LEM/TEK/1 Bahagian H
10 Februari 2020

PANDUAN TEKNIKAL

PANDUAN UNTUK MENDAPATKAN LESEN DARIPADA LEMBAGA BAGI AKTIVITI DI BAWAH LESEN KELAS G (MELIBATKAN NORM)

LEMBAGA PERLESENAN TENAGA ATOM
KEMENTERIAN SAINS, TEKNOLOGI DAN INOVASI

AELB ATOMIC ENERGY LICENSING BOARD

Lembaga Perlesenan Tenaga Atom
Kementerian Sains, Tenaga, Sains, Teknologi, Alam Sekitar dan Perubahan Iklim
Batu 24, Jalan Dengkil, 43800 Dengkil Selangor Darul Ehsan

Tel: 03-8922 5888
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Laman Web: http://www.aelb.gov.my

Kandungan Muka Surat

TUJUAN

1. Dokumen ini disediakan bertujuan untuk memberi panduan berkenaan prosedur permohonan lesen Kelas G yang melibatkan bahan radioaktif semula jadi (*Naturally Occurring Radioactive Materials*, NORM).

SKOP

2. Dokumen ini hanya terpakai bagi permohonan lesen Kelas G bagi aktiviti berikut:

a) Untuk melupuskan bahan-bahan radioaktif (NORM) atau sisa-sisanya;
b) Untuk menstor bahan-bahan radioaktif (NORM) atau sisa-sisanya sebelum pelupusannya; atau
c) Untuk membubarkan sesuatu pepasangan pengilangan atau kemudahan rawatan sisa yang melibatkan NORM

TAKRIFAN

3. Perkataan yang digunakan dalam panduan ini mempunyai makna seperti berikut:

"Berurusan" berhubungan dengan mana-mana bahan radioaktif, bahan nuklear, benda ditetapkan atau radas penyinaran, ertinya apa-apa aktiviti yang melibatkan bahan radioaktif, bahan nuklear, benda ditetapkan atau radas penyinaran yang sedemikian itu yang dikilang diperdagang, dikeluar, diproses, dibeli, dipunyai, diguna, diangkut, dipindah, dikendali, dijual, distor, diimport atau dieksport.

"kemudahan rawatan sisa" ertinya sesuatu kemudahan yang digunakan untuk memproses, merawat atau menstor, sebelum pelupusan, sisa bahan-bahan radioaktif, bahan-bahan radioaktif, bahan-bahan nuklear atau benda-benda ditetapkan;

“pengurusan sisa” ertinya semua kegiatan, pentadbiran dan kendalian, yang melibatkan pengendalian, prarawatan, rawatan, perapian, pengangkutan, penyimpanan dan pelupusan sisa radioaktif

“pelupusan” ertinya penempatan sisa radioaktif atau efluen yang dibuang secara terus di suatu kemudahan yang bersesuaian tanpa niat untuk mendapat semula (*retrieval*).

SINGKATAN

LPTA Lembaga Perlesenan Tenaga Atom

IAEA *International Atomic Energy Agency*

NORM Bahan radioaktif semula jadi (*Naturally Occurring Radioactive Material*)

OBTL Orang bertanggungjawab terhadap lesen

PPS Pegawai Perlindungan Sinaran (*Radiation Protection Officer,* RPO*)*

RWMO Pegawai Pengurusan Sisa Radioaktif (*Radiation Waste Management Officer)*

eLesen Sistem atas talian bagi permohonan lesen dengan LPTA

PENGENALAN

4. Mana-mana pemegang lesen Kelas A yang berhasrat untuk berurusan dengan aktiviti berikut:-

a) melupuskan bahan-bahan radioaktif (NORM) atau sisa-sisanya;

b) menstor sebelum melupus bahan-bahan radioaktif (NORM) atau sisa-sisanya; atau

c) membubarkan sesuatu pepasangan pengilangan atau kemudahan rawatan sisa yang melibatkan NORM

hendaklah mendapatkan lesen kelas G daripada Lembaga melalui sistem atas talian (eLesen).

5. Manakala pemegang lesen Kelas A yang berhasrat untuk melupuskan sisa NORM dengan membina dan mengendalikan kemudahan rawatan sisa sendiri hendaklah memohon lesen Kelas A (Kemudahan Rawatan Sisa) dan Kelas G (Melupus).

6. Di samping itu, bagi mana-mana orang yang berhasrat untuk mengendalikan pelupusan sisa NORM dengan membina dan mengendalikan kemudahan rawatan sisa hendaklah juga memohon lesen Kelas A (Kemudahan Rawatan Sisa) dan Kelas G (Melupus).

7. Panduan LEM/TEK/76 *Criteria For Siting of Disposal Facility for Wastes Containing Naturally Occurring Radioactive Materials* (NORM) boleh dirujuk oleh mana-mana orang yang berhasrat membina kemudahan pelupusan untuk melupuskan bahan-bahan radioaktif (NORM) dan sisa-sisanya.

KEPERLUAN PERLESENAN

8. Pemohon yang ingin memohon lesen kelas G hendaklah merujuk kepada bahan panduan LEM/TEK/1 bertajuk “Panduan Umum Bagi Mendapatkan Lesen daripada Lembaga Perlesenan Tenaga Atom”. Senarai semak keperluan bagi permohonan lesen kelas G untuk skop dokumen ini adalah seperti di **Lampiran 1**.

9. Pemohon hendaklah membayar fi permohonan kepada LPTA sebanyak RM15 bagi setiap kelas lesen bagi setiap permohonan sebelum mengemukakan permohonan secara atas talian. Sekiranya permohonan diluluskan, pemohon hendaklah menjelaskan bayaran fi lesen yang dikenakan sebelum lesen yang sah dikeluarkan oleh LPTA.

Bayaran fi lesen yang dikenakan bagi lesen kelas G melibatkan aktiviti pelupusan atau penstoran sebelum pelupusan adalah sebanyak RM100 setahun sepertimana yang ditetapkan dalam Peraturan-Peraturan Perlindungan Sinaran (Perlesenan) 1986.

10. Selain itu, pemohon yang berhasrat untuk membina dan mengendalikan pelupusan di kemudahan pelupusan (*Disposal Facility*), hendaklah mengemukakan dokumen berikut semasa membuat permohonan lesen Kelas A dan Kelas G:

a) *Radiological Impact Assessment* – **Lampiran *2***
b) *Safety Case for the Radioactive Waste Management Facility* - **Lampiran 3**
c) *Radioactive Waste Management Plan* **– Lampiran 4**
d) *Decommissioning Plan* **– Lampiran 5**
e) *Emergency Response Plan*
f) *Criteria For Siting of Disposal Facility for Wastes Containing Naturally Occurring Radioactive Materials (NORM)*
g) Kelulusan tapak untuk menempatkan kemudahan pelupusan oleh Kerajaan Negeri/ Kerajaan Tempatan

11. Pemohon juga tertakluk kepada apa-apa peruntukan undang-undang yang dikuatkuasa oleh pihak berkuasa berkenaan yang berkaitan.

12. Dokumen ini adalah tertakluk kepada pindaan dan arahan yang dikeluarkan oleh LPTA dari semasa ke semasa.

PENUTUP

13. Sekiranya terdapat sebarang pertanyaan mengenai panduan ini, pemohon/pemegang lesen boleh berhubung dengan LPTA menggunakan alamat di bawah:

Lembaga Perlesenan Tenaga Atom
Batu 24, Jalan Dengkil, 43800 Dengkil,
Selangor Darul Ehsan.
Telefon: 03-89225888 Faks: 03-89223685
Email: corporate@aelb.gov.my

REKOD DOKUMEN

<table>
<tr><th>Tarikh Terimapakai</th><th>Status semakan</th><th colspan="2">Penyedia</th></tr>
<tr><td rowspan="11">29 Disember 2015</td><td rowspan="11">0</td><td colspan="2">Panduan ini dibangunkan oleh Jawatankuasa Kecil Keselamatan (Pengurusan Sisa Radioaktif) dan urus setia LPTA seperti berikut:</td></tr>
<tr><td>1. Tn. Hj. Mohd Yusuf Bin Mohd Ali</td><td>Pesara Agensi Nuklear Malaysia</td></tr>
<tr><td>2. Tn. Hj. Mohd Zaidi Bin Mohd Hasan</td><td>Jabatan Mineral dan Galian (JMG)</td></tr>
<tr><td>3. YBrs. Ir. Dr. Tuan Suhaimi Bin Salleh</td><td>Jabatan Kerja Raya (JKR)</td></tr>
<tr><td>4. YBrs. Dr. Ahmad Riadz Bin Mazeli</td><td>Kementerian Kesihatan Malaysia (KKM)</td></tr>
<tr><td>5. YBrs. Prof. Dr. Amran Bin Abdul Majid</td><td>Universiti Kebangsaan Malaysia (UKM)</td></tr>
<tr><td>6. YBrs. Prof. Dr. Abd. Aziz Bin Tajuddin</td><td>Universiti Sains Malaysia (USM)</td></tr>
<tr><td>7. Y.Bhg. Datin Hjh. Hanili Binti Ghazali</td><td>Jabatan Alam Sekitar (JAS)</td></tr>
<tr><td>8. YBrs. Dr. Abd. Mohd Wahab Bin Yusuf</td><td>Agensi Nuklear Malaysia</td></tr>
<tr><td>9. Dr. Teng Iyu Lin</td><td rowspan="2">Urus setia Lembaga Perlesenan Tenaga Atom</td></tr>
<tr><td>10. En. Halim Bin Abdul Rahman</td></tr>
</table>

Tarikh Terimapakai	Status semakan	Penyedia
		11. Pn. Suhana Binti Jalil 12. Pn. Siti Afidah Binti Awang 13. Tn. Hj. Adbul Hamid Bin A. Latib
10 Februari 2020	1	1. Pn. Siti Afidah Binti Awang 2. Pn. Lim Ai Phing

RUJUKAN

a. Akta Perlesenan Tenaga Atom 1984 (Akta 304)

b. Peraturan-peraturan Perlindungan Sinaran (Perlesenan) 1986 [P.U. (A) 149]

c. Peraturan-Perlesenan Tenaga Atom (Perlindungan Sinaran Keselamatan Asas) 2010 [P.U. (A) 46]

d. Peraturan-Peraturan Perlesenan Tenaga Atom (Pengurusan Sisa Radioaktif) 2011 [P.U. (A) 274]

LAMPIRAN 1

SENARAI SEMAK PERMOHONAN LESEN KELAS G BAGI AKTIVITI

a) Melupuskan bahan-bahan radioaktif (NORM) atau sisa-sisanya;
b) Menstor sebelum melupuskan bahan-bahan radioaktif (NORM) atau sisa-sisanya; atau
c) Membubarkan sesuatu pepasangan pengilangan atau kemudahan rawatan sisa yang melibatkan NORM

Bil.	Perkara / Maklumat	Jenis Permohonan Lesen		
		Baru	Pinda	Baharui
	MAKLUMAT UMUM UNTUK PERMOHONAN LESEN			
A.	**Organisasi dan Pengurusan**			
1.	Surat permohonan (surat hasrat) [permohonan hendaklah dibuat menggunakan perkhidmatan atas talian di http://elesen.aelb.gov.my	/	/	/
2.	Butir-butir syarikat iaitu nama, nombor telefon, nombor faks, alamat surat–menyurat dan alamat premis	/	/	/
3.	Orang yang Bertanggungjawab Terhadap Lesen (OBTL) [sila sertakan Borang 49 yang disahkan benar oleh Suruhanjaya Syarikat Malaysia (SSM). Sekiranya bukan Ahli Lembaga Pengarah surat perlantikan hendaklah ditandatangani oleh salah seorang ahli Lembaga Pengarah Syarikat [sila dapatkan dari laman web AELB di www.aelb.gov.my]. Sertakan carta organisasi syarikat	/		
5.	Salinan sijil pendaftaran syarikat yang telah disahkan benar oleh SSM (Borang 9)	/		
6.	Surat perakuan pengamal perubatan berdaftar yang diluluskan [sila dapatkan dari laman web LPTA di www.aelb.gov.my]	/		
B.	**Pekerja Sinaran**			
1.	Untuk pengiktirafan sebagai Pegawai Perlindungan Sinaran (PPS)/ Penyelia (PY) dan Pegawai Pengurusan Sisa Radioaktif (RWMO), permohonan hendaklah dibuat menggunakan perkhidmatan atas talian dengan memuatnaik: a) Salinan sijil lulus peperiksaan dari AELB atau agensi yang diiktiraf oleh AELB. b) Salinan sijil kursus perlindungan sinaran anjuran agensi yang diiktiraf oleh LPTA bersama borang log CEP. Bagi pemohon bekas PPS yang tidak aktif dan PPS baru yang belum diiktiraf selepas setahun lulus peperiksaan PPS, sila lampirkan borang log CEP. c) Salinan kad pengenalan dan gambar saiz passport.	/		

Bil.	Perkara / Maklumat	Jenis Permohonan Lesen		
		Baru	Pinda	Baharui
	MAKLUMAT UMUM UNTUK PERMOHONAN LESEN			
	d) Bagi bukan warganegara, sertakan salinan permit kerja (Imigresen) dan pasport yang sah. e) Salinan surat pengesahan pemeriksaan perubatan [LPTA/BM/5 Seksyen A dan B], tidak melebihi 6 bulan daripada tarikh pemeriksaan.			
2.	Untuk pengiktirafan pengendali, sila kemukakan perkara B1(c), B1(d) dan B1(e).	/		
3.	Pengendali sinaran hendaklah tidak bekerja dengan mana-mana syarikat. Sekiranya masih bekerja di syarikat lain, urusan pemberhentian hendaklah dimaklumkan kepada Bahagian Kawalselia Sinaran di Ibu Pejabat/ Cawangan LPTA yang berkenaan.	/		
C.	**Alat Pengesan Sinaran**			
1.	Salinan sijil tentukuran alat pengesan sinaran daripada agensi yang diiktiraf oleh LPTA.	/		
2.	Surat pengesahan pembelian alat pengesan sinaran (sekiranya belum ada). Pastikan alat pengesan sinaran sesuai dengan jenis sinaran yang digunakan.		/	/
D.	**Program Perlindungan Sinaran**			
1.	Program Perlindungan Sinaran hendaklah disedia dan dihantar secara atas talian kepada LPTA terlebih dahulu untuk diterimapakai sebelum permohonan lesen dibuat. Program hendaklah mengandungi sekurang-kurangnya maklumat seperti format LEM/TEK/45 Sem.1 (rujuk laman web LPTA di www.aelb.gov.my). Program perlu dikemaskini dari semasa ke semasa sekiranya terdapat sebarang perubahan.	/	*/	*/
E.	**Status Tindakan Perundangan (Jika berkaitan)**			
1.	Pernyataan sama ada syarikat sedang dalam siasatan/tindakan perundangan LPTA		/	/
F.	**Kaedah Pelupusan Sisa (yang berkaitan)**			
1.	Pelupusan di suatu kemudahan yang telah diiktiraf oleh LPTA	/	/	/
G.	**Perihal Bahan Radioaktif**			
	Perihal bahan radioaktif akan dilupuskan adalah merujuk kepada senarai bahan radioaktif yang telah dilesenkan seperti di Lampiran A lesen syarikat. NOTA: Pemegang lesen yang telah diluluskan lesen kelas G, MASIH PERLU MEMOHON KELULUSAN daripada Bahagian Kawalselia Sinaran/Cawangan LPTA yang berkenaan, setiap kali berhasrat melakukan pelupusan, dengan menyatakan secara terperinci perihal kaedah pelupusan (perkara H)	/	/	/
H.	**MENSTOR SEBELUM MELUPUS**			
	Rekabentuk Tempat Penstoran			

Bil.	Perkara / Maklumat	Jenis Permohonan Lesen		
		Baru	Pinda	Baharui
	MAKLUMAT UMUM UNTUK PERMOHONAN LESEN			
1.	Pelan lakar kedudukan/ lokasi kemudahan penstoran [Sila nyatakan kawasan yang berhampiran dengan kawasan tersebut – Perlu mendapat pengesahan daripada Jurutera Profesional yang diiktiraf]	/	/	
2.	Rekabentuk dan dimensi kemudahan Pelan Rekabentuk perlu mendapat pengesahan daripada Jurutera Profesional yang diiktiraf	/	/	
3.	Prosedur menerima, mengendali dan menstor bahan radioaktif (NORM) atau sisa NORM yang diterima	/	/	
4.	Inventori sisa NORM	/	/	/
6.	Perihal Perancangan Pembubaran asasnya dan Perancangan Pembubaran bagi pengawasan selepas pengendalian (Decommissioning Plan)	/	*/	*/
I.	**MELUPUS/ KEMUDAHAN PELUPUSAN**			
	Pra-kendalian: **i. Penempatan tapak/rekabentuk kemudahan**			
1.	Perihal kemudahan pelupusan dan aktiviti yang dicadangkan	/		
2.	Pernyataan mengenai kawalan banjir dan kaedah mengawal arus-arus air di jalan-jalan air yang sedia ada (jika ada)	/	/	
3.	**Penilaian Impak Radiologi (RIA) / Safety assessment (SA)** 2 set Penilaian Impak Radiologi (RIA) ke atas tapak kemudahan pelupusan yang dicadangkan. [Kajian hendaklah dilakukan oleh juruperunding dan makmal yang diiktiraf oleh LPTA] Antara lainnya meliputi: (kandungan keseluruhan RIA – sila rujuk Lampiran) - Ciri fizikal tapak: geologi, hidrologi, meteorologi, kaji gempa, tumbuh-tumbuhan, haiwan, biota aquatik etc - Taburan penduduk di sekitar tapak pelupusan, termasuk aliran masa depan pertumbuhan penduduk dan jarak pusat-pusat penduduk dari tapak - Penggunaan tanah pada masa sekarang di kawasan sekitar tapak pelupusan - Penilaian kesan kepada alam sekitar dan radiologi daripada pengendalian normal termasuk analisis awal bahaya sinaran yang dijangka	/ /		

Bil.	Perkara / Maklumat	Jenis Permohonan Lesen		
		Baru	Pinda	Baharui
	MAKLUMAT UMUM UNTUK PERMOHONAN LESEN			
4.	Dokumen Sokongan lain: i. Pelan Penempatan Tapak (Siting of Disposal Facility) ii. Penilaian Impak Radiologi (RIA) iii. *Safety Case* peringkat penempatan tapak bagi kemudahan pelupusan sisa radioaktif iv. Perancangan pengurusan sisa radioaktif (RWMP) v. Decommissioning Plan	/		/
5.	Program pemantauan radiologi dan pensampelan alam sekitar (bacaan latar belakang bagi 12 bulan kalendar)	/		/
6.	Jadual Perlaksanaan projek	/		/
	Pra kendalian: **ii. Pembinaan**			
1.	Susunatur am dan Pelan rekabentuk terperinci kemudahan, termasuk rekabentuk keselamatan yang dirancangkan Pelan Rekabentuk perlu disahkan oleh jurutera profesional (P.E) yang berdaftar.	/		
2.	Perihal bahaya sinaran dan kimia yang dijangka kepada pekerja dan orang awam semasa pengendalian normal kemudahan pelupusan yang dicadangkan, dengan mengambil kira ciri-ciri kimia dan fizikal dan kandungan radioaktif dan cadangan langkah mitigasi yang diambil.	/		
3.	Pernyataan mengenai kemalangan yang mungkin berlaku dan hendaklah mengandungi antara lainnya: a) Pernyataan menyebabkan kemalangan dan pelepasan sisa dan bahan berbahaya yang tidak dijangka b) Pernyataan mengenai kesan kemungkinan kemalangan dan pelepasan kepada kesihatan dan keselamatan pekerja, orang awam dan alam sekitar, c) Pernyataan mengenai program bagi pemeriksaan dan penyenggaraan yang dicadangkan untuk mencegah daripada berlakunya kemalangan dan pelepasan d) Pernyataan mengenai program kesiapsiagaan dan rancangan kecemasaan serta langkah-langkah mitigasi untuk mengatasi kemalangan dan pelepasan.	/		
4.	Sistem kawalan habuk yang dicadangkan	/		
5.	Perihal langkah-langkah yang dicadangkan untuk mengawal saliran di tapak Kemudahan Pelupusan	/		

Bil.	Perkara / Maklumat	Jenis Permohonan Lesen		
		Baru	Pinda	Baharui
	MAKLUMAT UMUM UNTUK PERMOHONAN LESEN			
6.	Pelan kejuruteraan terperinci mengenai lencongan air dan pelan pengawasan terperinci serta langkah-langkah luar jangka bagi peringkat pembinaan kemudahan pelupusan	/		
7.	Program pemantauan radiologi dan pensampelan alam sekitar (bacaan latar belakang bagi 12 bulan kalendar)	/		
8	Dokumen Sokongan lain: (dalam checklist website tiada) a) Safety Case peringkat pembinaan bagi kemudahan pelupusan sisa radioaktif. Maklumat SC diperingkat ini perlu lebih terperinci berbanding maklumat SC diperingkat penempatan tapak/rekabentuk kemudahan b) Perancangan pengurusan sisa radioaktif (RWMP)-jika ada perubahan c) Pelan Pembubaran – jika ada perubahan d) Pelan Kecemasan – jika ada perubahan	/		
J.	**Kendalian:**			
1.	Apa-apa pertukaran pada sisa radioaktif yang dilupuskan atau pada rekabentuk yang dibuat semasa kemudahan pelupusan dibina-jika berkaitan	/	*/	
2.	Kemaskini Program perlindungan sinaran, antara lainnya: a) Perihal langkah-langkah yang dicadangkan untuk mengawal dedahan sinaran, termasuk program pengawasan sinaran semasa pengendalian bagi pekerja, orang awam dan alam sekitar, berserta senarai lengkap perkhidmatan dan kemudahan sokongan b) Rancangan luar jangka sekiranya terdapat keputusan pemonitoran radiologi dan alam sekitar yang abnormal c) Program pengawasan perubatan yang terperinci d) Program bagi latihan awal dan berkala untuk pekerja mengenai keselamatan am dan perlindungan sinaran e) Kemudahan dan kelengkapan yang direkabentuk untuk menbendung tumpahan dan prosedur yang diikuti dalam mengendalikan tumpahan sisa radioaktif f) Rancangan dan prosedur yang dicadangkan untuk mencegah kehilangan, kecurian atau penggunaan tanpa kebenaran bahan/ sisa radioaktif g) Perihal prosedur yang dicadangkan untuk mencegah kemalangan dan rancangan luar jangka yang dicadangkan sekiranya berlaku kemalangan	/	*/	

Bil.	Perkara / Maklumat	Jenis Permohonan Lesen		
		Baru	Pinda	Baharui
	MAKLUMAT UMUM UNTUK PERMOHONAN LESEN			
3	Program pemonitoran radiologi dan alam sekitar, antara lainnya meliputi: a) Kekerapan dan tempat pengambilan sampel b) Jenis kelengkapan dan kaedah analisa yang akan digunakan	/		
4.	Laporan keputusan pemantauan radiologi dan pensampelan alam sekitar (Laporan Analisa Keselamatan, SAR)			/
5.	Perihal perancangan bagi penutupan Kemudahan Pelupusan (*Closure of disposal facility*)	/		/
K.	**Selepas Kendalian:**			
1.	Laporan keputusan pemantauan radiologi dan pensampelan alam sekitar (SAR) – 2 tahun			/
2.	*Safety Assessment after closure* dan cadangan tempoh kawalan institusi (Tempoh minimum: 30 tahun)			/

*jika ada perubahan

LAMPIRAN 2

CONTENT FOR THE PREPARATION OF RADIOLOGICAL IMPACT ASSESSMENT (RIA)

NO	ITEM	EXPLANATION
1.	Executive Summary	Both languages
2.	General	RIA is a very important document prepared by an applicant when applying for a license to operate a plant which deals with radiation or radioactive materials. The document focuses on assessment of the radiological impact and risk caused by operation of the plant to the members of the public, workers and the environment as to ensure that the resulting risk to these groups of population and the environment are within the permissible limits. The RIA should take into consideration all activities associated with operation of the plant and those which provide support for its safe operation. It should also include consideration on those activities and facilities which are located outside the plant but their implementation and operation may have implication on safety of the plant. The assessment should be realistic enough to reflect the actual situation in which the plant is going to be operated and the condition of the environment surrounding the plant which may be affected by operation of the plant. The assessment should start with generic inputs if detailed information and more realistic local data are not available. However, as time progresses and more local and site-specific information and data are available, the RIA should be reviewed and updated and reassessment is carried out using these information and data in order for the RIA to be more meaningful and representative of the actual situation. <u>Note:</u> This document shall be revised and updated in accordance with the requirements of the Radiation Protection (Licensing) Regulations 1986 at each licensing stages.

NO	ITEM	EXPLANATION
3.	Scope	In preparing the RIA, consideration should be given to the entire activities required to ensure normal operation of the plant starting from importation or transportation of the raw (feed) materials to the plant through the whole processes that take place in the plant until disposal of the wastes generated from operation of the plant. The assessment should take into consideration any abnormal situation that can/ may occur during normal operation of the plant. **It should not, however, cover the plant decommissioning and disposal (D&D), since it is going to be covered under the D&D Plan which requires another RIA to be carried out specifically for the D&D operation.** The assessment should take into consideration the impact and the risk caused by both radiological and non-radiological aspects of the operation of the plant. A point to note, the non-radiological aspects should be prepared in a separate document which should be submitted together with the RIA report to the relevant authorities[1] including the requirements of Environmental Quality Act 1974 and Occupational Safety and Health Act 1994, where appropriate.
4.	Objective of RIA	If the RIA is prepared for the first time, the objective of the RIA should be to assess the exposure and the risk to members of the public, workers and the environment resulting from normal operation of the plant and any unplanned event that can happen during its operation. For subsequent RIAs, the objective should be to reassess the exposure and the risk made in the earlier report, taking into consideration availability of the latest information and local, more realistic and site-specific data of the plant, the site and its surrounding environment, any progress that has been made on the plant design and construction and any changes of the process involved since it was last reported in the earlier RIA report.
5.	Description of the plant and the process involved	The RIA should include a description on the plant and its various processes, as detail and accurate as possible, taking into consideration availability of the latest information and data on the plant and the process involved. This information is important in the RIA in order to:

NO	ITEM	EXPLANATION
		a) Identify and establish the source term used in the assessment modeling and calculations; b) Identify the critical target group(s) among members of the public and workers; c) Identify the occupational and public exposure pathways through which the radionuclides identified in the source term would finally be brought to the critical target group(s); and d) Develop occupational and public exposure modeling.
6.	Description of the site and its surrounding environment	The RIA should include a description on the site and its surrounding environment, as detail and accurate as possible. Priority should be given on inclusion of the latest information and data on the site and its surrounding environment. This information is important in the RIA in order to: a) Identify the critical target group(s) among members of the public; b) Understand the migration and transport of radionuclides released from the site; c) Identify the public exposure pathways through which the radionuclides identified in the source term would finally be brought to the critical target group(s) among members of the public; and d) Develop public exposure modeling. The RIA should include detail description on characteristics of the site which is important to determine the release, migration and movement of the identified radionuclides in the environment through which they would finally reach the critical group(s) of the general population and deliver the radiation exposure. The site characteristics should include gathering and verification of data and information on the following subjects: a) Topography; b) Demography; c) Hydrology; d) Geology;

NO	ITEM	EXPLANATION
		e) Meteorology; and f) Present and future land use It is very important for the data and information to be collected over many years and as far behind as possible in order to know the variation and changes that have taken place over the years and the trend over long period of time besides to know in case of any extreme/ worst situation had ever happened with the site which should be taken into consideration as the worst case scenario in the assessment. It is equally important to know future planning of the areas around the site, in particular, with regard to land use, future development and population growth so that proper mitigation measures can be taken into consideration during the planning and design stage in order to minimize the impact caused to the public. The information also provides valuable inputs for the establishment of emergency planning, preparedness and countermeasures to cater for any eventuality that can/ may happen during operation of the plant.
7.	Current state of radiological environment	The RIA should include a description on status of background radiation and the presence of natural and made-made radioactive materials in the environment around the country and, in particular, around the site where the plant is going to be constructed and operated. There should also be a description on the presence of radiation and radioactive materials in the environment around similar plants in the country and elsewhere. These information and data are important to reflect the reality of the current situation of the areas around the plant besides they can be used to benchmark safety performance of the plant over the years.
8.	Impact assessment	This is the most important part of the RIA document. There should be a clear description given on the process involved in carrying out an impact assessment of the plant. The process should include:

NO	ITEM	EXPLANATION
		a) Description on methodology used for the assessment; b) Description on input data for the assessment; c) Radiation protection criteria; d) Source term. (Identity, quantity, chemical and physical form of the radionuclides); e) Exposure scenarios; f) Identification of critical groups; g) Dosimeter assessment and impact analysis; h) Results of the analysis; and i) Treatment of uncertainty involved in the calculations (sensitivity analysis) **a) <u>Method of assessment</u>** The method used in the assessment should be clearly described in the RIA. The description may include explanation on: i. establishment of radiation protection criteria based on relevant regulatory requirements, standards and guides issued by AELB, ii. determination of source terms (critical radionuclides) involved in the assessment based on the description given in item 4, iii. identification of exposure scenarios and the critical group(s) which can be derived from a description given in item 4 and 5, iv. development/ identification of exposure model(s) to be used in the assessment, and v. Calculations of the dose received by the critical groups and compare them with the permissible limits as stipulated in the radiation protection criteria/ regulations. **b) <u>Input data for the assessment</u>** There should be a clear description given on the input data used in the assessment whether they are generic data, local data or those of site-specific. These data can be extracted or derived from the information provided in item 4 and 5.

NO	ITEM	EXPLANATION
		In the absence of local or site-specific data, generic data can be used but the assessment must be reviewed and updated when local or site-specific data are available. The generic data used should be taken from reliable and credible sources, such as, IAEA, ICRP, UNSCEAR, WHO etc and they should be carefully selected such that the calculated results would always be on the conservative side. **c) <u>Radiation protection criteria</u>** There should be a clear description given on the radiation protection criteria used in the RIA. The radiation protection criteria are used as a basis for analyzing/ assessing the resulting impact caused by the operation of the plant to the target groups. They should be established based on the annual dose limits for members of the public and workers and other requirements given in the Atomic Energy Licensing (Basic Safety Radiation Protection) Regulations 2010. Dose constraints can also be used as one of the criteria to limit the exposure of the public. For controlling the exposure risk to the public from NORM in Oil and Gas Industry, the AELB recommends to use the dose constraint of 0.3 mSv per year as stipulated in the LEM/TEK/30 Sem.2 1996 or any updated version. **d) <u>Source term</u>** The source term is very critical for the RIA as it provides the inputs for the calculations of the radiation dose to the critical groups. It should be determined based on the type of radionuclides involved in or generated from operation of the plant which can be extracted or derived from the information provided in item 4. The plant operation may be associated with a number of radionuclides but many of them may not be that significant to be considered for the purpose of RIA because of their short half-lives, small amount (percentage) and low activity, low radio toxicity to human beings, alpha/ beta emitters which are not relevant for certain exposure pathways and their limited movement or release over a period of time due to their chemical/ physical property and the nature of process involved which retard them from migrating out.

NO	ITEM	EXPLANATION
		Therefore, it is very important to know the characteristics of all radionuclides involved with respect to the process and operation of the plant and to consider only the critical ones for the purpose of the RIA. For certain types of plant, accident may lead to a slightly different type of radionuclides released to the environment surrounding the plant than those usually anticipated during normal operation of the plant. This should be taken into consideration and properly addressed in the RIA. **e) <u>Exposure scenarios</u>** The exposure pathways through which the critical radionuclides would deliver radiation exposure to the critical groups should be identified and clearly described in the RIA. In most situations, radiation dose can be delivered to the critical groups through: i. External radiation emitted by the critical radionuclide(s) present in the areas; ii. Intake of critical radionuclide(s) through inhalation of air containing the critical radionuclides; iii. Inhalation of radon/ thoron gas in the case of NORM/ TENORM; iv. Intake of the critical radionuclide(s) through ingestion of food and water contaminated with the critical radionuclides; and v. Intake of the critical radionuclide(s) through a cut in the skin. The critical pathways of the exposure can be identified and determined from the description given in item 4 and 5 after identification and confirmation of the critical groups affected by the operation of the plant. In identifying the critical pathways of exposure, consideration should be given to the situation that may occur during normal operation of the plant as well as during abnormal situation. **f) <u>Identification of critical groups</u>** The critical group is a group of persons who will be affected most by operation of a plant that deals with radiation or radioactive

NO	ITEM	EXPLANATION
		materials. They are most vulnerable to the radiation exposure and are expected to receive the highest dose from the operation of the plant. In some situations, there can be more than one group of the population significantly involved or affected by the operation of the plant, depending on its nature. The critical groups should be identified among workers working with the plant and the population living close to the plant and clearly described in the RIA. <u>Definition:</u> ➢ "critical group" means that group of the members of the public whose exposure is reasonably homogeneous and is typical of individuals receiving the highest dose; ➢ "critical pathway" means the route by which any radioactive material, nuclear material or prescribed substance travels to reach a critical group and causes the highest radiation dose; **g) <u>Treatment of uncertainty (sensitivity analysis)</u>** The RIA is carried out based on mathematical modelling developed by the applicant after taking into consideration all the information and input data described in items 4 and 5. Being mainly calculations in nature, it is, therefore, very much subjected to inaccuracy resulting from uncertainty in the value of the input data, inaccuracy of the model developed and used in the assessment and errors in the calculations due to rounding off of the figures etc. It is, therefore, very important for such uncertainty to be properly identified and addressed in the RIA report to ensure that all calculated results of the assessment are representative and acceptable within certain confident level.
9.	Mitigation measure	There should be a clear description given on mitigation measures to be undertaken by the applicant to control the hazard and to minimize the impact caused to members of the public and workers resulting from normal operation of the plant as well as during abnormal situations.
10.	Monitoring program	Monitoring should consist of radiological monitoring and non-radiological monitoring. For the purpose of RIA only radiological monitoring is considered. Non-radiological monitoring should be considered and prepared as a separate report submitted to the relevant authorities including the requirements of Environmental

NO	ITEM	EXPLANATION
		Quality Act 1974 and Occupational Safety and Health Act 1994, where appropriate. Radiological monitoring is required for the following purposes: a) To establish baseline data prior to operation of the plant, which will later be used to benchmark the radiological impact of the plant; b) To ensure that the operational of the plant is within the acceptable level as what has been assessed and predicted by the RIA. c) To ensure that the operation of the plant comply the regulations and the guidelines issued by AELB. Radiological monitoring of the environment onsite and offsite the plant should be considered for both radiation and radioactive materials. It should be carried out prior to commencement of the operation of the plant (pre-operational monitoring) and continued during operational period until the plant ceases operation. Pre-operational monitoring should be done for a period of not less than one year in order to have a complete picture of changes in environmental condition that may have taken place during one year period which may have influence on monitoring results. At the beginning of operation, monitoring can be done monthly, but thereafter the frequency can be reduced to other period, depending on the situation and performance of the plant with approval of AELB. Selection of monitoring locations should be made based on the information provided in item 5 i.e. weather condition (wind speed and the frequency of wind direction) and movement of underground water of the site. Monitoring for operational period should also take into consideration monitoring of workplaces (where radiation and radioactive materials are involved) and personnel (radiation workers). A detailed monitoring program should be established, taking into consideration the explanation given in the preceding paragraphs.

NO	ITEM	EXPLANATION
		Selection of monitoring locations, parameters for environmental monitoring, monitoring frequency and the method use for monitoring should be clearly described in the program which becomes part of the RIA. Results of pre-operational monitoring should be included in the RIA report submitted for application of a temporary operating stage license. Results of operational monitoring (environmental, workplaces and personnel monitoring), on the other hand, should be included in the final RIA report submitted for application of a full operating license.
11.	Conclusion	The RIA should include a conclusion on the findings of the assessments.
12.	Reference	1. International Atomic Energy Agency; Predisposal Management of Radioactive Waste, IAEA Safety Standards No. GSR Part 5 (2009) 2. International Atomic Energy Agency; Management of Radioactive Wastes from the Mining and Milling of Ores, IAEA Safety Standards Series No. WS-G-1.2 (2002)

Note:

1) The non-radiological impacts shall be covered under Environmental Impact Assessment (EIA) report and any other related assessment.

LAMPIRAN 3

CONTENT FOR THE SAFETY CASE FOR DISPOSAL FACILITY

NO.	ITEM	EXPLANATION
1.	Executive Summary	Both languages
2.	General	Disposal of radioactive waste represents the final step in its management and disposal facilities are designed, operated and closed with a view to providing the necessary degree of containment and isolation[1] to ensure safety. The IAEA Fundamental Safety objective is to protect people and the environment from the harmful effects of ionizing radiation and as a principle "*Radioactive waste must be managed in such a way as to avoid imposing an undue burden on future generations; that is, the generations that produce the waste have to seek and apply safe, practicable and environmentally acceptable solutions for its long term management*." The safety case is the collection of scientific, technical, administrative and managerial arguments and evidence in support of the safety of a disposal facility covering the suitability of the site and the design, construction and operation of the facility, the assessment of radiation risks and assurance of the adequacy and quality of all the safety related work associated with the disposal facility. Preparation of this document should be made with reference to the IAEA Safety Standards, The Safety Case and Safety Assessment for the Disposal of Radioactive Waste, Specific Safety Guide No. SSG-23, 2012. <u>Note:</u> This document may be revised and updated in accordance with the latest requirements of the IAEA standards.

[1] *Containment denotes all methods or physical structures designed to prevent or control the release and the dispersion of radioactive substances. Isolation of the waste from the accessible biosphere substantially reduces the likelihood of inadvertent human intrusion into the waste and its consequences.*

NO.	ITEM	EXPLANATION
3.	Objective	The objective of this safety case is to assess, demonstrate and document the safety of all types of radioactive waste generated from operation of the plant and waste arising from D&D of the plant. The most important considerations when assessing the safety of radioactive waste disposal facilities after closure are identified, and guidance is provided on best practice in undertaking such assessment and presenting the safety case.
4.	Scope	This document should cover the waste generated from the operation of the plant and waste arising from D&D of the plant which include both radiological and non-radiological wastes, stored within or outside the plant premise. For management of non-radiological waste, licensee shall prepare a separate section in accordance with the requirements of Environmental Quality Act 1974, where appropriate.
5.	Preparation of the Safety Case	The safety case should be prepared taking into the following considerations: a) An integration of relevant information in a structured, traceable and transparent way that demonstrates an understanding of the behaviour and performance of the disposal system in the period after closure. b) Identification of uncertainties in the behaviour and performance of the disposal system, analysis of the significance of the uncertainties, and identification of approaches for the management of significant uncertainties. c) A demonstration of long term safety by providing reasonable assurance that the disposal facility will perform in a manner that protects human health and the environment. d) Support to decision making in the step by step approach to development of a disposal facility. e) Facilitation of communication between interested parties on issues relating to a disposal facility. The Safety Case shall include the following:

NO.	ITEM	EXPLANATION
		1.Safety case context a) Purpose of the safety case b) requirement for Safety Case, national policy/ strategy on disposal facilities, regulations c) Demonstration of safety d) Public engagement/ acceptence e) Graded Approach f) financial consideration 2. Safety Strategy a) Base line data eg. waste inventory, projection etc, b) Consideration of options eg. disposal strategy method: near surface, deep geological etc, c) Multiple safety function, d) Demonstrability, e) Waste acceptance criteria eg. packaging type, waste type etc, f) QA 3. Description of the disposal system. a. Master plan eg. entry road, development plan of neighbouring area etc b. system features, c. type barriers, d. operating procedures of the facilities, e. Plant layout eg. Detail design drawings etc. 4. Safety Assessment a) RIA for the period after closure (at appropriate licence stage) b) Site and engineering aspects c) Passive safety d) Multiple safety functions e) Robustness f) Scientific and engineering principles g) Quality of the site characterization h) Operational safety aspects i) Scenario models and calculation j) Post closure Radiological impact k) Non-radiological environmental impacts (EIA) l) Management system

NO.	ITEM	EXPLANATION
		5. Management of uncertainties a) Technical - design, concept, geomorphology parameter; and b) Political) 6. Iteration and design optimization. 7. Limits, control and conditions 8. Integration of safety arguments a) Comparison with safety criteria b) Complementary safety indicators and performance indicators c) Multiple lines of reasoning d) The robustness, defence in depth, system understanding & monitoring e) Additional measures to increase confidence – independent review f) Plans for addressing unresolved issues
	Conclusion	The Safety Case should include a conclusion on the results of the assessments.
7.	Reference	IAEA Safety Standards, The Safety Case and Safety Assessment for the Disposal of Radioactive Waste, Specific Safety Guide No. SSG-23, 2012

**Safety Assessment - Prediction of environmental concentrations of radionuclides and radiation doses to people from the proposed waste management practices, including demonstration that the legal requirements will be met both now and in the future as determined by the relevant regulatory authority.*

The **safety case is the **collection of scientific, technical, administrative and managerial arguments and evidence in support of the safety of a disposal facility** covering the suitability of the site and the design, construction and operation of the facility, the assessment of radiation risks and assurance of the adequacy and quality of all the safety related work associated with the disposal facility. **Safety assessment, an integral part of the safety case** is driven by a **systematic assessment of radiation hazards and is an important component** of the safety case. The latter involves quantification of radiation dose and radiation risks that may arise from the disposal facility for comparison with dose and risk criteria, and provides an understanding of the behaviour of the disposal facility under normal conditions and disturbing events, considering the time frames over which the radioactive waste remains hazardous. The **safety case and supporting safety assessment provides the basis for demonstration of safety and for licensing**, and will evolve with the development of the disposal facility and will assist and guide decisions on siting, design and operations. The **safety case will also be the main basis** on which **dialogue with interested parties will be conducted and on which confidence in the safety of the disposal facility will be developed**.*

LAMPIRAN 4

CONTENT FOR RADIOACTIVE WASTE MANAGEMENT PLAN

NO.	ITEM	EXPLANATION
1.	Executive Summary	Both languages
2.	General	This Waste Management Plan should be prepared with clear indications and explanation on waste to be generated from operation of the plant, and licensee' commitment on WHAT it plans/ proposes to do with the waste and HOW licensee is going to deal with and manage the waste during operation of the plant and post-operational period. Waste Management Plan should include (where appropriate) waste collection, storage, handling, transport, treatment, conditioning, packaging and finally disposal. This Waste Management Plan shall comply with the requirements stipulated in the Atomic Energy Licensing (Radioactive Waste Management) Regulations 2011. Note: This document shall be revised and updated in accordance with the requirements of the Radiation Protection (Licensing) Regulations 1986 at each licensing stage.
3.	Scope	To cover only waste to be generated during operational period of the plant (not to include waste generated from decommissioning which should be described in the Decontamination and Decommissioning Plan). The Waste Management Plan should clearly describe the management of both: a. radiological and b. non-radiological wastes. For management of non-radiological waste, licensee shall prepare a separate section in accordance with the requirements of Environmental Quality Act 1974, where appropriate.
4.	Objective of Waste Management	Should state clearly the objective of this Waste Management Plan.

NO.	ITEM	EXPLANATION
		It should reflect licensee' commitment on how the waste to be generated is going to be dealt with and managed by licensee to ensure its risk to members of the public, workers and the environment are within the limits during operational and post-operational period (protection of future generations). For subsequent Waste Management Plan, the objective should be to re-assess the actual waste generated to be dealt with and managed by licensee to ensure its risk to members of the public, workers and the environment are within the limits during operational and post-operational period (protection of future generations).
5.	Waste Generation	The Waste Management Plan should include a description of the waste to be generated during operation of the plant. The description should include at least the following: a. An outline of the processes generating waste and detail mass balance; b. Types of waste to be generated (radiological and non-radiological); c. Estimated quantity to be generated over one year and over the design period of the plant; d. Radionuclides involved and their activity; e. Characteristic of the waste (physical, chemical and biological properties) and f. Category of the waste (as defined in the Atomic Energy Licensing (Radioactive Waste Management) Regulations 2011.
6.	Waste management strategy	The Waste Management Plan should include a description on strategy to be undertaken by licensee on <u>how</u> to minimize the impact caused by waste generated from operation of the plant over short term (operational period) and long term (post operational period). The description on waste management strategy may include but is not limited to the following: a. Waste segregation b. Waste minimization i. Proper selection of raw materials; ii. Proper selection of the process involved;

NO.	ITEM	EXPLANATION
		iii. Recycling of process materials; iv. Exemption of residues; v. Recycling/reuse of residues. c. Waste transport and handling d. Waste storage during operational period i. Selection of storage location; ii. Design of the storage facility; iii. Control of workers and public exposure. e. Waste disposal: i. During operational period • A description of the environment into which the waste will be discharged or disposed, including the baseline radiological characteristics; • Establishment of release limits for gaseous and liquid effluents; • Installation of control/ cleaning system for gaseous and liquid discharges; • Controlled releases; • Recording system for waste discharges. ii. Post Operational Period. Preliminary indication about: • Method of disposal; • Selection of disposal site; • Conceptual design of waste repository; • Safety Assessment* of the disposal facility; • Post Closure program; • Indication about Institutional Control (IC).
7.	Waste Management System	A description of the proposed system for waste management including: a. The facilities and procedures involved in the handling, b. Treatment, c. Storage and d. Disposal of radioactive waste.
8.	Legal requirements on waste management	The plan should include a description on how legal requirements on waste management are met: a. Appointment of Waste Management Officer; b. Record keeping of wastes generation, waste disposal and waste inventory;

NO.	ITEM	EXPLANATION
		c. Theoretical dose assessment and exposure to members of the public, workers and the environment based on quantity; d. Control (Safety and security) of waste prior to disposal; e. A program for monitoring the concentration of radionuclides in the environment and assessment of radiation doses to members of the public arising from the waste management practices; f. A schedule for reporting on the results of monitoring and assessments required by this plan; g. Establishment of discharge limits for liquid and gaseous effluents and monitoring program to verify their compliance; h. Establishment and implementation of Quality Assurance Program (QAP) for waste disposal; i. Security, physical protection and control of waste; j. Return of Disused Sealed Radioactive Sources (DSRS); k. A system of periodic assessment and review of the adequacy and effectiveness of procedures instituted under the Waste Management Plan to ensure currency and to take account of potential improvements consistent with best practicable technology; l. Preparation of Safety Case for waste disposal.
9.	Reference	1) IAEA TECDOC 1660: Exposure of the public from large deposits of mineral residue, June 2011 2) IAEA Safety Standards Series, WS-G 1.2, Management of Radioactive Waste from the Mining and Milling of ores, 2002 3) IAEA Safety Fundamentals Principles, No. SF-1, 2006 4) IAEA TECDOC 1712, Management of NORM Residues, 2013

LAMPIRAN 5

CONTENT FOR DECOMMISSIONING AND DISPOSAL (D&D) PLAN

NO	ITEM	EXPLANATION
1.	Executive Summary	Both languages
2.	General	The D&D plan should be prepared with clear indications and explanation on planned D&D to be carried out by licensee on the plant at the end of its operational life. The plan should indicate both the technical aspects of D&D and the commitment of licensee to provide adequate financial support for carrying out the D&D operation until release of the plant site and the final disposal of the D&D wastes. The plan should indicate the approach to be taken by licensee for the D&D of the plant and HOW licensee is going to deal with and manage the proposed D&D operation of the plant including cleaning up of the site. Note: This document shall be revised and updated in accordance with the requirements of the Radiation Protection (Licensing) Regulations 1986 at each licensing stage.
3.	Scope	To cover D&D operation of the plant at the end of its operational life. To cover management of D&D wastes generated from the D&D operation (not to include waste generated from operation of the plant which should be described in the Waste Management Plan). The plan should consider both radiological and non-radiological aspects of the D&D including the requirements of Environmental Quality Act 1974 and Occupational Safety and Health Act 1994, where appropriate.
4.	Description of plant to be decommissioned and its site	The description should include:- a. Operation history of the plant and the waste generated, b. Its storage and c. Disposal (including any accident happened during operation of the plant and any modification carried out during operation of

NO	ITEM	EXPLANATION
		the plant – to be added later during application for the decommissioning license).
5.	Objective of the D&D Plan	Should state clearly what is the objective of the D&D Plan? It should reflect licensee's proposal and commitment on HOW the plant D&D is going to be carried out to ensure that D&D operation complies with the requirements of LEM/TEK/56 including safe disposal of the waste generated during post-operational period (after plant ceases operation) (protection of future generations). For subsequent Decommissioning Plan, the objective should be to reassess commitment on HOW the plant D&D is going to be carried out to ensure that D&D operation complies with the requirements of LEM/TEK/56 including safe disposal of the waste generated during post-operational period (after plant ceases operation) (protection of future generations)
6.	Establishment of Health and Safety program for D&D operation	To describe a preliminary health and safety program to be developed specifically for D&D operation which is different from the health and safety program developed for operation of the plant. The program should include: a. radiation protection program for D&D b. Industrial safety in carrying out D&D operation
7.	D&D strategy	There should be a description on strategy to be undertaken by licensee in carrying out the D&D of the plant and its site to minimize the impact caused to members of the public, workers and the environment. It should include but not limited to the following: a. Characterization of the plant and the site b. Estimation of volume of D&D waste to be generated c. D&D options: • Recycling of non-contaminated parts of the plant • Decontamination and recycling of contaminated parts of the plant • Dismantle and dispose of the whole plant • Cleaning up of the site to remain as industrial site

NO	ITEM	EXPLANATION
		• Cleaning up of the site to become public area.
8.	Waste Management and disposal (*detail description as in LEM/TEK/56 should be included in the document prepared for a Class A-Milling (Full Operation Stage) license and later Class G: Decommissioning licence*)	m. Appointment of Waste Management Officer; n. Record keeping of wastes generation and waste disposal; o. Establishment and implementation of QAP for waste disposal; d. Waste disposal (detail in the application for D&D license): ii. <u>During D&D operation</u> • Establishment of release limits for gaseous and liquid effluents; • Installation of control/cleaning system for gaseous and liquid discharges; • Controlled releases; • Recording system for waste discharges. iii. <u>Post closure period</u> • Indication about method of disposal • Selection of disposal site • Conceptual design of waste repository • Indication about Institutional control (IC)
9.	Proposed implementation of D&D	The description should include explanation on: a. Safety assessment for D&D operation b. Establishment of D&D Plan c. Establishment of decommissioning criteria i. release limits and release criteria for the plant and the site ii. cleanup criteria for the site d. Establishment of Quality Assurance Program (QAP) for D&D operation e. Emergency planning and preparedness for D&D operation
10.	Cost estimation and funding mechanism for D&D	To indicate the commitment of licensee to provide fund for D&D operation at the end of plant operation.
11.	References	a. LEM/TEK 56, Guidelines for Decommissioning of Facilities Contaminated with radioactive Materials, 2008, LPTA b. IAEA Safety Standards, Decommissioning of Facilities, General Safety Requirements Part 6 No. GSR Part 6, 2014 c. NUREG USNRC