

6. MITIGATION AND MONITORING

Existing Infrastructure and Techniques to Manage Dust Emissions

- 6.1 As discussed in **Chapter 5**, dust is primarily generated from wind blowing across surfaces containing coal particulates, most notably the coal stockpiles; and, to a lesser extent, from the road and yard areas particularly when vehicles are in use.
- 6.2 Water is the primary means to manage coal dust. The coal stockyard has fifteen fixed high spray water towers, three fixed low sprayers, two semi mobile high towers and one low mobile spray unit as well as a water cart with spray cannons.
- 6.3 The fixed spray towers are located around the perimeter of the coal stockpiles and can be individually controlled. The sprinklers on the upwind side of the stockpiles are used so that the wind blows the water over the stockpile. This increases the coverage of the water and reduces the amount of water wasted as overspray. The towers around the perimeter of the coal stockyard are shown in **Figure 6.1**.
- 6.4 As shown in **Figure 6.2**, the water cart operates during the day usually between October and March when weather conditions require. A second, smaller truck can be brought to the coal stockyard if there is equipment breakdown.
- 6.5 The water cart can also apply a veneer to the stockpiles during the Christmas break or any other time when there might be a period of inactivity. There is no point in using the veneer if the stockpile crust is going to be disrupted due to work on the stockpile or from the water cannon. The veneer is a biodegradable product that is added to the water and acts to coat and bind the coal particles. In other words, it creates a surface crust or veneer that reduces the potential for dust lift-off.
- 6.6 There is a network of weather stations around the Port that enables coal stockyard staff to forecast when to use the fixed spray towers or the water cart. This includes a station at the coal stockyard that measures the speed and direction of the wind. Further information on the weather stations is detailed in the Tonkin & Taylor report attached in **Appendix 6**.
- 6.7 There are a number of other measures LPC use to manage coal dust:
 - a. The load-out conveyors have top covers along the majority of their length;
 - b. The coal drop-height onto conveyors is minimised;

- c. Water is sprayed onto a major transfer point along the load-in conveyor point;
 - d. Scrapers are used to clean belts, and coal is picked up using sweepers or a suction truck;
 - e. The wharf is regularly cleaned; and
 - f. Vehicles speeds are regulated to reduce dust.
- 6.7 The above dust mitigation measures (along with stormwater treatment) have been introduced and improved over the years as shown in **Figure 6.3**. The measures are contained in proposed condition 7 attached in **Appendix 4**. Dust extractor fans and filters were also introduced to the coal conveyor interchange points many years ago but were ineffective, mainly because most of the coal was too damp.



Figure 6.1: Photograph of the fixed spray towers around the perimeter of the coal stockyard. The load-out conveyor is the linear structure running parallel to the hillside and the rails with the gantry stacker and the bucket wheel reclaimer are seen at the far right-hand side of the yard Source: LPC



Figure 6.2: Water being applied to coal stockpiles using a rear side-bar and using the water cannon. Source: LPC

Additional Response Measures to Mitigate Coal Dust

- 6.8 A telemetered¹ weather station is currently used to enable staff to forecast when dust mitigation measures need to be activated. In future when hourly wind speeds exceed 7m/s at the weather station,² and less than 2mm of rain has fallen the last 24 hours, an alert will be sent³ to activate the relevant sprinkler towers as a measure to reduce dust emissions.⁴
- 6.9 The PM₁₀ size fraction of coal dust is also proposed to be monitored continuously using a telemetered nephelometer.⁵ If the nephelometer records an exceedance of the tier-one PM₁₀ trigger, identified in the dust management plan, then the relevant sprinkler towers are again to be activated and staff are required to take any other actions as necessary to reduce dust emissions.⁶ If the nephelometer records an exceedance of the tier-two trigger identified in the dust management plan, then all work on the coal stockpiles and the transporting of coal to and from the coal stockpiles must cease; or, alternatively, a surfactant introduced with the water as a means to reduce dust emissions.⁷ The mitigation measure chosen must remain in place until the PM₁₀ concentrations have fallen below the tier-one trigger value.⁸

¹ The process of recording and transmitting the readings of an instrument

² Significant amounts of dust erosion are not typically observed until windspeeds exceeds 7 m/s – see section 2.3.2 of the draft Dust Management Plan attached in **Appendix 3**

³ Proposed condition 23 (c)

⁴ Proposed condition 8 (b) (i) and (ii)

⁵ Proposed condition 24

⁶ Proposed condition 8 (c)

⁷ Coal particles are naturally hydrophobic (water repelling). A surfactant reduces water repellence and therefore reduces water from running off the coal. The surfactant lowers the water's surface tension, allowing the water to be adsorbed on the coal particle surface

⁸ Proposed condition 8 (b) (iii), 8 (c) and 8 (d)

Coal dust mitigation measures

Timeline of upgrades

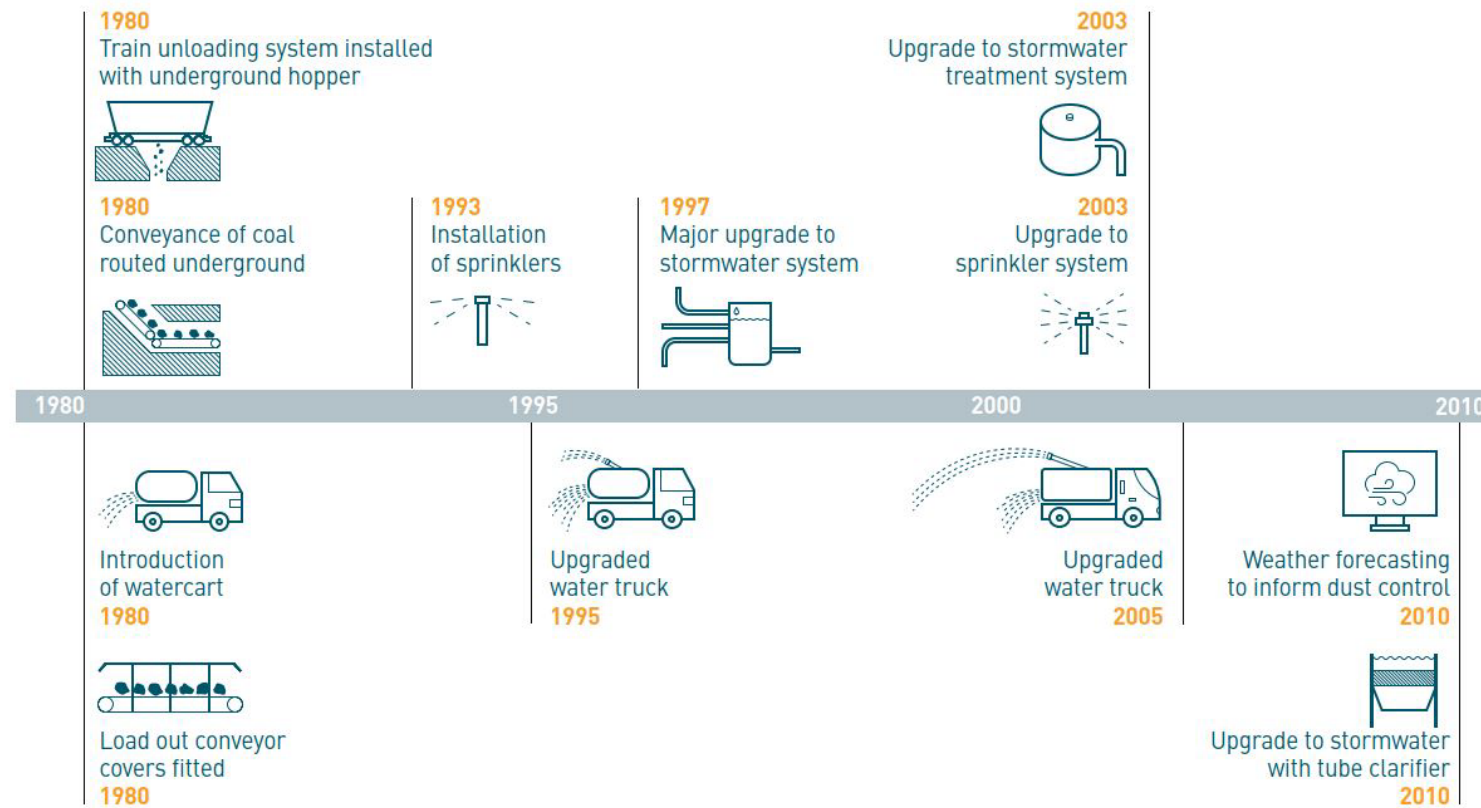


Figure 6.3: Introduction of previous dust and stormwater mitigation measures. Source: LPC

Future Measures to Mitigate Coal Dust with Increased Coal Throughput

- 6.10 As discussed in **Chapter 5**, when annual throughput of coal increases the potential to generate coal dust emissions increase. The air quality assessment considers additional measures are needed to reduce the potential coal dust emissions once annual throughput is forecast to exceed 1.75 million tonnes.
- 6.11 Firstly, a spray bar on the bucket wheel reclaimer or associated conveyor needs to be installed as a means to dampen the coal and reduce dust emissions during this part of the load-out process to a vessel.⁹
- 6.12 Secondly, LPC need to trial the use of fog cannons as a means to either replace the water sprinkler towers or work alongside of them. As shown in **Figure 6.4**, fog cannons (or mist cannons) pump highly pressurised water through a series of jet nozzles, turning the water into a fine mist that is dispersed through the air by a powerful fan. The airborne dust particles are captured by the mist before being able to disperse. The cannons are likely to be placed on poles on the eastern and northern sides of the coal stockyard as part of the trial.¹⁰



Figure 6.4: Fog cannon controlling dust emissions from a stockpile. Source: Tonkin & Taylor

⁹ Proposed condition 11

¹⁰ Proposed condition 12

- 6.13 If the trial is successful then LPC is required to adopt the fog cannon unless there are cogent reasons put to the consent authority that adoption is inappropriate.¹¹ For example, it may be that the annual throughput is only forecast to exceed the 1.75 million tonne threshold for a year or two and the financial costs to introduce fog cannons after the trial cannot be justified in terms of the best practicable option. If the consent authority (Environment Canterbury) agrees that the fog cannons would be inappropriate then LPC must instead routinely use a second water cart at the coal stockyard in a manner recommended by an air quality expert,¹² at least until the annual throughput is forecast to fall below the 1.75 million tonne threshold for the following summer.¹³

Dust Management Plan

- 6.14 Dust management plans are required for most operations involving the handling and storage of bulk materials. Dust management plans in essence describe 'how' the conditions of consent are to be complied. They are 'living documents' that can be amended in order to reflect changes in the coal stockyard operation.
- 6.15 The purpose of the plan is to set out the practices, procedures and mitigation measures to ensure compliance with the conditions of the consent; and, otherwise, to minimise adverse effects of coal dust beyond the boundary of LPC owned land.
- 6.16 A draft management plan is attached in **Appendix 4** and will be confirmed within three months after commencement of this consent.¹⁴ The three-month period will enable LPC to purchase and install the nephelometer that is to be used to continuously monitor coal dust once a final location immediately west of the coal stockyard has been determined.
- 6.17 As discussed earlier, a nephelometer is proposed to monitor PM₁₀ concentrations and will alert staff when PM₁₀ concentrations exceed the trigger levels that are identified in the dust management plan. An initial tier-two trigger value of 150 µg/m³, measured as a 1-hour rolling average, has been adopted in the draft management plan. The trigger value is based on the Ministry for the Environment Guidelines (2016), which recommends a 1-hour average PM₁₀ concentration of 150 µg/m³ for high sensitivity receiving environment locations. The initial tier-1 trigger value adopted in the dust

¹¹ Proposed condition 14

¹² Proposed conditions 16 and 17

¹³ Proposed condition 20

¹⁴ Proposed condition 30

management plan is two-thirds that of the initial tier-2 trigger level ($100 \mu\text{g}/\text{m}^3$).

- 6.18 The trigger values may need to be adjusted up or down depending on monitor type, experience with operating the monitoring station, or feedback from neighbours regarding impacts. The dust management plan can be amended to revise the triggers with reasons why the changes are necessary.
- 6.19 The draft dust management plan also contains various reporting requirements that are reflected in the proposed conditions.

Depositional Dust

- 6.20 The existing consent conditions require a network of dust deposition gauges around the coal stockyard and at the eastern-side of Lyttelton (see Figure 6.4), along with an associated depositional limit of 80 milligrams per square metre per day ($80 \text{ mg}/\text{m}^2/\text{day}$), measured over a 30-day period (see **Appendix 2**).
- 6.21 The existing limit has been a useful predictor of potential dust nuisance in the past and is proposed to be continued, albeit with some minor modifications in the wording of the conditions.¹⁵ The gauges are also proposed to be rationalised and reconfigured for reasons discussed in section 7.4.1 of the air quality assessment (see **Appendix 6**).



Figure 6.5: Example of a dust deposition gauge used in Lyttelton. Source: Tonkin & Taylor

¹⁵ Proposed conditions 6 and conditions 25 to 29