

Chapter 30 – Asbestos Management Plan (REDACTED)

30.1 Introduction

The impetus for compiling the NASA Ames Asbestos Management Plan derives from the need to comply with over seven major governmental regulations and guidance documents published by governmental institutions. The NASA Ames Asbestos Management Plan is an effort to streamline these compliance documents into a logical and economically efficient plan.

The Ames Asbestos Management Plan integrates applicable Federal, State, and local regulatory agency requirements and NASA policy governing asbestos-related work. It addresses any operation, including maintenance activities, involving potential or actual disturbance of materials that contain asbestos. All contractors/subcontractors who conduct asbestos-related work located on NASA property must adhere to all requirements set forth in the Ames Asbestos Management Plan.

30.2 Purpose

NASA Ames Research Center (ARC) has established the Ames Asbestos Management Plan to address a variety of issues regarding asbestos-related work. The goals of the Ames Asbestos Management Plan are to:

1. Minimize exposure of employees, visitors, and contractors of NASA Ames Research Center to airborne asbestos.
2. Comply with all pertinent, regulatory, and NASA requirements related to asbestos-containing materials. ARC recognizes and will comply with all applicable Federal, State, and local governing regulatory agency regulations/guidelines pertaining to asbestos-containing materials.
3. Establish procedures for the identification, evaluation, control, maintenance, disturbance, abatement, and waste storage/disposal of asbestos-containing material at ARC.
4. Remove, enclose, encapsulate, or repair hazardous asbestos-containing material as required by government or NASA regulations, and as needed to protect human health.
5. Provide asbestos awareness training.
6. Provide certified asbestos consultants to evaluate potential asbestos-related hazards, sample suspect materials, and oversee asbestos-abatement projects.
7. Eliminate the installation of new asbestos-containing material whenever possible.
8. Ensure that asbestos-related contracted/subcontracted work is properly planned, reviewed, and conducted.

30.3 Applicability

This manual is applicable to: (1) all Ames Employees; and (2) all persons and entities who agree in writing to comply with this manual.

30.4 Authority

NASA ARC adheres to and enforces this policy and all applicable Federal, State, and local governing regulatory agency laws/guidelines pertaining to asbestos-containing materials and asbestos-related work, including:

1. U.S. Department of Labor, Occupational Safety & Health Administration (OSHA)
 - 29 CFR Part 1910.1001 (Asbestos Regulations)
 - 29 CFR Part 1910.134 (Respirator Regulations)
 - 29 CFR Part 1926.1101 (Construction Asbestos Regulations)
2. U.S. Environmental Protection Agency (EPA)
 - 40 CFR Part 61, National Emissions Standards for Hazardous Air Pollutants (NESHAPS) - Subpart M - National Emission Standards for Asbestos
 - 40 CFR Part 763 Subpart E, Asbestos Emergency Response Act (AHERA)
 - EPA Guidance Documents
 - Asbestos-Containing Materials in School Buildings, parts 1 and 2
 - Guidance for Controlling Asbestos-Containing Materials in Buildings
 - Managing Asbestos in Place - A Building Owner's Guide for Operations and Maintenance Programs for Asbestos-Containing Materials
3. Bay Area Air Quality Management District (BAAQMD) Regulation #11, Rule #2 - Asbestos
4. California Labor Code Sections 6501.5, 6501.7, 6501.8, and 6505.5
5. California Code of Regulations (CCR)
 - Title 8, Section 1529
 - Title 8, Section 5208-5208.1
 - Title 8, Section 1529
 - Title 8, Section 5144
 - Title 8, Sections 341.6-341.14, Registration - Asbestos Related Work
 - Title 22, Sections 22-12000 and 22-12901 (Proposition 65)
 - Title 26, Divisions 22 and 23
6. American National Standards Institute (ANSI)
7. Fundamentals Governing the Design Operation of Local Exhaust Systems (ANSI, Z.9.2)
8. National Electrical Code
9. National Plumbing Code
10. California Business & Professions Code Section 7058.5
11. ASTM Standard 1368-03 Standard Practice for Visual Inspection of Asbestos Abatement Projects

30.5 Definitions

1. **Abatement:** Any operation that is designed to permanently remove asbestos-containing materials.
2. **Aggressive Method:** Removal or disturbance of building material by sanding, abrading, grinding, or other method that breaks, crumbles, or disintegrates intact asbestos-containing material (ACM).
3. **Asbestos:** Six fibrous magnesium silicate minerals: chrysotile, crocidolite, amosite, and the fibrous forms of actinolite, tremolite, and anthophyllite.
4. **Asbestos Hazard Emergency Response Act (AHERA):** This act became law in 1987 and specified a plan by which schools would manage asbestos.

5. **Asbestos-Containing Building Material (ACBM):** Construction materials that contain more than one-tenth of one percent of asbestos.
6. **Asbestos-Containing Material (ACM):** Any material that contains more than one-tenth of one percent of asbestos.
7. **Asbestos-Containing Waste Material:** Any waste that contains more than one-tenth of one percent asbestos.
8. **Asbestos Regulated as Hazardous Waste:** Friable or nonfriable asbestos-containing waste material with a concentration greater than or equal to one percent asbestos by weight.
9. **Asbestos-Related Work:** Any work that involves asbestos-containing material and may result in the release of any quantity of asbestos fibers into the air.
10. **Authorized Person:** Any person authorized by the employer and required by work duties to be present in regulated areas. An authorized person shall have at least a two-hour orientation on the hazards of asbestos along with a medical exam and respirator training.
11. **Bay Area Air Quality Management District (BAAQMD):** The BAAQMD is tasked by the State of California to act as the local EPA at ARC.
12. **Category I Nonfriable Asbestos-Containing Material:** Asbestos-containing packings, gaskets, resilient floor coverings, and asphalt roofing products.
13. **Category II Nonfriable Asbestos-Containing Material:** Asbestos-containing material, excluding Category I nonfriable asbestos-containing material, that, when dry and in its present form, cannot be crumbled, pulverized, or reduced to powder by hand pressure (Transite Trademark (TM), cement products, stucco).
14. **Certified Asbestos Consultant (CAC):** Any person who contracts to provide professional health and safety services that relate to asbestos-containing construction material that comprises 100 square feet or more of surface area. The activities of an asbestos consultant include building inspection, abatement project design, contract administration, sample collection, preparation of asbestos management plans, clearance monitoring, and supervision of site surveillance technicians.
15. **Certified Industrial Hygienist (CIH):** An individual certified in the comprehensive practice of industrial hygiene by the American Board of Industrial Hygiene.
16. **Class I Asbestos Work:** Activities that involve the removal of Thermal System Insulation (TSI) and surfacing ACM and Presumed ACM (PACM).
17. **Class II Asbestos Work:** Activities that involve the removal of ACM that is not TSI or surfacing material. This includes, but is not limited to, the removal of asbestos-containing wallboard, floor tile and sheeting, roofing and siding shingles, and construction mastics.
18. **Class III Asbestos Work:** Repair and maintenance operations where ACM, including TSI and surfacing material, is likely to be disturbed. If the amount of ACM or PACM disturbed is likely to exceed that which can be contained in one glove bag or waste bag no larger than 60 inches square the disturbance becomes classified as Class I work.
19. **Class IV Asbestos Work:** Maintenance and custodial activities during which employees contact, but do not disturb, ACM or PACM, and activities to clean up minimal waste and debris that contains ACM or PACM -- (must not exceed the OSHA PEL or EL. If work is expected to release airborne asbestos fibers, which may cause the employee exposure in excess of the OSHA PEL or EL, work must be considered Class III work. The Safety Office shall determine this potential.)
20. **Clean Room:** An uncontaminated room that has facilities for the storage of employees' street clothing and uncontaminated materials and equipment.

21. **Competent Person/Certified Supervisor:** An individual who is capable of identifying asbestos hazards in the workplace and who has sufficient experience, training, and authority to take prompt corrective measures to eliminate them.
22. **COTR:** Contracting Officer's Technical Representative.
23. **Critical Barriers:** One or more layers of at least six-mil-thick fire-retardant polyethylene sheeting sealed over all openings into a work area or any other similarly placed physical barrier sufficient to prevent airborne asbestos in a work area from migrating to an adjacent area.
24. **Decontamination Area (D-Con):** An enclosed area adjacent and connected to the regulated area and consisting of an equipment room, shower area, and clean room, which is used for the decontamination of workers, materials and equipment that are contaminated with asbestos.
25. **Demolition:** Any operation that involves the wrecking or removal of any load-supporting structural members of a facility.
26. **Demolition/Renovation Surveys:** A survey conducted by an EPA-accredited asbestos building inspector to check for the presence of asbestos-containing materials prior to any demolition/renovation activities.
27. **Disturbance:** Contact with any material that contains ACM or PACM that causes release of fibers. This term includes activities that disrupt the matrix of ACM or PACM, render ACM or PACM friable, or generate visible debris. Disturbance includes cutting away small amounts of ACM and PACM.
28. **Emergency Demolition:** Demolition carried out pursuant to an order of a State or local Government agency because the building is structurally unsound and in danger of imminent collapse.
29. **Emergency Renovation:** Renovation that is not planned but results from a sudden, unexpected event. This includes operations necessitated by equipment failures and unanticipated findings of ACM or the conversion of previously nonfriable ACM to friable material during the course of a renovation. Renovations due to fire, water, or earthquake damage, or where an imminent danger to the public health may exist, are included.
30. **Employee Exposure:** The exposure to airborne asbestos that occurs or would occur - if the employee were not using respiratory protective equipment.
31. **Encapsulation:** A method that utilizes sealers, paints, or special bridging/encapsulating compounds to control airborne asbestos fibers.
32. **Enclosure:** An airtight, impermeable, permanent barrier constructed to surround asbestos-containing materials and prevent the release of asbestos fibers into the air.
33. **EPA-Approved Building Inspector:** An individual who has successfully completed an EPA-approved building inspector course for collecting asbestos bulk samples and conducting AHERA quality surveys. An EPA building inspector is not a construction inspector; primary responsibilities include collecting bulk samples for asbestos analysis and conducting surveys for asbestos.
34. **Fiber:** A particulate form of asbestos, 5 micrometers or longer, with a length-to-diameter ratio of at least 3-to-1.
35. **Friable Asbestos-Containing Material:** Any material that contains more than one-tenth of one percent asbestos that, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure.
36. **High Efficiency Particulate Air (HEPA) Filter:** A high-efficiency particulate air filter capable of removing particles 0.3 micrometers in diameter or larger with 99.97-percent efficiency.

37. **Homogenous Area:** An area of surfacing material or thermal system insulation that is uniform in color and texture.
38. **Incidentally exposed employee:** Incidentally exposed are those people who may have been exposed in excess of the action level on a one-time basis. The Safety Office personnel can assist to validate.
39. **Intact:** ACM that has not crumbled, been pulverized, or otherwise deteriorated so that it is no longer likely to be bound with its matrix.
40. **NESHAP:** An acronym for National Emissions Standards for Hazardous Air Pollutants.
41. **PEL:** Permissible Exposure Limits established by the Occupational Safety and Health Administration. According to OSHA, the employer shall ensure that no employee is exposed to a airborne concentration of asbestos in excess of 0.1 fiber per cubic centimeter (f/cc) of air as an eight (8) hour time-weighted average (TWA), as determined by the National Institute of Occupational Safety and Health (NIOSH) method 7400 Phase Contrast Microscopy (PCM). In addition, the employer shall ensure that no employee is exposed to an airborne concentration of asbestos in excess of 1.0 f/cc as averaged over a sampling period of 30 minutes, as determined by NIOSH method 7400 PCM, known as the excursion limit (EL).
42. **Presumed Asbestos-Containing Material (PACM):** All thermal system insulation and spray-on or troweled-on surfacing materials in buildings or substrates constructed before 1980, and all resilient flooring material including associated mastic and backing, regardless of age, shall be identified as asbestos-containing, unless an industrial hygienist or certified asbestos consultant determines that it is not ACM using recognized techniques.
43. **Project Manager:** An individual assigned to a specified project with the ultimate decision-making authority and responsibility for the project.
44. **Regulated Asbestos-Containing Material (RACM):**
- Friable asbestos-containing material,
 - Category I nonfriable ACM that has become friable,
 - Category I nonfriable ACM that will be or has been ground, sanded, cut, or abraded, or
 - Category II nonfriable ACM that has a probability of becoming or that has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of demolition or renovation operations regulated by the asbestos NESHAP.
45. **Removal:**
- All operations where ACM and/or PACM is taken out or stripped from structures or substrates, including demolition operations.
- **Renovation:** Any operation that involves altering a facility or one or more facility components in any way.
 - **Site-Specific Health and Safety Plan:** A nongeneric Health and Safety Plan. This plan must be submitted prior to the start of any asbestos-related work. The plan must include all methods utilized for compliance with the Ames Asbestos Management Plan, and all Federal, State, and local governing regulatory agency laws/guidelines pertaining to asbestos. The plan must include all safety precautions and training appropriate/necessary to complete the scope of work as related to the specific contract. The plan must contain drawings that depict contractor's/subcontractor's abatement strategies/methods and containment(s) and negative air machine(s) locations. The ARC project manager must approve this plan prior to any asbestos-related work.
 - **Surfacing Material:** Material that is sprayed, troweled-on, or otherwise applied to surfaces (such as acoustical plaster on ceilings and fireproofing materials on structural members, or other materials on surfaces for acoustical, fireproofing, and other purposes).

- **Thermal System Insulation (TSI):** ACM applied to pipes, fittings, boilers, breaching, tanks, ducts, or other structural components to prevent heat loss or gain.

30.6 Responsibility

All persons who manage construction or maintenance projects, disturb, handle, store, or dispose of asbestos-containing material located on NASA property shall conduct operations in compliance with this policy and all applicable governing regulatory agency regulations/guidelines pertaining to asbestos-containing materials.

30.6.1 Safety Office

1. Oversee development and implementation of the Ames Asbestos Management Plan.
2. Provide Certified Asbestos Consulting services for asbestos-related work activities as requested. This service will be implemented on a budget-reimbursable basis to the Center.
3. Inform Certified Asbestos Consultants of NASA policies regarding asbestos-containing materials.
4. Review and evaluate the impact of regulatory changes on the Center.
5. As requested, review and evaluate asbestos-abatement plans, specifications, and abatement contractor submittals prior to abatement.
6. Verify that personnel who perform asbestos abatement work on NASA property have appropriate training and credentials to perform their assignment.
7. Approve the selection of accredited laboratories used to analyze asbestos bulk/air samples.
8. Determine the need for baseline air monitoring in occupied buildings.
9. Periodically inspect the abatement area and contractor/subcontractor for compliance with the Ames Asbestos Management Plan.
10. Establish criteria for post-abatement clearance testing and approve re-occupancy of buildings/areas upon successful clearance testing.
11. Provide unique sampling numbers to building inspectors and asbestos consultants to be utilized for asbestos bulk/air sampling identification.
12. Maintain a central location for all asbestos management documentation.
13. Conduct periodic assessments of asbestos and presumed asbestos-containing material.

30.6.2 ARC Project Managers, COTRs

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30.6.3 Certified Asbestos Consultants

1. Monitor compliance to the Ames Asbestos Management Plan.
2. Conduct bulk/air sampling as requested by the Safety Office and present findings in a user-friendly format.
3. Assist in planning asbestos abatement projects by reviewing and commenting on bids, specifications, and procedures.
4. Review contractor/subcontractors submittals for compliance with the Ames Asbestos Management Plan.
5. Act as ARC primary health and safety contact for inspection and compliance concerning asbestos-related work activities.
6. Conduct pre- and post-asbestos-abatement inspections.
7. Conduct daily inspections on asbestos-abatement projects, including cleanup operations, and document these inspections (see Appendix B section 30.14.2). Notify the project manager and contracting officer of any contractor/subcontractor deficiencies. Should any

deficiency pose an imminent safety and health hazard, the consultant may stop the project and immediately follow up with the project manager and contracting officer.

8. Determine final clearance criteria. If the Transmission Electron Microscopy (TEM) method is utilized, a minimum volume of 1199 liters must be collected. The results must be 70 structures per square millimeter (str/mm²) or below to meet clearance criteria. Prior approval from the Ames Safety Office must be granted if the Phase Contrast Microscopy (PCM) method is utilized, and the results must be below 0.01 fibers per cubic centimeter (f/cc) to meet clearance criteria.
9. Written documentation must be provided certifying that area(s) meet the clearance criteria set forth in the Ames Asbestos Management Plan. This documentation must be provided for any final visual inspection and final clearance sampling conducted (see Appendix E section 30.14.5).
10. Conduct area air monitoring on asbestos-abatement projects, as requested by the project manager or NASA Safety Office. Prior to conducting area monitoring, background monitoring should be conducted.

30.6.4 General Contractors Involved in Asbestos-Related Work

1. Exercise supervisory authority over all work covered by this chapter. As supervisor of the entire project, the general contractor shall comply and require all subcontractors to comply with the Ames Asbestos Management Plan, and all applicable regulatory requirements.
2. Notify the NASA project manager immediately upon discovery of any previously unidentified suspected asbestos-containing material or other material with possible hazards or undetermined contaminants.

30.6.5 Asbestos Abatement Contractors/Subcontractors

1. Adhere to the Ames Asbestos Management Plan, and all Federal, State, and local regulatory agency laws/guidelines that pertain to asbestos. Any deviations from the Ames Asbestos Management Plan must have the approval of NASA Safety Office and the NASA project manager.
2. All asbestos-related work, unless directed by the NASA Safety Office, shall be conducted under the surveillance of a Certified Asbestos Consultant who is independently procured and financed by ARC or who is a representative of the NASA Safety Office.
3. On multiemployer worksites, a contractor who performs work that requires the establishment of a regulated area shall inform other employers on the site of the nature of the employer's work with asbestos and/or PACM, of the existence of the requirements that pertain to regulated areas, and the measures taken to ensure that employees of the other employer are not exposed to asbestos.
4. Asbestos hazards at the contractor's/subcontractor's worksite shall be abated by the contractors/subcontractors who created or control the source.
5. Notify the NASA project manager immediately upon discovery of any previously unidentified suspected asbestos-containing material or PACM.
6. The following documents must be delivered to the project manager and approved before any asbestos-related work is conducted:
 - A copy of the contractor's/subcontractor's Asbestos Abatement Contractors license issued by the California Contractors State Licensing Board.
 - A copy of the contractor's/subcontractor's registration for asbestos-related work issued by CAL-OSHA.

- A copy of the notification for proposed asbestos-related work provided to CAL-OSHA and the BAAQMD.
- A copy of the contractor's/subcontractor's insurance policy for asbestos-related work, general liability, and workers compensation, as well as insurance coverage for future asbestos-related claims. Ensure that the monetary amounts are sufficient for the scope of work being performed.
- A copy of the site-specific health and safety plan.
- A copy of the contractor's/subcontractor's Hazard Communication and Respiratory Protection Programs.
- A copy of all contractor's/subcontractor's employee EPA-approved asbestos-related training certificates, licensed physician medical evaluations, and respiratory fit-test certifications.
- A copy of the hazardous waste hauler's permits/licenses.
- A copy of the hazardous waste landfill permits/licenses.
- A signed letter stating that the contractor/subcontractor has read and understands the content of this entire document.

7. There shall be no deviations from the contractor's/subcontractor's approved health and safety plan without prior consent of the Safety Office and the NASA project manager.

30.6.6 Competent Person/Certified Supervisor

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30.6.7 Facilities Engineering Branch

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30.6.8 ARC Acquisition Office

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30.6.9 Health Unit

1. With the exception of incidentally exposed employees, provide pre-placement, periodic, and termination of employment medical examinations to Ames employees who are or may be exposed to asbestos as required by CAL-OSHA and NASA Headquarters Environmental Health Program.
2. Offer incidentally exposed employees a complete baseline examination, but no periodic examinations.
3. Schedule Ames employees for medical examinations in accordance with CAL-OSHA initially, within 10 days of exposure or potential asbestos exposure, at least annually thereafter, and at least 30 days after termination of employment.
4. Only asbestos workers who have been exposed to airborne asbestos in excess of the permissible exposure limit (0.1 fibers/cc of air as an 8-hr. TWA), or the excursion limit (1.0 fiber/cc averaged over 30 minutes) require chest x-ray surveillance.

30.7 Prohibited Asbestos-Related Work Activities

The following work practices and engineering controls shall not be utilized for asbestos-related work, regardless of quantity, type, or operation:

- High-speed abrasive disc saws that are not equipped with a point-of-cut ventilator or enclosures with HEPA-filtered exhaust air.

- Compressed air, unless the compressed air is used in conjunction with an enclosed ventilation system designed to capture the dust cloud created by the compressed air.
- Dry sweeping, shoveling, or other dry cleanup of suspected asbestos-containing material.
- Employee rotation as a means to reduce employee exposure to asbestos.

30.8 Additional Regulations/References, Codes & Practices

Other regulations routinely observed and enforced at Ames follow. They are provided as a guidance tool and will be enforced. The list is not all-inclusive. Contractors must know and follow all OSHA regulations including but not limited to:

- Confined space
- Dusts, fumes, mists, vapors, and gases
- Electrical
- Emergency Medical Services
- Fire Protection and Prevention
- Hazard Communication
- Ladders
- Log of injury and illness
- Permits, excavations, trenches, construction and demolition, air tanks
- Personal Protective Equipment
- Fall Protection
- Sanitation
- Scaffolds
- Stairways
- Standard Railings
- Ventilation

30.9 Analytical Laboratories

All laboratories utilized to perform asbestos analysis and relied upon to supply NASA with results must be American Industrial Hygiene Association (AIHA)-accredited and a successful participant in the Proficiency Analytical Testing Program (PAT). Where asbestos bulk sampling or TEM analysis is required, the laboratory must be accredited by the National Laboratory of Science and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP) for asbestos analysis.

30.10 Storage/Disposal/Transportation of Waste Material

1. All materials, whether hazardous or nonhazardous, shall be handled, sampled, stored, disposed of, and transported in accordance with the provisions of this section and any/all applicable Federal, State, county, and local regulations and guidelines.
2. All materials that contain asbestos greater than one percent shall be handled, sealed, stored, labeled, and disposed of as hazardous asbestos-containing materials.
3. The contractor/subcontractor must submit all licenses/permits for the proposed landfill and waste transporter for approval by the appropriate NASA personnel prior to the start of any work.
4. The contractor/subcontractor shall be responsible for the actions of the waste hauler.
5. The contractor/subcontractor must comply with the Environmental Protection Agency and Department of Transportation regulations for waste containers, including packaging, storing, and labeling.
6. All hazardous waste generated and transported from NASA property must have a hazardous waste manifest signed by the Environmental Services Office prior to transportation.

30.11 Operations & Maintenance (O&M) Activities

The principal objective of an operations and maintenance program is to minimize potential exposure to airborne asbestos fibers of all building occupants and maintenance personnel. Individuals involved in an operations and maintenance program are employees who are in casual and nonintentional contact with asbestos because of the nature of their work or mere presence in a building. To accomplish this objective, an operations and maintenance (O&M) program shall include work practices to:

- Maintain ACM in good condition.
- Ensure cleanup of asbestos fibers previously released.
- Prevent further release of asbestos fibers.
- Monitor the condition of ACM.

The implementation of the O&M Program is the primary responsibility of the NASA ARC groups that are responsible for maintenance activities such as the Facilities Engineering and Plant Engineering Offices. NASA ARC's O&M Program includes the following elements:

- A notification program to tell workers, tenants, building occupants, and visitors where ACM is located and how and why to avoid disturbing the ACM.
- Regular ACM surveillance to note, assess, and document any changes in the ACM's condition.
- A work control/permit system to control activities that might disturb ACM.
- Training of custodial and maintenance staff.
- Procedures for accidental release of asbestos.
- Procedures for specific maintenance operations.
- Procedures for keeping records that pertain to asbestos activities.

30.11.1 Notification

The goal of the notification is to avoid disturbing asbestos-containing material through communication of potential hazards. The idea is that informed persons are less likely to unknowingly disturb the material and cause fibers to be released into the air. The notification either shall be in writing, or shall consist of a personal communication between NASA and the person to whom notification must be given, or his/her authorized representative. The NASA Safety Office (in coordination with the building managers and supervisors) will periodically notify the following groups of the presence, location, and quantity of ACM or PACM at the work sites in NASA buildings and facilities:

- Employees of NASA who will work in or adjacent to areas that contain such material.
- On multiemployer worksites, all employers/employees who will be performing work within or adjacent to areas that contain such materials.
- Tenants who will occupy areas that contain such material.
- Building Emergency Action Plans shall include asbestos notification information to facilitate employee and contractor awareness of the presence and location of ACM or PACM.

30.11.1.1 Posting Signs for Areas or Buildings that Contain Asbestos

Areas or buildings found to contain asbestos shall be posted with a warning notice that is readily comprehended, indicating the presence of asbestos, its location, and work practices that ensure that it will not be disturbed. An example of suitable sign format and content is shown in Appendix C (see section 30.14.3). At a minimum, these signs will be posted at the entrance to mechanical rooms/areas in which employees reasonably can be expected to enter and that contain ACM/PACM.

30.11.1.2 Installed Asbestos-Containing Materials Notification

Warning labels/signs will be posted (with assistance from facilities engineering), where feasible, on installed friable asbestos-containing materials that are accessible to employees, contractors, or the general public. (See Appendix D section 30.14.4.)

30.11.1.3 Contractors Notification

All successful bidding contractors (regardless of the contract amount) will be provided with a written Asbestos Notification Summary at the time a contract is awarded. The Asbestos Notification Summary should list the location and condition of ACM. It is the responsibility of the NASA Acquisition Office as well as all contractors to provide the Asbestos Notification Summary in all contracts.

30.11.2 Centerwide Survey for ACM

All NASA ARC-Moffett buildings constructed as of January 1987 have had a preliminary evaluation for the presence of ACM. This Centerwide building evaluation consisted of both the identification of specific ACM components and an assessment as to the hazard that such materials may present to NASA ARC employees and contractor personnel. The documentation of this survey resides in the NASA Safety Office and is available for review by engineers and other personnel who may need to know the location of ACM or PACM. Information from the survey should be used only to supplement new survey data collected with new sampling and analytical protocols.

30.11.3 Periodic Reassessment of ACM

Conditions, accessibility, use factors, etc. are likely to change over time. Therefore, ACMs require periodic reassessment to determine if changes have occurred that warrant reassessment to a different hazard class.

30.11.3.1 Reassessment Procedure

As deemed appropriate, the Safety Office will perform visual AHERA type assessments using AHERA classifications and definitions of NASA buildings and facilities to assess any changes in the condition of ACMs and PACMs. All assessments will be conducted in accordance with EPA guide 700/B-92/001 February 1992, "A Guide to Performing Reinspections under the Asbestos Hazard Emergency Response Act (AHERA)." Procedures from this guide may be modified for appropriateness and applicability under changing standards. Any revisions to this guide will be used. One of the seven categories defined in the AHERA regulations will be assigned each friable surfacing, TSI, and miscellaneous ACM or PACM during inspections and reinspections:

- Damaged or significantly damaged TSI, ACM, or PACM.
- Damaged friable surfacing ACM or PACM.
- Significantly damaged friable surfacing ACM or PACM.
- Damaged or significantly damaged friable miscellaneous ACM or PACM.
- ACM or PACM with potential for damage.
- ACM or PACM with potential for significant damage.
- Any remaining friable ACM or PACM or friable suspected ACM.

30.11.4 Air Sampling Policy

As appropriate, the NASA Safety Office will perform air sampling in selected locations in conjunction with the building assessments under the following conditions:

Air sampling should be conducted in functional areas where the ACM or PACM has been deemed by an industrial hygienist or Certified Asbestos Consultant as "Damaged" or "Significantly Damaged" as defined by AHERA, or if deemed necessary by an industrial hygienist or certified asbestos consultant. Air-sampling results will aid in determining the actual airborne concentrations of asbestos or absence of asbestos. These samples can also show the

airborne concentration of asbestos prior to abatement (as long as they are still representative of the sampled conditions).

30.11.4.1 Air-Sampling Procedure

All air samples during the quantitative assessment shall be collected per the specifications of NIOSH Sampling and Analytical Method 7400, PCM. Per the method, all fibers that meet a 3-to-1 aspect ratio and greater than 5 microns in length are counted to provide an airborne concentration in fibers per cubic centimeter (f/cc) of air. More sophisticated analytical techniques, such as transmission electron microscopy (TEM), are available that can differentiate types of asbestos and nonasbestos fibers and count extremely small fibers. The use of TEM will be specified at the judgment of the NASA Safety Office. Additionally, the NASA Safety Office will continue to review the health and safety literature and regulatory requirements and will make changes in analytical techniques as warranted. To ensure that the air samples are representative of occupant exposure conditions, air samples will be collected during normal workday activities in each selected area. The determination of normalcy will be based upon discussions with area personnel. Additionally, the area samplers will be placed as close as possible to breathing-zone height, i.e., five to six feet from the floor. Three samples per functional area should be collected unless physical limitations exist or if deemed unnecessary by an industrial hygienist or certified asbestos consultant.

30.11.4.2 Interpretation of Air-Monitoring Results

Air-sampling results from normally occupied areas, such as offices and laboratories, with airborne asbestos concentrations equal to or greater than 0.01 fiber /cc by PCM or 70 structures str/mm² by TEM of air will be retested as soon as reasonably possible. If deemed appropriate by an industrial hygienist or by a certified asbestos consultant, the air-sampling results may be averaged. If the re-evaluation produces concentrations greater than 0.01 f/cc by PCM or 70 str/mm² by TEM, the appropriate maintenance organization will be notified in order to determine the possible cause and begin necessary corrective action. When correction is completed, air monitoring will be repeated. All reasonable efforts will be made to control the airborne concentrations at less than 0.01 f/cc by PCM or 70 str/mm² by TEM. If at anytime airborne concentrations meet or exceed 0.01 f/cc by PCM or 70 str/mm² by TEM, occupants must be notified and removed from the area. Maintenance will be notified to respond or, if an abatement contractor is the potential source, the contractor will be notified along with his/her project manager and COTR.

30.11.5 Basic Procedures for Class I Asbestos Work

Activities that involve the removal of TSI and surfacing ACM and PACM are considered Class I operations. This work is to be performed by asbestos abatement contractors meeting the requirements stated in 30.6.5 of this chapter, in accordance with CAL-OSHA and BAAQMD regulations.

30.11.6 Basic Procedures for Class II Asbestos Work

Activities that involve the removal of ACM that is not TSI or surfacing material are considered Class II operations. This includes, but is not limited to, the removal of asbestos-containing wallboard, floor tile and sheeting, roofing and siding shingles, and construction mastics. This work is to be performed by asbestos abatement contractors meeting the requirements stated in 30.6.5 of this chapter, in accordance with CAL-OSHA and BAAQMD regulations.

30.11.7 Basic Procedures for Class III Asbestos Work

Repair and maintenance operations where ACM (including thermal system insulation and surfacing material) is likely to be disturbed are considered Class III operations (must fit in one standard glove bag or waste container <60 inches square). All Class III asbestos work shall be conducted using engineering and work practice controls that minimize the exposure to

employees who perform the asbestos work and to bystanders. Employers of workers are responsible for these controls and requirements, which include:

- Demarcate the area with signs to minimize the number of persons within the area and protect persons outside the area from exposure to airborne asbestos.
- Limit access to regulated areas to authorized persons.
- Do not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in the regulated area.
- Use wet methods or wetting agents to control employee exposures during asbestos handling and cleanup, except where employers demonstrate that the use of wet methods is not feasible because of hazards such as electrical equipment malfunction, slipping hazards, etc.
- Use local exhaust ventilation when feasible.
- Where the disturbance involves drilling, cutting, abrading, sanding, chipping, breaking, or sawing of thermal system insulation or surfacing material, use impermeable drop cloths and isolate the operation using mini-enclosures or a glove bag.
- Where a "negative exposure assessment" for an asbestos-related job is not completed, or where monitoring results show that the PEL has been exceeded, isolate the area using impermeable dropcloths and plastic barriers.
- For Class III jobs that involve the disturbance of TSI or surfacing material, or where a "negative exposure assessment" has not been performed, or where air-monitoring results show a PEL has been exceeded, wear protective whole-body clothing, head coverings, gloves, foot coverings, and respirators that are selected, used, and fitted pursuant to provision of 29 CFR 1926.1101(h), 8 CCR 1529 (h), Respiratory Protection and the Chapter 28 of the Ames Health and Safety Manual, Provisions for Respiratory Protection.
- For Class III jobs where exposures exceed a PEL or where there is no negative exposure assessment performed, establish an equipment room or area adjacent to the regulated area for the decontamination of employees and their equipment which is contaminated with asbestos, consisting of an area covered by an impermeable drop cloth on the floor or horizontal working surface. The area must be of sufficient size as to accommodate cleaning of equipment and removing personal protective equipment without spreading contamination beyond the area (as determined by visual accumulations.) Work clothing must be cleared with a HEPA vacuum before it is removed. All equipment and surfaces of containers filled with ACM must be cleaned prior to removing them from the equipment room or area. Employees must enter and exit the regulated area through the equipment room or area.
- Training for employees who perform Class III asbestos work shall be the equivalent in the curriculum and training method to the 16-hour O&M course developed by the EPA for maintenance and custodial workers who conduct activities that will result in the disturbance of ACM. This training shall include "hands-on" training in the use of respiratory protection and work practices, and shall take at least 16 hours.
- Medical surveillance shall be in accordance with section 30.6.8 of this Chapter.
- Perform Class III work under the supervision of an onsite competent person who has completed a course equivalent in the curriculum and training method to the 16-hour O&M course developed by the EPA. The onsite competent person must inspect Class III asbestos work at intervals sufficient to assess whether conditions have changed, and at any reasonable time by an employee request.

30.11.8 Basic Procedures for Class IV Asbestos Work

Maintenance and custodial activities during which employees contact ACM and/or PACM, and activities to clean up minimal waste and debris containing ACM and/or PACM will be considered Class IV asbestos work. (This work must not exceed the OSHA PEL or EL. If work is expected to release airborne asbestos fibers, which may cause the employee exposure in excess of the OSHA PEL or EL, work must be considered Class III work. The Safety Office shall determine this potential.) Employers of workers are responsible for these work practice and engineering controls for Class IV asbestos work, regardless of exposure, which include:

- Demarcate the area with signs to minimize the number of persons within the area and protect persons outside the area from exposure to airborne asbestos.
- Limit access to regulated areas to authorized persons.
- Do not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in the regulated area.
- If there is visible deterioration of ACM or PACM and debris has fallen or has been released from the material, then use HEPA vacuums to clean the area.
- Use wet methods or wetting agents to control employee exposures during asbestos handling and cleanup, except where employers demonstrate that the use of wet methods is not feasible because of hazards such as electrical equipment malfunction, slipping hazards, etc.
- If Class IV work includes clean-up of waste and debris in areas where friable thermal system insulation or surfacing material is accessible, assume that such waste and debris contains asbestos.
- Where Class IV jobs involve TSI or surfacing, establish an equipment room or area adjacent to the regulated area for the decontamination of employees and their equipment that is contaminated with asbestos, consisting of an area covered by an impermeable drop cloth on the floor or horizontal working surface. The area must be of sufficient size as to accommodate cleaning of equipment and removing personal protective equipment without spreading contamination beyond the area (as determined by visual accumulations.) Work clothing must be cleared with a HEPA vacuum before it is removed. All equipment and surfaces of containers filled with ACM must be cleaned prior to removing them from the equipment room or area. Employees must enter and exit the regulated area through the equipment room or area.
- Training for employees who perform Class IV operations shall be the equivalent to the curriculum and training method in the awareness training course developed by the EPA for maintenance and custodial workers who work in buildings that contain ACM or PACM. Such training shall include available information about the locations of PACM and ACM and asbestos-containing flooring material, or flooring material where the absence of asbestos has not been certified, and instruction in recognition of damage, deterioration, and delaminating of asbestos-containing building materials. This course shall take at least two hours.
- Medical surveillance shall be in accordance with section 30.6.8 of this Chapter.
- Perform Class IV work under the supervision of an onsite competent person who has completed a course equivalent to the curriculum and training method in the 16-hour O&M course developed by the EPA.

30.11.9 Procedures for Specific Maintenance Operations

- Where vacuuming methods are selected, HEPA filtered vacuuming equipment must be used.

- Asbestos waste, scrap, debris, bags, containers, equipment, and contaminated clothing for disposal shall be collected and disposed of in sealed, labeled, impermeable bags.
- Sanding, cutting, or abrading ACM floor tiles shall be prohibited, unless controlled with appropriate abatement procedures.
- Stripping of finishes shall be conducted using wet methods and low abrasion pads at speeds lower than 300 rpm.
- Burnishing or dry buffing may be performed only on flooring that has sufficient finish so that the pad cannot contact the flooring material.

30.11.10 Procedures for Accidental Release of Asbestos

The following procedures must be used if asbestos is accidentally released:

- Immediately isolate the area by closing doors and/or erecting temporary barriers to restrict air movement as well as access to the site.
- Notify NASA Safety Office and NASA maintenance.
- If asbestos fibers are suspected to have entered the Heating, Ventilation and Air Conditioning (HVAC) system (or may do so), the HVAC system must be shut down and sealed off.
- Post asbestos-abatement warning signs around the area.
- Class IV trained employees, at a minimum, shall employ thorough cleanup procedures to properly control the ACM, by using wet methods, HEPA vacuums, respiratory protection, etc.
- An industrial hygienist or CAC will inspect the area before clearance testing in accordance with the ASTM Standard 1368-03 Standard Practice for Visual Inspection of Asbestos Abatement Projects.
- Collect at least one air sample for a final clearance level of 70 str/mm² for releases greater than three square feet or three linear feet, unless more are required by the NASA Safety Office.

30.12 Recordkeeping

All building asbestos management documents should be centrally located in the NASA Safety Office. Some of the documents include:

- Respirator Training Records (for NASA personnel).
- Air-sampling data from abatement and O&M projects.
- Laboratory results from area/final clearance sampling, and personnel monitoring.
- Results from bulk sampling analysis.
- Medical Surveillance Records (all medical surveillance records of NASA employees will be located in the Ames Health Unit).
- Proof of medical surveillance pursuant to section 30.6.8 shall be provided to the NASA Safety Office before any NASA employee engages in asbestos-related work.

30.13 Procedures for Special Asbestos Activities

Special asbestos work activities include:

30.13.1 Emergency Demolition/Renovation Operations

Before any asbestos-related work is conducted pursuant to and classified as an emergency demolition/renovation project, the NASA Safety Office must be notified and the work plan and schedule must be approved by the NASA Safety Office.

30.13.2 Brake & Clutch Inspection & Repair

The OSHA General Industry Standard for asbestos impacts the **REDACTED** Automotive Repair Shop (Motorpool). OSHA standards require engineering and work practice controls during brake and clutch repair, inspection, disassembly, repair, and assembly operations. There are two methods that meet this requirement:

- Method 1, Negative Pressure-Enclosure with HEPA Vacuum System

The brake and clutch inspection, disassembly, repair, and assembly operations shall be enclosed to cover and contain the clutch or brake assembly and to prevent the release of asbestos fibers into the worker's breathing zone. The enclosure shall be sealed tightly and thoroughly inspected for leaks before work begins on brake and clutch inspection, disassembly, and repair and assembly. The enclosure shall be such that the worker can clearly see the operation and shall provide impermeable sleeves through which the worker can handle the brake and clutch inspection, disassembly, and repair and assembly. The integrity of the sleeves and ports shall be examined before work begins. A HEPA-filtered vacuum shall be utilized to maintain the enclosure under negative pressure throughout the operation. The HEPA vacuum shall be used first to loosen the asbestos-containing residue from the brake and clutch parts and then to evacuate the loosened asbestos-containing material in the vacuum filter. The vacuum's filter, when full, shall be first wet with a fine mist of water, then removed and placed immediately in an impermeable container, properly labeled, and disposed of in a hazardous waste container with a hazardous waste label. Any spills or release of asbestos-containing waste material from inside of the enclosure or vacuum hose or vacuum filter shall be immediately cleaned up and disposed of as hazardous material. Compressed air may not be used to remove asbestos fibers or particulates from the enclosure.

- Method 2, Low-Pressure/Wet-Cleaning Method

A catch basin shall be placed under the brake assembly and positioned to avoid splashes and spills. The reservoir shall contain water with an organic solvent or wetting agent. The flow of liquid shall be controlled so that the brake assembly is gently flooded to prevent the asbestos-containing brake dust from becoming airborne. The aqueous solution shall be allowed to flow between the brake drum and brake support before the drum is removed. After removing the brake drum, the wheel hub and back of the brake assembly shall be thoroughly wet to suppress dust. The brake support plate, brake shoes, and brake components used to attach the brake shoes shall be thoroughly washed before removing the old shoes. In systems that use filters, the filters, when full, shall be wet with a fine mist of water, then removed and placed immediately in an impermeable hazardous waste container with a hazardous waste label. Any remaining water should be wiped up with rags and disposed of in the same container as the filter. Any spills of asbestos-containing aqueous solution or any asbestos-containing waste material shall be cleaned up immediately and disposed of as hazardous material. The use of dry brushing during low-pressure/wet-cleaning operations is prohibited.

30.13.3 TA Wire Insulation

TA wire for the purpose of repairing electrical connections is classified as Class III asbestos-related work because this work is part of a maintenance and repair operation, and disturbance will occur as an adjunct to the repair and maintenance of the electrical system. The manipulation or inspection of TA wire in order to clean the connectors is not a construction

activity, but the workers who inspect TA wire must have at least two hours of asbestos awareness training.

Prior to handling, removing, or cutting any electrical insulation, wiring, or conduit, the electrical wire shall be de-energized by turning off the power of the electrical equipment/devices that supply power to the service line. The electrical equipment/device shall be locked out and tagged pursuant to NASA and Federal/State regulations to prevent accidents, injuries, or electrocution of workers.

30.13.3.1 Method

Regardless of the type of activity, it is a regulatory requirement that all persons who engage in Class III asbestos-related work or the manipulation/inspection of TA wire adhere to the following:

1. Workers will have at least two hours of asbestos awareness training.
2. Workers will have completed a medical examination for working with asbestos, pursuant to section 30.6.8 of this Chapter, and for donning respiratory protection, in accordance with Chapter 28 of the Ames Health and Safety Manual, Provisions for Respiratory Protection, that states they are physically fit to wear a respirator.
3. Workers shall have completed respirator training and fit testing within the last year, in accordance with Chapter 28 of the Ames Health and Safety Manual, Provisions for Respiratory Protection (workers or their supervisor will maintain a copy of all current training documents and medical clearance to wear a respirator on site).
4. Throughout any operation covered in this procedure, the contractor is required to perform personal air sampling of the contractor's exposed employees to verify that exposures do not exceed the PEL.

30.13.3.2 Maintenance & Repair of TA Wire

1. Wear protective clothing and half-face respirator unless powered air-purifying respirators are required.
2. Use ground fault circuit interrupters (GFCI) for all powered equipment.
3. Place at least two layers of six-mil polyethylene sheeting around the work areas.
4. Barricade the work area with asbestos warning tape.
5. Place asbestos danger sign(s) at a prominent location(s) near the worksite.
6. Designate a competent person in accordance with NASA/Federal regulations/guidelines.
7. If the electrical wire is de-energized, as verified by the safety department, or otherwise determined safe, have a supply of water available (plant sprayer is considered to be adequate).
8. Remove asbestos and place asbestos-containing materials into a properly labeled asbestos disposal bag.
9. Spray encapsulant.
10. Fill out waste manifest and contact the Safety Office at **REDACTED**.

30.13.3.3 TA Wire Reparation

If the TA wire is damaged and requires repair, the wire should be handled in a manner that will not release fibers into the environment. This may be accomplished by encapsulating the wire with another insulating material or enclosing the damaged wire with a suitable casing so that it no longer presents an electrical or asbestos hazard.

30.13.3.4 Repair of TA Wire Connectors

The repair of the TA wire connectors is limited to the minor manipulation of the wire to free the wire from the housing and facilitate the reparation of the connector either by replacement or repair. TA wire should remain intact during this operation and no waste shall be generated.

30.13.3.5 Inspection of TA Wire Connectors

Inspection of connectors should be accomplished in a manner that involves only minor manipulation of the wire.

30.13.4 Drilling Holes

Drilling holes into asbestos-containing material shall be limited to nonfriable materials such as transite siding, floor tiles, and sheetrock. Impermeable drop cloths must be placed under/around area(s) to be drilled, drilling must be performed through a wet sponge or disposable cup of shaving cream to prevent airborne fiber release. Upon project completion, the area must be cleaned using wet methods and/or HEPA vacuums if necessary. Notification must be provided to the Safety Office prior to any drilling operation that affects ACM/PACM. All persons conducting this work shall have, at a minimum, two-hour asbestos awareness training.

30.14 Appendices

30.14.1 Appendix A: Asbestos/Lead Survey Form

General Survey Information - Suspect Asbestos and/or Lead Survey				
Task No.:	Date Task Was Issued:	Name of Contact:	Organization Code:	Permit Number (If Applicable):
Building No.:	Room or Specific Area:	Scope of Task:		
Type of Survey Conducted:		Check	Reason Survey Was Requested:	Check
Asbestos-Containing Material:			Planned or Upcoming Renovation or Repair	
Lead-Bearing Paint/Coating:			Unplanned or Emergency Renovation or Repair	
Other:			Other:	
Name of Certified Asbestos Consultant/DHS Certified Lead Inspector/Project Monitor:			Certification No.:	
Specific Survey Information				
Were Suspect Asbestos-Containing Materials Present?		Yes or No	Number of Suspect Materials Identified/Evaluated:	
Were Suspect Lead-Bearing Paint/Coatings Present?		Yes or No	Asbestos:	Lead:
Name and Address of Laboratory Used:		Lab Certifications:	Check	Number of Samples Collected:
		EPA NVLAP		Asbestos:
		AIHA ELLAP		Lead:
Analytical Methods Utilized:		Check	General Comments Regarding Survey:	
Polarized Light Microscopy:				
Transmission Electron Microscope:				
Scanning Electron Microscope:				
Atomic Absorption:				
X-Ray Fluorescence:				
Other:				
Findings & Results of Survey/Further Action				
Asbestos		Lead		
Examples Include: Asbestos/Lead Management Plans, Regulation Citations, Certified/Licensed Contractor, etc.				
Check any attachments included:				
Table(s) Analytical Results:		Sample Documentation Forms:		Sample Location Map:
Chain-of-Custody Forms:		Asbestos Submittal:		Lead Compliance Plan:
Laboratory Results:		(Other):		(Other):
Other (describe):				
Consultant's Signature:			Date:	

30.14.3 Appendix C: Asbestos Signs for Buildings

<h1 style="margin: 0;">CAUTION</h1>		
<p>Asbestos is a cancer and lung disease hazard.</p> <p>Asbestos may be contained in materials found in this building.</p> <p>Do Not Disturb these materials without proper training and equipment.</p> <p>See the list of materials below.</p>		
Cement wallboard	Fireproofing material	HVAC duct insulation
Cement siding	Roofing felt	Boiler insulation
Asphalt floor tile	Fire door	Ductwork fabric connector
Vinyl floor tile	Wallboard	Ceiling tiles/panels
Vinyl sheet flooring	Wall plaster	Electrical wiring insulation
Acoustical plaster	Joint compounds	Spray applied insulation
Pipe insulation	Heating & electrical ducts	Construction mastics on tiles, floor, and ceiling
<p>Due to inspection limitations, this listing may not include all asbestos-containing materials in this building.</p> <p>For more information, contact the Ames Safety Office at REDACTED</p>		

30.14.4 Appendix D: Asbestos Labels/Signs for Installed Asbestos- Containing Materials



