



Department
of Energy &
Climate Change

**Department of Energy & Climate
Change**

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www.decc.gov.uk

Our ref: 14/0355

21-03-2014

Freedom of information request: Chemtrails and Contrails

Thank you for your email dated 30th January 2013. Your request has been considered under the Environmental Information Regulations 2004 (EIRs) as the information you have sought disclosure of does, in our view, fall within the definition of 'environmental information' as stated in the EIRs.

Under the EIRs you have the right to:

- know whether we hold the information you have requested; and
- be provided with that information (subject to any exceptions under the EIRs which may apply).

Within your correspondence you include questions and quotes, which I have appended for reference (Annex A), from the website form: <http://www.chemtrailsprojectuk.com/take-action/directive/status/>.

The "Directive" is based on misunderstanding and the UK population is not being sprayed.

Before we answer the questions directly I would like to outline the science behind the formation of contrails, and the UK Government's position on climate change and Solar Radiation Management (SRM).

Chemtrails and contrails

The trails that can be seen in the sky and on the website are contrails from aircraft. Aircraft condensation trails ("contrails") are formed by mixing between the engine exhaust air and the surrounding environmental air. The exhaust air contains additional water vapour that has been released by burning fuel and the mixing process (depending on the engine exhaust characteristics) creates a plume of air that is briefly super-saturated with water vapour (i.e. contains more than enough water vapour to be saturated at its existing temperature). Observations of contrail formation conditions show that it is necessary to achieve super-saturation with respect to liquid water in order for cloud particles to be nucleated in the mixing plume. This phenomenon is the same as that underlying the appearance of condensation in one's breath on a cold day.

There are fundamentally two forms of contrails; those that are persistent and those that are non-persistent.



Department of Energy & Climate Change

If humidity and temperature are in the right balance (temperature must be below -45°C for modern airliner jet engines) these condensed trails cannot evaporate again and so persist for some time and can be dispersed into broader patterns by the wind at high altitudes. These persistent contrails can combine with the contrails from other aircraft to form what can effectively be described as high cloud. This can be very noticeable, especially if it occurs near air traffic route "hubs" where many aircraft converge. It is also more noticeable if the contrail is oriented perpendicular to the wind shear direction and can easily result in cloud streaks that may be many kilometres wide and visible in satellite cloud images.

On other occasions when prevailing humidity at altitude is low, the contrails can readily evaporate again and so are non-persistent.

Climate Change

HMG accepts the overwhelming body of scientific evidence on climate change, most recently summarised in Working Group I of the Fifth Assessment Report produced by the Intergovernmental Panel on Climate Change, specifically that the driver behind climate change is the Radiative Forcing (RF) of greenhouse gases. "Total radiative forcing is positive, and has led to an uptake of energy by the climate system. The largest contribution to total radiative forcing is caused by the increase in the atmospheric concentration of CO_2 since 1750 (see Figure SPM.5)."¹ Chapter 7 of this report further details that "persistent contrails from aviation contribute a RF of $+0.01$ ($+0.005$ to $+0.03$) W m^{-2} for year 2011, and the combined contrail and contrail-cirrus ERF [Effective Radiative Forcing] from aviation is assessed to be $+0.05$ ($+0.02$ to $+0.15$) W m^{-2} "² and is two orders of magnitude smaller than the effects of greenhouse gases.

The UK strongly supports a global measure to tackle aviation emissions, and is working through the International Civil Aviation Organisation (ICAO) to achieve this. In the meantime, since 2012, aviation emissions have been included in EU Emissions Trading System (ETS), which caps the total amount of CO_2 that can be emitted within the system. Following positive progress made at ICAO towards a global agreement in Autumn 2013, the European Commission adopted a proposal to amend Aviation EU ETS, and this is currently being negotiated at EU-level, with a decision expected in April 2014.

Solar Radiation Management (SRM)

The UK government's priority is to mitigate climate change, as legislated through the Climate Change Act, by reducing emissions and protecting natural carbon sinks. It is also seeking a strong global agreement in 2015 in response to climate change.

The Royal Society published a report in 2009³ which explains SRM methods. No SRM, which could include spraying to reflect sunlight or modifying clouds, is being performed by HMG and, to the best of our knowledge, is not being performed in or above the UK. While SRM is

¹ Climate Change 2013: The Physical Science Basis: Summary for Policymakers - http://www.climatechange2013.org/images/uploads/WGI_AR5_SPM_brochure.pdf

² Climate Change 2013: The Physical Science Basis: Summary for Policymakers - http://www.climatechange2013.org/images/report/WG1AR5_Chapter07_FINAL.pdf

³ http://royalsociety.org/uploadedFiles/Royal_Society_Content/policy/publications/2009/8693.pdf



Department
of Energy &
Climate Change

discussed in the Royal Society report, it does not recommend implementing a programme of SRM, and no such programme exists.

With reference to the specific questions you have asked please see our answers below:

- 1) There is no such recording mechanism because the activities you list are not happening.
- 2) GeoEngineering is a broad term that encompasses many techniques and The Royal Society 2009 report details these⁴. DECC has funded research at the Met Office Hadley Centre into the climate effects of SRM⁵⁶. Annex B is a list of projects currently underway in the UK. This will become available through the Conference of Parties to the Convention on Biological Diversity clearing-house mechanism (decision XI/20, paragraph 15 (a))⁷.
- 3) a-c) The Government isn't engaged in any such dialogue. We are aware the Research Councils have undertaken work in this area but do not hold details of their current activities.
- 4) The Government is not undertaking geoengineering activities and as far as we are aware nobody is in the UK therefore we're not clear what is meant by "stakeholders".
- 5) Currently there is no specific regulation on SRM. A useful summary of the existing regulations that could have an impact on any SRM can be found within the paper by Jesse Reynolds, 2013⁸.
- 6-12) This information is not held by DECC. DECC cannot comment on questions derived from an FAQ published by DfT.
- 13) Please see explanation on climate change as detailed above.
- 14) The government is not developing "*the Regulation of Geoengineering*" and DECC holds no records of aircraft activities in the 1950s.
- 15-16) The evidence credibly shows contrails appearing, by the process described above.

If you are dissatisfied with the handling of your request, you have the right to ask for an internal review. Under Regulation 11(2) of the EIRs a request for an internal review should be submitted no later than 40 working days after the date of this letter and should be addressed to: foi@decc.gsi.gov.uk

Please remember to quote the reference number above in any future communications.

If you are not content with the outcome of the internal review, you have the right to apply directly to the Information Commissioner for a decision. The Information Commissioner can be contacted at: Information Commissioner's Office, Wycliffe House, Water Lane, Wilmslow, Cheshire SK9 5AF.

Yours sincerely,

Science Team
Department of Energy and Climate Change

4 http://royalsociety.org/uploadedFiles/Royal_Society_Content/policy/publications/2009/8693.pdf

5 http://www.see.ed.ac.uk/~shs/Climate%20change/Climate%20model%20results/JHB%20July%202010_files/291_ftp_002.pdf

6 Jones, A., et al. (2013), The impact of abrupt suspension of solar radiation management (termination effect) in experiment G2 of the Geoengineering Model Intercomparison Project (GeoMIP), J. Geophys. Res. Atmos., 118, 9743–9752, doi:10.1002/jgrd.50762.

7 <https://www.cbd.int/decision/cop/default.shtml?id=13181>

8 http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2326913



Annex A

- 1) *Where does one make an official statement for the record that I DO NOT give my permission NOR consent to any form of climate geoengineering, weather modification and untoward additives to aircraft emissions and injections, as those that are already visibly present in our sky are blocking the vital life force energy of the sun that is necessary to sustain health and well being for all.*
- 2) *Please provide all records of all geoengineering research that has been done in the UK and EU to date and what programmes are planned for any future research.*
- 3) *a) In what form is there any ongoing dialogue with the public about geoengineering and where is it taking place. b) What and where are any future dialogue opportunities with the public being planned. c) How can I make sure that I am notified to enable myself and other concerned citizens to participate.*
- 4) *a) Who are the key stakeholders in climate geoengineering. b) Does the opinion of these stakeholders take priority over the votes of the majority of the general public who would be against it?*
- 5) *a) What regulations are presently in place to prevent climate geo-engineering from occurring now. b) If there are no regulations for climate geo-engineering in place, how do you determine that no climate geo-engineering is occurring now?*
- 6) *What aircraft emissions tests are in place to date in the UK and EU. I) Who is the responsible body doing aircraft emissions tests. Ii) What Department is responsible for making aircraft jet fuel regulations. Ii) What aircraft fuel and emissions regulations are in place in the UK and EU. Ii) Where can aircraft fuel and fuel emissions regulations be accessed.*
- 7) *From UK Dept of Transport's Contrail / Chemtrails – Frequently Asked Questions*
<http://assets.dft.gov.uk/publications/contrails-faqs/contrail-faqs.pdf>
"If atmospheric conditions of temperature and humidity are favourable, the contrails can continue to spread forming persistent contrails that can last for several hours"
With reference to this image – <http://cpuk.org/2-planes-1-chemtrail.jpg> and this video footage – <http://www.youtube.com/watch?v=8XUpphCLlrQ>: One plane leaves a persistent trail whilst another plane does not whilst atmospheric conditions are the same for each plane
 - i) Please provide the papers / research done to back up the above statement made in 'Contrails / Chemtrails – Frequently Asked Questions'.*
 - ii) Please provide how the atmospheric conditions are favourable for one plane's contrail but not the other plane's contrails?*
 - iii) What assurances can be made that the additional factor is not the aircraft, aircraft fuel or aircraft emissions?*
- 8) *From UK Dept of Transport's Contrails / Chemtrails – Frequently Asked Questions*
"The nuclei of some of the ice crystals in a contrail will contain minute products of Combustion but they are essentially pure ice."
If what looks like a contrail then becomes a cloud, it isn't made of water vapour or pure



Department
of Energy &
Climate Change

ice crystal alone.

- i) Please show evidence how a contrail can be pure ice if they contain minute products of combustion in them.*
 - ii) What are the allowable chemicals and products in aircraft in the UK and at what quantities.*
 - iii) What government or other inspections, rules and regulations are in place to ensure that these elements and limits are upheld by law.*
- 9) From UK Government's 'Contrails / Chemtrails' "Alumina-silicates (compounds of aluminium and silicon) are common in clay soils and a wide range of other minerals, therefore measurements in air and soils are dominated by the ground level sources of aluminosilicates rather than any that might come from contrails."
- i) Please provide the papers/research done to back up the above statement made in 'Contrails / Chemtrails'*
- 10) From the UK Government's 'Contrails / Chemtrails' "In the UK the Department is not aware of any other matter or aerosol being ejected from aircraft (known as chemtrails), other than the normal exhaust products from the aircraft."
- i) How can the government be sure what 'normal exhaust products' are being emitted 'from the aircraft'?*
 - ii) Please provide evidence of, or advise what routine tests are done on, aircraft emissions to back up the above statement.*
- 11) From the UK Government's 'Contrails / Chemtrails' "Aircraft often follow similar routes separated by altitude, time or lateral distance and that is why you see grid like patterns in the sky"
- i) Please explain the increase in this phenomenon over the past 20 years?*
 - ii) Please advise how these lines were not seen a few decades ago.*
 - iii) Please advise what changes to aviation fuels i.e. additives now included, that enables this phenomenon to occur now when it did not occur 20 years ago.*
 - iv) Please advise why some planes producing persistent trails do not appear on flightradar24.com, despite the vast majority (over 70%) of commercial planes in UK airspace being fitted with ADS-B transponders?*
- 12) From UK Government's 'Contrails / Chemtrails' "There is no evidence that contrails cause health problems"
- Contrails reduce the amount of sunlight reaching the earth, resulting in vitamin D deficiency and rickets. See the Directive for details.*
- i) Therefore, how will the Government address these factors in order to safeguard the health of the population?*
- 13) From UK Government's 'Contrails / Chemtrails' "Current scientific understanding is that they cause an additional warming of the atmosphere"
- i) Please provide the papers / research done to back up the above statement.*
 - ii) Please confirm that the Government therefore understands that aircraft in UK airspace are contributing to 'global warming'*



Department
of Energy &
Climate Change

iii) What research has been done to forecast additional problems that may arise from this?

- 14) *As the Government has been developing the Regulation of Geoengineering its scientific techniques and intentions need understanding. I hope that the verifiable information provided for you in the Directive has aided you in your understanding of its physical and environmental consequences and side effects*

A vital part of the ENMOD treaty,

<http://www.sweetliberty.org/issues/weather/enmod.html> which is in ARTICLE III states:

1. The provisions of this Convention shall not hinder the use of environmental modification techniques for peaceful purposes and shall be without prejudice to the generally recognized principles and applicable rules of international law concerning such use.

Until now, the Ministry of Defence has categorically denied the knowledge of any cloud-seeding experiments taking place in the UK during early August 1952. But documents suggest that Operation Cumulus was going on between August 4 and August 15 1952. The scientists were based at Cranfield school of aeronautics and worked in collaboration with the RAF and the MoD's meteorological research flight based at Farnborough. The chemicals were provided by ICI in Billingham.

<http://www.theguardian.com/uk/2001/aug/30/sillyseason.physicalsciences>

Consequences of deployed Environmental Modification techniques for peaceful purposes can have devastating effects on lives and livelihoods of the population. The Directive provides evidence via photographs and videos the techniques described in the technology of Weather and Environmental modification in the UK and we are experiencing such extremes in weather as can be expected with its implementation.

Therefore: i) What geoengineering and Environmental Modification techniques have been carried out in the UK and the EU in secrecy or any other reason, since the ENMOD treaty was signed into effect by the UK Govt. in Geneva on 18 May 1977.

- 15) *A: Is the video evidence and photographic evidence of Chemtrailing online via the internet credible observational evidence? B) If not why isn't it credible evidence? C) The evidence I presented in my letter why isn't that credible observational evidence?*
- 16) *A) What do you and the DECC define in detail as Credible Observational Evidence? Which includes photographs, video, phone video footage, written evidence in letters? It's the only evidence the general public can provide?*



Department
of Energy &
Climate Change

Annex B

1. Multi-approach projects, including governance

	Title	Main funders (Funding £k; UK total)	Relevance to geoengineering	Lead research organisations	Dates
1.1	Integrated assessment of geoengineering proposals (IAGP)	EPSRC, NERC, STFC (1,729)	Development of an evaluation framework to allow in-depth comparison of all major geoengineering proposals. The project combines Earth system modelling and deliberative engagement with stakeholders and the wider public. Details: www.iagp.ac.uk	Leeds University, Oxford University, Lancaster University, Cardiff University, Bristol University, UK Met Office	2010 - 2014
1.2	Climate geoengineering governance	ESRC, AHRC (1,048)	Project includes i) study of ethical, legal, social and geopolitical implications of range of geoengineering approaches; ii) development of guidelines on governance and regulation; iii) stakeholder dialogue on possible role of geoengineering in relation to climate change mitigation and adaptation. Details: http://geoengineering-governance-research.org/	Oxford University, Sussex University, University College London	2012 - 2014
1.3	Geoengineering – a systems engineering analysis	EPSRC Training Award	This project will use a low order climate model to determine formal observability, controllability and closed-loop stability properties and to devise new concepts for geoengineering to reduce the scale of interventions required.	Strathclyde University	2013 - 2016
1.4	Climate engineering research: responsible innovation	EPSRC/ESRC	This project involves i) stakeholder mapping and engagement around the RCUK funded SPICE project and the wider context of Solar Radiation Management (SRM) ; and ii) a critical review of the wider risk uncertainties, ethical, legal, governance and social issues associated with the project and SRM more generally.	Exeter University, University College London	2012- 2014
1.5	The Responsible Innovation Framework: scoping study and science -policy seminar	EPSRC/ESRC	Project to develop a framework for responsible innovation to support research policy development at EPSRC, See http://www.epsrc.ac.uk/research/framework/Pages/framework.aspx	Exeter University	2011- 2012
1.6	Regulating geoengineering research through strategic environmental assessment	ESRC Training Award	Focus on legal aspects: how authority might be justly exercised in the absence of democratic legitimacy.	Bristol University	2013 - 2016
1.7	Should we geoengineer our future climate?	NERC Training Award	Model-based analysis of effectiveness of different geoengineering options	Bristol University	2009 - 2012
1.8	Public participation in the social appraisal of climate geoengineering proposals	Private sector Training Award	Research on the expert, stakeholder and public social appraisal of climate geoengineering proposals; using a novel and innovative participatory research method (Deliberative Mapping). Close links with IAGP project (#1.1)	University of East Anglia	2010 - 2013



Department
of Energy &
Climate Change

1.9	European trans-disciplinary assessment of climate engineering (EuTRACE)	EC (266k €)	Project addresses the potentials, implications, risks and uncertainties of climate engineering (geoengineering), including stakeholder dialogue and policy development. Details: http://www.eutrace.org/	Tyndall Centre/ University of East Anglia; Exeter University, Bristol University, Edinburgh University	2011-2013
1.10	Oxford geoengineering programme (OGP)	Oxford Martin School (688)	Provides complementary 'internal' university support to extend the scope of external awards, also for pilot studies that include assessing proposals for cloud modification, and the engineering and resource constraints of CDR	Oxford University	2010 - 2014

2. Solar radiation management, also known as sunlight reduction methods (SRM)

	Title	Main funders (Funding £k; UK total)	Relevance to geoengineering	Lead research organisations	Dates
2.1	Stratospheric particle injection for climate change (SPICE)	EPSRC, NERC, STFC (1,609)	Addresses issues relating to the effectiveness of stratospheric particle injection as an SRM technique: i) how much, of what, might need to be injected where into the atmosphere to effectively and safely manage the climate system; ii) what techniques might be used to deliver it there; and iii) what might be the impacts. A field component was originally planned (involving water aerosol from a tethered balloon) but was not carried out.	Bristol University, Oxford University, Cambridge University, Edinburgh University	2010 - 2014
2.2	Geoengineering model intercomparison project (GeoMIP)	Met Office/ Hadley Centre Climate Programme	GeoMIP is an international model comparison exercise, endorsed by the World Climate Research Programme (WCRP). It prescribes the experiments which all participating climate models will perform. Initial focus on stratospheric SO ₂ injection and generic SRM; subsequent studies on sea spray geoengineering, including marine cloud brightening.	UK Met Office	2010 -
2.3	Marine cloud brightening using an atmosphere-only climate model	EPSRC Training Award	Model-based assessment of effect of seeding patches or all marine stratocumulus clouds	NCAS/Leeds University	2006 - 2010
2.4	Climate impacts of marine cloud brightening	Carnegie Inst, U.S.A.	Use of HadGEM Earth System Model to examine effect of marine cloud brightening on the Earth's climate system, targeting optimal regions for seeding	NCAS/Leeds University	2009 - 2013
2.5	Designer ice nuclei for geoengineering of clouds	NERC Training Award	Laboratory experiments to identify materials that could be efficiently, safely and cost-effectively used to promote ice nucleation (in cirrus clouds)	Leeds University	2013 - 2016
2.6	Global and regional sea level response to geoengineering by 2100	NERC Training Award	Model projections of response of sea level components (e.g. ocean heat content, ice sheet and glacier melting) to SRM geoengineering	NOC, Liverpool University	2013 - 2016



Department
of Energy &
Climate Change

3. Greenhouse gas removal, also known as carbon dioxide removal or negative emission techniques (GGR, CDR and NETs)

	Title	Main funders (Funding £k UK total)	Relevance to geoengineering	Lead research organisations	Dates
3.1	Ocean carbon-climate feedbacks and geoengineering potential	NERC Training Award	Study of how ocean uptake of CO ₂ is affected by climate in context of ocean-based CDR geoengineering (nutrient pipes, fertilization and ocean liming)	Southampton University	2013 - 2016
3.2	Biochar and biotrophic carbon storage in temperate soils (AGRIFOOD)	NERC Training Award	Study of biochar treatment effects on faunal and microbial soil communities and associated impacts, including rates of C and N cycling, greenhouse gas emissions (CO ₂ , CH ₄ , N ₂ O); and climate resilience of soil organic matter.	Edinburgh University, CEH	2010 - 2014
3.3	Capture of atmospheric CO ₂ by mineral-plant reactions	NERC Training Award	Study of role of plants in precipitating soil carbonate (from CO ₂ / bicarbonate interacting with Ca ions) and potential enhancement of such carbon sequestration by addition of calcium silicates to soils	Newcastle University	2009 - 2012

Acronyms: AHRC, Arts and Humanities Research Council; BBSRC, Biotechnology and Biological Sciences Research Council; BECCS, Bioenergy with carbon capture and storage; BGS, British Geological Survey; CEH, Centre for Ecology and Hydrology; CCS, carbon capture and storage; DECC, Department of Energy and Climate Change; EC, European Commission; EPSRC, Engineering and Physical Sciences Research Council; ESRC, Economic and Social Research Council; NCAS, National Centre for Atmospheric Science; NERC, Natural Environment Research Council; NOC, National Oceanography Centre; PML, Plymouth Marine Laboratory; STFC, Science and Technologies Facilities Council

