Annex B

A Summary of Issues Discussed by the EIA Subcommittee on 19 March 2007

Progress of the construction works

On the progress of construction works of the Permanent Aviation Fuel Facility (PAFF), the project proponent indicated that some construction works had been undertaken from November 2005 after the decision of the Court of Appeal on the Judicial Review. These had been suspended following the judgment of the Court of Final Appeal (CFA) of July 2006. Construction works completed during the period included site formation, foundations of six tanks, jetty piling, landscaping around the site and transplanting of trees.

Site selection and marine transit

2. Some Members were concerned about the marine transport risk by using larger sized vessels. The project proponent explained that modelling results showed that the hazard range of a complete loss of the cargo of an 80,000 dwt vessel (the largest vessel calling at the PAFF) would not be greater than that of a 5,000 dwt vessel currently used. The maximum vessel size of 80,000 dwt to be used for the project was quite modest in comparison with world-class vessels of up to about 550,000 dwt. In assessing the marine transport risk, it would be important to note the nature of aviation fuel Jet A1. Jet A1 was a type of clean fuel which would evaporate quickly. Unlike crude oil, it would not leave persistent oily residues. The use of larger sized vessels would reduce marine transport risk in Ma Wan Channel as a result of the reduced number of aviation fuel vessel movements from 1,100 to about 150 to 200 per year. The use of double-hulled vessels with advanced design, maneuvered by pilots and tug boats would further reduce the risk level.

3. On the difference in the consequence of leakage of Jet A1 as compared with other liquid fuels during marine transit, the project proponent explained that the cargo tanks were specifically segregated in the tanker designs. The double hull design would make a complete loss of cargo unlikely to occur. The hazard level of Jet A1 and other liquid fuels was very different due to the very different nature of the products. When Jet A1 was spilled onto the sea, there would not be any flammable vapour and it would be extremely difficult to ignite it on sea surface. For crude oil, it would be quite easy to ignite it when it was initially poured onto the sea as it contained volatile fractions. However, this would not be the case if the crude oil had stayed long on the sea over a long period of time. For liquefied natural gas (LNG) and liquefied petroleum gas (LPG), it would take away the heat from the sea and vapourize almost immediately. When it vapourized, it would form gas clouds which were heavier than air and would likely drift over a long distance above the sea surface.

4. The project proponent explained that Jet A1 was far more difficult to ignite than other liquid fuels. The minimum flash point of Jet A1 was 38 ℃ which was above the highest temperature recorded in Hong Kong based on metrological data. In comparison, the flash point of petrol was well below 0 ℃. If Jet A1 was heated in a furnace or a jet engine on an aircraft, flammable vapour would be produced. As stated in the EIA report, a fire would be expected if a pool of Jet A1 was poured into a furnace.

5. The project proponent indicated that they had a site visit to the tank farm in the airport with members of the Tuen Mun District Council in 2002. They had demonstrated to the members how difficult it would be for Jet A1 to ignite.

6. On the consequence of a collision incident of a Jet A1 vessel with another vessel, the project proponent explained that it would unlikely set fire to it because the flash point of Jet A1 fuel was 38 ℃ which was above the ambient temperature. Moreover, it would be difficult for a collision incident on sea to generate high temperature over a large area.

7. Some Members were concerned about the heavy traffic in Ma Wan Channel as well as that along the coast of Tuen Mun Area 38 due to the clusters of heavy industries requiring marine access. The project proponent explained that a very detailed marine traffic impact assessment had been conducted. They had worked very closely with the Marine Department and carried out simulations taking into account the busy traffic in Ma Wan Channel and other users in the district. Gazette notice was published and approval was granted under the Foreshore and Seabed Ordinance.

8. On the marine traffic under extreme weather conditions such as typhoons, the project proponent explained that the simulations included different types of wind situations and the issue was discussed at length with relevant authorities and the Port Operations Committee. The vessels would have to follow the rules laid down by the authorities when a tropical cyclone signal was issued.

9. Some Members asked about the reason for not including the marine transport risk assessment in the revised EIA report, the project proponent explained that the requirement under the Study Brief was to conduct studies related to the tank farm, pipelines and jetty.

10. EPD advised that marine transport risk assessment in Ma Wan Channel had been conducted in previous studies, as stated in paragraph 10.3.1.3 of the EIA report.

11. The project proponent indicated that they had briefed the Council in 1995 on the marine transit of aviation fuel to the existing temporary Aviation Fuel Receiving Facility (AFRF) off Sha Chau and the risk identified was in the "As Low As Reasonably Practicable" (ALARP) region. The operation of PAFF would reduce the risk level considerably within the ALARP region. They had also briefed the Council in 2000

about the study results on the site selection which included the marine transport risk assessment in Ma Wan Channel.

12. Members noted that the project proponent had briefed and consulted the Council since 1996 on the site search and site selection process. Members agreed that the key issue was whether the situation in Ma Wan Channel had changed to the extent that it warranted a fresh assessment. Some Members were concerned about the consistency in adopting the ALARP principle in considering the marine transport risk for the current case and the LNG terminal project discussed by the Subcommittee at the previous meeting.

13. On the ALARP principle, Environmental Protection Department (EPD) advised that under the risk guidelines, the area between the acceptable and unacceptable regions was borderline and called the ALARP region. It involved a conditional acceptance depending on the adoption of all practicable risk mitigation measures to reduce the risk as low as reasonably practicable. The project proponent had to adopt whatever practicable mitigation measures to avoid and reduce risk in the region. A project in the ALARP region could be deemed to meet the ALARP principle provided that the project proponent had demonstrated that they had implemented all practicable risk mitigation measures and such measures were implementable. A project in the ALARP region could be deemed unacceptable if no risk mitigation measure was implemented and the risk had not been mitigated to as low as reasonably practicable.

14. On the comparison of the PAFF and LNG cases, EPD advised that aviation fuel vessels were currently using the Ma Wan Channel for marine transit to the AFRF and operation of the PAFF would reduce the existing risk. The vessel movements would be reduced from about 1,100 to about 200 per year. All practicable measures elaborated in Section 10.3.1.3 of the EIA report had been implemented in accordance with the ALARP principle. For the proposed LNG terminal project, it would involve adding new risk by large LNG carriers containing fuel with much greater hazard potential than aviation fuel. A cautious approach to LNG had to be adopted to avoid adding new risk in Ma Wan Channel. It had been confirmed by the relevant authority that the proposed mitigation measure (3 km marine exclusion zone around the LNG carrier) to reduce the risk level was considered not implementable in Hong Kong. The use of alternative route to South Soko would avoid adding new risk to Ma Wan Channel.

Hazard assessment on tank farm

15. On the worst-case scenario (i.e. 100% instantaneous loss of fuel) under the quantitative risk assessment (QRA) of the impact of an aviation fuel spillage, the project proponent explained that the risk assessment was mainly on the people close to the facility, including those along the road outside the fence of the PAFF, in the Shiu Wing Steel Mill (SWS) and proposed EcoPark. The physical modelling under the worst-case scenario showed that oil flow would not affect the cement works, the Castle Peak Power Station or the nearest residential area.

16. On details of the physical modelling, the project proponent explained that it involved the construction of scaled models to simulate impacts on the SWS. In conducting the physical modelling, the objective was to simulate the worst-case scenario. Tests were performed on instantaneous removal of the tank walls and unzipping one side of the tank in less than a second while the contents were still there. The results showed that the risks were well within the acceptable region of the risk guidelines.

17. On the suggestion of enhancing risk communication, the project proponent indicated that they had been maintaining active dialogues with relevant parties and concerned groups. Leaflets explaining and clarifying the risk issue and concerns were to be distributed.

18. On the suggestion of adopting precautionary approach as the project involved life and risk, the project proponent explained that safety and precautionary measures had been adopted not just to meet or adhere to the standards or requirements but also to further minimize the acceptable risk level as far as practicable. The standard required for aviation fuel containment was a single bund wall and a site boundary fence outside the tank. However, the design of the PAFF included a partly sunken bund wall of 4.8 m high with wave wall, two separate impervious security walls and a landscape bund to contain spills. The containment system design well exceeded the international standards. The risk level outside this particular site was extremely low.

19. On the suggestion of using individual bund for each tank rather than a collective bund for all the tanks, the project proponent explained that in the previous application made to the Fire Services Department (FSD) prior to the CFA's decision, the proposal of installing one collective bund for six tanks was considered acceptable by FSD.

20. On the storage capacity, FSD advised that according to the international practice for oil installation, the maximum recommended storage capacity was 60,000 m^3 for a single compound and the bund wall height was 1.5 m. With mitigation measures, the recommended thresholds could be adjusted accordingly. Some of the oil storage facilities in Hong Kong exceeded this storage capacity. The key consideration was whether the fuel could be stored within a protected area away from ignition sources. Another important consideration was whether in the event of a fire, it could be tackled efficiently and effectively.

21. On the tank farm design, the project proponent confirmed that they adopted the best practices in the world in consultation with relevant government departments. For example, the fire fighting equipment would be the best compared with other similar tank farms world wide. The remote fire-fighting monitors to be used for the PAFF tank farm were more commonly found in situations such as liquefied gas jetties which involved much higher levels of risk.

22. On the cumulative risk assessment, the project proponent confirmed that the

total risk level of all events had been assessed having regard to risks associated with marine transport, jetty transfer, pipeline transfer, tank farm storage and instantaneous tank wall failure. The total risk of all events was well within the acceptable level.

23. Some Members noted that the SWS claimed that the QRA should fall into the ALARP region rather than the acceptable region. The project proponent highlighted that the CFA required that the QRA must be both generic and project-specific. The QRA conducted by SWS's consultancy Health and Safety Laboratory (HSL) in 2003, which was based on one of the most pessimistic frequencies for the tank failure, was not applicable to PAFF. The frequency related to different types of fuels and tanks. The project proponent's consultant had reviewed the information available on previous incidents and concluded that the risk for a Jet A1 tank farm of PAFF in the Hong Kong condition was very low.

24. The project proponent had not previously seen the new HSL report tabled at the meeting, but highlighted that the earlier HSL assessment assumed that the ignition probability of spills was 60%. However, this probability should be applicable to spills of fuel such as LPG but not spills of Jet A1. The report was based on conservative assumptions and well beyond the upper credible limit for assessment of the PAFF.

25. EPD advised that the SWS adopted a set of assumptions very different from that of the project proponent. In any QRA, there would be a range of uncertainties. The sensitivity study was presented in Figure 10.13 of the EIA report.

26. On the experience learnt from the UK Buncefield incident, the project proponent explained that the incident involved overfilling of a petrol tank forming flammable gas clouds moving away from the tank. A large number of tanks were set on fire after the petrol vapour cloud explosion during the incident. Large amount of smoke was produced and the nearby major road was closed on two occasions as a precautionary measure. However, it was important to note that there was no fatality or serious injury either on-site or off-site. One lesson learned from the incident was that the bund walls should be sealed with fire resistant material to prevent fuel and firewater seepage that could contaminate surrounding land. In the case of PAFF, fire-retardant joints would be used.

27. On the Portland tank farm case in the UK, the project proponent was unsure of the relevance, but undertook to review the information and provide further details on the case in relation to the PAFF.

(Note: The project proponent provided the supplementary information in Part 2 to Annex C. They pointed out that the UK planning inquiry into the proposed storage at a tank farm at Portland appeared to be of very limited relevance to the PAFF.)

28. The project proponent drew Members' attention to a set of responses (tabled by the project proponent for Members' information) to the comments tabled by SWS at the

meeting of the Tuen Mun District Council held on 13 March 2007. They highlighted the following –

(a) In response to the claim that the QRA had not addressed all hazardous scenarios – the EIA report had identified and considered all potential scenarios as stated in Table 10.2. In doing so, it had complied with the scope of the Study Brief which required consideration of the hazardous scenarios associated with the receiving, storage and export of Jet A1.

(b) In response to the claim that consideration had not been given to events such an explosion of a furnace in the EcoPark or steel mill leading to an impact on the tank which would then subsequently had an impact back onto the adjacent site – this cause would not affect the quantification of the risks or contribute any further to the hazardous scenarios which had been assessed.

(c) In response to the claim that the PAFF would be the largest fuel depot in the world – fuel farms for aviation fuel and other fuels varied in size according to the requirements of the facility and the local circumstances. PAFF was not the largest fuel depot in the world. Even at Tsing Yi the storage capacity was about three times as great as the PAFF and two of the individual depots at Tsing Yi had capacities of about 95% of the PAFF and store a variety of fuels. The size of the PAFF was not therefore particularly unusual.

(d) In response to the claim about the high temperature areas and potential ignition sources inside SWS and EcoPark – the situation of hot-works in the steel mill coming in contact with Jet A1 was analyzed. It was concluded that it might be possible for the hot metal route to ignite a pool of Jet A1 below it. The consequences and frequency of an event being ignited in this area had been fully quantified within the assessment.

(e) In response to the claim that the siting of a fuel facility beside high temperature operation was extremely unusual in the world – the size of the PAFF, its layout and proximity to the flame, fire and high temperature were not particularly unusual and indeed were quite common for other storage in refineries around the world. An example was the Shell Pernis refinery in the Netherlands where a large number of storage tanks for different types of fuel, including highly flammable fuel, was stored adjacent to furnaces. There were about 750 refineries in the world and this was the situation in most of them. One could also find storage tanks adjacent to residential development and ignition sources (such as power lines) as in the cases in Melbourne.

29. EPD advised that according to the CFA judgment, the QRA must be both

generic and project-specific. The assessment should involve two steps in searching all generic incidents occurred in the world and then filtering out irrelevant information to focus on project-specific information. As stated in paragraph 72 of the CFA judgment, the methodology required "searches for the relevant scenarios in the history of projects of the same genus – and thus identifies scenarios for the purposes of para. (i) [clause 3.3.10.1 of the Study Brief referred in paragraph 55 of the CFA judgment] – then quantifies risk by reference to that history and the specific features of the instant project…".

30. Members noted that the QRA presented by the project proponent and HSL used different assumptions and adopted different basis which led to differences in the QRA results. To facilitate Members' consideration, Members requested the project proponent to provide supplementary information on the assumptions used and basis adopted in the hazard assessment as compared with those used and adopted by other parties contained in the public comments on the EIA report. The project proponent should also provide responses to the public comments on the EIA report in the aspect of hazard assessment. EPD advised that they had to forward the public comments received by the department during the public inspection period to the project proponent under the EIA Ordinance. The project proponent would be able to get hold of all the public comments received by EPD for preparation of the supplementary information.

31. Members were satisfied with the assessment set out in the revised EIA report except that further consideration should be given to the outstanding issue of hazard assessment associated with the tank farm. The Subcommittee recommended that this outstanding issue be further discussed at the full Council meeting with further information to be provided by the project proponent.