pollutants and sources;

3. Find out the relationship between the analysis result and industrial structure and location, power structure and public facilities.

4. Develop management software system based on GIS and PM source analysis.



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2.1.3 Main content of research

1. Physicochemical characteristics of TSP

Take sample from street dust, floating dust, construction site dust, soil dust, coal burning dust (industrial and civilian) and car emission, analyze the organic pollutant and toxic heavy metals.

2. Research on source of PM in different time

Compare the various PM's contribution in heating season and non-heating season.

3. Research on the pollutants attached on PM

To analyze inorganic element and organic matters in PM. To know the main pollutants and source of pollution.

4. Analysis on atmospheric PM impact factor

To Find out the relationship between the analysis result and industrial structure and location, power structure and public facilities.

5. Develop management software based on GIS

By using GIS, we can illustrate the distributed parameter of the PM, origin of the pollution, pollution intensity, etc.

6. Propose measure and suggestion to reduce the pollution



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2.1.4 Schedule plan

July, 2010 Draw up working program, set up research content and technical route

August - October 2010 Data and background information collection, identify the fundamental theory. Complete the data collection for Receptor model. Draw up lab plan, determine the sample venue and category of PM.

November, 2010 - June, 2011 Complete the sample collecting, conduct lab analysis and make out pollutant ingredients spectrum, summarize the related material to form the research result.

July, 2011 - December, 2012 Introduce CMB model, develop management software based on GIS, establish data base. Propose policy suggestions in control of PM, complete the research report.

2013 Make use of the research achievement.

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2.1.5 Expected application for the research achievement

1. Provide scientific reference to government for decision making.
2. Propose suggestion for policy making.
3. The knowledge and research achievement could be shared among all winter cities.



2.2 Negative impact of snowmelt agent.

2.2.1 Preliminary investigation

3 categories of snowmelt agent:

Category 1: Chloride, eg. CaCl_2 , MgCl_2 , NaCl . The price is cheap, widely used by the cities around the world.

Category 2: Non-chloride, eg. CMA, CH_3COOK . The price is very high, not used too much.

Category 3: Mixed type - A new type agent under further development

(1) Chloride + Non-chloride

(2) Chloride + Non-chloride + corrosion resisting agent

2.2 Negative impact of snowmelt agent

2.2.1 Preliminary investigation

Tromso, Norway and Japan use CaCl_2 ;
Shenyang, China starts to use the mixed CaCl_2 and MgCl_2 ;
US and Russia use CMA, CH_3COOK .
Most countries use NaCl as snowmelt agent.

The use of industrial salt can lead to dead of city plant, damage road and bridge surface, rust the metal products, shorten the life span of tires, pollute the groundwater, etc.



2.2 Negative impact of snowmelt agent

2.2.1 Preliminary investigation

- R&D and history of snowmelt agent:

2002.11.01 in Beijing, China the 1st local standard issued for the using of snowmelt agent

2005 in Harbin, China 《 Administrative Rules for the Usage of Snowmelt Agent in Harbin 》 issued

- Chinese city's target:

efficient, free of pollution, free of corrosion, reasonable price. Upgrade or even replace the chloride snowmelt agent.

2.2 Negative impact of snowmelt agent

2.2.2 General goals

1. Analyze the environment problem raised by snowmelt agent;
2. Make in-depth research on new type of snowmelt agent;
3. Make use of the research result into city management, upgrade the city service and improve the environment;
4. Conduct international cooperation under the frame of WWCAM, broaden the exchanges fields.



2.2 Negative impact of snowmelt agent

2.2.2 General goals

New type snowmelt agent should:

1. Green and ecological friendly. No damage to the road surface, plants and public facilities;
2. Snow melted fast, less cost;
3. Snowmelt agent residue brings no harm to the crops and plants;
4. Reasonable price;
5. Easy melt, attached dust on ground
6. Used in -30°C ;
7. Easy use.

2.2 Negative impact of snowmelt agent

2.2.3 Research content

1. Study secondary and accompanying pollution;
2. Exchange ideas and methods on pollution control
 - analyze the possible polluted surface water, groundwater and soil;
 - New products R&D;
3. Develop new tech on snow removal
4. Propose suggestions on spread of the new tech and products.
Propose budget and reward.
5. Formalize final report.