AWE comments in response to the DoE RFI Docket No: HS-RM-10-CBDPP

Background to AWE's position and responses.

AWE are neither subject to DoE oversight nor required to comply with 10 CFR 850. However, we are subject to UK H&S legislation, with the Control of Substances Hazardous to Health (CoSHH) regulations being the prime regulation which informs our philosophy for managing our Be Facility and operations.

Under CoSHH, the Maximum Exposure Limit (MEL) for airborne Be Particulate is 2 µg m^{-3} – which aligns with the OSHA PEL - and our action/alert levels are based on fractions of that MEL value.

As you may be aware, upon first establishing the Be Facility, it was assumed that a number of operations would generate (significant) airborne particulate. The decision was made to enclose those operations, and develop an IH regime which supported that engineered control route; that IH regime contained "alert" and "action" levels of 0.25 MEL and 0.5 MEL respectively (0.5 µg m^{-3} and 1.0 µg m^{-3}), with responses clearly defined in Facility Procedures. At all times, any release – no matter how small is investigated – and appropriate an response/remediation implemented.

The release data gained from many year's operating experience was used to justify a local reduction in the "alert" and "action" levels to 0.25 µg m^{-3} and 0.5 µg m^{-3} respectively, with no increase in release events requiring investigation.

Our responses to DoE's questions below are based on our operational experience.

Question 1 – DoE currently defers to the Occupational Safety and Health Administration (OSHA) for establishing the permissible exposure limits (PEL) and uses an action level as the administrative level to assure that controls are implemented to prevent exposures from exceeding the permissible exposure limits. Should the Department continue to use the OSHA PEL? Please explain your answer and provide evidence to support your answer.

If we use PAS (Personal Air Sampler – lapel samplers in the US) data as the metric for considering airborne release/operator exposure, the table below summarises AWE's PAS data for a nominal 14 year period.

	Summary of PAS data: 01/01/97 – 30/09/10 PAS reading - µg m^{-3}					
TOTAL	= 0.02	= 0.1	= 0.5	= 1.0	= 2.0	=2.0
100500	99330	1106	56	4	2	2

We use this data to back up our contention that if you have good engineering controls in place and all releases are investigated, there is no need to change the existing 2 µg m^{-3} MEL/PEL.

Of the eight readings = 1.0 µg m^{-3}, only one was shown to be genuine, arising from a poor procedure; the procedure was changed and there has been no recurrence.

It should also be noted that all 56 readings in the = 0.5 µg m^{-3} group were investigated as a matter of routine, and any identified improvements implemented.

At this time, we have done no further, more detailed, statistical analysis of this data – for instance frequency distributions of the specific values of PAS readings in each band. However, we contend that the low exposure results align with our low incidence of disease.

From a risk communication perspective, the benefit of reducing the limit would have to be explained. While this might appear at first sight to be a good thing, the reduction of the limit as a means of reducing the exposure, as opposed to preventing the exposure in the first place would be an interesting discussion.

This ties back to the ERICPD principle of occupational health management, whereby;

- E = Eliminate.
- R = Reduce.
- I = Isolate.
- C = Control.
- P = PPE – Use of respirators etc.
- D = Discipline (ie management control – procedures)

As you implement measures higher up the hierarchy, results will improve ie exposures will reduce without having to implement measures lower down.

Since in this case we can neither eliminate nor reduce the hazard, our start point is isolate/control. We can get into an arguably pointless debate about whether engineering controls sit within "Isolate" or "Control" but they certainly **don't** sit within PPE or Discipline, so rigid application of ERICPD drives us to start our exposure reduction by implementation of improved engineering controls.

The interesting debate comes when we try and align reduction of the limit with ERICPD…….

2. Should the Department use the 2010 ACGIH threshold limit value (TLV) of 0.05 µg/m3 (8-hour time-weighted average of 0.05 microgram of beryllium, in inhalable particulate matter, per cubic meter of air), for its allowable exposure limit? Please explain your answer and provide evidence to support your answer.

The technical issues associated with adopting (i) an inhalable fraction and (ii) an inhalable fraction at the proposed TLV are well known - and can be debated/argued/discussed by far better qualified people than us BUT essentially we need to be able to routinely/easily be able to measure/analyse at the given limit, and there are significant issues here.

I refer you back to our answer at (1) above as far as justifying any reduction is concerned; get the engineering controls right, prevent the release I the first place, and the MEL/PEL value is (almost) irrelevant.

As with the ACGIH, the HSE in the UK disclaims liability with respect to the use of TLVs.

3. Should an airborne action level that is different from the 2010 ACGIH TLV for beryllium (8-hour time-weighted average of 0.05 microgram of beryllium, in inhalable particulate matter, per cubic meter of air) be established? If so, what should be the level? Please explain each of your answers and provide evidence to support your answers.

I refer you back to our answer at (1) above as far as justifying any reduction is concerned; get the engineering controls right, prevent the release I the first place, and the MEL/PEL value is almost irrelevant.

4. In the past DOE encouraged, but did not require, the use of wet wipes rather than dry wipes for surface monitoring. DOE's experience with wipe testing leads the Department to consider requiring the use of wet wipes, unless the employer demonstrates that using wet wipes may cause an undesirable alteration of the surface, in order to achieve greater comparability of results across the DOE complex and in response to studies demonstrating that wet wipes capture more of the surface contamination than do dry wipes. Should the Department require the use of wet wipes? Please explain your answer and provide evidence to support your answer.
AWE uses dry wipes for surface monitoring, and there is no intent to move to a wet wipe technique. Should DoE mandate a change to wet wipes across the complex, the risk communication issues are (i) explaining why the change is being made and (ii) explaining what the results mean because, without doubt, “the numbers” will be different (higher as wet wiping more efficient ?) so without appropriate explanation, it will initially seem that areas are dirtier. Again, for workplace monitoring/sampling, if the releases are prevented at source, then the wipe method becomes less relevant.
5. Since the use of wipe sampling is not a common occupational safety and health requirement, how do current wipe sampling protocols aid exposure assessments and the protection of beryllium workers? How reliable and accurate are current sampling and analytical methods for beryllium wipe samples? Please explain your answers and provide evidence to support your answers.
Under UK H&S legislation, wipe sampling is not a requirement. However, AWE use it as part of its toolkit of techniques for evaluating plant safety and cleanliness, and are fully aware of the potential variability inherent in the technique. Our observation here is that a clean wipe only tells you that the wiped area is clean; it does not confirm that an unwiped area is clean. Conversely, a dirty wipe identifies that contamination has come from somewhere, and the source has then to be determined. This is where reliance on the skill of the IH practitioners in developing an appropriate wipe regime for each circumstance is of paramount importance. As far as the reliability and accuracy of the analytical technique used for wipe samples is concerned, we have no concerns.
6. What is the best method for sampling and analyzing inhalable beryllium? Please explain your answers and provide evidence to support your answers.
No comment. We are aware of the technical issues and difficulties associated with the collection and analysis of the inhalable fraction. There is no intent to move away from our longstanding use of total mass.

7. How should total fraction exposure data be compared to inhalable fraction exposure measurements? Please explain your answer and provide evidence to support your answer.

All we would offer here is that the particle size distribution is dependent on the particular task being undertaken, so until all tasks are fully characterised in terms of their resultant particle size distribution it is very difficult to answer this question.

8. Should surface area action levels be established, or should DOE consider controlling the health risk of surface levels by establishing a low airborne action level that precludes beryllium settling out on surfaces, and administrative controls that prevent the buildup of beryllium on surfaces? If surface area action levels are established, what should be the DOE surface area action levels? If a low airborne action level should be established in lieu of the surface area action level, what should that airborne action level be? What, if any, additional administrative controls to prevent the buildup on surfaces should be established? Please explain each of your answers and provide evidence to support your answers.

In the first instance, I am unaware of any correlation between surface levels and airborne contamination.

I would hesitate to assign an "…airborne action level that precludes beryllium settling out on surfaces.." because if we assume that "heavy" Be particles settle out on surfaces and "light" Be particles remain suspended, then potentially those "light" particles sit in the size range that are acknowledged to achieve deep lung penetration and all that follows thereafter.

AWE's Be area alert and action levels for airborne contamination are presented at para 3 of the "background" section above; it must also be emphasised that all times we operate on the ALARP (As Low As Reasonably Practicable) principle whereby any airborne reading is investigated.

As far as surface contamination levels are concerned, we operate at the following limits;

- < 5 µg ft^{-2} (< 50 µg $m^{-2)}$ for a Be Controlled area, and
- < 1 µg ft^{-2} (< 10 µg $m^{-2)}$ for a non-toxic area (like an office ?).

It goes without saying that we drive to as low as possible. Our "management controls" include regular maintenance of our HVAC system to ensure it continues to function as required, regular appraisals of our fumecupboards and containment stations to ensure that they continue to present the face velocity at the working opening that guarantees particulate containment, a housekeeping regime which regularly cleans all areas, and a wipe campaign that confirms the adequacy of the housekeeping regime. At all times this is backed up by 100% wearing of PASs (lapel samplers) – all staff in our Be wear an air sampler so that independent of the maintenance and housekeeping protocols we have a means - albeit after-the-event - of keeping tabs on airborne levels.

Additionally, all operations are assessed prior to commencement. If the assessment deems the operation to be intrusive with 100% likelihood of exposure to Be particulate, then the process is performed wearing respiratory protection. If the operation is "new" - commissioning a new machine tool for instance – then the commissioning of that equipment is undertaken under a regime involving extensive respiratory protection while the process is characterised. The commissioning report presents all the IH data collected as part of the characteristion activity – air sampling and wipes – and a decision is then made on the level of respiratory protection required for "normal" operations.

9. Should warning labels be required for the transfer, to either another DOE entity or to an entity to whom this rule does not apply, of items with surface areas that are free of removable surface levels of beryllium but which may contain surface contamination that is inaccessible or has been sealed with hard-to-remove substances, e.g., paint? Please explain your answer and provide evidence to support your answer.

At AWE, any item leaving our Be Shop sits in one of two categories;

1. It is free from Be contamination, or
2. Its exposed surfaces are free from Be contamination

Items that sit in category (1) have no inaccessible regions that cannot be cleaned - and more significantly can be wiped to confirm cleanliness. We attach no stickers to these items; the clearance certificate confirms that the item is free form Be contamination.

Items that sit in category (2) are far more common than those in category (1). Category (2) items are either;

(i) Tools or components destined for reuse in another Be/Controlled area,
(ii) Consigned for disposal within our regulated waste stream, or
(iii) Are Be material (components, solid, powder or swarf) being sent for recycling.

We do not release any category (2) item for use by the general public once it has been used in a Be area. Each “destination” for a category (2) item has a specific set of labels/stickers, and I can supply further information if requested/required.

10. Should the Department establish both surface level and aggressive air sampling criteria (modeled after the U.S. Environmental Protection Agency's aggressive air sampling criteria to clear an area after asbestos abatement) for releasing areas in a facility, or should the Department consider establishing only the aggressive air sampling criteria? Please explain your answers and provide evidence to support your answers.

We already know that surface contamination doesn’t correlate with airborne, so I would be wary of assigning airborne levels as the sole means of determining clearance; I would advise a confirmatory campaign of wipe samples.
Using the asbestos model, the contractors we use at AWE use both air and surface sampling to confirm the effectiveness of an asbestos removal exercise as dictated by our asbestos management regulations.

Agree with Bishop’s statement on high surface loadings trapped in a film of grease; a high power air-blast won’t disturb it, and surface wiping is difficult. Under those circumstances, a specific, localised cleaning may be required/mandated.

11. Currently, after the site occupational medicine director has determined that a beryllium worker should be medically removed from exposure to beryllium, the worker must consent to the removal. Should the Department continue to require the worker's consent for medical removal, or require mandatory medical removal? Please explain your answers.

Using the RA model, our operating procedure requires that any individual receiving a high exposure/dose is removed from RA work. The period of removal is dependent on the nature of the exposure and how quickly/well the contamination is reduced/excreted, but the operator has no say. Consent doesn’t come into it – they are automatically removed from contact.

However. The “reality” of an RA exposure is easy to confirm whereas that isn’t always the case with Be. We have had a number of high PAS readings – including one that I had – but extensive investigations do not produce confirmatory evidence, so a high Be PAS reading cannot be the sole reason for exclusion

We believe removing a worker from exposure to beryllium should remain at the worker’s consent and should not be mandatory.

This is because:

1. Despite recent pointers[1] the prognosis of chronic beryllium disease remains uncertain[,2,3] .

2. It is not proven that removal from exposure to beryllium improves prognosis.

However, in a similar disease, occupational asthma, there is good evidence that removal from exposure to the causative agent improves prognosis[4]. It is also sensible to assume that repeated exposure to beryllium will worsen an immune-modulated disease such as CBD.

Therefore we believe that the worker should be counselled fully as to all the uncertainties surrounding CBD and strongly ***encouraged*** to accept removal from exposure to beryllium, but should not be forced.

REFERENCES

1. Marchand-Adam S et al 2008 Short-and long-term response to corticosteroid therapy in chronic beryllium disease.*Eur Respir J* **32** 687-693

2. Seeler AO 1959 Treatment of chronic beryllium disease poisoning *AMA Arch Ind Health* **19** 164-168

3. Duggal M et al 2010 Long-term follow-up of beryllium-sensitised workers from a single employer *BMC Public Health* **10:5**

4. British Occupational Health Foundation 2004 Occupational Asthma – identification, management and prevention: evidence based review and guidelines