

Installation of cold stores for mineral processing

Claude N Smith Limited

Slate Drift Industrial Estate, Collyweston, Northamptonshire PE9 3PG

Supporting Statement

26 June 2017

1 Purpose of the application

This Statement has been prepared to support an application for the installation and operation of one or two cold stores on the applicant's property to facilitate accelerated and controlled processing of rock (called "log") in order to produce Collyweston Slate in a controlled environment. The rock will be extracted from the mine located on the applicant's property and the processed Collyweston Slate will be dressed and shaped on the applicant's property. There will be no movement of personnel or materials outside the on the applicant's property in connection with the operation of the cold stores.

2 Details if the applicant

The applicant is Claude N Smith Limited, a local construction company specialising in installation and repair of roofs using traditional Collyweston slates: an important heritage building material.

The application is a local family run business with a strong reputation, trading since 1965 and winner of several recent awards. The business also employs a number of local people, including apprentices.

The Applicant is developing an underground mine on its business premises at Slate Drift Industrial Estate, Collyweston in Northamptonshire. The mine received permission on 16/9/2015 in decision 15/0030/MINFUL and a new tunnel has been driven to connect with old workings. Some "log" has been extracted for trials and full production is expected to commence during summer 2017.

When production commences, this mine will be the sole traditional source of the raw material necessary for the production of Collyweston Slates in the country. Collyweston Slates are in high demand for ongoing repairs to the several thousand buildings with Collyweston Slate roofs, including several Cambridge colleges and other substantial properties. There is also a demand for individual new-build projects.

3 Summary of the processing requirement

Collyweston Slate is a heritage roofing stone rather than a “true” slate. It differs from other roofing stones because it is able to be cleaved into thin sheets, typically 10mm in thickness, making an ideal roofing material i.e. strong, light and thin.

The raw material (log) cannot be used commercially immediately after extraction from the mine. The log does not cleave easily into suitable slates when fresh. As with most minerals, processing is required to produce the required product. Furthermore, as a natural material, variations in composition and texture result in variations in the duration and effectiveness of processing.

The design concept for the mine was for processing to use traditional local methods. The particular seam of rock, less than 1m thick, must be selectively and carefully excavated to produce the raw log. The extracted log will be placed in stockpiles on the ground surface near the mine and exposed to winter weather conditions to emphasise the natural cleavage so that the stone can be worked into the required shapes.

The most important elements of the process are wetting, followed by repeated freezing and thawing. In periods of colder climate, exposure during one winter season may have been sufficient to process a batch of log. However, winter weather has been mild in recent years, very few days of prolonged frost. This may result in the natural processing being less effective and requiring several years to complete.

If the winter frosts are insufficient in depth and duration, the quantity and quality of Collyweston Slates produced may be reduced. As there are currently no other traditional natural sources of Collyweston Slates, reductions in productivity would have a major impact on supply. This would reduce also the mine’s income. Once business has been established on the basis of a reliable supply of authentic new slates, reductions in the supply would be commercially undesirable.

As a result of the recent mild winters, the Applicant is interested to explore ways of enhancing the processing method, which would ensure that the planned quantity and quality of Collyweston Slate production is maintained.

4 Proposed processing methodology

During the planning process for the Applicant’s mine, Historic England commenced trials of enhancing the weathering process on samples from various strata, using artificial wetting and freezing over controlled periods. The Applicant donated some samples of fresh log from old mine workings on site for use in the tests.

The results of the tests were encouraging, and suggested that good quality Collyweston Slates could be obtained by artificially enhanced weathering of log, without affecting the important properties and appearance of the product.

These results were not available in time to be included in the planning application for the mine. Also, the trial was small-scale and the results need to be confirmed for commercial quantities in a realistic timeframe.

The tests also suggest that the process may be effective rock other than the best "log". If this can be proved at the Applicant's mine, the amount of wastage may be reduced.

Therefore, the Applicant wishes to make a trial at commercial scale, which would continue into a pilot production if successful.

5 Proposed treatment trial and pilot

The Applicant proposes to utilise an enhanced weathering process on its site near the mine in order to enhance the production of Collyweston Slates.

This will require the operation of one or two cold stores near the existing processing area. One suitable cold store has been located onto a suitable area of the site, as shown in the attached site plan. It has been connected to a safe power supply and has been tested for periods of several days to ensure that it is operational. If successful, a second cold store may be required to produce greater volumes.

Freshly excavated log will be transported from the mine and will be placed in the area for traditional open-air processing. Here it will be wetted before being placed in containers in the cold stores.

If the cold stores are full, the surplus log will be placed in a holding area until capacity is available for processing.

After a certain period of time (probably one day or more - the optimum period is to be determined) the frozen log will be removed from the cold stores and placed on part of the traditional processing area to thaw.

The cold stores will then be loaded with log from the traditional processing area or from run-of-mine production.

Samples will be taken after each freezing and thawing cycle for trial splitting and dressing. This will help to optimise the use of the cold store to maximise its utilisation and efficiency.

6 Visual assessment

The first cold store has dimensions 13.5m long, 2.6m wide and 2.7m high. It was formally mounted on a road-trailer chassis and used for chilled food distribution.

The first cold store has been placed on the ground at the location shown in Figure 1. The perimeter bund surrounding the site ensures limited visibility from neighbouring properties. The cold store has been painted off-white, in order to reduce further any visual impact.

The second unit would be similar, if installed

7 Noise assessment and mitigation

The cold stores will be located in the centre of the rear of the site, to maximise distance from adjacent properties. The refrigeration units will be at the rear of the cold stores, facing away from neighbouring houses in order to further reduce the possible impact of sound from the refrigeration units.

Background sound measurement was made for a period of 1 hour on January 2017 in front of the neighbouring property at 15 Slaters Drift. The measurements were made between 15:00 and 16:00 using a new Wensn data-logging sound level meter fixed to a tripod in a vertical orientation, with the microphone 1.2m above ground level. The measurements were made with the normal site activities in progress, including mine construction, but without the cold store operating.

The results for the background sound measurement are shown in Figure 2. The 1 minute RMS sound pressure level (A weighted) was typically around 38-44dB, with medium-duration peaks exceeding 55dB and short-duration events up to 80dB. The background noise comprised vehicle noise from the A43, wind noise in trees, occasional noise from the site and neighbouring properties, barking dogs and bird song. A record was kept of the notable loud noises, which included cars passing in Slaters Drift, unidentified loud noises (which did not originate on the site) and some noise from plant working on site.

The data were adjusted by replacing loud off-site noise events with an average figure. The noise event due to site operations (typically 55dB) was retained, as shown in Figure 3. This allowed the 1 hour equivalent sound level due to site operations to be calculated. The result was 54.3 dB, which is well below the temporary limit of 70dB (for the construction period) in the planning permission. It is also below the general site limit of 55dB. This result is conservative because it includes several loud noises (above 80dB) which originated offsite are included in the calculation.

The sound pressure level from the cold store was measured at a distance of 1m from the refrigeration unit. The results are shown in Figure 4. The overall sound pressure was approximately 79dB. The breakdown by frequency was as follows:

Frequency, Hz	62	125	250	500	1000	2000	4000	8000	16000
Level, dB	46	60	72	64	59	64	56	55	20

Sound pressure level measurements were made in front of two neighbouring properties while the refrigeration unit was switched on. One of the properties (19 Slaters Drift) is the closest house to the refrigeration unit and is the only property with a line of site to the unit.

The equivalent sound level was calculated for these periods (i.e. shorter than 1 hour). The results are shown in Figure 5 and Figure 6. In neither case was the refrigeration unit audible to the instrument operator and is not visible on the sound pressure level results.

The sound pressure level results of the refrigeration unit for the three sets of measurements (1m distance and at neighbouring properties) are plotted together for comparison on Figure 7. This graph clearly shows that sound from the refrigeration unit is not detectable at nearby neighbouring properties,.

The lack of sound detection at these properties is unsurprising. If the area was an open field, an 80dB sound source would result in sound pressure levels of 36dB at the nearest property, 19 Slaters Drift. This figure is conservative because of the presence of items that reduce sound transmission, including the cold store itself, earth bund, wooden fence, other site buildings and vegetation in the strip of open land in front of the houses. Modelling of sound levels on a web-based application suggests that the attenuated sound level due to the cold store would be approximately 26dB at 19 Slaters Drift.

The logarithmic dB scale means that combining sound levels is not a simple addition. For example, in daytime, if the background sound pressure level is 40 dB, the impact of a continuous additional sound of 26dB (such as from the cold store) would raise the background sound pressure level by a very small amount, to 40.4dB, which would be very difficult for an observer to detect. In night time, if the background sound pressure level is 30 dB, the impact of the cold store operation would raise the background sound pressure level to 32.2dB, which is below the UK limit for residential areas.

If a second cold store was in use, the refrigeration units would be independent and may not operate at the same time. However, if they did, the impact of a second unit would be minor. Next to the units the next increase in sound pressure would be 3dB. This would be less near neighbouring properties, which would have very little additional effect, even at night time. In addition, the first cold store would be located between the second sound source and the properties, providing additional attenuation.

In conclusion, we are confident that one or two cold store units could operate continuously without causing a nuisance to neighbouring properties.

8 Summary of benefits and potential impacts

If successful, the benefits of the enhanced weathering process would be:

- Guaranteed production rate
- Guaranteed quality of slates
- Reduced wastage of "log"
- Improved commercial performance
- Increased commercial viability of the mine

The potential impacts are limited to:

- Electricity usage (offset by revenue from product available sooner)
- Low levels of noise (mitigated by earth bund and structures on site)
- Visual impact (mitigated by location and decoration)

9 Compliance with planning guidance

The National Planning Policy Framework (NPPF) aims to protect the environment and to promote sustainable growth.

The proposed installation of cold stores will improve sustainability of the mine by reducing wastage and strengthening the commercial viability of the operation. The latter is important because from early 2017 the mine will be sole source of Collyweston Slate roof stone.

The installation of the cold stores will be compliant with the objectives of the Planning Policy Guidance Notes (PPGs), particularly paragraph 123.

The PPGs recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established.

Most neighbouring properties were built since the Applicant commenced business in 1965. Furthermore, the Applicant's mine is reopening an operation that commenced 150 years ago, when the area was a dedicated zone for mineral extraction and processing.

The enhanced processing technique is required as a result of milder climate and pressing commercial requirements to ensure production rates are achieved. It is a modification of the previously used methods, and is not a completely new process.

Nevertheless, the Applicant understands that the proposed process should avoid causing noise levels that give rise to significant adverse impacts on health and quality of life. This will be reflected in the selection of the cold stores and the implementation of mitigation measures, if required.

The proposed new process will aim to operate at or below the Lowest Observable Adverse Effect Level (LOAEL), with a target of the No Observed Effect Level (NOEL). These levels will be defined in parallel with detailed noise monitoring once the process is operating.

10 Compliance with the Minerals and Waste Local Plan

Objective 6 (efficient use and re-use of mineral resources) aims to ensure the "efficient use of primary aggregates and encourage the use of secondary and recycled materials for higher quality end-uses for development to support the growth of Northamptonshire and its infrastructure requirements."

One of the reasons why the Applicant is opening the mine is to overcome a serious shortage of reclaimed Collyweston Slates. There has been no commercial production of new slates for 50 years. During this time, the demand for repairs and refurbishments to existing roofs has outstripped the possible supply from reclaimed slates. Several major refurbishment and new-build projects are commencing soon which will need a source of high-quality new product.

Production from the Applicant's mine will comply with this objective by supplementing the available reserves of reclaimed materials, rather than replacing them.

The installation of the enhanced processing method is intended to increase the efficiency of production of the new Collyweston Slates and reduce potential wastage from the mineral stratum. This is in full agreement with Objective 6.

Policy 3 (development criteria for mineral extraction) requires that "the development will maximise the recovery of the particular reserve whilst minimising waste through operational techniques employed, and promotes the most appropriate end-use of materials, and specifically ensure that building and roofing stone is used for high quality end-uses and not aggregate."

This policy also states that the development should "support the supply of locally sourced building materials (including varieties of limestone, ironstone, sandstone and Collyweston slate); and the principal purpose of the extraction is for building and roofing stone"

The Applicant's mine complies fully with this Policy, because it will supply new Collyweston Slate roofing stone solely for the purpose of high-end roofing use.

Extracted "log" which does not split and dress properly is suitable for low-end uses only, and may even be waste. This is a particular risk due to mild winter weather. It is hoped that the enhanced processing method utilising the cold store will reduce this risk by improving the splitting of the "log" and increasing utilisation of the mineral.

Therefore, the Applicant's proposal to install cold stores to facilitate an enhanced processing method will further increase compliance with Policy 3, by increasing the quality of the product and reducing the potential for wastage.

Policy 22 requires that "proposals for minerals and waste development must demonstrate that the following matters have been considered and addressed:

Avoiding and / or minimising potentially adverse impacts to an acceptable level, specifically addressing air emissions (including dust), odour, bioaerosols, noise and vibration,

Ensuring built development is of a design and layout that has regard to its visual appearance in the context of the defining characteristics of the local area,

Where applicable a site-specific management plan should be developed to ensure the implementation and maintenance of mitigation measures throughout construction, operation, decommissioning and restoration works".

The only potential impact from the enhanced processing method will be the occasional noise from the refrigeration unit on the cold stores. Although the cold stores will need to operate continuously, the refrigeration units will operate only when the internal temperature rises above a pre-set level.

Informal measurements suggest that noise levels will not create an impact. However this will need to be confirmed in fully operational condition, with measurements by calibrated equipment on the boundaries of neighbouring properties. If noise levels are proven to cause an impact, mitigation measures such as installing acoustic insulation, are available.

The appearance of the cold stores are compatible with other structures on the site, which include a range of small industrial buildings, sheds and mobile structures. The cold store will be placed on level ground in the centre-rear of the site, and will be partly hidden by the perimeter bund. In addition, the cold stores will be painted a neutral colour to reduce visual impact, as shown in Photograph 1.

The site management plan is currently being revised regularly to accommodate development of the mine. The cold stores and enhanced processing may be added to the plan as and when necessary.

These levels of impacts and available mitigation measures will ensure compliance with Policy 22 of the plan.

Photograph 1 – Existing cold store

The white door on the left is the portable cabin used as the mine office.

The skips on the right are filled with water and are used for wetting the log extracted from the mine prior to weathering. They may also be used in the treatment process.



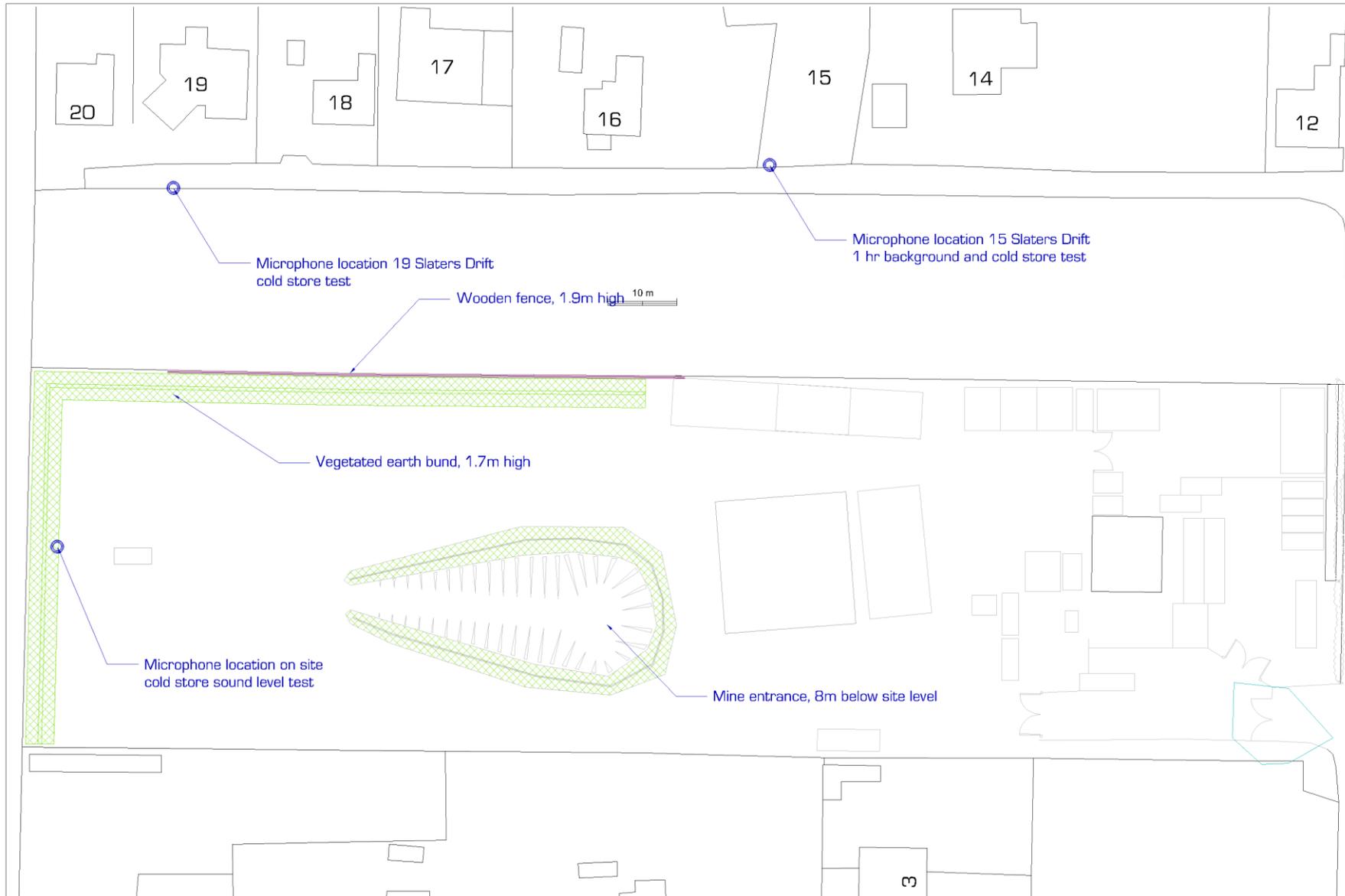


Figure 1 Site plan with details of sound level survey

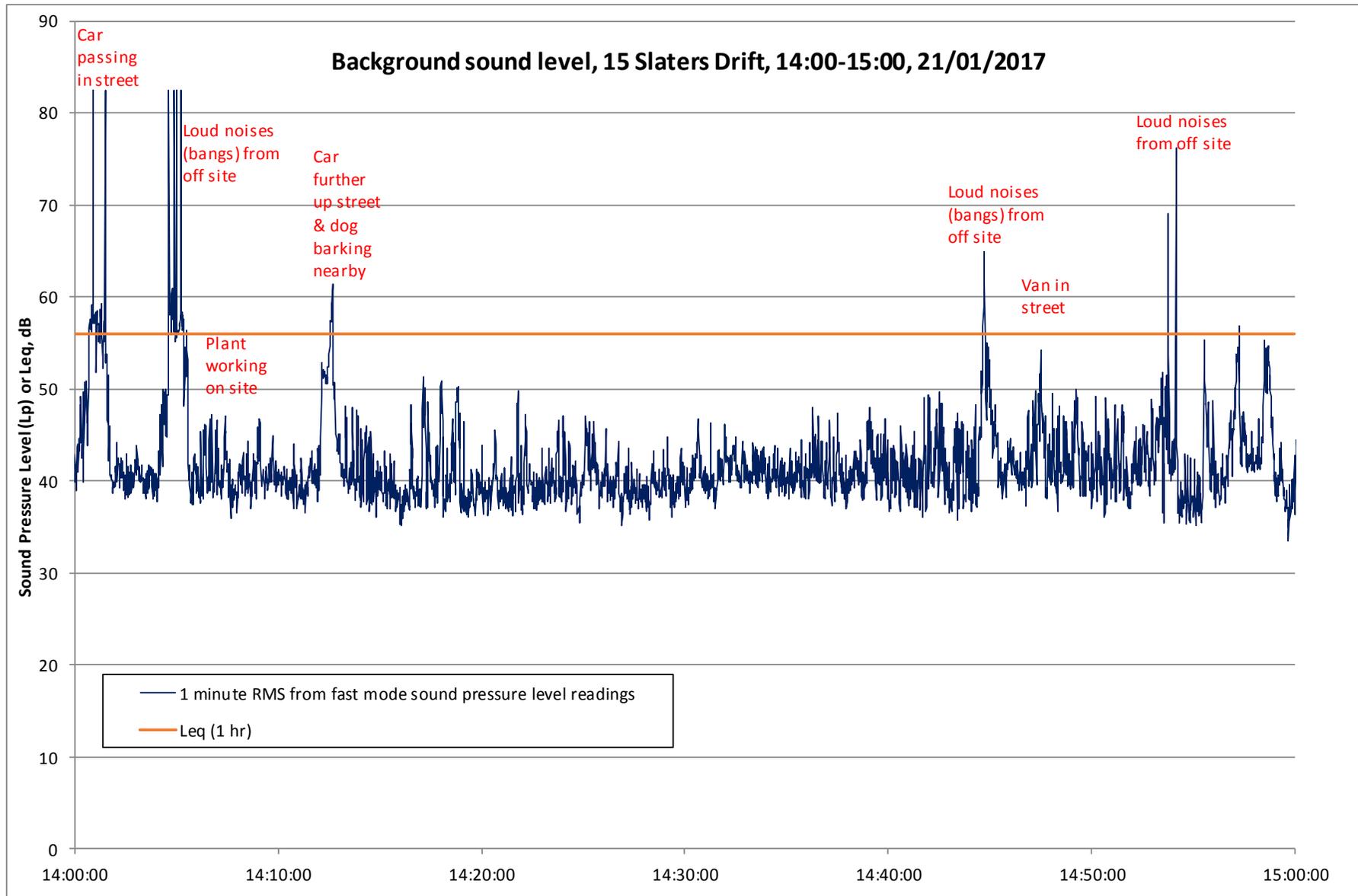


Figure 2 1 hour sound levels at a neighbouring property

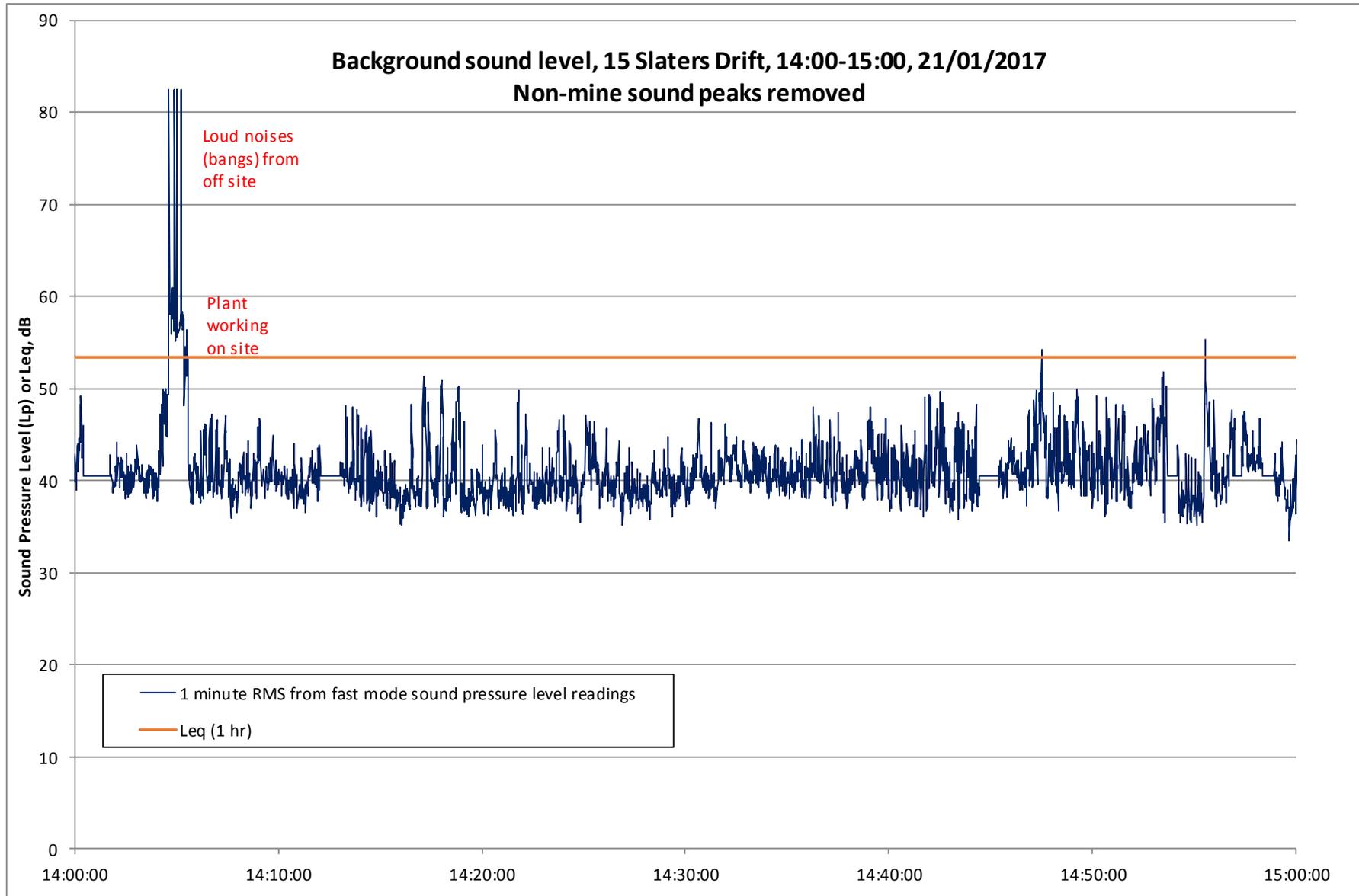


Figure 3 Adjusted 1 hour sound levels at a neighbouring property

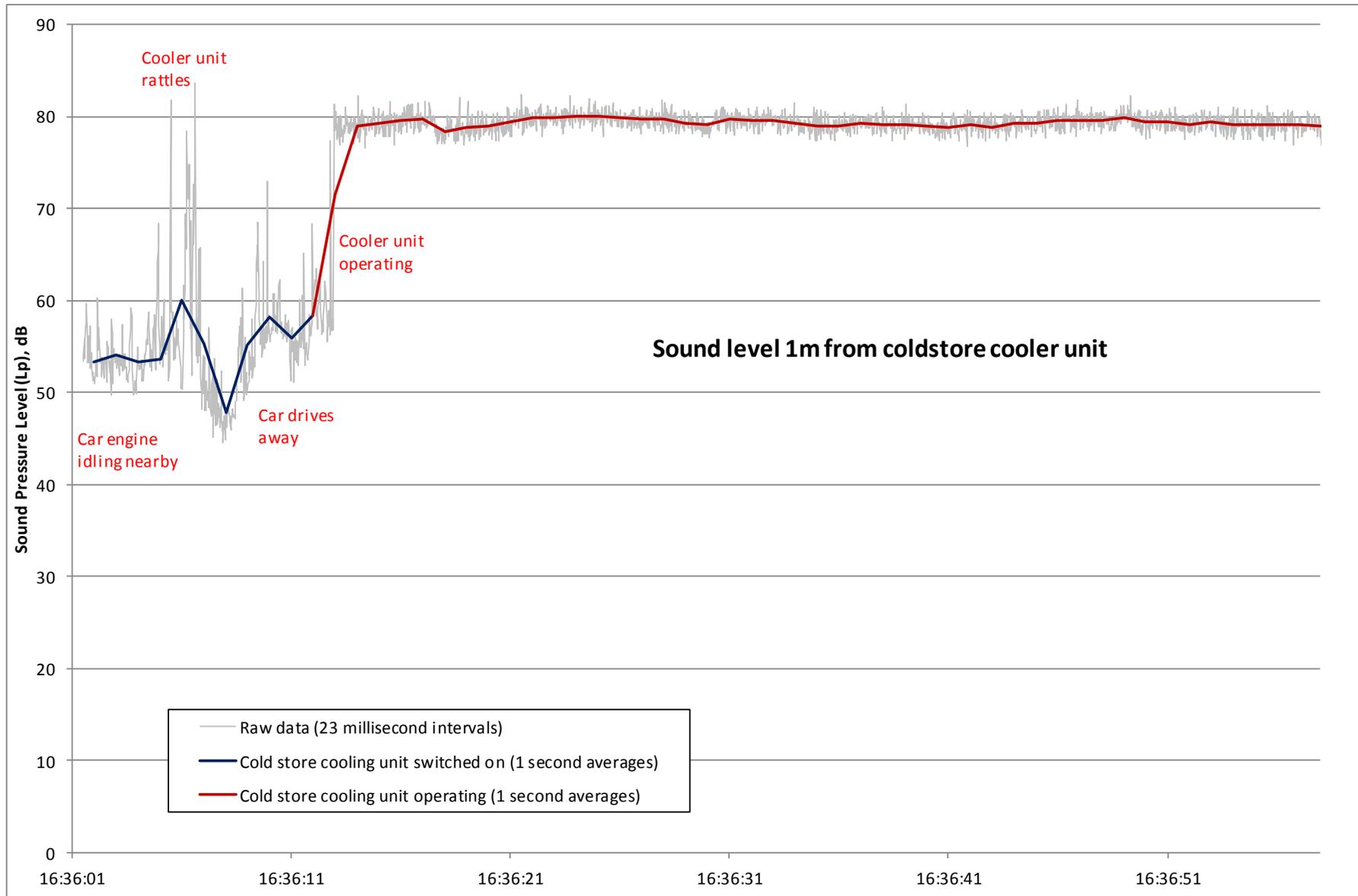


Figure 4 Sound measurement 1m from the coldstore cooler unit

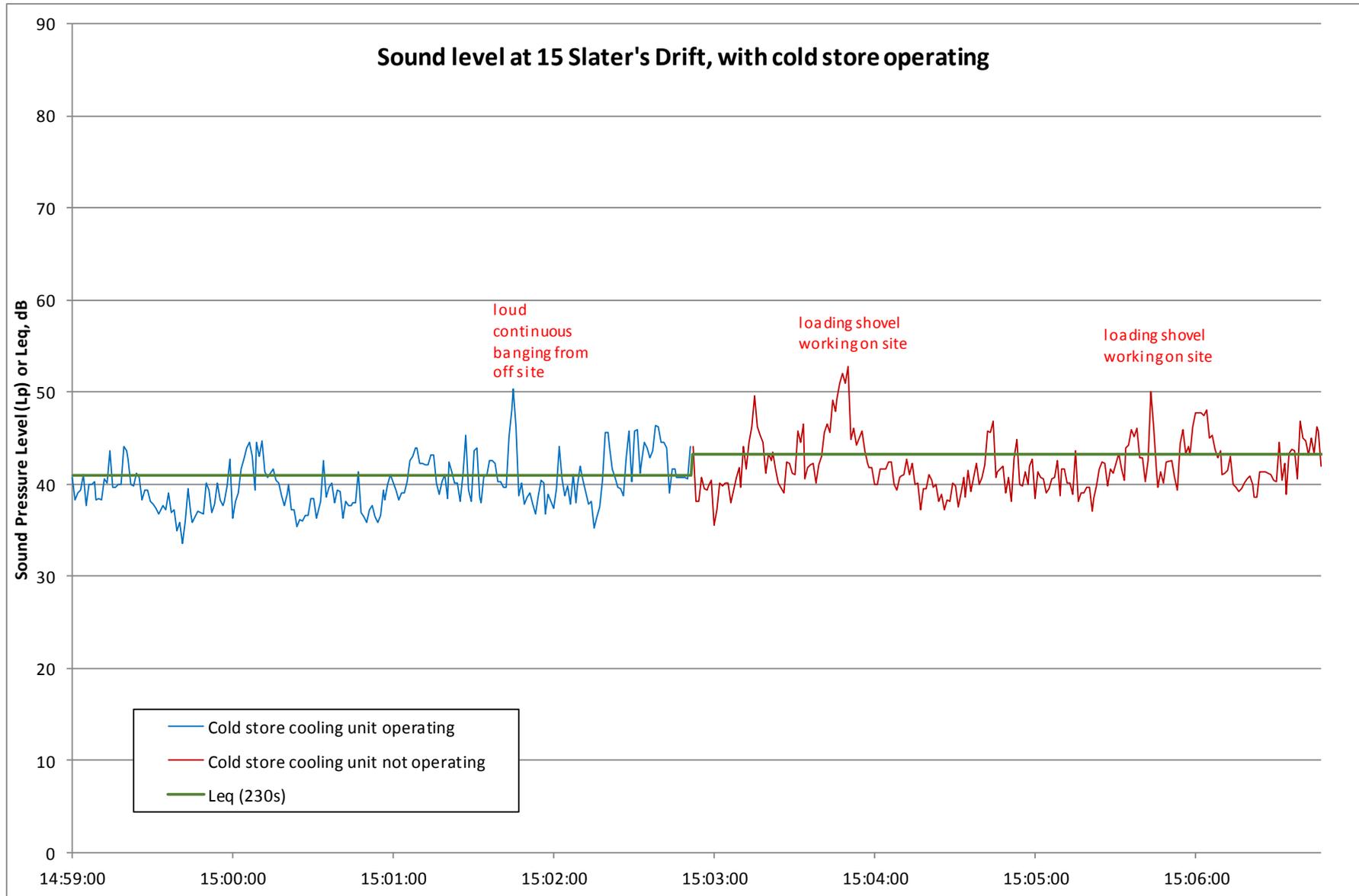


Figure 5 Sound measurement at 15 Slaters Drift property with coldstore start-up

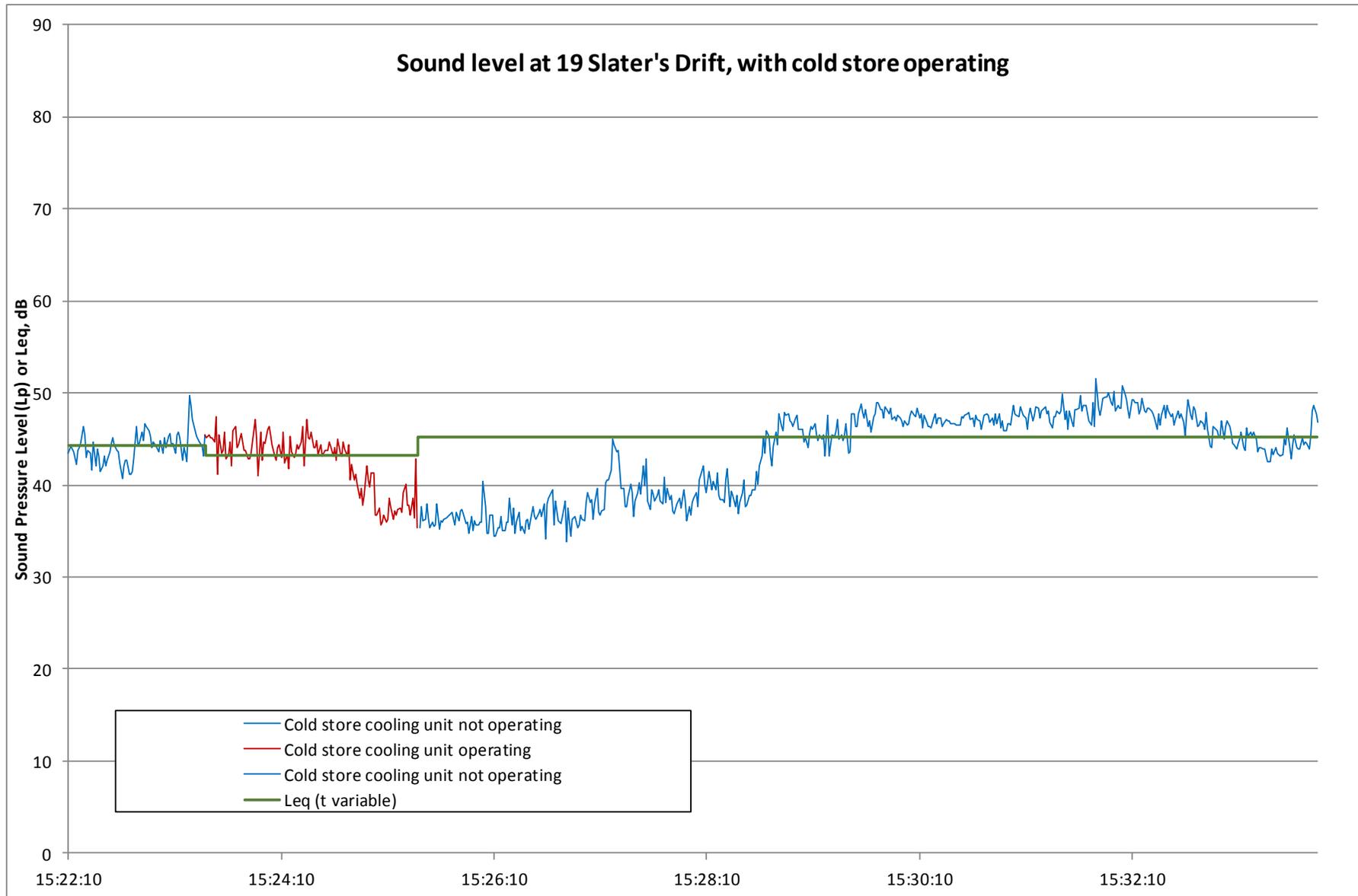


Figure 6 Sound measurement at 19 Slaters Drift property with coldstore start-up

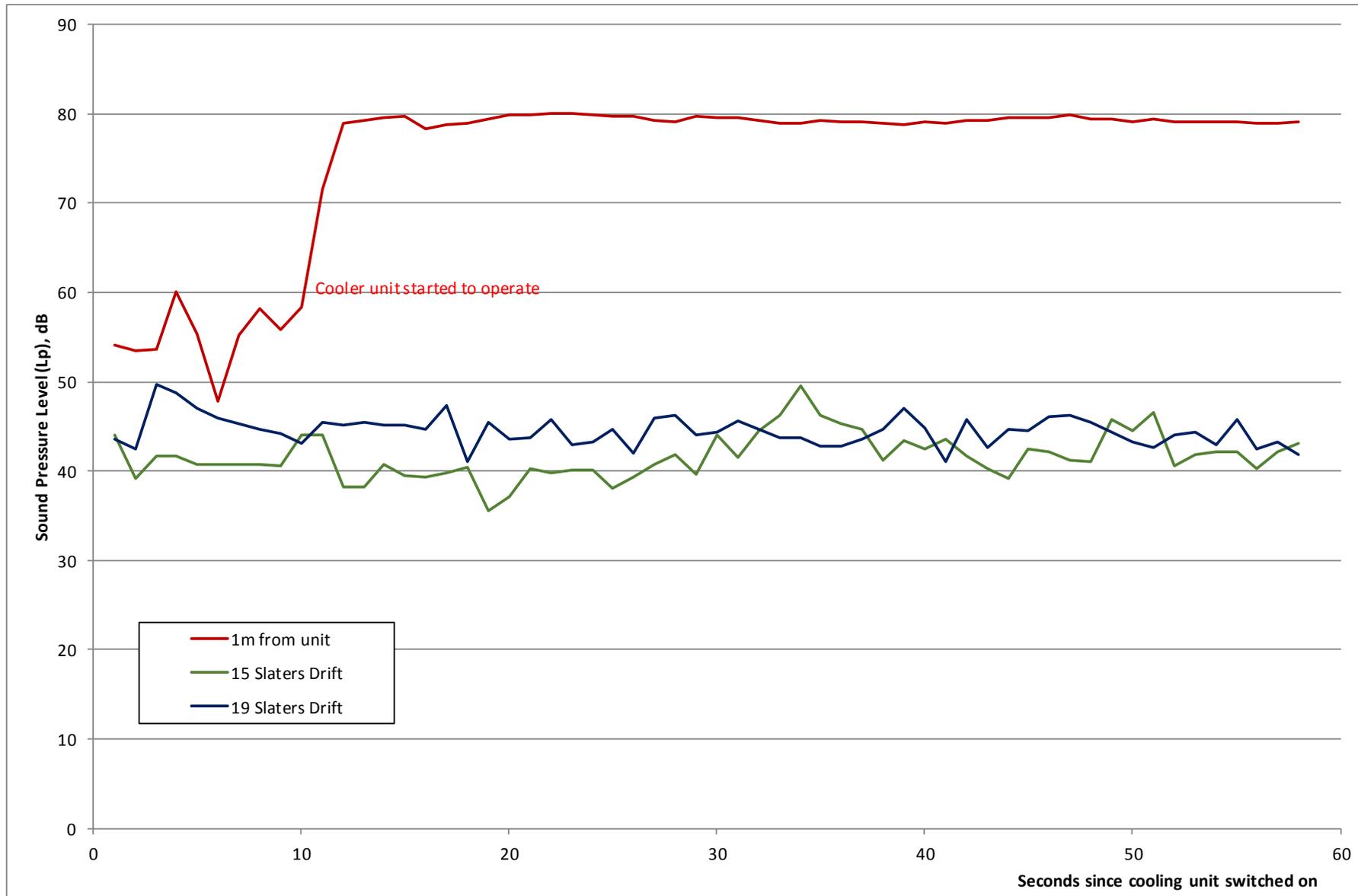


Figure 7 Comparison of sound levels during coldstore start-up