Comment-Response Document NPA-OPS 23

Subpart D

Com .No	JAR-OPS 1.390	from	Comment	Response
10	1.390(a)	IFALPA	Insert additional text prior to (a): ***In accordance with the ALARA Principle, exposure of aircrew to radiation should be limited to a value as little as reasonably achievable (e.g. by altering routes, changing altitudes and reducing exposure time).*** *The ALARA Principle should be referenced in JAR-OPS as it is now specifically addressed in European Legislation.*	EU Directive, Title IV, Chapter 1, Article 6, paragraph 3(a): ”in the context of optimisation all exposures shall be kept **a**s **l**ow **a**s **r**easonably **a**chievable, economic and social factors being taken into account." Comment rejected because the sentence is considered a political statement of intent which is supportable but should not be added to JAR-OPS.
27		LBA, Germany	*Delete the proposed text and replace it with a reference to the existing national regulations on radiation protection. For EU-Countries there is no need for this requirement because of Directive 96/29 EURATOM being implemented in all EU Member States.*	The topic was included in JAR-OPS 1 to introduce the corresponding EU-Directive in all JAA Member States including those who are not EU Members. Comment rejected
77		FAA	*Also see original comment. Summary: range of doses on one-way flights between each city-pair on schedule should be available to all aircrews and passengers and updated monthly. Female crew-members after reporting pregnancy should not be exposed to more than 0,5 mSv/month in addition to the 1mSv limit. Proposal for education of aircrews. Crewmembers should maintain their record of occupational exposure. No justification for medical examinations for employees classified category A.* CARI 3 is outdated, CARI 6 is recommended	Comment noted. Education of health risks: information will be in ACJ. Pregnancy: implementation of EU Directive only, 0,5 mSv not mentioned there. Record keeping: Highly exposed crew members will be provided with records annually. Categorisation: deleted. CARI 3 table will be kept as an example, until the table coming from EURADOS is issued.
30	1.390(a)(1)	IAOPA/	(a)(1) An operator shall not operate an aeroplane	The paragraph was amended to alleviate operators

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		AOPA Ger	above 15.000 m unless ***a mathematical calculation of radiation dosage on the basis of tried and trusted computer programs has been exercised.*** ~~the equipment specified in JAR-OPS 1.680(a)(1) is serviceable, or the procedure prescribed in JAR-OPS 1.680(a)(2) is complied with.~~ *The airlines and EU Commission have proven the danger for the health of our crews does not start above 20 mSv per year. Other scientists mention 6 mSv per year. The value of 1mSv however is not acceptable as mentioned in para 1.390(b)*	from the mandatory fitment of the monitoring equipment because it is no longer obtainable. The necessary procedure is to be found in JAR-OPS 1.680 (a)(2). The equipment to measure the dose rate is an ICAO rule (Annex 6, paragraph 6.12). The EU Directive states that Airlines have to take account of exposure to cosmic radiation of aircrew who are liable to be subject to exposure of more than 1 mSv per year. Comment rejected
42		Swedish Airline Pilot Associa-tion	(a)(1) An operator shall not operate an aeroplane above 15.000 m (49.000 ft) unless the equipment specified in JAR-OPS 1.680(a)(1) is serviceable~~, or the procedure prescribed in JAR-OPS 1.680(a)(2) is complied with.~~ *The dose rate of total cosmic radiation shall be measured and indicated continuously to identify unexpected increase of radiation (solar flares) and to provide a possibility to take immediate action (e.g.descent to lower flight level).*	The paragraph was amended to alleviate operators from the mandatory fitment of the monitoring equipment because it is no longer obtainable. Comment rejected
37	1.390(a)(2)	SLV Denmark	*Text of (a)(2) has little relevance for flights above 49.000 feet where no measuring & indicating instrument is installed.*	The text of JAR-OPS 1.390 (a)(2) is based on Chicago Convention, Part 1, Annex 6, para 6.12: "All aeroplanes intended to be operated above 15 000 m (49 000 ft) shall carry equipment to measure and indicate continuously..... The display unit of the equipment shall be readily visible to a flight crew

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			For flights where no "active monitoring" is available, attention is drawn to the Directive for Radiation Protection 88, 1997, where the last sentence in item 70 indicates that a detection of high dose rates can be achieved by other means than an on-board monitor. (Extract with comment).	member." There is no requirement for descent in Annex 6. Comment noted
20	1.390 (a) and (b)	BAE Systems	*If active monitoring (a) OR passive monitoring (b) is acceptable, this need to be clear – e.g. add the word "or" between 1.390(a)(2) and 1.390(b).* *1.390(b) requires the operator to take account of the in-flight exposure of flight and cabin crew while on duty. The operator should also take account of crew who are carried but not on duty (e.g. positioning).*	Covered: The words "active monitoring" and "passive monitoring" are deleted. Crew members who are carried on a flight without being on duty (e.g. positioning) follow their Roster as given by the operator. Comment to 1.390(b) accepted.
55	1.390(b)	AEA	(b) ~~Passive monitoring:~~ An operator shall take account of the in-flight exposure.... *The title is misleading because one would expect passive measurements in contrast to the active measurements. Dose assessment will be done using "appropriate computer programmes" and the title "passive monitoring therefore is not accurate. This comment also applies to AMC OPS 1.390(b).*	Covered by answer to comment 20 above.
12	1.390(b)(1)	IFALPA	(b) ... An operator shall .... take the following measures ..... (1) assess their exposure ***monthly in order to determine the annual exposure on a rolling twelve month basis;*** *Assessment of exposure should be on a regular achieved exposure basis and not as one-off predictive basis.*	The proposed NPA text is the same as in the EU Directive, Article 42. Article 8 "Dose limits for exposed workers", paragraph 1, states: "The limit on effective dose for exposed workers shall be 100 mSv in a consecutive five-year period, subject to a maximum effective dose of 50 mSV in any single year...." A monthly evaluation is not introduced.

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40		BALPA	same comment as 12 above	Comments 12 and 40 rejected
47		CAAd Finland	(b) ... An operator shall .... take the following measures ..... (1) assess their exposure ***and keep appropriate records of the results;*** *Position of the Radiation and Nuclear Safety Authority, Finland.*	record keeping is dealt with in (a)(5). Comment noted
42	1.390(b)(2)	Swedish Airline Pilots Associ-ation	(b) ... An operator shall .... take the following measures ..... (2) arrange their working schedules, ~~where practicable~~, to keep exposure below 6 mSv per year. *Deletion is proposed to ensure that the operator arrange working schedules to keep annual dose below 6 mSv.*	EU Directive requires assessment of exposure for crew liable to be subject to exposure of more than 1 mSV per year. Text of this para is now adapted to EU Directive and 6mSv is replaced by "highly exposed". "Where practicable" is deleted. Comments 42 and 62 noted
62		SLV Sweden	same comment as 42 above	
58	1.390(b)(2)	DGAC France	(b) ... An operator shall .... take the following measures ..... (2) ***take account of the estimated exposure to*** arrange their working schedules, ***in order to reduce the doses for those crew liable to be subject to high levels of exposure;*** ~~where practicable~~, ~~to keep exposure below 6 mSv per year.~~ *Discrepancy with EU Directive: exposure to be kept "where practicable, below 6 mSv per year" applies only to category A workers as defined in the directive, and does not concern flight or cabin crew.*	The proposed NPA-text is based on the EU Directive (Title VII, Article 42): "The undertakings shall take appropriate measures, in particular: a. ..... b. to take into account the assessed exposure when organising working schedules with a view to reducing the doses of highly exposed aircrew." Title VII, "Significant increase in exposure due to natural radiation sources" does not state any dose limits. Comment accepted with text from Article 42

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33	1.390(b)(4)	JETCOM CH	(b) ... An operator shall .... take the following measures ..... (4) ....and in any case ensure that the ***effective*** dose ***exposure of the mother*** does not exceed 1 mSv for the ~~remainder~~ ***total duration*** of the pregnancy; *Avoid various interpretations by operators. 1. It is easy to estimate the effective exposure of the mother then the foetus one. 2. The foetus exposure is almost the same as the equivalent dose at the surface of the mother'' body.* (For literature quoted see original comment).	The proposed NPA-text is taken from Article 10, EU Directive where it is said that working conditions shall "therefore be such that the equivalent dose to the child to be born will be as low as reasonably achievable and that it will be unlikely that this dose will exceed 1 mSv at least for the rest of the pregnancy". Comments 33 and 34 rejected
34		A.S.P.P.A., CH	same comment as 33 above	
11	1.390(b)(5)	IFALPA	(b) ... An operator shall .... take the following measures ..... (5) ensure that where exposure is considered likely to exceed ~~6 mSv~~ ***1 mSv*** per year, records are kept for each flight crew member affected, and that appropriate medical surveillance is applied (see IEM OPS 1.390(b)). *AMC 1.390(b)(f) states that for air crew whose annual dose falls in the range 1-6 mSv there should be individual estimates of dose. These should be made available to the individual concerned. It is considered that this should be part of the regulation and not the AMC. 1 mSv is the general population exposure limit and any employee exposed beyond should be entitled to receive an exposure statement from his employer. Further epidemiological study of radiation exposure relies on accurate records being required to be kept.*	The EU Directive does not mention medical surveillance for crew members and it has therefore been deleted from the document. Record keeping is considered necessary for proper assessment and therefore the requirement was introduced though Article 42 does not mention it. (See also comment 47, p. 4 of this doc.) Para 1 f. of ACJ OPS 1.390 (b) is now deleted. Individual record keeping is required for "highly exposed crew members" and a new IEM states more than 6 mSv per year are considered "highly exposed". Comments 11 and 39 rejected.

Com .No	JAR-OPS 1.390	from	Comment	Response
39		BALPA	same comment as comment 11 above	
58	1.390(b)(5)	DGAC France	delete (b)(5) *also refers to medical records for Category A workers. In France, the 96/29/EURATOM Directive will lead to the issuance of several laws. Specific rules applying to flight and cabin crew should therefore be made in a very generic manner, in order not to create discrepancies with a higher level rule.*	Reasoning see comments 11 and 39 above. Comment rejected. Though (b)(5) [now (a)(5)] goes beyond the EU Directive, Article 41 and 42, records of assessments are considered appropriate.
42	1.680(a)(1)	Swedish Airline Pilots Associa-tion	An operator shall not operate an aeroplane above 15000 m (49000 feet) unless: (1) ..... ~~or (2) A system of on-board quarterly radiation sampling acceptable to the Authority is established (see AMC...)~~ *This proposal follows the proposal to delete JAR-OPS 1.390(a)(1) and also applies to ACJ 1.680(a)(2) which is proposed to be deleted as well.*	The paragraph was amended to alleviate operators from the mandatory fitment of the monitoring equipment because it is no longer obtainable. Comment rejected.
	1.390 (b)(3)	MSC	Flight crew and cabin crew should be informed of the current knowledge on cosmic radiation and of health risks possibly associated with exposure. This information should have an interactive character and shall be provided at pre-employment and further on a periodical basis (yearly). *Rationale see original comment.*	See ACJ 3 Comment accepted
71	AMC OPS 1.390 1.a.	CAA UK	*This paragraph contains two uses of the term "moderately conservative". This term is not understood, as something is either conservative or it isn't —there cannot be degrees of conservatism in this context. If the term is to be*	Comment accepted.

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			retained it should at least be given a definition.	
68			.... estimate of the number of flying hours at various ~~heights~~ ***altitudes*** in which a dose of	editorial change, accepted
69			Doses from cosmic radiation vary ~~strongly~~ ***greatly*** with altitude	accepted
02	AMC OPS 1.390 1.b.	Shell Aircraft ltd., UK	*The computer based estimates should be derived from the latest version of CARI, now at CARI-6. The table should be subject to periodic revision in line with revisions to the CARI program.*	Comments 02, 54, and 09.1 acknowledged. The table, published for illustration purposes, is based on the CARI-3 computer program; and may be superseded by updated versions, as approved by the Authority.
54		AEA	*CAR-6 is the programme currently in use, and therefore, the table should be updated.*	
09		IFALPA	*1. Same as comments 02 and 54 above* *2. The conversion factor addressed in the note is not unanimously accepted among radiation experts: "For most components of the radiation field at aircraft altitudes, which to a good approximation can be considered to be isotropic (...), the magnitudes of effective dose and ambient dose equivalent are similar. For proton components, the magnitude of effective dose is about 5 times that of ambient dose equivalent." (Dr. Barlet).*	Comment 09.1 accepted. 09.2: The conversion factor 0.8 is standard at the moment, for CARI 3 table. Comment rejected: keep the conversion factor of 0.8 until EU provides the result of WG EURODOS.
01	AMC OPS 1.390 1.f. 1st sentence	AIR FOYE	*The monitoring of individual crew members who fall within an average exposure dose rate of 1 to 6 mSv per year would prove time consuming and be a burden on company recourses. As no further action is required on behalf of crew members who fall within the 1 to 6 mSv band individual monitoring becomes meaningless except in cases of pregnant aircrew.*	According to the EU Directive exposure to cosmic radiation has to be assessed for aircrew who are liable to be subject to exposure of more than 1 mSv per year (Article 42). Record keeping is addressed in the requirement, above 6 mSv.

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			For a proposal of regular statistical exposure assessment see original comment.	Comments 01 accepted
38		Britannia Airways, UK	For aircrew whose annual dose falls in the range ~~1 – 6 mSv~~ ***5 – 6 mSv*** there should be individual estimates of dose. *Individual estimates would require costly programme developments for a group of crew whose estimates are well below the 6 mSv level.*	Comment 38 rejected, see above.
21	AMC OPS 1.390 1.f. 2nd sentence		These estimates of doses **and their significance** should be made available to the individuals concerned. *No instruction is given. What should the individual/ operator do if the level is 5 mSv that is different from what they would do if the level were 2 mSv?*	According to JAR-OPS 1.390(b)(3) an operator shall inform crew members of the health risk associated with the likely exposure. ACJ OPS 1.390(a)(3) applies. Comment noted
53	AMC OPS 1.390 1.f. 2nd sentence	AEA	These estimates of doses should be made available to the individuals concerned ***at least once a year.*** *With regards to current standards in radiation protection and to avoid logistical problems within the airlines (high number of requests for information).*	Addressed in requirement: "notified to the individual on an annual basis" Comment accepted
46	AMC OPS 1.390 1.f. 3rd sentence	CAAd, Finland	For flights below 15 km (49.000 feet) these may be carried out using an appropriate computer programme***, which is subject to approval by the radiation and nuclear safety authority,*** and internationally ..... *Position of the Radiation and Nuclear Safety Authority,*	Text of 1 f. deleted. Issue covered in ACJ OPS 1.390 (a)(1). Comment noted

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			Finland.	
36		SLV Denmark	*Methods for evaluating individual dose rates should – if possible – be harmonised e.g. through the use of common established generic route doses. The Commission has already established an expert group under the European Dosimetry Group (EURADOS) to propose a solution to this problem.*	Comment noted. Discussion will have to be postponed until EURADOS issues a result. Text of 1 f. deleted
52	AMC OPS 1.390 1.f. penultimate sentence	AEA	That this is the case should be confirmed by occasional measurements using either active instruments on specific flights or passive measuring devices for a number of flights on an individual route ***at the discretion of the NAA.*** *The clarification of the text is needed.*	Comment noted. Text of 1 f. deleted.
70	AMC OPS 1.390 1.f general	CAA UK	This paragraph contains the term “moderately cautious”. This raises the same comment as for “moderately conservative”. (See 1st comment, number 71, of this section).	1 f. deleted
	AMC OPS 1.390 1f:	MSC	For all aircrew whose annual dose is expected to be over 1 mSv there should be individual estimates. Doses can be estimated by using accepted computer programmes (CARI 6). Individual estimated doses shall be recorded annually and a registry shall be kept of individual annual doses of aircrew. Individual data shall be kept for at least 30 years after the date of the last recorded dose. Rationale: 1)This recommendation is in line with the EU Directive. 2) The highest frequency of cancer in aircrew will occur after retirement. Individuals and their treating physicians should be enabled to know their cumulative	Article 42 of the EU Directive requires assessment of the exposure for those crew members liable to be subject to more than 1 mSv per year but it does not require record keeping. The text of AMC 1 f. has been deleted but as record keeping for highly exposed crew members was considered necessary it is required in JAR-OPS 1.390(a)(5). The explanation for "highly exposed" is in ACJ 2. The operator will not be responsible to keep the records for 30 years, but crew members concerned could do so because they will receive their individual records annually.

Com .No	JAR-OPS 1.390	from	Comment	Response
			dose. 3) These records (in an anonymized format) are of utmost importance for epidemiological research into the specific risks for aircrew.	Comment acknowledged
35	IEM OPS 1.390 2 general	SLV Denmark	*The 96/29 Euratom Directive does not stipulate that all requirements for workers exposed to "normal" radiation also be valid for aircrew exposed to cosmic radiation. The requirements to divide between category A & B workers and to implement compulsory medical checks for category A workers does not necessarily apply to aircrew. As aircrew are already subject to stringent medical examinations there seems no need to create further specific detailed rules for exposure to cosmic radiation.*	EU Directive does not require categorisation of crew or special medical surveillance. Comment noted, text of IEM deleted.
45	IEM OPS 1.390	CAAd Finland	*The EU Directive 96/29/Euratom does not require categorisation of crew members into categories A and B, nor does it require medical surveillance because of exposure to cosmic radiation.* *It is not necessary to set special requirements on the medical surveillance of crew members because of exposure to cosmic radiation. The medical practitioner responsible for the medical surveillance should be aware of the level of a worker's exposure to radiation, if the dose can be greater than 1 mSv per year. For this reason it is important to assess personal doses of workers and to keep appropriate records of the results.*	The EU Implementation Guidance for Article VII recommends record keeping in the sense of the directive. The Directive itself does not require categorisation and medical surveillance. Comment noted, text of IEM deleted.
61	IEM OPS 1.390 2 general	SLV Sweden	*The extensive medical surveillance, that aircrew undergo and which is standard procedure, could very well serve the purpose as medical surveillance in this case.* *Proposal: Delete ACJ*	See comments above, accepted
57	IEM OPS	DGAC	Proposal is to delete IEM OPS 1.390(b).	See comments above, accepted

Com .No	JAR-OPS 1.390	from	Comment	Response
	1.390 2 general	France		
51		AEA	*There is no requirement (in the EU Directive Articles 10 and 42) to categorise workers on the basis of their likely exposure although the Directive itself does require the operator to try to reduce the doses of highly exposed workers through the organisation of work schedules. Other than this stipulation, there is no requirement for optimisation as such.* *Even highly exposed crew do not approach the new ICRP adult limit of 20 mSv per year, therefore, the categorisation of the worker is meaningless. There is no need to designate areas as there is no obvious protective purpose to be achieved by this (ref. to Radiation Protection 88, section 4.2, para 68).*	See comments above, accepted
06	IEM OPS 1.390 2.1	IFALPA	Notwithstanding the overall responsibilities of the operator, the medical surveillance of category A ***and B*** workers is the responsibility of approved medical practitioners or approved occupational health services....	Category B workers receive an effective dose of less than 6 mSv/year. Any medical surveillance in addition to JAR-FCL 3 would be purely preventive action. IEM deleted, comment rejected
67	IEM OPS 1.390 2.2.a.	CAA UK	...for a post as category A worker for which he***/she*** is being considered. *Reason: To be correct*	This is very correct, but then all of JAR-OPS has to be revised and possibly other JARs as well. Comment noted, IEM deleted
06	IEM OPS 1.390	IFALPA	The state of health of each category A worker should be reviewed at least once a year ***and category B***	Fitness to fly (flight crew members) should only be determined by an authorised AME (see JAR-FCL 3).

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	2.3.		***workers once every two years***, in order to determine whether they remain fit to perform their duties ...	Normal aeromedical examinations cover the scope. For cabin crew see JAR-OPS 1.995(a)(3) Comment noted, IEM deleted
66	IEM OPS 1.390 2.3	CAA UK	... as many time**s** as the approved medical practitioner considers necessary, ...	Comment noted, IEM deleted
65	IEM OPS 1.390 3.2		... if the medical findings deem him**/her** unfit ...	Comment noted, IEM deleted
64	IEM OPS 1.390 4.1		A medical record should be ..... kept so long as he**/she** remains a worker of that category.	see above.
08	IEM OPS 1.390 proposal of additional paragraph 5	IFALPA	***5. Education of flight crew*** ***5.1 Crew members should be made aware through extensive educational programmes that high altitude flying exposes them to significantly higher ionising radiation levels, with carcinogenic potential, than the general population and the scope of radiation protection legislation. As altitude is the main determinant of radiation dosage, flight crew should be encouraged not to cruise above the economically optimum altitude unless additional considerations apply.*** ***5.2 Pregnant Flight Crew. Flight crew***	There are several comments dealing with the need for education of crew members: 77 (FAA) 21 (BAE Systems) Comment accepted, text rejected. See ACJ OPS 1.390 (a)(3).

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			members should be warned that radiation exposure above 1.0 mSv during course of the entire pregnancy may cause an increased risk to the foetus. Operators should have provisions in place to adjust flight duties (low altitude flights that minimise exposure/ground duties) so that this limit is not exceeded after declaration of pregnancy by the flight crew member.	The 1 mSv limit applies to female crew after they declare a pregnancy for the remainder of the pregnancy. New ACJ from EU Implementation Guidance: "Employers should explain the risks of occupational exposure to radiation to their staff. Female staff should know of the need to control doses during pregnancy and that their employer must be notified so that necessary dose control measures can be introduced. "
	IEM OPS 1.390 1.390 (b):	MSC	The EU Directive does not differentiate in categories of aircrew. Creating a "Category A" (>6 mSv) in the context of this Directive will lead to confusion among those who are involved in Radiological Protection. It is not justifiable to categorise aircrew based on the dose constraint of 6 mSv. The EURATOM Expert group ex Art 31 concludes that it is "normally possible that no aircrew will exceed 6 mSv / yr". In case of dose rates of 7 or 8 mSv per annum, direct medical surveillance will yield no useful results and may only lead to a false feeling of safety. Conclusion: skip the "category A" and direct the efforts to all aircrew whose annual dose is expected to be over 1 mSv. *(comment shortened)*	Comment noted. Categorisation of crew members has been deleted.