#### California Environmental Protection Agency

##### AIR RESOURCES BOARD



Compliance Offset Protocol

Ozone Depleting

Substances Projects

Destruction of U.S.

Ozone Depleting Substances Banks

Adopted: [INSERT Date of Board Adoption]

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# Chapter 1. Purpose and Definitions

## 1.1. Purpose.

1. The purpose of the Compliance Offset Protocol Ozone Depleting Substances Projects (protocol) is to quantify greenhouse gas emission reductions associated with the destruction of high global warming potential ozone depleting substances sourced from and destroyed within the United States that would have otherwise been released to the atmosphere. This project category includes ODS used in foam blowing agent and refrigerant applications.
2. AB 32 exempts quantification methodologies from the Administrative Procedure Act;[[1]](#footnote-1) however, those elements of the protocol are still regulatory. The exemption allows future updates to the quantification methodologies to be made through a public review and Board adoption process but without the need for rulemaking documents. Each protocol identifies sections that are considered quantification methodologies and exempt from APA requirements. Any changes to the non-quantification elements of the offset protocols would be considered a regulatory update subject to the full regulatory development process. Those sections that are considered to be a quantification methodology are clearly indicated in the title of the chapter or subchapter if only a portion of that chapter is considered part of the quantification methodology of the protocol.

## 1.2. Definitions.

1. For the purposes of this protocol, the following definitions apply:
2. “Aggregation” means the grouping together of multiple containers of ODS into a single shipment or single container. Aggregation does not require the collected ODS to be combined into a single container. Multiple containers shipped together are considered an aggregate.
3. “Cap-and-Trade Regulation” or “Regulation” means ARB’s regulation establishing the California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms set forth in title 17, California Code of Regulations, chapter 1, subchapter 10, article 5 (commencing with section 95800).
4. “Certificate of Destruction” means an official document provided by the destruction facility certifying the date, mass, and type of ODS destroyed.
5. “Cold storage” means storage which includes the refrigeration equipment used to house perishable goods or any manufactured product requiring refrigerated storage.
6. “Container” means an air-tight and water-tight unit for storing or transporting ODS material without leakage or escape of ODS. Containers used in transporting ODS material must comply with all applicable U.S. Department of Transportation (DOT) requirements.
7. “Destruction” means the destruction of ODS by qualified destruction, transformation or conversion plants achieving greater than 99.99% destruction and removal efficiency, so that the destructed ODS are not emitted to the atmosphere. Destruction may be performed using any technology, including transformation, that results in the complete breakdown of ODS into a waste product, a usable by-product, or end-product.
8. “Destruction facility” means a facility that destroys, transforms, or converts ODS using a technology that meets the standards defined by the United Nations (UN) Environment Programme Technology and Economic Assessment Panel Task Force on Destruction Technologies as provided in the *Report of the Task Force on Destruction Technologies*.
9. “Eligible ODS” means those ODS included in subchapter 2.2.1.(b) and subchapter 2.2.2.(b) in this protocol.
10. “Emission rate” means the rate at which refrigerant is lost to the atmosphere, including emissions from leaks during operation and servicing events.
11. “Ineligible ODS” means those ODS not included in subchapter 2.2.1.(b) or subchapter 2.2.2.(b) in this protocol.
12. “Intermediate Aggregation Facility” means a transitional facility for eligible ODS to sit, be aggregated, and be transported in between a point of origin and the destruction facility.
13. “Mixed ODS” means less than or equal to 90% composition of a single ODS species.
14. “Non-mixed ODS” means greater than 90% composition of a single ODS species.
15. “Ozone Depleting Substances” or “ODS” means substances known to deplete the stratospheric ozone layer. The ODS controlled under the Montreal Protocol and its Amendments are chloroﬂuorocarbons (CFC), hydrochloroﬂuorocarbons (HCFC), halons, methyl bromide (CH3Br), carbon tetrachloride (CCl4), methyl chloroform (CH3CCl3), hydrobromoﬂuorocarbons (HBFC) and bromochloromethane (CHBrCl).
16. “ODS species” means any individual type of ODS (e.g., CFC-11, CFC-113, HCFC-22).
17. “Recovery efficiency” means the percent of total ODS blowing agent that is recovered during the process of ODS blowing agent extraction.
18. “Refrigeration equipment” means a refrigeration appliance used in any sector (including commercial, industrial, or residential) that requires cold storage.
19. “Registry offset credits” means the offset credits defined in section 95802 of the Regulation and whose issuance is described in section 95980 and section 95980.1 of the Regulation.
20. “Startup, shutdown, and malfunction plan” or “SSMP” means a plan, as specified under 40 CFR 63.1206, that includes a description of potential causes of malfunctions, including releases from emergency safety vents, that may result in significant releases of hazardous air pollutants, and actions the source is taking to minimize the frequency and severity of those malfunctions.
21. “Stockpile” means ODS stored for future use or disposal in bulk quantities at a single location. These quantities may be composed of many small containers or a single large container.
22. “Substitute refrigerant” means those refrigerants that will be used to fulfill the function that would have been filled by the destroyed ODS refrigerants. These refrigerants may be drop-in replacements used in equipment that previously used the type of ODS destroyed or may be used in new equipment that fulfills the same market function.
23. “Substitute emissions” means a term used in this protocol to describe the GHG emitted from the use of substitute refrigerants in technologies that are used to replace the ODS destroyed in a project.
24. “Transformation” or “conversion” means the breakdown of a substance into a waste product, a usable by-product, or end-product.
25. For terms not defined in subchapter 1.2(a), the definitions in section 95802 of the Regulation apply.
26. Acronyms. For purposes of this protocol, the following acronyms apply:
27. “AB 32” means the California Global Warming Solutions Act of 2006.
28. "AHRI" means Air-Conditioning, Heating and Refrigeration Institute.
29. “APA” means California’s Administrative Procedure Act.
30. “ARB” means the California Air Resources Board.
31. "CAA" means Clean Air Act.
32. "CEMS" means continuous emissions monitoring system.
33. "CFC" means chlorofluorocarbons.
34. "CH4" means methane.
35. “CITSS” means Compliance Instrument Tracking System Service.
36. "CO2" means carbon dioxide.
37. "DOT" means U.S. Department of Transportation.
38. "DRE" means destruction and removal efficiency.
39. “GHG” means greenhouse gas.
40. "GWP" means global warming potential.
41. "HBFC" means hydrobromofluorocarbons.
42. “HBR” means high boiling residue.
43. "HCFC" means hydrochlorofluorocarbons.
44. "HFC" means hydrofluorocarbons.
45. "HWC" means hazardous waste combustor.
46. “mt” means metric ton.
47. "NESHAP" means National Emissions Standards for Hazardous Air Pollutants.
48. "ODS" means ozone depleting substances.
49. "PU" means polyurethane.
50. "RCRA" means Resource Conservation and Recovery Act.
51. “SSMP” means startup, shutdown, and malfunction plan.
52. "SSR" means GHG sources, GHG sinks, and GHG reservoirs.
53. "TEAP" means Technology & Economic Assessment Panel.
54. “UN” means United Nations.
55. “U.S.” means United States.
56. “U.S. EPA” means United States Environmental Protection Agency.

# Chapter 2. Eligible Activities – Quantification Methodology

This protocol defines a set of activities designed to reduce GHG emissions by the destruction of eligible ODS at a single qualifying destruction facility.

## 2.1. Eligible Destruction Facilities

1. The end fate of the ODS must be destruction at either:
   1. An approved HWC subject to the RCRA and with a RCRA permit for the ODS destruction facility stating an ODS destruction efficiency of at least 99.99%; or
   2. A transformation or destruction facility that meets or exceeds the Montreal Protocol’s TEAP standards provided in the *Report of the Task Force on Destruction Technologies.* 
      * 1. A facility must demonstrate DRE of 99.99% and emission levels consistent with the guidelines set forth in the TEAP report.
        2. A facility must have been certified by a third party no more than three years prior to the offset project commencement date and must show that it maintains its operational status as stated in the certification.
2. A destruction facility must meet any applicable requirements under CAA and NESHAP standards, as well as all applicable federal, state, and local laws.
3. At the time of ODS destruction the destruction facility must have a valid Title V air permit, if applicable, and any other air or water permits required by local, state or federal law to destroy ODS and document compliance with all monitoring and operational requirements.
4. Any upsets or exceedances must be managed in accordance with an authorized SSMP.

## 2.2. Eligible ODS

1. ODS destroyed under this protocol must be from one or more of the eligible sources listed below:
2. Refrigerants from industrial, commercial or residential equipment, systems, and appliances or stockpiles;
3. ODS blowing agents extracted and concentrated from appliance foams; or
4. Intact foam sourced from building insulation.
5. ODS produced or used as solvents, medical aerosols, or applications not listed above are not eligible.
6. A single offset project may incorporate ODS obtained from one or more of the ODS source categories in subchapter 2.2(a).
7. Destruction activity must take place under one or more Certificates of Destruction.
8. All of the following conditions must be met for multiple Certificates of Destruction to be eligible as a single project:
   1. The Offset Project Operator and, if applicable, Authorized Project Designee are the same for all ODS destroyed;
   2. All ODS destroyed must be at the same eligible destruction facility; and
   3. The destruction activities must occur during one reporting period.
9. A Certificate of Destruction may be used for only one offset project.
10. Each Certificate of Destruction must be issued by the qualifying destruction facility and must include the following information:
11. Offset Project Operator or Authorized Project Designee;
12. Destruction facility;
13. Generator name;
14. Certificate of destruction ID Number;
15. Serial, tracking, or ID number of all containers for which ODS destruction occurred;
16. Weight and type of material destroyed from each container; and
17. Start and end destruction dates.
18. The ODS destroyed may originate from a single source or from numerous sources.
19. ODS collection, handling, extraction, and destruction must be performed in accordance with the reporting and operating requirements in the Regulation and subchapter 7.2 of this protocol.
20. The handling, recovery, and disposal of ODS refrigerants must be performed by technicians certified by the U.S. EPA under CAA, sections 608 and 609. Technicians may service only appliances or equipment based on their certificate type(s). Technician certification must be retained as part of the documentation retention requirements of this protocol and the Regulation.

### 2.2.1. Refrigerant Sources

1. Eligible refrigerants must originate from domestic U.S. supplies. Imported refrigerant is not eligible under this protocol.
2. Only destruction of the following ODS refrigerants is eligible to generate ARB or registry offset credits under this protocol:
3. CFC-11;
4. CFC-12;
5. CFC-13;
6. CFC-113;
7. CFC-114; and
8. CFC-115.
9. ODS extracted from a foam source for use in refrigeration equipment is not part of this source category and must be considered as a foam source.
10. ODS sourced from federal government installations or stockpiles is not eligible under this protocol.

### 2.2.2. Foam Sources

1. Eligible foam ODS blowing agent must originate from U.S. foam sources. Imported foams are not eligible under this protocol.
2. Only the destruction of the following ODS foam blowing agents are eligible to generate ARB or registry offset credits under this protocol:
3. CFC-11;
4. CFC-12;
5. HCFC-22; and
6. HCFC-141b.
7. The only foam sources eligible under this protocol are building and appliance insulation foams. Other sources, such as transport refrigeration units, are not eligible.
8. To be eligible to generate ARB or registry offset credits, the ODS blowing agent must be destroyed in one of two ways:
9. The ODS blowing agent must be extracted from the foam under negative pressure and collected, stored, and transported in cylinders or other hermetically sealed containers; or
10. Intact foam must be separating from the building panels, and stored, transported, and destroyed in sealed containers.

# Chapter 3. Eligibility

Ozone depleting substances offset projects must adhere to the eligibility requirements below, in addition to the offset project eligibility criteria and regulatory program requirements set forth in subarticle 13 of the Regulation.

## 3.1. General Eligibility Requirements

1. Offset projects that use this protocol must:
2. Involve the recovery, collection, and destruction of ODS;
3. Recover ODS that would otherwise be emitted to the atmosphere;
4. Destroy the recovered ODS through an eligible end-use management option pursuant to subchapter 2.1 of this protocol;
5. Conform with the point of origin documentation requirements, as specified in chapter 6 of this protocol; and
6. Conform to the chain of custody documentation requirements, as specified in chapter 6 of this protocol.
7. An Offset Project Operator or Authorized Project Designee that uses this protocol must:
8. Provide the listing information required by section 95975 of the Regulation and subchapter 7.1 of this protocol;
9. Monitor SSRs within the GHG Assessment Boundary as delineated in chapter 4 pursuant to the requirements of chapter 6 in this protocol;
10. Quantify GHG emission reductions pursuant to chapter 5 of this protocol;
11. Prepare and submit an Offset Project Data Report (OPDR) that includes the information required in subchapter 7.2 of this protocol; and
12. Obtain offset verification services from an ARB-accredited offset verification body in accordance with section 95977 of the Regulation and chapter 8 of this protocol.

## 3.2. Location

1. Only projects located in the United States or its territories are eligible under this protocol.
2. All ODS must be sourced from stocks in the United States or its territories.
3. All ODS must be destroyed within the United States or its territories.
4. Offset projects situated on the following categories of land are only eligible under this protocol if they meet the requirements of this protocol and the Regulation, including the waiver of sovereign immunity requirements of section 95975(l) of the Regulation:
   1. Land that is owned by, or subject to an ownership or possessory interest of a Tribe;
   2. Land that is “Indian lands” of a Tribe, as defined by 25 U.S.C. §81(a)(1); or
   3. Land that is owned by any person, entity, or Tribe, within the external borders of such Indian lands.

## 3.3. Offset Project Operator or Authorized Project Designee

1. The Offset Project Operator or Authorized Project Designee is responsible for project listing, monitoring, reporting, and verification.
2. The Offset Project Operator or Authorized Project Designee must submit the information required by subarticle 13 of the Regulation and in chapter 7 of this protocol.
3. The Offset Project Operator must have legal authority to implement the offset project.

## 3.4. Additionality

Offset projects must meet the additionality requirements of section 95973(a)(2) of the Regulation, in addition to the requirements in this protocol. Eligible offsets must be generated by projects that yield additional GHG reductions that exceed any GHG reductions otherwise required by law or regulation or any GHG reduction that would otherwise occur in a conservative business-as-usual scenario. These requirements are assessed through the Legal Requirement Test in subchapter 3.4.1 and the Performance Standard Evaluation in subchapter 3.4.2 of this protocol.

### 3.4.1. Legal Requirement Test

1. Emission reductions achieved by a project using this protocol must exceed those required by any law, regulation, or legally binding mandate, as required in sections 95973(a)(2)(A) and 95975(n) of the Regulation.
2. The following legal requirement test applies to all ODS projects:
   1. If no law, regulation, or legally binding mandate requires the destruction of ODS stocks at the point of origin or the destruction site, all emission reductions resulting from the recovery and destruction of ODS are considered to not be legally required, and therefore eligible for crediting under this protocol.
   2. If any law, regulation, or legally binding mandate requires the destruction of ODS stocks at the point of origin or the destruction site, only emission reductions resulting from the recovery and destruction of ODS that are in excess of what is required to comply with those laws, regulations, and legally binding mandates are eligible for crediting under this protocol.

### 3.4.2. Performance Standard Evaluation

1. Emission reductions achieved by a project using this protocol must exceed those likely to occur in a conservative business-as-usual scenario.
2. The destruction of ODS sourced from the U.S. government is ineligible for crediting under this protocol.
3. The performance standard evaluation is satisfied if the ODS project activities meet the project definition and all other eligibility requirements in the protocol.

## 3.5. Offset Project Commencement

1. For this protocol, offset project commencement is defined as the date on which the earliest destruction activity of a project commences, as documented on a Certificate of Destruction.
2. Offset project activities will occur prior to offset project commencement.
3. Pursuant to section 95973(a)(2)(B) of the Regulation, compliance offset projects must have an offset project commencement date after December 31, 2006.

## 3.6. Offset Project Reporting Period

1. An ODS project can only have a single reporting period.
2. Multiple destruction events may be combined within a single reporting period subject to the requirements in subchapter 2.2.(e) of this protocol.
3. The reporting period must not exceed 12 consecutive months. The Offset Project Operator or Authorized Project Designee may choose a reporting period shorter than 12 consecutive months.
4. The offset project reporting period begins on the offset project commencement date.

## 3.7. Offset Project Crediting Period

1. The offset project crediting period is the period of time over which emission reductions are quantified for the purpose of determining creditable GHG reductions.
2. The offset project crediting period for this protocol is ten years.
3. The offset project crediting period begins on the offset project commencement date.

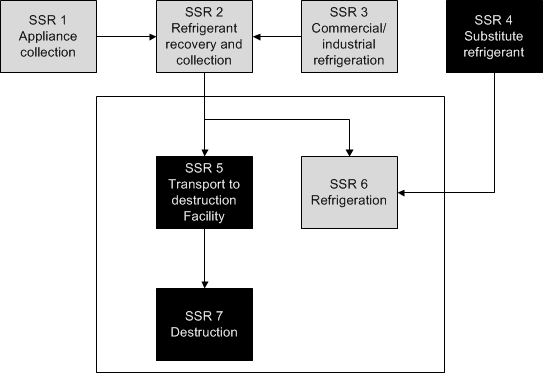
## 3.8. Regulatory Compliance

1. An offset project must meet the regulatory compliance requirements set forth in section 95973(b) of the Regulation.
2. The regulatory compliance requirements apply to the collection, recovery, storage, transportation (from point of origin until destruction), mixing, and destruction of ODS.

# Chapter 4. Offset Project Boundary – Quantification Methodology

1. The GHG assessment boundary, or offset project boundary, delineates the SSRs that must be included or excluded when quantifying the net changes in emissions associated with the recovery and destruction ODS.
2. Figure 4.1 illustrates the GHG assessment boundary for refrigerant ODS projects.
3. All SSRs within the bold line are included and must be accounted for under this protocol.
4. SSRs in lightly shaded boxes are relevant to the baseline and project emissions.
5. SSRs in darkly shaded boxes are relevant only to project emissions.

**Figure 4.1: Illustration of the Offset Project Boundary for Refrigerant Projects**



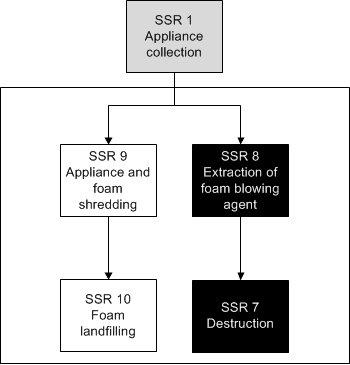
1. Table 4.1 lists the SSRs for refrigerant projects indicating which gases are included or excluded from the offset project boundary.

### Table 4.1 List of identified SSRs for refrigerant projects

| SSR | Source Description | Gas | Included (I) or Excluded (E) |
| --- | --- | --- | --- |
| 1 | Fossil fuel emissions from the collection and transport of end-of-life residential appliances | CO2 | E |
| CH4 | E |
| N2O | E |
| 2 | Emissions of ODS from the recovery and collection of refrigerant at end-of-life or servicing | ODS | E |
| Fossil fuel emissions from the recovery and collection of refrigerant at end-of-life or servicing | CO2 | E |
| CH4 | E |
| N2O | E |
| 3 | Emissions of ODS from equipment leak and servicing | ODS | E |
| Fossil fuel emissions from the operation of refrigeration and air conditioning equipment | CO2 | E |
| CH4 | E |
| N2O | E |
| 4 | * Emissions of substitute refrigerant occurring during production * Fossil fuel emissions from the production of substitute refrigerants | CO2e | E |
| CO2 | E |
| CH4 | E |
| N2O | E |
| 5 | Fossil fuel emissions from the vehicular transport of ODS from aggregation point to final destruction facility | CO2 | I |
| CH4 | E |
| N2O | E |
| 6 | Emissions of ODS from leaks and servicing through continued operation of equipment | ODS | I |
| Emissions of substitute refrigerants from leaks and servicing through continued operation of equipment | CO2e | I |
| Indirect emissions from grid-delivered electricity | CO2 | E |
| CH4 | E |
| N2O | E |
| 7 | Emissions of ODS from incomplete destruction at destruction facility | ODS | I |
| Emissions from the oxidation of carbon contained in destroyed ODS | CO2 | I |
| Fossil fuel emissions from the destruction of ODS at destruction facility | CO2 | I |
| CH4 | E |
| N2O | E |
| Indirect emissions from the use of grid-delivered electricity | CO2 | I |
| CH4 | E |
| N2O | E |

1. Figure 4.2 illustrates the GHG assessment boundary for appliance foam blowing agent recovery ODS projects.
2. All SSRs within the bold line are included and must be accounted for under this protocol.
3. SSRs in unshaded boxes are relevant only to baseline emissions.
4. SSRs in lightly shaded boxes are relevant to the baseline and project emissions.
5. SSRs in darkly shaded boxes are relevant only to project emissions.

**Figure 4.2: Illustration of the Offset Project Boundary for Appliance Foam Projects**



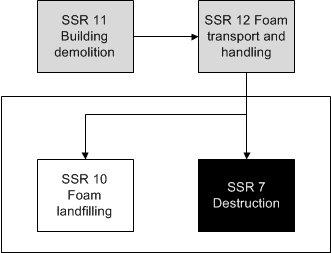
1. Table 4.2 lists the SSRs for appliance foam projects indicating which gases are included or excluded from the offset project boundary.

### Table 4.2 List of identified SSRs for appliance foam projects

| SSR | Source Description | Gas | Included (I) or Excluded (E) |
| --- | --- | --- | --- |
| 1 | Fossil fuel emissions from the collection and transport of end-of-life residential appliances | CO2 | E |
| CH4 | E |
| N2O | E |
| 7 | Emissions of ODS from incomplete destruction at destruction facility | ODS | I |
| Emissions from the oxidation of carbon contained in destroyed ODS | CO2 | I |
| Fossil fuel emissions from the destruction of ODS at destruction facility | CO2 | I |
| CH4 | E |
| N2O | E |
| Indirect emissions from the use of grid-delivered electricity | CO2 | I |
| CH4 | E |
| N2O | E |
| 8 | Emissions of ODS released during the separation of foam from appliance | ODS | I |
| 9 | Emissions of ODS from the shredding of appliances for materials recovery, releasing ODS from foam | ODS | I |
| 10 | Emissions of ODS released from foam disposed of in random dumps | ODS | I |
| Emissions of ODS degradation products from foam disposed of in random dumps | HFC, HCFC | E |
| Fossil fuel emissions from the transport and placement of shredded foam waste in random dumps | CO2 | E |
| CH4 | E |
| N2O | E |

1. Figure 4.3 illustrates the GHG assessment boundary of building foam ODS projects.
2. All SSRs within the bold line are included and must be accounted for under this protocol.
3. SSRs in unshaded boxes are relevant only to baseline emissions.
4. SSRs in lightly shaded boxes are relevant to the baseline and project emissions.
5. SSRs in darkly shaded boxes are relevant only to project emissions.

**Figure 4.3:** Illustration of the Offset Project Boundary for Building Foam Projects



1. Table 4.3 lists the SSRs for building foam projects indicating which gases are included or excluded from the offset project boundary.

### Table 4.3 List of identified SSRs for building foam projects

| SSR | Source Description | Gas | Included (I) or Excluded (E) |
| --- | --- | --- | --- |
| 7 | Emissions of ODS from incomplete destruction at destruction facility | ODS | I |
| Emissions from the oxidation of carbon contained in destroyed ODS | CO2 | I |
| Fossil fuel emissions from the destruction of ODS at destruction facility | CO2 | I |
| CH4 | E |
| N2O | E |
| Indirect emissions from the use of grid-delivered electricity | CO2 | I |
| CH4 | E |
| N2O | E |
| 10 | Emissions of ODS released from foam disposed of in random dumps | ODS | I |
| Emissions of ODS degradation products from foam disposed of in random dumps | HFC, HCFC | E |
| Fossil fuel emissions from the transport and placement of shredded foam waste in random dumps | CO2 | E |
| CH4 | E |
| N2O | E |
| 11 | Emissions of ODS from the demolition of buildings and damage to foam insulation panels | ODS | E |
| Fossil fuel emissions from the demolition of buildings | CO2 | E |
| CH4 | E |
| N2O | E |
| 12 | Emissions of ODS released from foam during transport and handling | ODS | E |
| Fossil fuel emissions from the transport and handling of building foam | CO2 | E |
| CH4 | E |
| N2O | E |

# Chapter 5. Quantifying GHG Emission Reductions - Quantification Methodology

1. GHG emission reductions from an ODS project are quantified by comparing actual project emissions to calculated project baseline emissions.
2. An Offset Project Operator or, if applicable, Authorized Project Designee must use the calculation methods provided in this protocol to determine baseline and project GHG emissions.
3. GHG emissions must be quantified using the GWP values in tables B.1 and B.2.
4. GHG emission reductions (ER) must be quantified by subtracting the project emissions (PE) from the baseline emissions (BE) using equation 5.1.

Equation 5.1. GHG Emission Reductions

|  |  |  |  |
| --- | --- | --- | --- |
|  | | | |
| *Where,* |  |  | Units |
| ER | = | Total mass of GHG emission reductions | mtCO2e |
| BE | = | Total mass of project baseline emissions | mtCO2e |
| PE | = | Total mass of project emissions | mtCO2e |

## 5.1. Quantifying Project Baseline Emissions

1. Baseline emissions (BE) must be estimated by using equation 5.2 and by summing the baseline emissions for all SSRs identified as included in the baseline in tables 4.1, 4.2, and 4.3.

Equation 5.2. Total Project Baseline Emissions

|  |  |  |  |
| --- | --- | --- | --- |
|  | | | |
| *Where,* |  |  | Units |
| BE | = | Total mass of project baseline emissions | mtCO2e |
| BErefr | = | Total mass of project baseline emissions from refrigerant ODS | mtCO2e |
| BEfoam | = | Total mass of project baseline emissions from ODS blowing agent | mtCO2e |

1. Baseline emissions from refrigerant ODS (BErefr) must be quantified using equation 5.3.
2. BErefr must include the estimated CO2e emissions that would have occurred over the ten-year crediting period had the destroyed ODS been used in existing refrigeration or air conditioning equipment.
3. The total mass of refrigerant ODS sent for destruction (Qrefr,i) excludes the mass of HBR, moisture, and ineligible ODS.
4. The GWP values for refrigerant ODS (GWPi) must be taken from table B.1.
5. The 10-year cumulative emission rate for refrigerant ODS (ERrefr,i) must be taken from table B.1.
6. If the project did not destroy any refrigerant ODS, then BErefr = 0.

Equation 5.3. Project Baseline Emissions from Refrigerant ODS

|  |  |  |  |
| --- | --- | --- | --- |
|  | | | |
| *Where,* |  |  | Units |
| BErefr | = | Total mass of refrigerant project baseline emissions | mtCO2e |
| Qrefr,i | = | Total mass of refrigerant ODS *i* sent for destruction by the offset project | mtODS |
| ERrefr,i | = | 10-year cumulative emission rate of refrigerant ODS *i* from table B.1 | % |
| GWPi | = | The GWP value for ODS *i* from table B.1 | mtCO2e/ mtODS |

1. Baseline emissions from foam ODS (BEfoam) must be quantified using equation 5.4.
2. BEfoam must include the estimated CO2e emissions that would have occurred over ten years as the result of foam shredding and random dumping.
3. The GWP values for refrigerant ODS (GWPi) must be taken from table B.2.
4. The 10-year cumulative emission rate for appliance and building ODS (ERi,app,ERi,build) must be taken from table B.2.
5. The mass of the recovered and concentrated ODS blowing agent (Qrecover) from appliance foam must be calculated according to the procedures in appendix D.
6. The recovery efficiency (RE) of appliance foam ODS blowing agent must be calculated according to equation A.2.
7. The weight of intact building foam (Qfoam) must be calculated on the scales of the eligible destruction facility as specified in appendix C.
8. The mass fraction of ODS blowing agent in building foam (BA%) must be calculated according to appendix C.
9. If the project did not destroy any foam ODS, then BEfoam = 0.

Equation 5.4. Project Baseline Emissions from ODS Blowing Agent

|  |  |  |  |
| --- | --- | --- | --- |
|  | | | |
| *Where,* |  |  | Units |
| BEfoam | = | Total mass of ODS blowing agent project baseline emissions | mtCO2e |
| BAapp,i, | = | Total mass of ODS blowing agent *i* from appliance foam prior to treatment or processing, including blowing agent lost during processing | mtODS |
| BAbuild,i | = | Total mass of ODS blowing agent *i* from building foam sent for destruction | mtODS |
| ERi,app | = | 10-year emission rate of appliance ODS blowing agent *i* at end-of-life from table B.2 | % |
| ERi,build | = | 10-year emission rate of building ODS blowing agent *i* at end-of-life from table B.2 | % |
| GWPi | = | The GWP value for ODS *i* from table B.2 | mtCO2e/ mtODS |
|  | | | |
| *Where,* |  |  | Units |
| BAapp,i | = | Total mass of ODS foam blowing agent in foam prior to treatment or processing, including ODS foam blowing agent lost during processing | mtODS |
| Qrecover | = | Total mass of ODS foam blowing agent recovered during processing and sent for destruction, as determined according to appendix D | mtODS |
| RE | = | Recovery efficiency of the ODS foam blowing agent recovery process[[2]](#footnote-2) from equation A.2 (in appendix A) | % |
|  |  |  |  |
|  | | | |
| *Where,* |  |  |  |
| BAbuild | = | Total mass of ODS blowing agent *i* from building foam sent for destruction | mtODS |
| Qfoam | = | Total mass of foam with entrained ODS blowing agent sent for destruction | mt |
| BA% | = | Mass fraction of ODS blowing agent entrained in building foam, as determined according to appendix C | fraction (0-1) |

## 5.2. Quantifying Project Emissions

1. Project emissions (PE) must be quantified by summing the emissions for all SSRs identified as included in the project in table 4.1 using equation 5.5.

Equation 5.5. Total Project Emissions

|  |  |  |  |
| --- | --- | --- | --- |
|  | | | |
| *Where,* |  |  | Units |
| PE | = | Total mass of project emissions | mtCO2e |
| Subref | = | Total GHG emissions from substitute refrigerant | mtCO2e |
| BApr | = | Total mass of ODS blowing agent from appliance foam released during ODS extraction | mtCO2e |
| Tr | = | Total GHG emissions from transportation of ODS (calculated using either the default value in equation 5.8 or equation 5.10) | mtCO2e |
| Dest | = | Total GHG emissions from the process associated with destruction of ODS | mtCO2e |

1. Project emissions from substitute refrigerants (Subref) must be quantified using equation 5.6.
2. Subref must include the estimated CO2e emissions over a ten-year period from non-ODS substitute refrigerants that are used in their place. The emission factors for substitute refrigerants in table B.1 must be used.
3. The total mass of refrigerant ODS sent for destruction (Qrefi) excludes the mass of HBR, moisture, and ineligible ODS.
4. If the project did not destroy any refrigerant, then Subref = 0.

Equation 5.6. Project Emissions from the Use of Non-ODS Refrigerants

|  |  |  |  |
| --- | --- | --- | --- |
|  | | | |
| *Where,* |  |  | Units |
| Subrefr | = | Total mass of project emissions from substitute refrigerants | mtCO2e |
| Qref i | = | Total mass of refrigerant *i* sent for destruction | mt |
| SEi | = | Emission factor for substitute(s) for refrigerant *i*, from table B.1 | mtCO2e/ mtODS destroyed |

1. Project emissions from the release of ODS foam blowing agent during recovery from appliance foam (BApr) must be quantified using equation 5.7.
2. The recovery efficiency (RE) of appliance foam ODS blowing agent must be calculated according to equation A.2.
3. The mass of the recovered and concentrated ODS blowing agent (Qrecover) from appliance foam must be calculated according to the procedures in appendix D.
4. If the project did not destroy any foam ODS, then BApr = 0.

Equation 5.7. Calculating Project Emissions from the Release of ODS Blowing Agent during Processing

|  |  |  |  |
| --- | --- | --- | --- |
|  | | | |
| *Where,* |  |  | Units |
| BApr | = | Total mass of ODS blowing agent from appliance foam released during ODS extraction | mtCO2e |
| BAapp,i | = | Total mass of appliance ODS foam blowing agent in foam prior to treatment or processing, including ODS foam blowing agent lost during processing equation 5.4 | mtODS |
| RE | = | Recovery efficiency of the ODS foam blowing agent recovery process from equation A.2 | % |
| GWPi | = | GWP of ODS *i* from table B.2 | mtCO2e/ mtODS |
|  | | | |
| *Where,* |  |  | Units |
| BAapp,i | = | Total mass of ODS foam blowing agent in foam prior to treatment or processing, including ODS foam blowing agent lost during processing | mtODS |
| Qrecover | = | Total mass of ODS foam blowing agent recovered during processing and sent for destruction, as determined according to appendix D | mtODS |
| RE | = | Recovery efficiency of the ODS foam blowing agent recovery process[[3]](#footnote-3) from equation A.2 | % |
|  |  |  |  |

1. Project emission from the transportation and destruction of ODS may be quantified using default emission factors in equation 5.8.
   1. The default emission factor for ODS transportation and destruction (EFT&D) is 7.5 metric tons CO2e per metric ton ODS for refrigerant or extracted ODS blowing agent projects.
   2. The default emission factor for ODS transportation and destruction (EFT&D) is 75 metric tons CO2e per metric ton ODS for intact building foam projects.
   3. QTotalODS includes the mass of all eligible and ineligible ODS, moisture, HBR, and other accompanying material.

**Equation 5.8.** Project Emissions from Transportation and Destruction Using the Default Emission Factors

|  |  |  |  |
| --- | --- | --- | --- |
|  | | | |
| *Where,* |  |  | Units |
| Tr+Dest | = | Total GHG emissions from ODS transportation and destruction, as calculated using default emission factors | mtCO2e |
| QTotalODS, | = | Total mass of ODS *i*  sent for destruction in the project | mtODS |
| EFT&D | = | Default emission factor for transportation and destruction of ODS (7.5 for refrigerant or extracted ODS blowing agent projects, 75 for intact building foam projects) | mtCO2e/ mtODS |

1. If the transportation and destruction are not quantified using the default factors in equation 5.8, then equation 5.9 must be used to quantify site-specific ODS destruction emission (Dest), and equation 5.10 must be used to quantify ODS transportation emissions (Tr).
2. In both equation 5.9 and equation 5.10, Qdestroy is the total mass sent for destruction including ineligible ODS, HBR and water.

Equation 5.9. Project Emissions from the Destruction of ODS

|  |  |  |  |
| --- | --- | --- | --- |
|  | | | |
| *Where,* |  |  | Units |
| Dest | = | Total GHG emissions from the destruction of ODS | mtCO2e |
| FFdest | = | Total GHG emissions from fossil fuel used in the destruction facility | mtCO2 |
| ELdest | = | Total indirect GHG emissions from grid electricity used at the destruction facility | mtCO2 |
| ODSemissions | = | Total GHG emissions of undestroyed ODS | mtCO2e |
| ODSCO2 | = | Total GHG emissions of CO2 from ODS oxidation | mtCO2 |
| With: |  |  |  |
|  | | | |
| *Where,* |  |  | Units |
| FFdest | = | Total carbon dioxide emissions from the destruction of fossil fuel used to destroy ODS | mtCO2 |
| FFPR,k | = | Total fossil fuel *k* used to destroy ODS | unit of fossil fuel |
| EFFF,k | = | Fuel specific emission factor from table B.5 | kg CO2/ unit fossil fuel |
| 1000 | = | Conversion of kg to metric tons | kgCO2/ mtCO2 |
| And: |  |  |  |
|  | | | |
| *Where,* |  |  | Units |
| ELdest | = | Total carbon dioxide emissions from the consumption of electricity from the grid used to destroy ODS | mtCO2 |
| ELPR | = | Total electricity consumed to destroy ODS | MWh |
| EFEL | = | Carbon emission factor for electricity used from table B.6 | lb CO2/ MWh |
| And: |  |  |  |
|  | | | |
| *Where,* |  |  | Units |
| ODSemissions | = | Total GHG emissions of undestroyed ODS | mtCO2e |
| Qdestroy,i | = | Total mass of ODS *i*  sent for destruction in the project | mtODS |
| 0.0001 | = | Maximum allowable percent of ODS fed to destruction that is not destroyed |  |
| GWPi | = | The GWP value for ODSi from table B.1 | mtCO2e/ mtODS |
| And: |  |  |  |
|  | | | |
| ODSCO2 | = | Total GHG emissions of CO2 from ODS oxidation | mtCO2 |
| Qdestroy,i | = | Total mass of ODS *i*  sent for destruction in the project | mtODS |
| 0.9999 | = | Minimum destruction efficiency of destruction facility |  |
| CRi | = | Carbon ratio of ODS*i* fromtable B.3 | mole C/ mole ODS |
| 3.667 | = | Ratio of CO2 to C |  |

1. A ton-mile is (TMTi) is the product of the distance travelled in miles and the mass of ODS, any accompanying materials, and containers transported in metric tons.
2. Emissions shall be calculated for each leg of the transportation process separately and then summed according to equation 5.10.

Equation 5.10. Calculating Project Emissions from the Transportation of ODS

|  |  |  |  |
| --- | --- | --- | --- |
|  | | | |
| *Where,* |  |  | Units |
| Tr | = | Total GHG emissions from transportation of ODS | mtCO2e |
| TMTi | = | Ton-miles-traveledfor ODS *i* destroyed | mt-miles |
| EFTMT | = | CO2 emissions per mt-mile-traveled from table B.4 | kgCO2 / mt-mile |
| 1000 | = | Conversion from kg to mt | kg/mt |

## 5.3. Accounting for Ineligible ODS Material After Destruction

ARB or registry offset credits may only be generated for the destruction of eligible ODS. Any ODS, whose eligibility cannot be determined, must be removed from baseline emission calculations. The following method must be used to determine the weight and ODS species of the ineligible ODS:

1. The weight of each ineligible container of ODS shall be the weight the container is designed to carry if full. If a container’s capacity is labelled in volume rather than in weight, the ODS densities in table B.3 must be used to convert the volume to weight.
2. The species of each ineligible ODS shall be the species with the highest GWP of the destruction event.
3. The determined weight of ineligible ODS shall be subtracted from the total mass of that ODS species destroyed in the project.
4. The total mass of refrigerant ODS sent for destruction (Qrefr,i) shall be adjusted in equation 5.3.
5. The total mass of ODS foam blowing agent in foam prior to treatment or processing, including ODS foam blowing agent lost during processing (BAapp,i) shall be adjusted in equation 5.4.
6. The total mass of ODS blowing agent from building foam sent for destruction (BAbuild,i) shall be adjusted in equation 5.4.

## 5.4. Conversion Factors and Rounding Practices

1. For the purpose of this protocol, 1 pound (lb) equals 0.45359 kilogram (Kg).

(b) The following rounding practices shall be applied for the purpose of this protocol:

1. At least five significant figures shall be maintained.
2. There shall be no rounding to the left side of the decimal.

# Chapter 6. Monitoring

## 6.1. General Monitoring Requirements.

1. The Offset Project Operator or, if applicable, the Authorized Project Designee is responsible for monitoring all project activities to ensure compliance with the requirements of the Regulation and this protocol.
2. The point of origin of all ODS must be documented. To be eligible to receive ARB offset credits or registry offset credits, the Offset Project Operator or, if applicable, the Authorized Project Designee must collect and maintain documentation showing regulatory compliance back to all points of origin.
3. Documentation of the point of origin must include all of the following:
   * 1. Facility name and physical address;
     2. Point of origin zip code;
     3. Identification of any refrigeration system by serial number, if available, or description, location, and function, if serial number is unavailable (for quantities greater than 500 pounds); and
     4. Serial or ID number of containers used for storage and transport.
4. The Offset Project Operator or, if applicable, Authorized Project Designee must collect and maintain documentation on the chain of custody and ownership of the ODS beginning at the point of origin until destruction, including all of the following:
   * 1. Names, addresses, and contact information of all entities buying and selling ODS for destruction; and
     2. The mass of ODS, including ineligible ODS and contaminants, at each transaction.
5. The Offset Project Operator or, if applicable, the Authorized Project Designee must collect and maintain all of the following information:
6. For building foams:
   1. Building address;
   2. Date of construction;
   3. Blowing agent used; and
   4. Approximate building dimensions.
7. For ODS blowing agent recovered from appliance foam:
   1. Number of appliances processed;
   2. Facility at which ODS foam blowing agent is extracted to concentrated form; and
   3. Facility at which appliance de-manufacture occurs, if applicable.
8. For concentrated ODS composition and mass analysis all of the following information must be collected and maintained by the Offset Project Operator or, if applicable, the Authorized Project Designee:
   * 1. Time and date of sample;
     2. Name of Offset Project Operator or Authorized Project Designee;
     3. Name of technician taking sample;
     4. Employer of technician taking sample;
     5. Volume of container from which sample was extracted;
     6. Ambient air temperature at time of sampling; and
     7. Chain of custody for each sample from the point of sampling to the AHRI lab.
9. The destruction facility must track continuously during the ODS destruction process the following parameters and provide the data about these parameters to the Offset Project Operator or, if applicable, Authorized Project Designee. The Offset Project Operator or, if applicable, the Authorized Project Designee must collect and maintain all of the following information from the destruction facility:
   1. The ODS feed rate;
   2. The amount and type of consumables used in the process (not required if default project emission factor for transportation and destruction is used);
   3. The amount of electricity and amount and type of fuel consumed by the destruction unit (not required if default project emission factor for transportation and destruction is used);
   4. Operating temperature and pressure of the destruction unit during ODS destruction;
   5. Effluent discharges measured in terms of water and pH levels; and
   6. CEMS data on the emissions of carbon monoxide during ODS destruction.

## 6.2. Point of Origin Determination

1. The Offset Project Operator or, if applicable, Authorized Project Designee must collect and maintain data on the point of origin of each quantity of ODS as part of tracking chain of custody. Data must be generated at the time of collection from the point of origin.
2. Point of origin is defined as:
   1. The point of origin for refrigerant ODS which is stockpiled more than 24 months before acquisition by the Offset Project Operator and which was added to the stockpile before January 1, 2015 is the stockpile.
   2. The point of origin for refrigerant ODS which is stockpiled more than 24 months prior to acquisition by the Offset Project Operator and which was added to the stockpile after December 31, 2014, is the site at which greater than or equal to 500 pounds of ODS is first aggregated into a single or multiple containers after December 31, 2014. The point of origin may be the stockpile or a site prior to the ODS entering the stockpile.
   3. The point of origin for refrigerant ODS quantities less than 500 pounds is the site at which greater than or equal to 500 pounds of ODS is aggregated into a single or multiple containers.
   4. The point of origin for refrigerant ODS greater than or equal to 500 pounds is the site where the ODS is removed.
   5. The point of origin for ODS blowing agent extracted from foam is the facility where the ODS is extracted.
   6. The point of origin for ODS blowing agent in building foam is the location from which the building foam was taken.
3. Any point at which 500 pounds is reached in a single transaction or shipment is a point of origin; the 500 pounds does not need to be in a single container.
4. If equipment, including air-conditioning or refrigeration equipment, containing over 500 pounds ODS is transported prior to the ODS being removed from the equipment, then the point of origin is the site at which the ODS is removed from the equipment.
5. When ODS is combined into a single larger container for stockpiling and a portion of the ODS is subsequently removed from the container, the ODS removed must be considered the ODS stored the longest (i.e. first-in, first-out method).

## 6.3. Instrument QA/QC

Scales used to determine the mass of ODS used in calculating emission reductions must be inspected and calibrated at least quarterly.

## 6.4. Document Retention

1. The Offset Project Operator or, if applicable, Authorized Project Designee is required to keep all documentation and information outlined in the Regulation and this protocol. Record retention requirements are set forth in section 95976 of the Regulation.
2. Information that must be retained by the Offset Project Operator or Authorized Project Designee includes:
3. All data inputs for the calculation of the offset project emission reductions, including all required sampled data;
4. Copies of all permits, Notices of Violations (NOVs), and any relevant administrative or legal consent orders dating back at least 3 years prior to the project commencement date;
5. Destruction facility monitor information (CEMS data, DRE documentation, scale readings, calibration procedures, and permits);
6. Chain of custody and point of origin documentation; and
7. ODS composition and mass lab reports.

## 6.5. Monitoring Parameters – Quantification Methodology

The Offset Project Operator or, if applicable, Authorized Project Designee must monitor the parameters described in table 6.1.

Table 6.1. ODS Project Monitoring Parameters – Quantification Methodology

| **Eq. #** | **Parameter** | **Description** | **Data Unit** | **Measurement Frequency** | **Calculated (c) Measured (m) Reference (r)**  **Operating records (o)** | **Comment** |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | Legal Requirement Test | N/A | For each offset project |  | Must be monitored and determined for each project |
|  |  | Mass of ODS (or ODS mixture) in each container | mass of mixture | Per container | m | Must be determined for each container |
|  |  | Concentration of ODS (or ODS mixture) in each container | mass ODS/ mass of mixture | Per container | m | Must be determined for each container |
| 5.1 | ERt | Total mass of GHG emission reductions during the reporting period | tCO2e | For each offset project | c |  |
| 5.1, 5.2 | BEt | Total mass of project baseline emissions during the reporting period | tCO2e | For each offset project | c |  |
| 5.1, 5.5 | PEt | Total mass of project emissions during the reporting period | tCO2e | For each offset project | c |  |
| 5.2, 5.3 | BErefr | Total mass of project baseline emissions from refrigerant ODS | tCO2e | For each offset project | c |  |
| 5.2, 5.4 | BEfoam | Total mass of project baseline emissions from ODS blowing agent | tCO2e | For each offset project | c |  |
| 5.3, 5.6 | Qrefr,i | Total mass of refrigerant ODS *i* sent for destruction | tODS | For each offset project | m |  |
| 5.3 | ERrefr,i | 10-year cumulative emission rate of refrigerant ODS *i* | 0 - 1.0 | N/A | r | See table B.1 |
| 5.3, 5.4, 5.7, 5.10 | GWPi | GWP of ODS *i* | tCO2e/ tODS | N/A | r | See table B.1 |
| 5.4, 5.7 | BAapp,i, | Total mass of ODS blowing agent *i* from appliance foam prior to treatment or processing, including blowing agent lost during processing | tODS | For each offset project | c |  |
| 5.4 | BAbuild,i | Total mass of ODS blowing agent *i* from building foam sent for destruction. | tODS | For each offset project | c |  |
| 5.4 | ERi,j | Lifetime emission rate of ODS blowing agent *i* from application *j* at end-of-life (see table B.1) | % (0-1) | N/A | r |  |
| 5.4 | Qrecover | Total mass of ODS foam blowing agent recovered during processing and sent for destruction | tODS | For each offset project | m |  |
| 5.4, 5.7 | RE | Recovery efficiency of the ODS foam blowing agent recovery process | % (0-1) | Once for each offset project | c | See appendix A. |
| 5.4 | Qfoam | Total weight of foam with entrained ODS blowing agent sent for destruction | Metric tons | For each offset project | m |  |
| 5.4 | BA% | Mass ratio of ODS blowing agent entrained in building foam, as determined according to appendix C | % (0-1) | For each offset project | m |  |
| 5.5, 5.6 | Subrefr | Total GHG emissions from substitute refrigerant | tCO2e | For each offset project | c |  |
| 5.5, 5.7 | BApr,i | Total mass of ODS foam blowing agent *i* from appliance foam released during ODS extraction | tCO2e | For each offset project | c |  |
| 5.5, 5.8, 5.10 | Tr | Total GHG emissions from transportation of ODS | tCO2e | For each offset project | c |  |
| 5.5, 5.8, 5.9 | Dest | Total GHG emissions from the destruction process associated with destruction of ODS | tCO2e | For each offset project | c |  |
| 5.6 | SEi | Emission factor for substitute emissions of refrigerant *i*, per table 5.5 | tCO2e/ tODS destroyed | Per container | r | See table B.1 |
| 5.8, 5.10 | QODS,i | Total mass of ODS *i* sent for destruction | tODS | For each offset project | m |  |
| 5.8 | EFi | Default emission factor for transportation and destruction of ODS *i* | tCO2e/ tODS | N/A | r | Equal to 7.5 for refrigerant projects, and 75 for foam projects |
| 5.9, 5.10 | FFdest | Total GHG emissions from fossil fuel used in the destruction facility | tCO2e | For each offset project | c | Use only if calculating site-specific project emissions from ODS destruction |
| 5.9, 5.10 | ELdest | Total GHG emissions from grid electricity at the destruction facility | tCO2e | For each offset project | c | Use only if calculating site-specific project emissions from ODS destruction |
| 5.10 | FFPR,k | Total fossil fuel *k* used to destroy ODS | tCO2e | For each offset project | m | Use only if calculating site-specific project emissions from ODS destruction |
| 5.10 | EFFF,k | Fuel specific emission factor | kgCO2/ volume fuel | N/A | r | Use only if calculating site-specific project emissions from ODS destruction |
| 5.10 | ELPR | Total electricity consumed to destroy ODS | MWh | For each offset project | m | Use only if calculating site-specific project emissions from ODS destruction |
| 5.10 | EFEL | Carbon emission factor for electricity used | lbCO2/ MWh | N/A | m | Use only if calculating site-specific project emissions from ODS destruction |
| 5.10 | ODSemissions | Total GHG emissions of un-destroyed ODS | tCO2e | For each offset project | c | Use only if calculating site-specific project emissions from ODS destruction |
| 5.10 | ODSCO2 | Total emissions of CO2 from ODS oxidation | tCO2 | For each offset project | c | Use only if calculating site-specific project emissions from ODS destruction |
| 5.10 | CRi | Carbon ratio of ODS *i* | mole C/ mole ODS | N/A | r | Use only if calculating site-specific project emissions from ODS destruction |
| 5.10 | TMTi | Metric ton-miles-traveled for ODS *i* destroyed | Metric ton-miles | For each offset project | m | Use only if calculating site-specific project emissions from ODS transportation |
| 5.10 | EFTMT | Mode-specific emission factor | kgCO2/ metric ton-mile | N/A | r | Use only if calculating site-specific project emissions from ODS transportation |

## 6.6. Other Monitoring Requirements – Quantification Methodology

This subchapter provides monitoring requirements in addition to the general requirements in subchapter 6.1.

* + - 1. When transporting foam recovered from buildings or appliances, all recovered foam pieces must be placed in air-tight and water-tight storage until arrival at the destruction facility.
  1. Projects using this protocol to quantify emission reductions from recovering and destroying concentrated ODS blowing agents must meet all of the following requirements:

1. The ODS blowing agent must be extracted from the foam to a concentrated foam prior to destruction.
2. The extraction must occur under negative pressure.
3. The recovered ODS blowing agent must be collected, stored, and transported in containers meeting DOT standards for refrigerants.
4. The processes, training, QA/QC, and management systems relevant to the collection, storage, and transport of the ODS blowing agent must be documented.
   1. Projects destroying ODS blowing agent recovered from foam must follow the procedures in appendix C. The Offset Project Operator or, if applicable, the Authorized Project Designee must collect and maintain documentation showing conformance with the procedures in appendix C.
   2. Projects destroying concentrated ODS must follow the procedures in appendix D. The Offset Project Operator or, if applicable, the Authorized Project Designee must collect and maintain information showing conformance with the procedures in appendix D.

# Chapter 7. Reporting

General requirements for reporting and record retention are included in the Regulation. In addition to the offset project requirements in sections 95975 and 95976 of the Regulation, ODS offset projects must follow the project listing and reporting eligibility requirements below.

## 7.1. Project Listing Requirements

* + - 1. Listing information must be submitted by the Offset Project Operator or Authorized Project Designee no later than the date on which the Offset Project Operator or Authorized Project Designee submits the first Offset Project Data Report.
      2. In order for an ODS Compliance Offset Project to be listed, the Offset Project Operator or Authorized Project Designee must submit the information listed in section 95975 of the Regulation and the following information:

1. Offset project name and identification number(s);
2. Name and CITSS ID number for the:
   1. Offset Project Operator; and,
   2. Authorized Project Designee (if applicable);
3. Contact information for both the Offset Project Operator and, if applicable the Authorized Project Designee, including all of the following information:
   1. Entity’s mailing address;
   2. Entity’s physical address, if different from the mailing address;
   3. Contact person’s name;
   4. Contact person’s phone number; and
   5. Contact person’s email address;
4. Contact information including name, phone number, email address, and if applicable, the organizational affiliation for:
   1. The person submitting the listing information;
   2. Technical Consultants; and
   3. Other Parties with a Material Interest;
5. Date of form completion;
6. Offset project Description (1-2 paragraphs);
7. List of all points of origin by US state for ODS sourced for this project;
8. All ODS species that will be destroyed under this project:
   1. Refrigerant Destruction: CFC-11, CFC-12, CFC-13, CFC-113, CFC-114, and CFC-115;
   2. Destruction of ODS Blowing agent in intact building foam: CFC-11, CFC-12, HCFC-22, and HCFC-141b; and
   3. Destruction of concentrated ODS blowing agent in appliance foam: CFC-11, CFC-12, HCFC-22, and HCFC-141b;
9. Name of destruction facility;
10. Address of destruction facility;
11. Indication whether the destruction facility is a RCRA-permitted HWC;
12. If the destruction facility is not a RCRA-permitted HWC, indication whether the facility has met the TEAP requirements for ODS destruction;
13. Offset project commencement date;
14. Initial reporting period start and end dates;
15. Indication whether any GHG reductions associated with the offset project have ever been registered with or claimed by another registry or program, or sold to a third party prior to our listing; if so, identification of the registry or program, as well as vintage and reporting period;
16. Indication whether the offset project is being implemented and conducted as the result of any law, statute, regulation, court order, or other legally binding mandate. If so, an explanation must also be provided;
17. Indication whether an Offset Project Data Report has been developed and, if not, the date it will it be in place;
18. For appliance foam projects only, indication whether the offset project-specific recovery efficiency has been determined and, if yes, the factor or, if not, the date when will this factor be established;
19. Indication whether any of the destroyed ODS was or will be sources from the US government and, if so, how much; and
20. Indication whether any of the destroyed ODS was or will be considered hazardous waste under US, state or local law and, if so, an explanation and how much.

## 7.2. Offset Project Data Report Requirements

* + - 1. The Offset Project Operator or Authorized Project Designee must submit an Offset Project Data Report (OPDR) at the conclusion of each Reporting Period according to the reporting schedule in section 95976 of the Regulation.
      2. The Offset Project Operator or Authorized Project Designee must submit the information required by section 95976 of the Regulation and the following information:

1. Offset project name and identification number(s);
2. Name and CITSS ID number for the:
   1. Offset Project Operator; and,
   2. Authorized Project Designee (if applicable);
3. Contact information for both the Offset Project Operator and, if applicable the Authorized Project Designee, including all of the following information:
   1. Entity’s mailing address;
   2. Entity’s physical address, if different from mailing address;
   3. Contact person’s name;
   4. Contact person’s phone number; and
   5. Contact person’s email address;
4. Contact information including name, phone number, email address, and, if applicable, the organizational affiliation for the person submitting the reporting information;
5. Date OPDR completed;
6. Reporting period start and end dates;
7. Indication whether the offset project meets all local, state, or federal regulatory requirements;
8. Date(s) of ODS destruction;
9. Destruction facility name and location;
10. ODS species destroyed;
11. Mass and composition of ODS as determined by the processes outlined in appendix C and appendix D of this protocol;
12. Names of all parties and their contact information included in the chain of custody documentation;
13. Indication whether all the information in the offset project listing is still accurate. If not, provide updates;
14. Project baseline emissions;
15. Project emissions; and
16. Total GHG emission reductions.

# Chapter 8. Regulatory Verification Requirements

1. All Offset Project Data Reports are subject to regulatory verification pursuant to section 95977 of the Regulation by an ARB accredited offset verification body.
2. The Offset Project Data Reports must receive a positive or qualified positive verification statement to be issued ARB or registry offset credits.
3. Although verifiers may combine multiple projects into one site visit if they all are at the same destruction facility, each offset project’s data must be verified separately.
4. An ODS offset project requires only one site visit regardless of the number of destruction events within that reporting period.
5. For the purpose of this protocol, the site visit must include a visit to the destruction facility. The site visit may also include a visit to the OPO’s office(s) where all project-related documents and data were produced, managed, and retained. The site visit may also include a visit to any facility in the chain of custody, such as an aggregation facility or other point of origin.

Appendix A. Appliance Foam Recovery Efficiency and Calculations – Quantification Methodology

A.1 Calculating Recovery Efficiency

* + - * 1. All appliance foam projects must calculate a recovery efficiency based on a run of a minimum ten appliances.
        2. The concentration of ODS blowing agent in PU foam prior to any appliance treatment shall either be assumed to be 14.9% or calculated according to the steps below:

1. Four PU foam samples must be cut using a reciprocating saw from each appliance, one sample each from the left side, right side, top, and bottom. Each sample must be at least four inches square and maintain the full thickness of the insulation.
2. The cut edges of each foam sample shall be sealed using aluminum tape or similar product that prevents off-gassing.
3. Each sample must be individually labeled to record appliance model and site of sample (left, right, top, or bottom).
4. The samples must be analyzed according to the procedures dictated for building foam in appendix C.(b)(3). Each sample may be analyzed individually, or a single analysis for each appliance may be done using equal masses of foam from each sample.
5. Based on the average of the samples for each appliance, the 90% upper confidence limit of the concentration must be calculated and used as the parameter BAconc in equation A.1.
   * + - 1. The ODS blowing agent from the sampled appliances must be collected and quantified according to the following steps:

All samples must be processed (minimum of 40).

Processing must begin with all equipment shut down and emptied of all materials.

The blowing agent (BA) shall be extracted, collected, and concentrated.

The mass of the recovered blowing agent shall be determined by comparison of the mass of the fully evacuated receiving containers to their mass when filled.

This value shall be used as the parameter BApost in equation A.2.

* + - * 1. The quantity of foam in the processed appliances must be established either through use of a default value of 12.9 pounds per appliance, or according to the following steps:

1. All foam residual, which may be in a fluff, powder, or pelletized form, must be separated and collected. The separation and collection processes must be documented to demonstrate that no significant quantity of foam residual is lost in the air or other waste streams.
2. Non-foam components in the residual (e.g., plastic) may be manually separated to determine a mass percent of foam in residual. Separation must be done on at least one kilogram of residual, and must result in at least 90% foam.
3. The total recovered foam residual must be weighed and multiplied by the percent foam in residual, if applicable, to calculate the total mass of foam recovered. This value shall be used as the parameter Foamres in equation A.1.
   * + - 1. If the value of 12.9 pounds per appliance is used, it shall be multiplied by the number of appliances processed to determine Foamres in the calculation of recovery efficiency.
         2. The calculated values for BAconc, BApost, and Foamres shall be used in equation A.1 to calculate BAinit in equation A.1 and RE in equation A.2

**Equation A.1.** Initial Blowing Agent

|  |  |  |  |
| --- | --- | --- | --- |
|  | | | |
| *Where,* |  |  | Units |
| Foamres | = | Mass of foam recovered | lbs foam |
| BAconc | = | Initial concentration of blowing agent in PU foam | lbs BA / lbs PU |
| BAinit | = | Initial mass of blowing agent in appliances prior to treatment | lbs BA |

**Equation A.2.** Recovery Efficiency

|  |  |  |  |
| --- | --- | --- | --- |
|  | | | |
| *Where,* |  |  | Units |
| RE | = | Recovery efficiency | % |
| BApost | = | Mass of recovered blowing agent in concentrated form | lbs BA |
| BAinit | = | Initial mass of blowing agent in appliances prior to treatment | lbs BA |

Appendix B. Emission Factor Tables – Quantification Methodology

Table B.1. Parameters for ODS Refrigerants

|  |  |  |  |
| --- | --- | --- | --- |
| **ODS** | **100-yr Global Warming Potential**  **(t CO2e/t ODS)**  **(GWPi)** | **10-year Cumulative Emission Rate  (%/10 years)**  **(*ERrefr*)** | **Substitute Emissions (t CO2e/t ODS)**  **(*SEi*)** |
| CFC-11 | 4,750 | 89% | 223 |
| CFC-12 | 10,900 | 95% | 686 |
| CFC-13 | 14,400 | 61% | 7,144 |
| CFC-113 | 6,130 | 89% | 220 |
| CFC-114 | 10,000 | 78% | 659 |
| CFC-115 | 7,370 | 61% | 1,139 |

Table B.2. Parameters for ODS Foam

|  |  |  |  |
| --- | --- | --- | --- |
| **ODS Blowing Agent** | **100-yr Global Warming Potential**  **(t CO2e/t ODS)**  **(GWPi)** | **Appliance ODS blowing agent 10-year emission rate**  **(ERi,app)** | **Building ODS blowing agent 10-year emission rate**  **(ERi,build)** |
| CFC-11 | 4,750 | 44% | 20% |
| CFC-12 | 10,900 | 55% | 36% |
| HCFC-22 | 1,810 | 75% | 65% |
| HCFC-141b | 725 | 50% | 29% |

Table B.3. ODS Carbon Ratio and Density

|  |  |  |
| --- | --- | --- |
| **ODS** | **Carbon Ratio**  **(CRi)** | **Density (g/cm3)** |
| CFC-11 | 12/137 | 1.494 |
| CFC-12 | 12/121 | 1.486 |
| CFC-13 | 12/104 | 1.526 |
| CFC-113 | 24/187 | 1.560 |
| CFC-114 | 24/171 | 1.455 |
| CFC-115 | 24/154 | 1.568 |
| HCFC-22 | 12/87 | 3.66 |
| HCFC-141b | 24/117 | 1.25 |

Table B.4. CO2 emissions per ton-mile-traveled

|  |  |
| --- | --- |
| **Transport Mode** | **kgCO2 / ton-mile** |
| On-road truck transport | 0.297 |
| Rail transport | 0.0252 |
| Waterborne craft | 0.048 |
| Aircraft | 1.5279 |

Table B.5. CO2 Emission Factors for Fossil Fuel Use

|  |  |  |  |
| --- | --- | --- | --- |
| **Fuel Type** | **Default High Heat Value** | **Default CO2 Emission Factor** | **Default CO2 Emission Factor** |
| **Coal and Coke** | **MMBtu / short ton** | **kg C~~o~~O2 / MMBtu** | **kg CO2 / short ton** |
| Anthracite | 25.09 | 103.54 | 2597.819 |
| Bituminous | 24.93 | 93.40 | 2328.462 |
| Subbituminous | 17.25 | 97.02 | 1673.595 |
| Lignite | 14.21 | 96.36 | 1369.276 |
| Coke | 24.80 | 102.04 | 2530.592 |
| Mixed (Commercial sector) | 21.39 | 95.26 | 2037.611 |
| Mixed (Industrial coking) | 26.28 | 93.65 | 2461.122 |
| Mixed (Electric Power sector) | 19.73 | 94.38 | 1862.117 |
| **Natural Gas** | **MMBtu / scf** | **kg CO2 / MMBtu** | **kg CO2 / scf** |
| (Weighted U.S. Average) | 1.028 x 10-3 | 53.02 | 0.055 |
| **Petroleum Products** | **MMBtu / gallon** | **kg CO2 / MMBtu** | **kg CO2 / gallon** |
| Distillate Fuel Oil No. 1 | 0.139 | 73.25 | 10.182 |
| Distillate Fuel Oil No. 2 | 0.138 | 73.96 | 10.206 |
| Distillate Fuel Oil No. 4 | 0.146 | 75.04 | 10.956 |
| Distillate Fuel Oil No. 5 | 0.140 | 72.93 | 10.210 |
| Residual Fuel Oil No. 6 | 0.150 | 75.10 | 11.265 |
| Used Oil | 0.135 | 74.00 | 9.990 |
| Kerosene | 0.135 | 75.20 | 10.152 |
| Liquefied petroleum gases (LPG) | 0.092 | 62.98 | 5.794 |
| Propane | 0.091 | 61.46 | 5.593 |
| Propylene | 0.091 | 65.95 | 6.001 |
| Ethane | 0.069 | 62.64 | 4.322 |
| Ethanol | 0.084 | 68.44 | 5.749 |
| Ethylene | 0.100 | 67.43 | 6.743 |
| Isobutane | 0.097 | 64.91 | 6.296 |
| Isobutylene | 0.103 | 67.74 | 6.977 |
| Butane | 0.101 | 65.15 | 6.580 |
| Butylene | 0.103 | 67.73 | 6.976 |
| Naphtha (<401 deg F) | 0.125 | 68.02 | 8.503 |
| Natural Gasoline | 0.110 | 66.83 | 7.351 |
| Other Oil (>401 deg F) | 0.139 | 76.22 | 10.595 |
| Pentanes Plus | 0.110 | 70.02 | 7.702 |
| Petrochemical Feedstocks | 0.129 | 70.97 | 9.155 |
| Petroleum Coke | 0.143 | 102.41 | 14.645 |
| Special Naphtha | 0.125 | 72.34 | 9.043 |
| Unfinished Oils | 0.139 | 74.49 | 10.354 |
| Heavy Gas Oils | 0.148 | 74.92 | 11.088 |
| Lubricants | 0.144 | 74.27 | 10.695 |
| Motor Gasoline | 0.125 | 70.22 | 8.778 |
| Aviation Gasoline | 0.120 | 69.25 | 8.310 |
| Kerosene-Type Jet Fuel | 0.135 | 72.22 | 9.750 |
| Asphalt and Road Oil | 0.158 | 75.36 | 11.907 |
| Crude Oil | 0.138 | 74.49 | 10.280 |
| **Other fuels (solid)** | **MMBtu / short ton** | **kg CO2 / MMBtu** | **kg CO2 / short ton** |
| Municipal Solid Waste | 9.95~~1~~ | 90.7 | 902.465 |
| Tires | 26.87 | 85.97 | 2310.014 |
| Plastics | 38.00 | 75.00 | 2850.000 |
| Petroleum Coke | 30.00 | 102.41 | 3072.300 |
| **Other fuels (gaseous)** | **MMBtu / scf** | **kg CO2 / MMBtu** | **kg CO2 / scf** |
| Blast Furnace Gas | 0.092 x 10-3 | 274.32 | 0.025 |
| Coke Oven Gas | 0.599 x 10-3 | 46.85 | 0.028 |
| Propane Gas | 2.516 x 10-3 | 61.46 | 0.155 |
| Fuel Gas~~2~~ | 1.388 x 10-3 | 59.00 | 0.082 |
| **Biomass Fuels – (solid)** | **MMBtu / short ton** | **kg CO2 / MMBtu** | **kg CO2 / short ton** |
| Wood and Wood Residuals | 15.38 | 93.80 | 1442.644 |
| Agricultural Byproducts | 8.25 | 118.17 | 974.903 |
| Peat | 8.00 | 111.84 | 894.720 |
| Solid Byproducts | 25.83 | 105.51 | 2725.323 |
| **Biomass Fuels – (gaseous)** | **MMBtu / scf** | **kg CO2 / MMBtu** | **kg CO2 / scf** |
| Biogas (Captured methane) | 0.841 x 10-3 | 52.07 | 0.044 |
| **Biomass Fuels – (liquid)** | **MMBtu / gallon** | **kg CO2 / MMBtu** | **kg CO2 / gallon** |
| Ethanol | 0.084 | 68.44 | 5.749 |
| Biodiesel | 0.128 | 73.84 | 9.452 |
| Rendered Animal Fat | 0.125 | 71.06 | 8.883 |
| Vegetable Oil | 0.120 | 81.55 | 9.786 |

Table B.6. CO2 Electricity Emission Factors

|  |  |  |  |
| --- | --- | --- | --- |
| **eGRID** | **eGRID subregion name** | **Annual output emission rates** | |
| **subregion** |
| **acronym** | **(lb CO2/MWh)** | **(metric ton CO2/MWh)\*** |
| AKGD | ASCC Alaska Grid | 1,232.36 | 0.559 |
| AKMS | ASCC Miscellaneous | 498.86 | 0.226 |
| AZNM | WECC Southwest | 1,311.05 | 0.595 |
| CAMX | WECC California | 724.12 | 0.328 |
| ERCT | ERCOT All | 1,324.35 | 0.601 |
| FRCC | FRCC All | 1,318.57 | 0.598 |
| HIMS | HICC Miscellaneous | 1,514.92 | 0.687 |
| HIOA | HICC Oahu | 1,811.98 | 0.822 |
| MROE | MRO East | 1,834.72 | 0.832 |
| MROW | MRO West | 1,821.84 | 0.826 |
| NEWE | NPCC New England | 927.68 | 0.421 |
| NWPP | WECC Northwest | 902.24 | 0.409 |
| NYCW | NPCC NYC/Westchester | 815.45 | 0.370 |
| NYLI | NPCC Long Island | 1,536.80 | 0.697 |
| NYUP | NPCC Upstate NY | 720.80 | 0.327 |
| RFCE | RFC East | 1,139.07 | 0.517 |
| RFCM | RFC Michigan | 1,563.28 | 0.709 |
| RFCW | RFC West | 1,537.82 | 0.698 |
| RMPA | WECC Rockies | 1,883.08 | 0.854 |
| SPNO | SPP North | 1,960.94 | 0.889 |
| SPSO | SPP South | 1,658.14 | 0.752 |
| SRMV | SERC Mississippi Valley | 1,019.74 | 0.463 |
| SRMW | SERC Midwest | 1,830.51 | 0.830 |
| SRSO | SERC South | 1,489.54 | 0.676 |
| SRTV | SERC Tennessee Valley | 1,510.44 | 0.685 |
| SRVC | SERC Virginia/Carolina | 1,134.88 | 0.515 |



Figure B.1. Map of eGRID2007 Subregions

Appendix C. ODS Mass and Composition from Foam Projects – Quantification Methodology

ODS blowing agent from building insulation foam may be extracted and concentrated or may be destroyed intact without extraction. If destroyed intact, the procedures described in this appendix must be followed.

1. The foam’s mass shall be determined on scales at the destruction facility. The scales must be calibrated at least quarterly with a demonstrated accuracy of +/-5%.
2. To determine the composition and mass ratio of the ODS foam blowing agent(s) present in the foam at least two samples per building surface (e.g., wall, roof) must be taken. The samples must conform to all of the following requirements:
   1. Each must sample must be at least 2 inches in length, 2 inches in width, and 2 inches thick;
   2. For storage and transport, each sample must be placed and sealed in a separate air-tight and water-tight container that is at least 2 millimeters thick;
   3. The analysis of ODS foam blowing agent content and mass ratio shall be performed at an independent laboratory unaffiliated with the Offset Project Operator or Authorized Project Designee. The analysis shall be done using one of the two following methods: (1) ASTM Method D 7132-05 Standard Test Method for Determination of Retained Blowing Agent in Extruded Polystyrene Foam or (2) the heating method to extract ODS foam blowing agent from the foam samples described in Scheutz *et al*. (2007). The Scheurtz method must include all of the following steps:
   4. Each sample shall be prepared to a thickness no greater than 1 cm, placed in a 1123 mL glass bottle, weighed using a calibrated scale, and sealed with Teflon-coated septa and aluminum caps;
   5. To release the ODS blowing agent from the foam, the samples must be incubated in an oven for 48 hours at 140 degrees C;
   6. When cooled to room temperature, gas samples must be redrawn from the headspace and analyzed by gas chromatography;
   7. The lids must be removed after analysis, and the headspace must be flushed with atmospheric air for approximately 5 minutes using a compressor. Afterwards, septa and caps must be replaced and the bottles subjected to a second 48-hr heating step to drive out the remaining ODS blowing agent from the sampled foam; and
   8. When cooled down to room temperature after the second heating step, gas samples must be redrawn from the headspace and analyzed by gas chromatography;.
   9. The mass of ODS blowing agent(s) recovered shall then be divided by the total mass of the initial foam samples prior to analysis to determine the mass fraction of each ODS foam blowing agent present; and
   10. The results from all samples from a single building shall be averaged to determine the mass fraction of blowing agent in foam (BA%) used in equation 5.4.

Appendix D. ODS Mass and Composition from Concentrated ODS – Quantification Methodology

Prior to destruction, the precise mass and composition of both ODS refrigerants and concentrated ODS blowing agent must be determined. The following analysis must be conducted:

1. Mass must be determined by individually measuring the weight of each container of ODS first when it is full prior to destruction and then after it has been emptied and the contents have been fully purged and destroyed. The mass of ODS and any contaminants is equal to the difference between the full and empty weight, as measured. To be eligible to receive ARB offset credits or registry offset credits, all of the following requirements must be met when weighing the containers of ODS:
2. A single scale must be used for generating both the full and empty weight tickets at the destruction facility;
3. The scale used must be properly calibrated per the facility’s RCRA permit, or for non-RCRA facilities calibrated at least quarterly to an accuracy of within 5% of reading. RCRA facilities that do not have calibration requirements defined in their RCRA permits must calibrate scales quarterly to an accuracy of within 5% of reading;
4. The full weight must be measured no more than 48 hours prior to commencement of destruction per the Certificate of Destruction;
5. The empty weight must be measured no more than 48 hours after the conclusion of destruction per the Certificate of Destruction; and
6. Each single compartment, cylinder, drum, or any other eligible ODS container arriving at the destruction facility must be weighed separately, sampled separately, and treated as a separate destruction event.

|  |
| --- |
| **Issue 1: Weighing Procedures**  *More detail is necessary to assure accurate weights in and out. Discuss options.* |

1. Composition and concentration of ODS must be established for each individual container by taking a sample from each container of ODS and having it analyzed for composition and concentration at an AHRI-certified laboratory using the AHRI 700-2006 standard*.* The laboratory performing the composition analysis must not be affiliated with the Offset Project Operator or Authorized Project Designee. All of the following requirements must be met for each sample:
2. The sample must be taken while ODS is in the possession of the company that will destroy the ODS;
3. Samples must be taken by a technician unaffiliated with the Offset Project Operator or Authorized Project Designee; if the destruction facility is either the Offset Project Operator or Authorized Project Designee, an outside technician must perform this task;
4. Samples must be taken with a clean, fully evacuated sample bottle that meets applicable DOT requirements with a minimum capacity of one pound;
5. Each sample must be taken in liquid state;
6. A minimum sample size of one pound must be drawn for each sample;
7. Each sample must be individually labeled and tracked according to the container from which it was taken, and all of the following information recorded:
   1. Time and date of sample;
   2. Name of Offset Project Operator and Authorized Project Designee;
   3. Name of technician taking sample;
   4. Employer of technician taking sample;
   5. Volume of container from which sample was extracted; and
   6. Ambient air temperature at time of sampling; and
8. Chain of custody for each sample from the point of sampling to the AHRI lab must be documented by paper bills of lading or electronic, third-party tracking that includes proof of delivery.
9. All project samples shall be analyzed using ARI 700-2006 to confirm the mass percentage and identity of each component of the sample. The analysis shall provide:
10. Identification of the refrigerant;
11. Purity (%) of the ODS mixture by weight using gas chromatography;
12. Moisture level in parts per million. The moisture content of each sample must be less than 75% of the saturation point for the ODS based on the temperature recorded at the time the sample was taken;
    1. For non-mixed ODS, the saturation point is the saturation point of the major ODS species;
    2. For mixed ODS, the saturation point is the lowest saturation value of any species that makes up at least 10% of the composition;
13. Analysis of high boiling residue, which must be less than 10% by mass; and
14. Analysis of other ODS in the case of mixtures of ODS, and their percentage by mass.
15. If any of the requirements in sections (a) through (c) of this appendix are not met, no GHG reductions may be verified for ODS destruction associated with that container.
16. If a container holds non-mixed ODS, no further information or sampling is required to determine the mass and composition of the ODS. For non-mixed ODS, the analysis conducted for the sample taken at the destruction facility must be used for quantifying GHG emissions.
17. If the container holds mixed ODS, the Offset Project Operator or Authorized Project Designee must meet all of the following additional requirements:
18. The required sampling may be conducted at the final destruction facility or prior to delivery to the destruction facility;
19. Circulation and sampling activities must be conducted by a contracted third-party and by individuals who have been properly trained for the functions they perform;
20. The offset project documentation must specify the procedures by which mixed ODS are analyzed;
21. Prior to sampling, the ODS mixture must be circulated in a container that meets all of the following criteria:
22. The container has no solid interior obstructions;
23. The container was fully evacuated prior to filling;
24. The container must have sampling ports to sample liquid and gas phase ODS;
25. The sampling ports must be located in the middle third of the container (i.e., not at one end or the other); and
26. The container and associated equipment can circulate the mixture via a closed loop system from the bottom to top;
27. If the original mixed ODS container does not meet these requirements, the mixed ODS must be transferred into a temporary holding tank or container that meets all of the above criteria. The weight of the contents placed into the temporary container shall be calculated and recorded. During transfer of ODS into and out of the temporary container, ODS shall be recovered to the vacuum levels required by the U.S. EPA for that ODS (see 40 CFR 82.156);
28. Once the mixed ODS is in a container or temporary storage unit that meets the criteria above, circulation of mixed ODS must be conducted as follows:
29. Liquid mixture shall be circulated from the liquid port to the vapor port;
30. A volume of the mixture equal to two times the volume in the container shall be circulated;
31. Calculations converting between mass and volume shall use the densities provided in table B.3;
32. Circulation must occur at a rate of at least 30 gallons/minute; and
33. Start and end times shall be recorded;
34. Within 30 minutes of the completion of circulation, a minimum of two samples shall be taken from the bottom liquid port, and both samples must be analyzed at an AHRI approved laboratory; and
35. The Offset Project Operator or Authorized Project Designee must calculate the project GHG emission reductions using both sample results, and choose the sample resulting in the lower project emission reductions.

1. Health and Safety Code section 38571 [↑](#footnote-ref-1)
2. RE does not extend to the ODS destruction efficiency, which is handled separately under this protocol. [↑](#footnote-ref-2)
3. RE does not extend to the ODS destruction efficiency, which is handled separately under this protocol. [↑](#footnote-ref-3)