Figure 5-24 Maximum Predicted Incremental 24-hour Average $PM_{2.5}$ Concentrations ($\mu g/m^3$) Due to Fugitive Dust Emissions from the Ash Lagoon

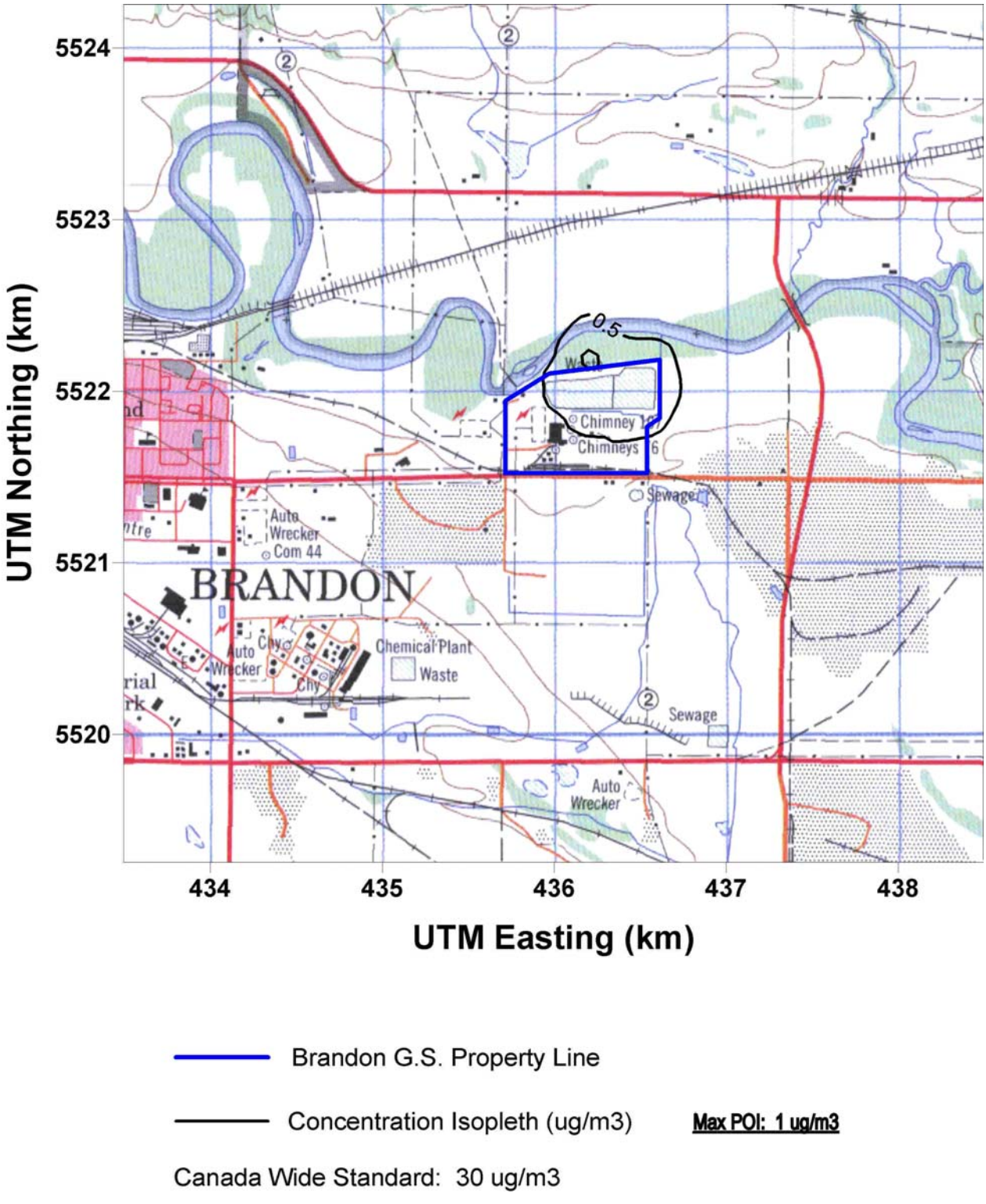
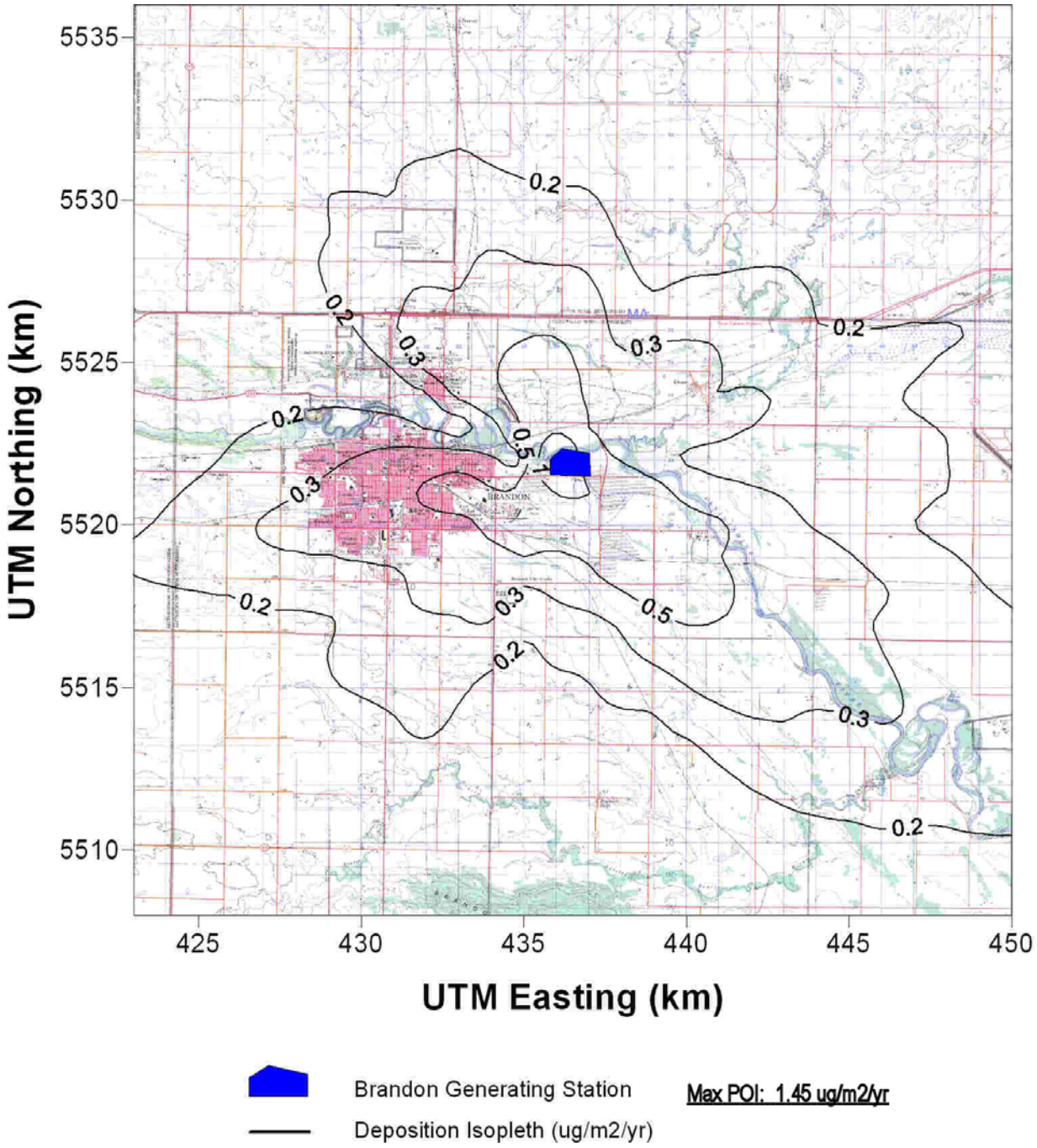


Figure 5-25 Maximum Annual Average Incremental Mercury Deposition Rate (µg/m^2) (based on emission cap of 20 kg/year)



5.2.4 NOISE EMISSIONS

Two noise studies were undertaken as part of the licence review process. SENES Consultants Limited completed a background noise study and a noise modeling study to assess the noise levels resulting from operation of the Brandon G.S (Appendix L – Noise Assessment Study, including Attachment A which contains the background noise study). These studies were not occupational noise studies; they examined the noise levels at offsite receptors from noise sources originating at the Brandon G.S.

5.2.4.1 Ambient Noise Criteria

The Brandon Generating Station must comply with the requirements as set out in its Environment Act Licence No. 1703 R, issued October 4, 1993, pursuant to the Manitoba Environment Act. Clause 13 of the Licence states that:

> "*The licencee shall limit sound emissions from all sources on the plant site to the degree that sound levels, when measured off the plant site in any area zoned industrial, does not exceed an Leq(1) of 70 dBA at any time, where the sound level determinations are based on measurements that exclude any significant interfering sounds from other sources off the plant site,…"*

The Licence makes no reference to areas zoned residential, however, Manitoba facilities operating under older licences may be required to meet the numerical sound level limits outlined in the province's Guidelines for Sound Pollution, and shown in Table 5-10 below.

Table 5-10 Environmental Sound Level Objectives for Continuous or Intermittent Sounds

LOCATION	LEQ (1) (DAY) 7:00 A.M. TO 10:00 P.M.	LEQ (1) (NIGHT) 10:00 P.M. TO 7:00 A.M.
RESIDENTIAL AREA		
(a) Maximum Desirable	55	45
(b) Maximum Acceptable i) Summer or year round operations	60	50
ii) Predominant discrete tone(s) or appreciable impulsive/impact character	55	45
iii) Winter operations only or temporary operations	65	55
COMMERCIAL AREA		
Maximum Desirable	55	45
Maximum Acceptable	70	60
INDUSTRIAL AREA		
Maximum Desirable	70	70
Maximum Acceptable	70	70

The Maximum Desirable limits are identical to the World Bank Guidelines[14] for noise levels in residential settings, but less stringent than Ontario's minimum daytime and evening sound level limits.

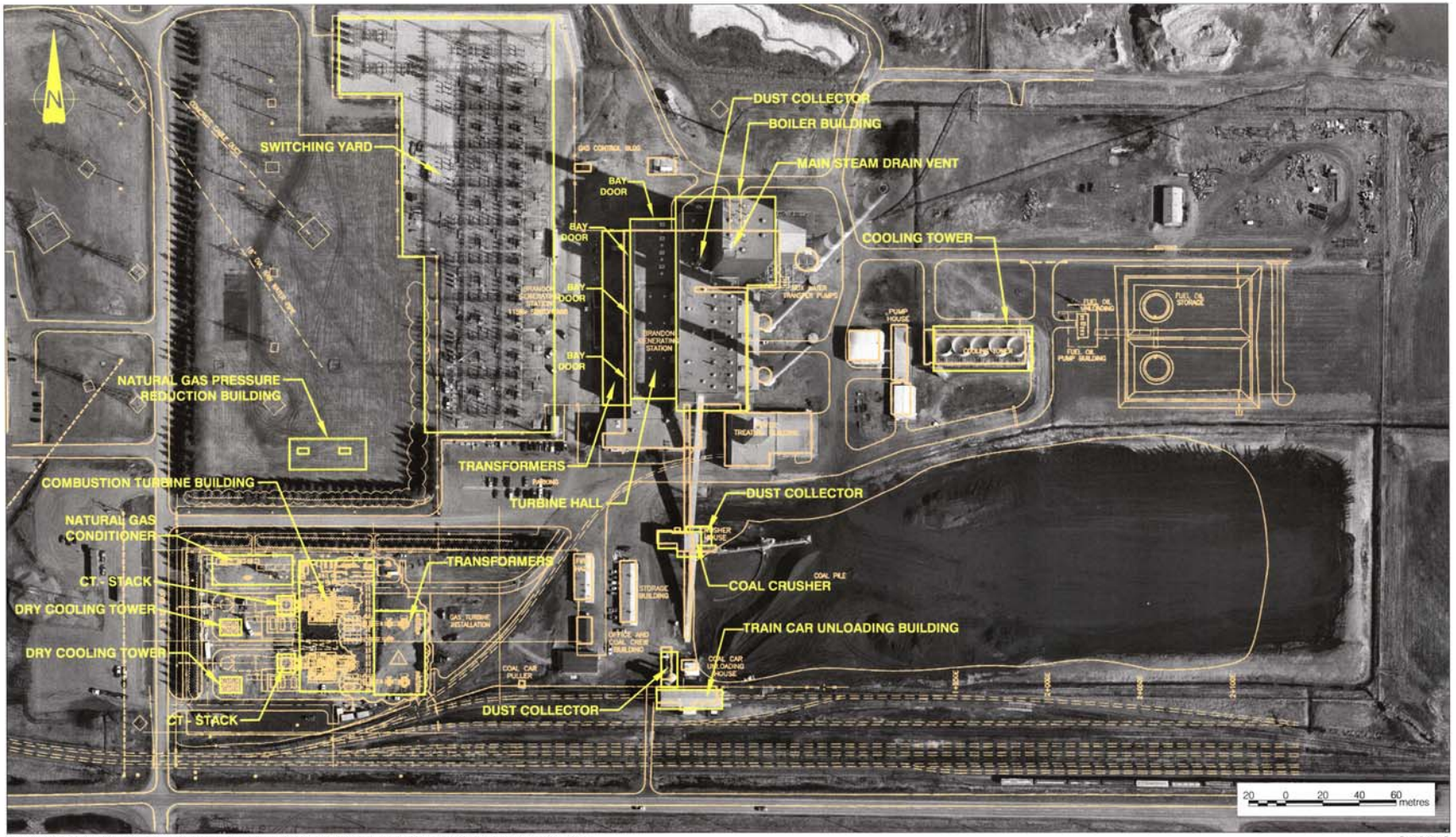
5.2.4.2 Spot Measurements

Spot measurements were collected at various on-site noise sources using a RION NA-27 precision integrating sound level meter, equipped with a real time 1/1 and 1/3 octave band analyzer. The measurement of sound pressure levels for all the on-site noise sources during both start-up and steady operation were carried out. In addition, since most of the continuous noise sources are inside the station building, spot measurement of sound pressure levels were carried out while the doors were open as well as when they were closed.

The locations and the conditions under which the spot measurements were taken (i.e. plant status, doors open/closed) are summarised in Appendix L. Measurement locations are illustrated in Figure 5-26. The location of the nearest receptors are indicated in Figure 5-3.

[14] The World Bank Guidelines for noise are consistent with the latest technical information on the effects of noise on human health from the World Health Organization

Figure 5-26 Brandon Generating Station Spot Noise Measurement Locations



BASE MAP SOURCE: MONITOBA HYDRO. BRANDON GENERATING STATION SURVEY CONTROL AT STATION SITE, No. 7-00109-DE-11520-0005, OCT 24, 2003.

SENES

5.2.4.3 Noise Modelling Results

The acoustical modeling for this project was completed using the Computer Aided Noise Abatement (CADNA-A) model. The outdoor noise propagation model is based on ISO 9613, Part 1: Calculation of the absorption of sound by the atmosphere, 1993 and Part 2: General method of calculation (ISO 9613-2:1996). The CADNA-A model was run for two operational modes:

a) Unit 5 start-up mode; and
b) regular steady operation mode.

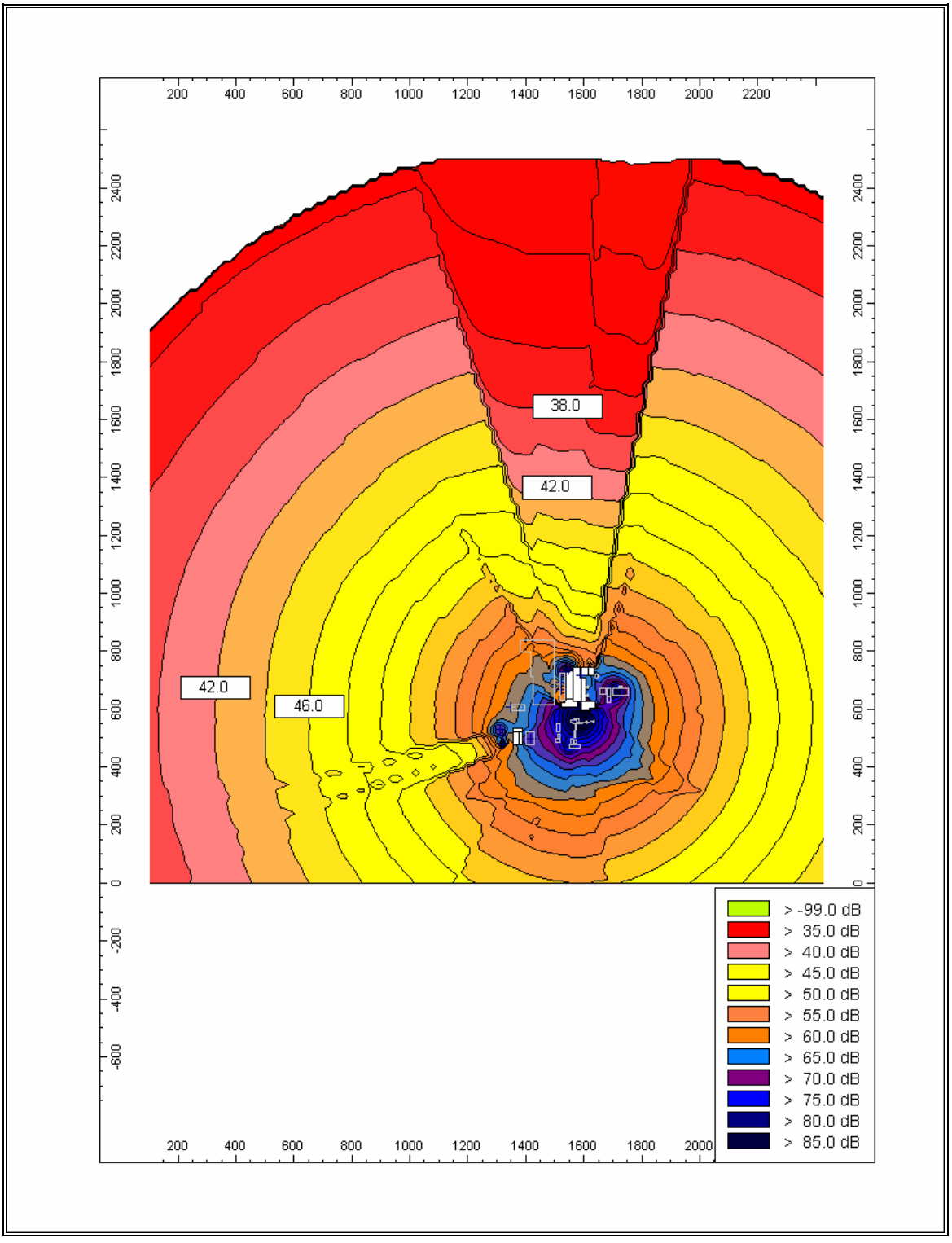
The sound levels associated with the Brandon G.S. during Unit 5 start-up are slightly higher than during normal, steady operation, mainly due to venting of high-pressure steam from the blow-down tank for Unit 5. Therefore, for the purpose of this modeling study, the noise levels during the start-up were modeled separately.

For the start-up mode, the major noise sources are as follows:

1) steam vent (boiler building roof-top);
2) transformers for Units 6&7;
3) plant noise leaking through open doors of the turbine hall - West;
4) plant noise leaking through open doors of the turbine hall - North;
5) main transformers;
6) wet cooling tower – Unit 5;
7) dry cooling tower for Units 6&7;
8) fuel conditioner for Units 6&7;
9) crusher building;
10) crusher building dust collector;
11) coal handling of rail cars;
12) gas pressure reducer building; and
13) Unit 6 combustion turbine in service.

The modeled sound level contours and the predicted sound levels at the closest receptor locations, for the start-up mode are presented in Figure 5-27.

Figure 5-27 Sound Level Contours for the Start-up Mode



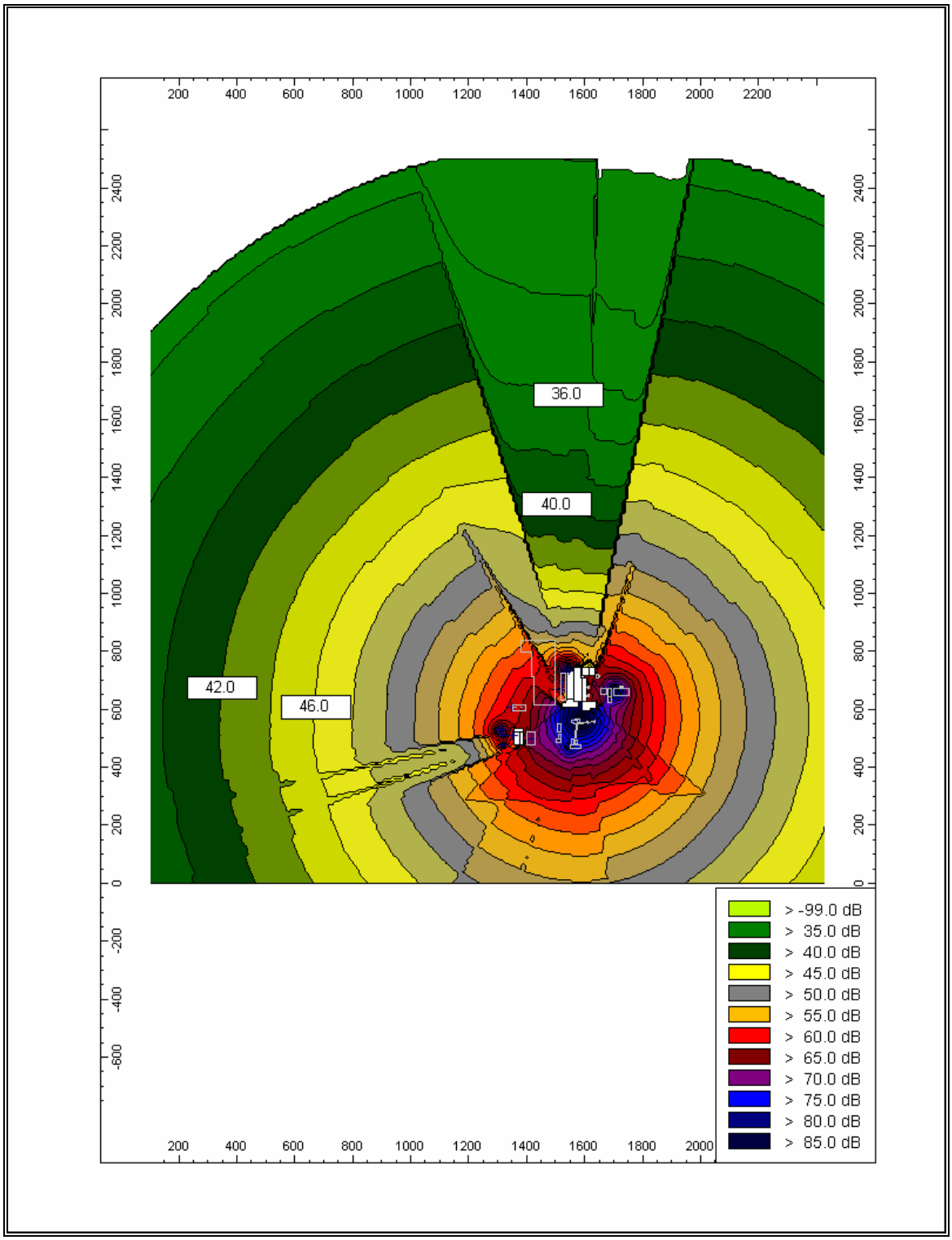
Under the regular steady operation mode, in order to model the upper bound noise emission scenario, the sound power levels that were measured with the station doors open were used in the modelling.

The regular steady state operations included the following sources:

1) one combustion turbine (Units 6&7) stack noise source;
2) transformers for Units 6&7;
3) plant noise leaking through open doors - West;
4) plant noise leaking through open doors North;
5) main transformers;
6) wet cooling tower – Unit 5;
7) dry cooling tower for Units 6&7;
8) fuel conditioners for Units 6&7;
9) crusher building;
10) crusher building dust collector – DC2;
11) coal handling of rail cars; and
12) gas reducers.

The modeled sound level contours and the predicted sound levels at the closest receptor locations for the regular steady operation mode are presented in Figure 5-28. The model results indicate that the model predicted sound level contributions from the Brandon G.S. do not influence the noise environment at the selected receptor locations. The model predicts sound levels that are below that stipulated in the operating Licence (No. 1703 R) for the facility and the daytime and nighttime limits as defined by the World Bank noise guidelines. From the predicted results, it can also be concluded that noise leakage from the open doors of the original building (Unit 5) and the coal handling buildings (unloading and crushing) do not contribute to noise levels at the selected receptor locations.

Figure 5-28 Sound Level Contours for the Regular Steady Operation Mode



5.3 MITIGATION AND MONITORING

As discussed in Section 5.2.3 predicted air emissions from Unit 5 (and Units 6&7) meet, with few exceptions, provincial and federal air quality objectives. There is potential for coal storage area and ash lagoon fugitive dust emissions to occasionally contribute to exceedences of the suspended particulate air quality objective at the station fenceline, when combined with background concentrations. Under extraordinary circumstances, the predicted 1-hour average NO_2 concentration could exceed the air quality objective approximately one hour per year at a location south-east of Brandon G.S., near the sewage treatment plant. As a toxic trace element, mercury emissions are a priority air issue. CCME is developing Canada-Wide Standards (CWSs) for mercury emissions from coal-fired power plants. As such, mercury emissions from Unit 5 are a management priority for Manitoba Hydro.

In addition to existing pollution control equipment and procedures, emission of air contaminants from Unit 5 are mitigated through:

- the use of environmentally-preferred fuel
- fugitive emission controls
- selective operation of boiler burners
- corporate greenhouse gas emission management program
- a voluntary mercury emissions cap.

Environmental performance will be quantified and assessed using new monitoring programs for mercury and NO_x. Existing monitoring programs have been updated using information generated for this Environmental Impact Statement.

5.3.1 EMISSION MONITORING

Manitoba Hydro will install continuous emission monitors to record concentrations of SO_2, NO_x and particulate matter emitted to the atmosphere from the Unit 5 stack. Continuous emissions monitors and an associated data management system will be used to assess compliance with the Environment Act Licence emission limits and will be reported to Manitoba Conservation on a monthly basis. The monitors will meet established performance and operational guidelines to be specified by the licence.

5.3.1.1 Mercury

Manitoba Hydro will implement the proposed Canadian Council of Ministers of the Environment Monitoring Protocol in Support of the Canada-Wide Standards for Mercury Emissions from Coal-Fired Electric Power Generation Plants. The monitoring protocol is designed to collect consistent, comparable, and credible information for public reporting and support future decisions on effective management of mercury releases.

5.3.1.2 NO_x

A continuous emissions monitoring system (CEMS) will be installed on the boiler flue gas system. The CEMS will monitor, calculate, and record emissions of nitrogen oxides. The system will be designed,