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LONDON CITY AIRPORT : LOCAL AIR QUALITY IMPACTS

NOTES ON VISIT TO MR &MRS E.

Parker Street, Silvertown, 27th August 1997, 0915hrs

1) Introduction

At a meeting between local residents and London City Airport, considering the proposed developments, Mr and Mrs E raised questions about the air quality impact of the Airport, including concerns about fallout. It was suggested that Mr and Mrs E might be willing to provide a more detailed explanation of their concerns about smells and fallout which was suspected of having originated from the Airport. Mr and Mrs E were telephoned and kindly invited a visit to their property on the morning of 27th August. During the visit they explained their concerns at some length and showed me their fine garden. They also allowed samples of atmospheric deposits to be taken from their windowsills for more detailed analysis. The discussion was limited to air quality impacts and it was explained that the subject of noise was being handled by another specialist, Mr Jeff Charles of Bickerdike Allen.

The purpose of these notes is to record the findings of the visit and sample analysis. The possible air quality impacts of concern can be allocated to four main headings:

a) Odours (smells)
b) Fallout - black spots and dark deposits
c) Failure to thrive in runner bean crops
d) Oil on water surface of bird baths and garden ponds

2) Odours (smells)

Mr and Mrs E (the E's) explained their view that the most important impact created by the Airport on local air quality was that of odours and smells. They described the smell as aero-engine kerosene, they explained the conditions when they experienced it most frequently and their reactions to it.

They also described having made a complaint about smells by telephone to the Airport some years ago, before the introduction of "the jets" (146s). They had talked to a security man and explained their annoyance about an aircraft being allowed to run its engine at the "Stand" for some 25 minutes, causing both noise and smells.

Over the last two years the odour problems have been most noticeable in spring, summer and autumn when the E's were out of doors in their garden. The odours are most noticeable with

light winds from the north-east, particularly when the aircraft are taking-off towards the east. Although odours did occur with northerly and north-westerly winds the E's were quite sure that the easterly direction of take-off was important in terms of the frequency of occurrence. They explained that they believed that this was due to the need for aircraft to run their engines for longer periods on the apron whilst waiting for instructions to move out onto the taxiway to the west end of the runway.

The E's well appreciated that the odours were created when the aircraft engines were being run at "idle" or low load. They explained that the smells could be associated with engine noise and wind direction and speed. They also pointed out that there was a considerable variation in the time periods for which aircraft ran their engines, whilst on the stands or on the apron, from starting-up to moving away from the Terminal area. The arrival of aircraft was not a problem as the engines were usually shut down very soon after arrival.

The E's explained that they could understand that it was necessary for the aircraft to run their engines for some minutes before leaving the Terminal area, this could be accepted. However, they could see no apparent need for aircraft to start-up their engines when there was no immediate prospect of leaving the stand or the apron area. It appeared that there was no appreciation of the unnecessary odour and noise impact this caused, or that the impact on the local residents could be significantly improved by taking action to control the unnecessarily prolonged running of engines at the stand or on the apron.

It was explained to Mr & Mrs E that this impact had been discussed in the Air Quality Chapter of the Environmental Statement. The position was appreciated by the Airport Management. They too had very good reason for similar concerns as they were anxious to minimise the occurrence of odours in the Terminal Building. The possibilities for achieving improvements was being actively explored. The Airport was also actively encouraging the airlines to make maximum use of electrical ground power for aircraft at the stands.

3) Fallout - Black Spots and Dark Deposits

The E's explained their concern about the atmospheric fallout - the deposits which formed on horizontal out-door surfaces and the dirtying of curtains etc. They appreciated that these deposits could originate from a number of different sources. They were concerned that the Airport could possibly be responsible as the dust deposition had appeared to become progressively worse over recent years and this coincided with the increase in aircraft traffic at the Airport.

The generation of smoke from aircraft gas turbine and diesel vehicle engines was discussed and it was explained that the combustion of fuels in both these types of engines produced a very fine

form of carbon particles, like fine soot. The individual particles are typically less than one micron in size (a micron is one thousandth of a millimetre) and are too small to be seen by the human eye unless they group together, of flocculate, forming "black snow-flakes". The effect of high levels of this fine smoke is to make white objects look greyer, or dingy. This effect only occurred slowly over long periods of time. If the black deposits occurred almost overnight or over just a few days after the surface was cleaned it was more probably that they had originated from either an industrial chimney or dust from road traffic.

The deposits on surfaces of the windowsills of the north facing side of the site were examined. The white UPVC windowsills were clearly dirty with a general dark grey deposit and a few individual black smuts of over about 1 mm in diameter were visible. The deposits were examined in-situ with a hand-lens and a pocket microscope and could be seen to be a mixture of a wide variety of particles. These included the normal constituents of dust deposits: sand, calcite, gypsum, alumino-silicates (clays), particles of brick, mortar and concrete, botanical and insect debris. The black particles of the deposits also came from a range of sources including coal and coked coal, coke from oil fired industrial boilers and cylindrical particles with pointed ends, which is the characteristic shape of vehicle tyre debris, particularly debris from tyres of HGVs.

The black smuts were difficult to view easily but could be seen to be comprised of coked oil droplets produced from an fuel oil burning industrial boiler. These smuts are often formed within the chimney of an industrial facility by the condensation of sulphuric acid in the flue gases. The presence of the acid causes the particles of coke to agglomerate. In this case the agglomerates were relatively weak and it was not possible to collect a smut without it breaking-up. This is good because it shows that the amount of acid present was very small and was unlikely to cause harm. [In some cases smuts can carry significant amounts of acid and this can be leached out onto the deposit surface to cause acid damage, in some cases being able to penetrate the paint systems of cars - "acid smuts"].

The samples were taken by wiping the deposit from the surface and retaining the deposit in a small plastic bag. Back in the laboratory the samples were later examined under a stereo-zoom Nikon microscope with high intensity incident illumination. The above contents were confirmed as the main constituents and the minor constituents were flakes of rust and paint, and paint spheres from paint spraying. Some of the coal and coked coal particles were large, about 150 microns, which showed that they either originated from tall industrial chimneys or from nearby domestic chimneys. The coked oil droplets were smaller, most less than 100 microns, which suggests that the industrial sources could be some distance away, perhaps over 1 km.

The main black component was tyre rubber debris which indicated that the main source of the dust deposit, including the sand and other mineral material, was from road dust. This is not an

unexpected finding. Major roads, with high HGV traffic flows, are usually found to be the largest source of airborne dust deposits in urban, industrial, commercial and sub-urban areas. This indicates that the road network to the south, south-west and west of the residential area is more likely to be the main source of the dust deposits than the access road to the Airport, which does not carry HGV traffic.

The sample contained no evidence of carbon soot from the airport operations. It should be remembered that the space heating plant for the Airport Terminal building is fired by natural gas, not fuel oil. The analysis of the sample gave no indication of any detectable impact from the Airport facilities or its operations.

4) Failure to Thrive of the Runner Beans Grown Against the Back Wall

The flowers in the front and back gardens provided an excellent demonstration of the skill as gardeners. Their concern about their crop of runner beans was quite understandable. They described how the bed had been prepared with compost against the south facing wall at the north end of the garden about 10 m south of the Airport access road. They had saved beans from the 1996 crop and these had been planted in both the garden and in their allotment with similar bed preparation . While both sets of plantings had grown well, the beans in the allotment had flowered more profusely, the beans had set and had grown much better than the garden plantings. The E's described the measures they had taken to ensure good performance including the regimes for watering and water misting of the bean flowers. They were concerned that the only significant difference between the crops at their allotment and their back garden was the exposure to possible air pollutants from the Airport. They pointed out that their neighbours had experienced similar problems.

They explained their suspicions that air pollution might have influenced insect pollination. However they noted that the budlia plants at the top of the wall at the north end of the garden had still been attracting the usual populations of butterflies. These did not appear to be adversely affected by local environmental conditions.

The leaves of the bean plants were examined and it was found that there were indications of a infection of a leaf mosaic virus. Samples of the leaves were taken and referred to Mr Tim Goodwin of EPCAD Consultants. Mr Goodwin after examining the leaves diagnosed the cause of the problem as being a "spider mite" infection. This explanation fits well with the environmental conditions. The south facing wall against which the beans had been grown is well sheltered from the wind and must had provided almost "hot-house"conditions in the weather of the 1997 summer. It is thus not surprising that this type of infection, more characteristic of a green house environment, had been encountered. The problem was more related to the excellent growing conditions than other factors. In this case the proximity to the Airport was not relevant.

5) Oil on water surface of bird baths and garden ponds

The E's pointed out that they had observed that occasionally films of oil had been found on the surface of water in garden bird baths and, in some cases on the surfaces of garden ponds. They were also concerned that this could have been caused by emissions from the aircraft on the apron area of the Airport. It was explained that this type of phenomenon was not unusual, occurring in many different types of environment, and could be produced by a number of causes. With garden bird baths a frequent cause was the due to the bathing of the birds themselves. Some birds, particularly Starlings, could leave a film of oil from the preening of their feathers. With garden ponds there were many other possible causes, some natural and others man-made.

One possible cause of the oil film is the deposition of "acid smuts" from the start-up of oil fuel fired boiler plant as described under point 3 above. The smuts created at the start-up of a boiler can be rich in light hydrocarbons which can disperse onto the water surface. The presence of smuts on the windowsills would suggest that this is the most likely "man-made" source of such problems. Unfortunately, it is not possible to be definite about the source of this pollution without taking samples and having the hydrocarbons analysed to differentiate between the various hydrocarbon fractions present. It should be noted that for an oil film to persist on a water surface it has to have low volatility. Aero-engine kerosene is relatively volatile and if deposits of fine droplets were to cause such a film then it would be expected to evaporate relatively quickly.

Conclusions

The E's confirmed that the most important local air pollution impact created by the City Airport was that of the characteristic kerosene odours. The Elliots were accurate in their descriptions of the occurrence of odours and in their understanding of the operational causes.

The view proposed was that an improvement in air quality impacts could be produced by the simple mechanism of preventing the aircraft operators from starting the engines of their aircraft before it was necessary. To the E's it appears that on many occasions aircraft engines are started regardless of the time for which aircraft will have to be held at the stand or on the apron. If it were appreciated that this causes nuisance to the local residents a more careful operating regime could be established to reduce this impact.

While the air quality effects of the airport are limited to the odour potential it is evident that the other concerns of the local residents were reasonable and might possibly have been allayed with better communications. Where attention is focussed on major issues such as the development plans, less important issues such as those described above can be neglected. It is suggested that in future communications between the Airport and the local residents should seek to address these minor issues as well the other factors of immediate concern.