



NAVAL FACILITIES ENGINEERING SERVICE CENTER
Port Hueneme, California 93043-4370

TECHNICAL MEMORANDUM

TM-2284-ENV

SPECIAL ASBESTOS PROJECTS IN RENOVATION CONTRACTS

by

NFESC NAVOSH Air Branch
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INTRODUCTION

This manual is one of many asbestos services provided by the Naval Facilities Engineering Service Center (NFESC). It replaces the Naval Energy and Environmental Activity (NEESA) document 70.2-009.3, and is one of a series designed to provide operating procedures during all phases of asbestos abatement contracts. The series includes guidance on demolition, renovation, and special projects.

The NFESC revised this document to help Navy personnel administer asbestos removal contracts. The intent of the manual is to ensure that the contractor will: (1) protect the workers health and safety; (2) prevent the release of asbestos fibers into the environment; and (3) comply with all applicable regulations throughout the duration of the contract.

The manual combines information from the following Federal and Navy standards: Occupational Safety and Health Administration (OSHA) 29 CFR 1915.1001 and 1926.1101, Environmental Protection Agency (EPA) 40 CFR 61 and 763, Naval Facilities Guide Specifications (NFGS) Section 13281, OPNAVINST 5100.23, and various EPA guidance documents.

The compiled material provides a backbone for managing asbestos in a variety of special projects. The format follows the logical sequence of an asbestos project. It is designed to be concise and easy to use, relying on removable checklists that emphasize important criteria. These checklists can be taken to the abatement site to verify that all critical portions of the contract are completed. The checklists provide basic information regarding required and/or recommended procedures for managing asbestos removal contracts. Detailed discussions of each checklist are included. Appendices provide additional relevant information, which aid in administering the contract.

This manual is a supplement to be used in conjunction with other NFESC documents such as TM-2210-ENV, "Managing Asbestos Abatement for Demolition Contracts, A Field Procedure Manual for OICC/ROICC", and TM-2211-ENV, "Managing Asbestos Abatement for Renovation Contracts, A Field Procedure Manual for OICC/ROICC".

The intention is not to replace the contract specifications, but to augment them by providing detailed checklists to use at various stages of the contract. The contract specifications are the legal binding documents that provide contract detail and serve as the final reference in areas of conflict or dispute. Completion of the checklists does not ensure the complete satisfaction of the contract specifications.

We hope that the information contained within this document will serve Navy personnel well and assist them in executing asbestos abatement contracts. We have an obligation to protect the safety and health of our workers as well as the environment.

ASBESTOS REGULATIONS

The Environmental Protection Agency (EPA) and the Occupational Safety and Health Administration (OSHA) are responsible for promulgating federal asbestos regulations.

EPA's regulations are as follows:

40 CFR 61 Subpart M - National Emission Standard for Hazardous Air Pollutants (NESHAP). NESHAP is primarily concerned with the application, renovation, demolition and disposal of asbestos containing material (ACM). The regulation defines ACM as being greater than 1% of the sample area as measured by polarized light microscopy. NESHAP requires notification and an asbestos survey prior to commencement of demolition/renovation projects. Destructive testing is required for all demolition projects.

40 CFR 763 - Asbestos Hazard Emergency Response Act (AHERA). AHERA applies to all schools, kindergarten through 12th grade. On November 28, 1992 the Asbestos in Schools Hazard Reauthorization Act (ASHARA) extended AHERA training requirements for inspectors, project designers, abatement workers, and contractor/supervisors for all personnel working with asbestos in public and commercial buildings.

The following regulations address specific OSHA requirements concerning worker protection and procedures used to control ACM:

29 CFR 1915.1001 - Shipyard. This regulation covers employees at shipyards engaged in demolition, as well as in removal. Also covered are ACM spill or emergency clean-up actions, and maintenance work.

29 CFR 1926.1101 - Construction Industry. This regulation covers employees engaged in demolition, as well as in removal. Also covered are ACM spill or emergency clean-up actions, and maintenance work.

29 CFR 1910.134 - Respiratory Protection. This standard establishes a respiratory protection program and sets minimum requirements for implementing an acceptable program and guidance for respiratory selection.

Finally, the Navy's asbestos program is defined by the following:

OPNAVINST 5100.23, Chapter 17 - Asbestos. This instruction provides specific guidance for Navy personnel concerning the control/elimination of asbestos exposure during the use, removal, and disposal of ACM. The provisions of this instruction apply to both industrial and construction activities and equal or exceed the OSHA's "General Industry Standard" and "Construction Industry Standard."

NOTE: The current version of this document is OPNAVINST 5100.23D. It is important to determine the latest version of each requirement prior to awarding any abatement contract.

EMERGENCY RESPONSE

Many renovation activities are conducted without disturbing asbestos containing materials (ACM). A key requirement of any renovation project is to clearly identify the form, quantity, and location of all ACM within the area to be renovated. Often, an accidental disturbance will occur to material outside the scope of the renovation project. This section describes procedures taken during any renovation project where an accidental fiber release of material either known or assumed to contain asbestos has occurred. This section is limited to isolation, clean up and repair procedures. Refer to the renovation manual, TM-2211-ENV, for information regarding removal of the damage materials.

EMERGENCY RESPONSE CHECKLIST		
CHECK ✓	CHECKLIST ITEM DESCRIPTION	REFERENCE
	1. Is work place isolation required for the area in which the disturbance has occurred?	29 CFR 1915.1001 (e) 29 CFR 1926.1101 (e)
	2. Has the activity APM been notified of the disturbance?	
	3. Have signs been posted to prevent unauthorized personnel from entering the work area?	29 CFR 1915.1001 (e)(2) & (k)(7)(i) 29 CFR 1926.1101 (e)(2) & (k)(7)(i) 40 CFR 763.91 (d)(2)
	4. Has the air-handling system been shut off to prevent the distribution of any released fibers to areas outside the work site?	40 CFR 763.91 (d)(3)
	5. Has the EPA or local agency been notified by phone? Has there been a follow-up written notification?	40 CFR 61.145 (b)(4)(xv)
	6. Has a Negative Exposure Assessment been made?	29 CFR 1915.1001 (f)(2)(iii) 29 CFR 1926.1101 (f)(2)(iii)
	7. Are all workers trained in asbestos clean up and repair operations? Is there an on-site supervisor trained in the requirements of NESHAP?	29 CFR 1915.1001 (k)(9)(i) & (o)(4) 29 CFR 1926.1101 (k)(9)(i) & (o)(4) 40 CFR 61.145 (c)(8) 40 CFR 763.121 (k)(3) OPNAVINST 5100.23ch.17
	8. Are all workers entering the regulated area wearing specified respiratory protection and protective clothing? Are the workers respirator trained and fit tested?	29 CFR 1915.1001 (h)(1) & (i)(1) 29 CFR 1926.1101 (h)(1) & (i)(1) 29 CFR 1910.134 (e)(5) OPNAVINST 5100.23ch.15
	9. Has personal and area monitoring been performed to establish airborne asbestos TWA?	29 CFR 1915.1001 (f)(1) 29 CFR 1926.1101 (f)(1) OPNAVINST 5100.23ch.17
	10. Has fallen debris been thoroughly saturated with amended water and placed in plastic bags for disposal?	40 CFR 61.150 (a)(1) OPNAVINST 5100.23ch.17
	11. Has the area been cleaned with water and/or HEPA filtered vacuums?	29 CFR 1915.1001 (g)(1) 29 CFR 1926.1101 (g)(1) OPNAVINST 5100.23 ch.17

EMERGENCY RESPONSE CHECKLIST		
CHECK ✓	CHECKLIST ITEM DESCRIPTION	REFERENCE
	12. Has damaged ACM been repaired with asbestos free spackle, plaster, cement, or isolation, or sealed with latex paint or an encapsulant?	
	13. Does the air monitoring show the area is ready for reoccupation?	29 CFR 1915.1001 (c) 29 CFR 1926.1101 (c) OPNAVINST 5100.23 Ch. 17

Detailed Discussion.

Checklist Item #1. Isolation is required if there is a high probability of contamination of either people or the environment. Most major disturbances cannot be corrected without isolation of the project area. Evacuation may be necessary if the area cannot be easily isolated and is normally occupied.

Checklist Item #2. In addition to contractual requirements, notify the activity Asbestos Program Manager (APM) when any releases of ACM occur during construction.

The APM is the activity's technical expert for asbestos projects. The APM can provide valuable assistance when dealing with regulatory issues or unique site conditions. Engineering Field Divisions and Engineering Field Activities also have asbestos experts to provide technical expertise and support for contractual interpretation.

Checklist Item #3. Place warning signs at all approaches to asbestos control areas. Locate the signs at such a distance that people can see and read them from all directions of approach.

Checklist Item #4. Seal off the heating, ventilation and air conditioning (HVAC) system from the contaminated area. Be aware that the rest of the facility may still require environmentally controlled air.

Checklist Item #5. If the amount of disturbed asbestos is at least 80 linear meters (260 linear feet), 15 square meters (160 square feet), or 1 cubic meter (35 cubic feet) send a written notification to the EPA no later than the following workday. EPA recommends notifying by phone, and by overnight express mail, to a delegated agency and/or EPA Regional Office.

Checklist Item #6. A competent person can obtain a negative exposure assessment (NEA) from the initial assessment, objective data, or historical data, taken on previous jobs within the past twelve months, under conditions closely resembling the current work, and which provide a high degree of certainty that neither the TWA nor the excursion limit will be exceeded. If a NEA has not been made, the supervisor will decide necessary controls such as impermeable dropcloths, plastic barriers, and respiratory protection.

Checklist Item #7. Train asbestos maintenance workers and supervisors with an EPA accredited training program. Also, a supervisor trained in the requirements of National Emission Standard for Hazardous Air Pollutants (NESHAP) must remain on-site during the handling of asbestos. Complete all training prior to beginning any abatement action.

Checklist Item #8. Workers performing asbestos clean up and repair activities where a NEA is not available shall wear respirators. Training in the proper use, limitations, and fitting of the respirators is mandatory to ensure that workers do not inhale asbestos fibers. Proof that employees have been respirator trained, in accordance with 29 CFR 1910.134, must be submitted by the contractor.

Checklist Item #9. For major disturbances (greater than or equal to 3 linear or square feet), use the procedures required by Occupational Safety and Health Administration (OSHA) for large-scale removal. This includes personal and area monitoring.

Checklist Item #10. Pack asbestos debris in leak-tight 6-mil thick plastic bags while wet. Mark bags with approved OSHA labels, generator's name, and location of removal. Clean them at a decontamination area before transport. The labels should be readily visible and legible and printed with waterproof ink. Detailed asbestos disposal methods are described in the NFESC Asbestos Field Procedure Manual for Renovation.

Checklist Item #11. Equip vacuums with High Efficiency Particulate Air (HEPA) filters and other controls conforming to the American National standard Institute (ANSI) standard Z9.2.

Checklist Item #12. Ensure that all new building materials are non-asbestos and are marked "asbestos-free". Also, ensure that the building drawings reveal the same information.

Checklist Item #12. Air testing confirms that the work site has been adequately cleaned and the airborne asbestos fiber concentration is below 0.01 f/cc. When the contractor has satisfied this requirement, furnishings and personnel may re-enter the work area.

NOTE: There may be instances when the outside ambient air concentrations are greater than 0.01 f/cc. Contact the NAVOSH manager and/or APM when these conditions are identified. In these situations, the outside ambient air quality standard becomes the clearance standard. It is not practical to require the contractor to clean to standards that are less than the ambient outside air quality.

GLOVE BAGS

Glove bags are used to effectively reduce asbestos exposures during removal and maintenance operations. The bags are fitted with arms, through which the work is performed. When installed properly, they allow the workers to remain totally isolated from the ACM being removed. They are intended as a single use control device that is disposed of at the end of each job. The amount of ACM removed with a glove bag is limited to its width (approximately three feet) without moving it along the length of the pipe or structure.

Restrictions on the use of multiple glove bags were eliminated in the OSHA standards, revised in August 1994. Glove bags are a specific control method for Class I work. Glove bags also help reduce worker exposure and decrease cleanup time by containing asbestos fibers in an enclosure. Besides the requirements for use of glove bags, all area preparation, air monitoring and final clearance requirements discussed in the companion NFESC asbestos field procedure manuals must be followed.

GLOVE BAG CHECKLIST		
CHECK ✓	CHECKLIST ITEM DESCRIPTION	REFERENCE
	1. Are all objects removed from the work area or covered with 6-mil thick polyethylene plastic sheeting before the task begins?	29 CFR 1915.1001 (g)(4)(v) 29 CFR 1926.1101 (g)(4)(v)
	2. Have critical barriers been placed over all openings to the regulated area?	29 CFR 1915.1001 (g)(4)(ii)(A) & (g)(7)(ii)(A) 29 CFR 1926.1101 (g)(4)(ii)(A) & (g)(7)(ii)(A)
	3. Are glove bags made of 6-mil thick plastic and seamless at the bottom?	29 CFR 1915.1001 (g)(5)(ii)(A)(1) 29 CFR 1926.1101 (g)(5)(ii)(A)(1)
	4. Are the glove bags used on elbows and other connections designed for this purpose, without modifications?	29 CFR 1915.1001 (g)(5)(ii)(A)(2) 29 CFR 1926.1101 (g)(5)(ii)(A)(2)
	5. Does the glove bag completely cover the circumference of the pipe or other structure where the asbestos removal is to be done?	29 CFR 1915.1001 (g)(5)(ii)(B)(1) 29 CFR 1926.1101 (g)(5)(ii)(B)(1)
	6. Is the surface temperature of the pipe under 150° F?	29 CFR 1915.1001 (g)(5)(ii)(B)(4) 29 CFR 1926.1101 (g)(5)(ii)(B)(4)
	7. After installation, has the glove bag been smoke tested for leaks?	29 CFR 1915.1001 (g)(5)(ii)(B)(2) 29 CFR 1926.1101 (g)(5)(ii)(B)(2)
	8. Are the workers equipped with the proper personal protective equipment?	29 CFR 1915.1001 (h)(1) & (i)(1) 29 CFR 1926.1101 (h)(1) & (i)(1)
	9. Are all Class I and II asbestos removal work supervised by a "competent" or "qualified" person?	29 CFR 1915.1001 (g)(4)(i) & (g)(7)(i) 29 CFR 1926.1101 (g)(4)(i) & (g)(7)(i)

GLOVE BAG CHECKLIST		
CHECK ☒	CHECKLIST ITEM DESCRIPTION	REFERENCE
	10. Are at least two workers performing Class I asbestos removal work?	29 CFR 1915.1001(g)(5)(iii)(B)(9) 29 CFR 1926.1101(g)(5)(iii)(B)(9)
	11. Is the ACM thoroughly wetted before removal?	29 CFR 1915.1001 (g)(1)(ii) 29 CFR 1926.1101 (g)(1)(ii)
	12. Is the surface from which the ACM is removed cleaned with a brush?	
	13. Are the exposed edges, as a result of removal or maintenance activities, encapsulated?	
	14. After removal and encapsulation is complete, is the glove bag collapsed, prior to disposal, by removing air using a HEPA vacuum?	29 CFR 1915.1001 (g)(5)(ii)(B)(5) 29 CFR 1926.1101 (g)(5)(ii)(B)(5)
	15. Is all asbestos-containing waste labeled properly and disposed of in an approved landfill in accordance with Federal, local or state regulations?	40 CFR 61.150

Detailed Discussion.

Checklist Item #1. When mini-enclosure and glove bags are used, remove all objects from the work area or cover them with plastic. If nonporous objects have already been contaminated, thoroughly clean them with a HEPA filtered vacuum or wet wipe before removal or cover them in plastic. This can be disregarded if only glove bags are used.

Checklist Item #2. For all class I work involving the removal of more than 25 linear or 10 square feet of TSI or surfacing material, critical barriers shall be place over all openings to the regulated area to ensure that airborne asbestos does not migrate from the regulated area.

Checklist Items #3 and 4. Glove bags shall be made of 6-mil thick plastic and shall be seamless at the bottom. Glove bags used on elbows and other connections must be designed for that purpose and used without modification.

Checklist Item #5. Install glove bags so they completely cover the pipe or structure where the asbestos work is to be done. Install the glove bag by cutting the sides to fit the size of the pipe from which the asbestos is to be removed. Securely attach the glove bag to the pipe and seal all openings with duct tape.

Checklist Item #6. Glove bag removal should not be attempted on hot pipes (over 150° F) due to the possibility of the bags melting.

Checklist Item #7. Use a smoke test to check the integrity of the glove bag. Fill the bag with smoke and while holding the water porthole closed, gently squeeze the glove bag and look for smoke leaking out especially around the top and ends of the glove bag.

Checklist Item #8. The worker performing the glove bag removal and any assistants must wear, at the minimum, a half-mask dual cartridge HEPA equipped respirator. Workers should also wear disposable full-body suits with hoods that go over the respirator straps. Workers should be trained in emergency procedures in the event the glove bag ruptures.

Checklist Item #9. A competent person shall supervise all class I work.

Checklist Item #10. At least two persons shall perform class I glove bag removal.

Checklist Item #11. Wet ACM thoroughly before removal from the pipe or structure. If multiple layers of ACM are present, mist each layer with a wetting agent to ensure it releases as little dust as possible.

Checklist Item #12. After ACM removal, clean the pipe or surface with a wire brush and wet wiped with a wetting agent until no traces of ACM can be seen. Some States may not allow the use of wire brushes in glovebags. In these cases, use a hard bristled plastic brush to clean the pipe surface.

Checklist Item #13. Spray, paint, or trowel over the exposed edges with an encapsulant to ensure that they do not release asbestos fibers to the atmosphere when the glove bag is removed.

Checklist Item #14. When removal and encapsulation is complete, remove any air in the bag that may contain asbestos fibers with a HEPA equipped vacuum. Squeeze the bag tightly, as close to the top as possible, twist and seal with duct tape to keep the ACM securely in the bottom of the bag. After sealing the glove bag, remove the HEPA filtered vacuum. Remove the sealed glove bag from the work area.

Checklist Item #15. When disposing of glove bagged asbestos waste, ensure that it is double bagged and that the outermost bag contains the required warning label. Dispose of all asbestos-containing waste in an approved landfill that complies with federal, state, or local regulations.

FLOOR TILE REMOVAL

Floor tile in good condition is considered by the EPA to be Category I ACM and is exempt from most EPA requirements for demolition, renovation, and waste disposal standards. Category I ACM becomes regulated if it: (a) becomes friable or (b) will be subject to sanding, grinding, cutting or abrading. Category I ACM is defined as "asbestos containing packing, gaskets, resilient floor covering, and asphalt roof covering, containing more than 1% asbestos."

Removal of floor tile which contains more than 1 percent asbestos, is considered Class II asbestos work per OSHA standard 29 CFR 1926.1101 (Construction Industry). If removal of floor tiles causes airborne contamination to exceed the action level for asbestos, then worker protection is required.

There are no regulatory requirements to remove floor tile that is well maintained and in good condition. If the floor tile must be removed, the checklist below reflects procedures necessary to complete the task per 29 CFR 1926.1101 and OPNAVINST 5100.23D.

NOTE: The following checklist is to be used in conjunction with the Abatement Checklists in the Renovation Manual, TM-2211-ENV.

FLOOR TILE REMOVAL CHECKLIST		
CHECK ☒	CHECKLIST ITEM DESCRIPTION	REFERENCE
☐	1. Will the resilient floor covering manufacture's recommended work practices be used for removal of intact floor tile?	OSHA Compliance Directive CPL 2-2.63 of Nov. 3, 97
☐	2. Is the material in poor condition? Will it be sawed, sanded, or made friable during removal?	40 CFR 61.145 (c)
☐	3. Is removal necessary for the project?	29 CFR 1910.1001 40 CFR 61.145 (c)(1) OPNAVINST 5100.23 Ch 17
☐	4. Have the floor tiles and mastic been tested for asbestos?	29 CFR 1915.1001 (g)(8)(i) 29 CFR 1926.1101(g)(8)(i)
☐	5. Has the EPA, State, or local agency been notified?	40 CFR 61.145(b)
☐	6. Has a negative exposure assessment been produced?	29 CFR 1915.1001 (g)(7)(ii) 29 CFR 1926.1101(g)(7)(ii)
☐	7. Are the floor tiles being chemically treated prior to removal?	
☐	8. Are the floor tiles being heat-treated to aid in removal?	29 CFR 1915.1001 (g)(8)(i)(H) 29 CFR 1926.1101 (g)(8)(i)(H)
☐	9. Is the floor tile being treated with dry ice to aid in removal?	

FLOOR TILE REMOVAL CHECKLIST		
CHECK ✓	CHECKLIST ITEM DESCRIPTION	REFERENCE
	10. Are the floor tiles being removed with a mechanical chipper?	29 CFR 1915.1001 (g)(8)(i)(F) 29 CFR 1926.1101 (g)(8)(i)(F)
	11. Has an initial assessment been accomplished?	29 CFR 1915.1001 (f)(2) 29 CFR 1926.1101(f)(2)
	12. Is periodic air monitoring conducted during removal?	29 CFR 1915.1001 (f)(3) 29 CFR 1926.1101(f)(3) OPNAVINST 5100.23 Ch 17
	13. Is the floor tile being disposed of properly?	29 CFR 1915.1001 (l)(3) 29 CFR 1926.1101(l)(3) OPNAVINST 5100.23 Ch 17

Detailed Discussion

Checklist Item #1. Work practices based recommendations by the resilient floor covering manufactures qualify as compliant work practices for removal of intact floor tile. When using these work practices the competent person can use the "Environ Data" set as a basis for a negative exposure assessment. If a negative exposure assessment is made and the compliant work practices are used, then provided the floor tile remains intact¹ throughout the removal process, the work area does not need to be enclosed and the workers do not need to wear respirators.

Workers using the "recommend work practices" for intact floor tile removal must have completed an 8-hour training program per 29 CFR 1926.1101 and OSHA Directive CPL 2-2.63 of Nov. 3, 1997. The competent person must have completed the same 8-hour worker training program plus an additional 4-hours of training as specified in CPL 2-2.63. Completion of these training courses does not qualify workers to remove non-intact floor tile or competent persons to supervise removal of non-intact floor tile.

Checklist Item #2. If floor tiles become friable during removal, treat them as friable ACM (see the abatement checklist for a renovation project 70.2-009.2).

Checklist Items #3. Asbestos floor tile in good condition does not need to be removed prior to demolition or renovation. Remove floor tile if they become friable. Treat friable asbestos floor tile as you would treat any other friable ACM.

Checklist Item #4. If the floor tiles and mastic have not been determined as asbestos free, then use the following work practices:

- Do not sand or saw the tiles, backing or mastic.
- Use only vacuum cleaners equipped with HEPA filters [29 CFR 1926.1101(g)(1)].
- Use wet methods or wetting agents to control employee exposure during floor tile handling, removal, and cleanup, except where it can be demonstrated that the use of wet methods are not feasible [29 CFR 1926.1101(g)(1) and OPNAVINST 5100.23D (1704)].
- Clean floors with HEPA filtered vacuums using a floor attachment made of metal.

- Dry sweeping is prohibited.
- Ensure prompt cleanup and disposal of wastes and debris contaminated with asbestos in leak-tight containers [29 CFR 1926.1101(g)(1) and OPNAVINST 5100.23D (1704)].

Checklist Item #5. 10 working days prior to start of work, notify EPA or an approved state or local agencies if the asbestos area disturbed in this project, or a combination of projects during a year, meet or exceeds 15 square meters (160 square feet).

Checklist Item #6. If a negative exposure assessment has not been accomplished, or if conditions have changed, indicating that there may be exposure above the PEL, then one of the following methods will be used to ensure that airborne asbestos does not migrate from the regulated area. Critical barriers as defined in 29 CFR 1926.1101(b) and (e), will be placed over all openings to the regulated area; or use another barrier/isolation method that prevents the migration of airborne asbestos from the regulated area as specified in 29 CFR 1926.1101(g)(4)(ii)(B).

Checklist Item #7. Floor tiles are sometimes soaked with chemicals prior to removal to separate the tile from the floor. This procedure prevents fibers from being released into the air while the floor tile is submerged. Check the material safety data sheet (MSDS) to ensure that the chemical is not a hazardous material. Using a hazardous material may expose the workers to airborne contaminants that they are not protected against. Dispose of the hazardous material and floor tiles as hazardous wastes.

Checklist Item #8. Floor tiles are sometimes heated prior to removal to eliminate the cohesion element between the floor and the tile. The floor tiles are then pried off the floor. This takes a lot of time, sometimes several minutes per tile, which may not be cost effective. Also, heating the floor tile and mastic might produce toxic vapors.

If heat is used and the tiles can be removed intact, then wetting is not required.

Checklist Item #9. The use of dry ice produces carbon dioxide that can result in an oxygen deficiency in the work area. Dry ice can also cause frostbite to workers and damage building materials.

Checklist Item #10. Mechanical chipping is prohibited unless performed in a negative pressure enclosure that meets the requirements of 29 CFR 1926.1101(g)(5)(i).

Checklist Item #11. Ensure that a "competent person" conducts an exposure assessment immediately before or at the initiation of all removal operations to ascertain expected exposures and to ensure that all systems for controlling the asbestos are appropriate and will work properly.

Checklist Item #12. Conduct daily periodic monitoring that is representative of the exposure to each employee who is assigned work in the regulated area. Daily periodic monitoring is not required if a negative exposure assessment was produced.

Daily monitoring of employees is not required if the employee is equipped with a supplied-air respirator operated in the pressure demand mode, or other positive pressure mode respirator.

If periodic monitoring reveals that worker exposures, as indicated by statistically reliable measurements, are below the action level and/or excursion limit, then air monitoring can be stopped.

Checklist Item #13. Before removing from the containment area, asbestos waste, scrap debris, bags, containers, equipment, and contaminated clothing consigned for disposal shall be collected and disposed of in sealed, labeled, impermeable bags or other closed, labeled, impermeable containers.

Disposal requirements for asbestos floor tiles vary from state to state. In most state, asbestos floor tiles must be disposed of in airtight containers. Some states require that asbestos floor tiles be disposed of as a hazardous waste. If the floor tiles have remained non-friable during removal, then the floor tile is exempt from asbestos disposal requirements in most states. Contact your State or local environmental office to find out the specific requirements for disposal in your area.

CRAWL SPACE ABATEMENT

Asbestos abatement in soil, under crawl spaces can be tedious, difficult, and expensive. Crawl space heights can vary from seven feet to barely inches. Columns, sub-foundations, cross-bracing, waste water lines and other building systems can render an area inaccessible. In addition, the nature of soil in a crawl space varies from location to location, from virtually rock-like to silted fine soil, to damp sticky clay. It is often difficult to prove that the space is clean and cleared for reoccupancy because aggressive air samples are quickly overloaded and unreadable.

Asbestos contaminated soil in crawl spaces usually results from previous maintenance or abatement activities, accidental disturbance, or damage. Typically, thermal system insulation (TSI) or other asbestos-containing materials (ACM) were damaged or removed without soil protection. Further distribution into the soil occurs through maintenance activities, leaks, or flooding. Any scheduled maintenance or ACM removal in crawl spaces must assure a thorough evaluation of soil conditions and proper protection of workers and soil during maintenance activities of soil removal.

In general, the abatement options, most frequently considered with respect to the abatement of asbestos contaminated crawlspace, include removal/excavation, enclosure, and encapsulation.

CRAWL SPACE ABATEMENT CHECKLIST		
CHECK ☒	CHECKLIST ITEM DESCRIPTION	REFERENCE
☐	1. Have federal, state, or local agencies been notified ten days in advance of work?	40 CFR 61.145(b)
☐	2. Has the workspace been isolated for the project?	29 CFR 1915.1001 (c) 29 CFR 1926.1101(c)
☐	3. Is the crawlspace considered a confined space? Is a permit required?	
☐	4. Have the critical barriers been established?	29 CFR 1915.1001 (g)(4)(ii)(A) 29 CFR 1926.1101 (g)(4)(ii)(A)
☐	5. Has negative pressure been established?	29 CFR 1915.1001 (g)(5)(i) 29 CFR 1926.1101 (g)(5)(i)
☐	6. Is the contractor using engineering controls, and asbestos work practices such as HEPA filtered vacuum and wet method?	29 CFR 1915.1001 (g)(1) 29 CFR 1926.1101 (g)(1)
☐	7. Has visible asbestos debris been removed?	
☐	8. Has the ACM installed on surfaces or systems inside the crawlspace been removed before undertaking the excavation, enclosure, or encapsulation of the soil?	

CRAWL SPACE ABATEMENT CHECKLIST		
CHECK ☒	CHECKLIST ITEM DESCRIPTION	REFERENCE
REMOVAL/EXCAVATION		
☐	9. Has the crawlspace soil been sampled?	
☐	10. Has the depth of soil removal been determined?	
☐	11. If Vacu-loading is used for removal, has the contractor obtained written approval from the EPA, state, or local agency before a dry removal project begins?	40 CFR 61.145 c(3)(ii)
ENCLOSURE		
☐	12. Does the poured concrete include drainage?	
☐	13. Are aggressive sampling techniques used to collect clearance air samples after enclosure is complete?	
ENCAPSULATION		
☐	14. Will the soil be encapsulated using a geo-textile membrane?	
☐	15. Has the geo-textile membrane been covered with sand or gravel?	
☐	16. Have provisions been made for drainage?	

Detailed Discussion.

Checklist Item #1. Notify EPA or approved state or local agencies if the asbestos area disturbed in this project, or a combination of projects during a year, meets or exceeds cut-off limits. The cut-off limits are: 80 linear meters (260 linear feet) on pipes, 15 square meters (160 square feet) on other facility components, or 1 cubic meter (35cubic feet) of facility components where the length could not be measured previously.

Checklist Item #2. Removal of ACM in crawlspaces has a high probability of inadvertent contamination of either people or the environment. Workspace isolation is necessary, which includes sealing floor penetrations, plenums, or other internal building access points.

Checklist Item #3. Crawlspaces can be confined spaces. Spaces such as crawlspace may be a permit required confined space during the heating season when steam pipes are active, and a non-permit confined space during the summer. Contractors who have employees working in a confined space are required by OSHA to have a confined space entry program, and procedure for confined space entry.

Checklist Item #4. Establish critical barriers by sealing penetration points, ventilation grills, and access hatches.

Checklist Item #5. Negative pressure is required to ensure that asbestos fibers do not migrate outside the containment. Individual abatement sites may present various issues that may prohibit the use of negative air. However, if feasible, maintain a minimum negative pressure of 0.02 in. w.g. relative to outside pressure.

Checklist Item #6. Use engineering controls and work practices such as vacuum cleaners equipped with HEPA filter, wet methods, local exhaust etc. to control asbestos.

Checklist Item #7. Carefully remove loose, visible asbestos debris by hand or with a HEPA vacuum prior to applying enclosure or encapsulation. Enclosing visible asbestos debris in a crawlspace with cement verges on creating a disposal site. This would require a variety of State and Federal approvals. If encapsulated, the encapsulant spray strikes the soil, asbestos fibers on the soil may become airborne and settle after the encapsulant is dry.

Checklist Item #8. Remove ACM installed on surfaces or systems inside the crawlspace before undertaking the excavation, enclosure, or encapsulation of the soil. Otherwise, the potential for recontamination of the soil is unacceptably high. Establish plastic barriers to prevent additional contamination of the soil and to avoid grinding asbestos debris deeper into the soil. After complete removal of the installed materials, the soil can be decontaminated.

Checklist Item #9. The soil sampling will develop a topographical map of the depth and extent of soil contamination. Samples should be collected in a grid layout and identified by depth.

Checklist Item #10. Asbestos materials will not “burrow” into the hard-pan. In most cases, pieces of debris will be limited to the top half-inch or so of the soil surface. Situations do exist where ACM is buried in filled-in trenches, or is carried by water into fissures of very porous soil. These conditions should be found during the building survey and addressed in the project design.

Checklist Item #11. The advent of sophisticated Vacu-loading systems has made excavation more practical and economical than HEPA vacuuming and bagging of debris by hand. Typically, a Vacu-loader is mounted on a vehicle chassis and consists of a cyclone debris separator attached to an assembly of HEPA filters and a bagging device. The cyclone separator channels most of the larger particles and pieces of rubble into bags, and the microscopic asbestos debris accumulates in the HEPA filters. Recent designs have incorporated a continuous bagging feature that enables the machine to cycle during the bagging process, instead of requiring partial shut down every time a bag is filled. In general, Vacu-loaders function optimally with dry, loose material. This requires specific permission from EPA, as per NESHAP, to be performed as a dry removal.

Checklist Item #12. Poured concrete is considered a permanent solution. Soil condition, water table and access must be evaluated prior to determining the use of concrete. Unless provisions are made for drainage, water will sit on the concrete surface and evaporate. This may cause structural deterioration, moisture and mold problems for the building.

Checklist Item #13. Aggressive air sampling is usually not recommended or required in crawl spaces since it will disturb soil and dust, and make analysis of air samples impossible.

If specified in the contract, use aggressive sampling for post-abatement air test. Artificially circulate air using forced air equipment such as a leaf blower to dislodge loose fibers, then slow speed fans to keep the fibers suspended during sampling. This way, fibers remain airborne during sampling process. Even though the site has been cleaned and has passed a visual test, the person conducting this air monitoring should wear a respirator since the levels of airborne asbestos still may be elevated. Refer to EPA publication 560/5-85-024 (Guide for Controlling Asbestos Containing Materials in Buildings) for additional information.

Checklist Item #14. The use of a geo-textile is considered a temporary method. Soil conditions, water table, and access must be evaluated prior implementation.

Checklist Item #15. The membrane must be covered with at least 4 to 6 inches of sand or gravel to ensure it remains intact.

Checklist Item #16. The vapor lock created by the plastic may interfere with drainage. Moisture will accumulate on top of the plastic and in the soil underneath. This may pose a future foundation problem.

BOILER ROOMS

Asbestos removal operations in boiler rooms are much more complicated than in standard classrooms or office spaces. Steam or hot water systems should be shut down before the removal of insulation containing asbestos from pipes, tanks, or boilers. If the steam or hot water systems must stay on line, give special considerations for a safe asbestos removal. Working on an operating boiler should only be done as a last resort. The following checklist reflects precautionary procedures necessary for this situation.

NOTE: The following checklist is to be used with the abatement checklists in the renovation manual (TM-2211-ENV).

BOILER ROOM CHECKLIST		
CHECK ✓	CHECKLIST ITEM DESCRIPTION	REFERENCE
	1. Has the EPA, State or local agency been notified of asbestos removal ten days in advance of work?	40 CFR 61.145b(3). OPNAVINST 5100.23 Ch.17
	2. Has a negative pressure enclosure been established	29 CFR 1915.1001 (g)(5)(i)(A) 29 CFR 1926.1101 (g)(5)(i)(A)
	3. Do the work schedule and procedures reflect the special case of working in an operating boiler room?	
	4. Has the material been treated with a solution of water and a wetting agent to reduce fiber release?	29 CFR 1915.1001 (g)(1)(ii) 29 CFR 1926.1101 (g)(1)(ii) 40 CFR 61.145(c)(2)(i) OPNAVINST 5100.23 Ch.17
	5. Has the contractor obtained written approval from the EPA, state, or local agency, if a dry removal project is performed?	40 CFR 61.145 (c)(i)(A)
	6. Are precautions taken to prevent heat stress and burns?	
	7. Are glove bags used? Is the surface temperature of the pipe under 150° F?	29 CFR 1915.1001 (g)(5)(ii)(B)(4) 29 CFR 1926.1101 (g)(5)(ii)(B)(4)
	8. Has ACM been packed wet?	40 CFR 61.150(a)(1) OPNAVINST 5100.23 Ch 17
	9. Are contaminated metal bands, wires, and jackets collected in separate bags from other ACM to avoid bag breakage?	
	10. Is high-pressure hot water spray necessary for the clean up? If yes, are special procedures established for complying with environmental regulations?	
	11. Are pipe and boiler insulation replaced with non-asbestos material	OPNAVINST 5100.23 Ch 17

Detailed Discussion

Checklist Item #1. EPA or equivalent State agency must be notified in writing 10 days before expected asbestos removal or renovation. In some states, the EPA has delegated this authority to the City, County, or local environmental or health offices. An updated notice must be filed if the amount of asbestos varies by $\pm 20\%$. The activity remains responsible for this action even when the asbestos work is contracted out.

Checklist Item # 2. Establish a negative pressure enclosure to avoid asbestos contamination beyond the regulated area.

Checklist Item #3. Asbestos removal in an operating boiler room is a lot different from removal in a standard classroom or office space. Most boiler rooms are cramped for space. Complicated machinery and piping are hard to cover with plastic. The floors, walls and machinery are usually covered with greasy dirt, which attracts asbestos fibers released by damaged ACM. If the boiler room is located in the basement with no window, setting up a negative air system can be a problem. These unique characteristics of a boiler room require special working procedures to protect the workers and the environment.

Checklist Items #4 and 5. Amosite-containing materials will not absorb either water or water amended with the wetting agent (50% polyoxyethylene ester and 50% polyoxyethylene ether). Test wetting agents on the material for absorption prior to ROICC approval. However, cold water sprayed on hot pipes can cause fracture and explosion. Also spraying water on operating machinery and electrical equipment is a safety hazard. Therefore, dry removal may be necessary. Soak dry ACM as soon as it is moved away from sensitive equipment. EPA, state and local approval is required before a dry removal can begin. Increased worker protection, engineering controls, and more stringent work practices are always required for dry removal.

Checklist Item #6. The temperature in an operating boiler room can reach 120 degrees. Heat stress and skin burn are the two major problems for the workers. Use short shifts and long breaks to protect them. Cooling in-line air supply suits or ice-vests are good personal cooling equipment.

Checklist Item #7. Glove bags are recommended for objects that are not too large. Glove bags are designed for small-scale short duration projects. For large-scale projects, glove bag removal must be done in a negative pressure enclosure. Test the glove bag against hot pipes before using.

NOTE: Refer to the Glove Bags section of this manual for more information on the use and limitation of glove bags.

Checklist Item #8 and 9. Pack bulk asbestos, while wet, in leak-tight plastic or metal drums lined with two sealable 6-mil thick plastic bags. Collect contaminated metal bands, wires and jackets in separate bags from other ACM to avoid spillage of asbestos due to breakage. Seal drums with a lid and retaining ring. If the bulk asbestos will not fit into drums put materials in two layers of 6-mil or thicker plastic bags and load onto skids for transport to an EPA-approved disposal site. Mark drums with approved OSHA labels, contractor's name, and location of removal. Clean them at a decontamination area before transport. Warning signs should be readily visible and legible and

printed with waterproof ink. Check Department of Transportation regulations for package labeling before transporting asbestos debris to the landfill.

Checklist Item #10. Most boiler room walls and floor are covered with a layer of greasy dirt that attracts asbestos fibers. A very effective way to clean those greasy walls and floors is to use high-pressure hot water spray. However, this method requires special procedures to ensure complying with environmental regulations. Contact the state department of environmental management for questions regarding water regulations in a particular area. After the gross asbestos has been removed, and floors and other surfaces have been vacuumed of visible debris, use high-pressure hot water to wash down the ceiling, the walls, the pipes, the boiler, and then the floors. A final wipe down with towels will get the room ready for visual inspection and air sampling.

Checklist Item #11. Ensure that all new insulation materials have been marked "asbestos free" and that the building drawings reveal the same information.

GLOSSARY

Abatement	Control of asbestos beyond an operations and maintenance program that includes removal, enclosure, and encapsulation techniques.
ACM (ACBM)	Asbestos-Containing Material (Asbestos-containing Building Material). Any material containing more than one percent asbestos.
Adequately Wet	Sufficiently mix or penetrate with liquid to prevent the release of particulates. If visible emissions are observed coming from asbestos-containing material, then that material has not been adequately wetted. However, the absence of visible emissions is not sufficient evidence of being adequately wet.
AHERA	Asbestos Hazard Emergency Response Act.
Air Monitoring	The process of measuring the fiber content of a specific volume of air.
Amended Water	Water to which a surfactant has been added for use in wetting ACM to control asbestos fibers.
APM	Asbestos Program Manager
Asbestos	Chrysotile, amosite, crocidolite, tremolite asbestos, anthophyllite asbestos, actinolite asbestos and any of these minerals that has been chemically treated and/or altered.
Asbestos-Containing Waste Material:	Any waste that contains commercial asbestos and is generated by a source regulated under NESHAP. This term includes filters from control devices, friable asbestos waste material, and bags or other similar packaging contaminated with commercial asbestos. As applied to demolition and renovation operations, this term also includes regulated asbestos-containing waste and materials contaminated with asbestos including demolition debris, crawl space soil, and disposable equipment and clothing.
Asbestos Hazard Emergency Response Act (AHERA):	An EPA regulation published 1987. AHERA requires all schools (K-12) to inspect and identify ACM their buildings, and develop and implement an asbestos management plan. The 1990 reauthorization extended training requirements to include personnel in public and commercial buildings.
Asbestos Program Manager (APM)	An activity representative who supervises all aspects of the asbestos management control program.
Breathing Zone	A hemisphere forward of the shoulders with a radius of approximately 6" to 9" (150-230 mm).
Class I Asbestos Work	Activities involving the removal of thermal system insulation or surfacing ACM/PACM.

Class II Asbestos Work	Activities involving removal of ACM which is neither TSI nor surfacing ACM. This includes, but is not limited to, the removal of asbestos-containing wallboard, floor tile and sheeting, roofing and siding shingles, and construction mastics.
Class III Asbestos Work	Repair and maintenance operations, where any ACM may be disturbed.
Class IV Asbestos Work	Maintenance and custodial activities during which employees contact ACM and PACM and activities to cleanup waste and debris containing ACM and PACM.
Competent Person	A person who is capable of identifying existing asbestos hazards in the workplace and selecting the appropriate control strategy for asbestos exposure. Additionally, a person who is specifically trained in a training course that meets the criteria of EPA's Model Accreditation Plan for project designer or supervisor, or its equivalent.
Critical Barrier	One or more layers of polyethylene taped in place over openings into a work area. Openings to be covered include doors, windows, diffusers, and any other opening that could allow outside air into a work area.
Decontamination	Cleaning of contaminated areas, equipment, and personnel. Decontamination chambers are used in asbestos abatement projects.
Disposal Bag	Properly labeled 6 mil (0.15 mm) thick (or thicker) leak-tight plastic bags used for transporting asbestos waste from work and to disposal site.
Drop Cloth	A layer of polyethylene on the floor of a work area to protect the floor below from contamination and to facilitate the clean-up of dust or debris generated during the work.
Encapsulation	The treatment of ACM with a material that surrounds or embeds asbestos fibers in an adhesive matrix to prevent the release of fibers, as the encapsulant creates a membrane over the surface (bridging encapsulant) or penetrates the material and binds its components together (penetrating encapsulant).
Enclosure	The construction of an airtight, impermeable, permanent barrier around asbestos-containing material to control the release of asbestos fibers into the air.
EPA	U.S. Environmental Protection Agency
Excursion Limit (EL)	The OSHA term used to define a maximum airborne concentration of asbestos in fibers per cubic centimeter as averaged over a sampling period of thirty minutes.
Friable	Any material which, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure. This may also include previously non-friable material that becomes broken or damaged by mechanical force.

Glovebag	A polyethylene or polyvinyl chloride bag-like enclosure affixed around an asbestos containing source (most often, TSI) so that the material may be removed while minimizing release of airborne fibers to the surrounding atmosphere.
HEPA Filter	High-Efficiency Particulate Air Filter. Such filters are rated to trap at least 99.97% of all particles 0.3 microns (0.3 μ m) in diameter or larger.
Industrial Hygienist	A professional qualified by education, training, and experience to anticipate, recognize, evaluate, and develop controls for occupation health hazards.
Medical Surveillance	A periodic comprehensive review of a worker's health status. The required elements of an acceptable medical surveillance program are listed in the OSHA standards for asbestos.
Navy Consultant (NC)	A Qualified Person (QP) employed directly by the Government to monitor, sample, inspect the work or in some other way advise the Contracting Officer. The NC is normally a private consultant, but can be an employee of the Government.
Negative Pressure System	A local exhaust system intended to prevent the escape of contaminated air to the surrounding environment. It utilizes HEPA filtration capable of maintaining a pressure differential with a lower pressure inside the Work Area than in any adjacent area. This system recirculates clean air and/or generates a constant flow of air from adjacent areas into the work area.
Negative Pressure Respirator	A respirator in which the air pressure inside the respiratory-inlet covering is positive during exhalation in relation to the air pressure of the outside atmosphere and negative during inhalation in relation to the air pressure of the outside atmosphere.
NESHAP	National Emission Standard for Hazardous Air Pollutants - EPA Rules under the Clean Air Act.
NIOSH	National Institute for Occupational Safety and Health.
Non-Friable	Any material which, when dry, can not be broken, crumbled, pulverized, or reduced to powder by hand pressure.
OSHA	Occupational Health & Safety Administration.
PACM	Presumed Asbestos-Containing Material. Materials assumed to contain asbestos but not laboratory tested.
PEL	Permissible Exposure Limit. Airborne fiber concentration limit of 0.1 fiber per cubic centimeter of air as an eight-hour time weighted average.

Personal Air Samples	An air sample taken with a sampling pump directly attached to the worker with the collecting filter and cassette placed in the worker's breathing zone. The OSHA asbestos standards and the EPA Worker Protection Rule require these samples.
Phase Contrast Microscopy (PCM)	A method of analysis using a light microscope used to find the concentration of airborne fibers. Does not distinguish among asbestos and other fibers. Used by OSHA to find personal exposures, and by EPA to find area levels for AHERA project clearance.
Polarized Light Microscopy (PLM)	A method of analysis using a light microscope to find the chemical or mineral types of samples, including the concentration of asbestos in bulk materials. Used by EPA for AHERA and NESHAP, and by OSHA to see if asbestos is involved in a project.
PPE	Personal Protective Equipment.
Private Qualified Person (PQP)	A Qualified Person (QP) hired by the Contractor to monitor, sample, inspect the work and perform other tasks as required by the contract.
Qualified Person (QP)	A Registered Architect, Professional Engineer, Certified Industrial Hygienist, consultant or other qualified person who has successfully completed training and is therefore accredited under the Model Accreditation Plan as described in 40 CFR 763 as a Building Inspector, Contractor/Supervisor Abatement Worker, and Asbestos Project Designer; and has successfully completed the NIOSH 582 course "Sampling and Evaluating Airborne Asbestos Dust" or equivalent. The QP must be qualified to perform visual inspections as indicated in ASTM E 1368.
Regulated Area	An area where Class I, II, and III asbestos work is done, and any adjoining area where debris and waste from such work accumulate.
Removal	The taking out or stripping of substantially all ACM from a damaged area, a functional space, or a homogeneous area.
Surfactant	A chemical wetting agent added to water to improve penetration, thus reducing the quantity of water required for a given operation or area.
Temporary Barriers	One or more layers of 6-mil polyethylene installed to isolate a work area from other portions of a facility.
Transmission Electron Microscopy (TEM)	Use of an electron microscope to find and analyze the concentration of airborne or bulk asbestos fibers and structures. Distinguishes among asbestos and other materials. Used to determine clearance levels.
WSR	Waste Shipment Record.

SUMMARY OF CHECKLISTS

The following is an accumulation of all the checklists discussed in this manual. These can be photo copied and used as working checklists during any demolition project.

Project Title: _____

Contract Number: _____ Building/Room: _____

ROICC Name: _____ Date: _____

EMERGENCY RESPONSE CHECKLIST		
CHECK ✓	CHECKLIST ITEM DESCRIPTION	REFERENCE
	1. Is work place isolation required for the area in which the disturbance has occurred?	29 CFR 1915.1001 (c) 29 CFR 1926.1101 (e)
	2. Has the activity APM been notified of the disturbance?	
	3. Have signs been posted to prevent unauthorized personnel from entering the work area?	29 CFR 1915.1001 (e)(2) & (k)(7)(i) 29 CFR 1926.1101 (e)(2) & (k)(7)(i) 40 CFR 763.91 (d)(2)
	4. Has the air-handling system been shut off to prevent the distribution of any released fibers to areas outside the work site?	40 CFR 763.91 (d)(3)
	5. Has the EPA or local agency been notified by phone? Has there been a follow-up written notification?	40 CFR 61.145 (b)(4)(xv)
	6. Has a Negative Exposure Assessment been made?	29 CFR 1915.1001 (f)(2)(iii) 29 CFR 1926.1101 (f)(2)(iii)
	7. Are all workers trained in asbestos clean up and repair operations? Is there an on-site supervisor trained in the requirements of NESHAP?	29 CFR 1915.1001 (k)(9)(i) & (o)(4) 29 CFR 1926.1101 (k)(9)(i) & (o)(4) 40 CFR 61.145 (c)(8) 40 CFR 763.121 (k)(3) OPNAVINST 5100.23ch.17
	8. Are all workers entering the regulated area wearing specified respiratory protection and protective clothing? Are the workers respirator trained and fit tested?	29 CFR 1915.1001 (h)(1) & (i)(1) 29 CFR 1926.1101 (h)(1) & (i)(1) 29 CFR 1910.134 (c)(5) OPNAVINST 5100.23ch.15
	9. Has personal and area monitoring been performed to establish airborne asbestos TWA?	29 CFR 1915.1001 (f)(1) 29 CFR 1926.1101 (f)(1) OPNAVINST 5100.23ch.17
	10. Has fallen debris been thoroughly saturated with amended water and placed in plastic bags for disposal?	40 CFR 61.150 (a)(1) OPNAVINST 5100.23ch.17
	11. Has the area been cleaned with water and/or HEPA filtered vacuums?	29 CFR 1915.1001 (g)(1) 29 CFR 1926.1101 (g)(1) OPNAVINST 5100.23 ch.17
	13. Has damaged ACM been repaired with asbestos free spackle, plaster, cement, or isolation, or sealed with latex paint or an encapsulant?	
	14. Does the air monitoring show the area is ready for reoccupation?	29 CFR 1915.1001 (c) 29 CFR 1926.1101 (c) OPNAVINST 5100.23 Ch. 17

Project Title: _____

Contract Number: _____ Building/Room: _____

ROICC Name: _____ Date: _____

GLOVE BAG CHECKLIST		
CHECK ✓	CHECKLIST ITEM DESCRIPTION	REFERENCE
	1. Are all objects removed from the work area or covered with 6-mil thick polyethylene plastic sheeting before the task begins?	29 CFR 1915.1001 (g)(4)(v) 29 CFR 1926.1101 (g)(4)(v)
	2. Have critical barriers been placed over all openings to the regulated area?	29 CFR 1915.1001 (g)(4)(ii)(A) & (g)(7)(ii)(A) 29 CFR 1926.1101 (g)(4)(ii)(A) & (g)(7)(ii)(A)
	3. Are glove bags made of 6-mil thick plastic and seamless at the bottom?	29 CFR 1915.1001 (g)(5)(ii)(A)(1) 29 CFR 1926.1101 (g)(5)(ii)(A)(1)
	4. Are the glove bags used on elbows and other connections designed for this purpose, without modifications?	29 CFR 1915.1001 (g)(5)(ii)(A)(2) 29 CFR 1926.1101 (g)(5)(ii)(A)(2)
	5. Does the glove bag completely cover the circumference of the pipe or other structure where the asbestos removal is to be done?	29 CFR 1915.1001 (g)(5)(ii)(B)(1) 29 CFR 1926.1101 (g)(5)(ii)(B)(1)
	6. Is the surface temperature of the pipe under 150° F?	29 CFR 1915.1001 (g)(5)(ii)(B)(4) 29 CFR 1926.1101 (g)(5)(ii)(B)(4)
	7. After installation, has the glove bag been smoke tested for leaks?	29 CFR 1915.1001 (g)(5)(ii)(B)(2) 29 CFR 1926.1101 (g)(5)(ii)(B)(2)
	8. Are the workers equipped with the proper personal protective equipment?	29 CFR 1915.1001 (h)(1) & (i)(1) 29 CFR 1926.1101 (h)(1) & (i)(1)
	9. Are all Class I and II asbestos removal work supervised by a "competent" or "qualified" person?	29 CFR 1915.1001 (g)(4)(i) & (g)(7)(i) 29 CFR 1926.1101 (g)(4)(i) & (g)(7)(i)
	10. Are at least two workers performing Class I asbestos removal work?	29 CFR 1915.1001(g)(5)(iii)(B)(9) 29 CFR 1926.1101(g)(5)(iii)(B)(9)
	11. Is the ACM thoroughly wetted before removal?	29 CFR 1915.1001 (g)(1)(ii) 29 CFR 1926.1101 (g)(1)(ii)
	12. Is the surface from which the ACM is removed cleaned with a brush?	
	13. Are the exposed edges, as a result of removal or maintenance activities, encapsulated?	
	14. After removal and encapsulation is complete, is the glove bag collapsed, prior to disposal, by removing air using a HEPA vacuum?	29 CFR 1915.1001 (g)(5)(ii)(B)(5) 29 CFR 1926.1101 (g)(5)(ii)(B)(5)
	15. Is all asbestos-containing waste labeled properly and disposed of in an approved landfill in accordance with Federal, local or state regulations?	40 CFR 61.150

Project Title: _____

Contract Number: _____ Building/Room: _____

ROICC Name: _____ Date: _____

FLOOR TILE REMOVAL CHECKLIST		
CHECK ☒	CHECKLIST ITEM DESCRIPTION	REFERENCE
☐	1. Will the resilient floor covering manufacture's recommended work practices be used for removal of intact floor tile?	OSHA Compliance Directive CPL 2-2.63 of Nov. 3, 97
☐	2. Is the material in poor condition? Will it be sawed, sanded, or made friable during removal?	40 CFR 61.145 (c)
☐	3. Is removal necessary for the project?	29 CFR 1910.1001 40 CFR 61.145 (c)(1) OPNAVINST 5100.23 Ch 17
☐	4. Have the floor tiles and mastic been tested for asbestos?	29 CFR 1915.1001 (g)(8)(i) 29 CFR 1926.1101(g)(8)(i)
☐	5. Has the EPA, State, or local agency been notified?	40 CFR 61.145(b)
☐	6. Has a negative exposure assessment been produced?	29 CFR 1915.1001 (g)(7)(ii) 29 CFR 1926.1101(g)(7)(ii)
☐	7. Are the floor tiles being chemically treated prior to removal?	
☐	8. Are the floor tiles being heat-treated to aid in removal?	29 CFR 1915.1001 (g)(8)(i)(H) 29 CFR 1926.1101 (g)(8)(i)(H)
☐	9. Is the floor tile being treated with dry ice to aid in removal?	
☐	10. Are the floor tiles being removed with a mechanical chipper?	29 CFR 1915.1001 (g)(8)(i)(F) 29 CFR 1926.1101 (g)(8)(i)(F)
☐	11. Has an initial assessment been accomplished?	29 CFR 1915.1001 (f)(2) 29 CFR 1926.1101(f)(2)
☐	12. Is periodic air monitoring conducted during removal?	29 CFR 1915.1001 (f)(3) 29 CFR 1926.1101(f)(3) OPNAVINST 5100.23 Ch 17
☐	13. Is the floor tile being disposed of properly?	29 CFR 1915.1001 (l)(3) 29 CFR 1926.1101(l)(3) OPNAVINST 5100.23 Ch 17
☐		
☐		
☐		

Project Title: _____

Contract Number: _____ Building/Room: _____

ROICC Name: _____ Date: _____

CRAWL SPACE ABATEMENT CHECKLIST		
CHECK ✓	CHECKLIST ITEM DESCRIPTION	REFERENCE
	1. Have federal, state, or local agencies been notified ten days in advance of work?	40 CFR 61.145(b)
	2. Has the workspace been isolated for the project?	29 CFR 1915.1001 (e) 29 CFR 1926.1101(e)
	3. Is the crawlspace considered a confined space? Is a permit required?	
	4. Have the critical barriers been established?	29 CFR 1915.1001 (g)(4)(ii)(A) 29 CFR 1926.1101 (g)(4)(ii)(A)
	5. Has negative pressure been established?	29 CFR 1915.1001 (g)(5)(i) 29 CFR 1926.1101 (g)(5)(i)
	6. Is the contractor using engineering controls, and asbestos work practices such as HEPA filtered vacuum and wet method?	29 CFR 1915.1001 (g)(1) 29 CFR 1926.1101 (g)(1)
	7. Has visible asbestos debris been removed?	
	8. Has the ACM installed on surfaces or systems inside the crawlspace been removed before undertaking the excavation, enclosure, or encapsulation of the soil?	
REMOVAL/EXCAVATION		
	9. Has the crawlspace soil been sampled?	
	10. Has the depth of soil removal been determined?	
	11. If Vacu-loading is used for removal, has the contractor obtained written approval from the EPA, state, or local agency before a dry removal project begins?	40 CFR 61.145 c(3)(ii)
ENCLOSURE		
	12. Does the poured concrete include drainage?	
	13. Are aggressive sampling techniques used to collect clearance air samples after enclosure is complete?	
ENCAPSULATION		
	14. Will the soil be encapsulated using a geo-textile membrane?	
	15. Has the geo-textile membrane been covered with sand or gravel?	
	16. Have provisions been made for drainage?	

Project Title: _____

Contract Number: _____ Building/Room: _____

ROICC Name: _____ Date: _____

BOILER ROOM CHECKLIST		
CHECK ✓	CHECKLIST ITEM DESCRIPTION	REFERENCE
	1. Has the EPA, State, or local agency been notified of asbestos removal ten days in advance of work?	40 CFR 61.145b(3). OPNAVINST 5100.23 Ch.17
	2. Has a negative pressure enclosure been established	29 CFR 1915.1001 (g)(5)(i)(A) 29 CFR 1926.1101 (g)(5)(i)(A)
	3. Do the work schedule and procedures reflect the special case of working in an operating boiler room?	
	4. Has the material been treated with a solution of water and a wetting agent to reduce fiber release?	29 CFR 1915.1001 (g)(1)(ii) 29 CFR 1926.1101 (g)(1)(ii) 40 CFR 61.145(c)(2)(i) OPNAVINST 5100.23 Ch.17
	5. Has the contractor obtained written approval from the EPA, state, or local agency, if a dry removal project is performed?	40 CFR 61.145 (c)(i)(A)
	6. Are precautions taken to prevent heat stress and burns?	
	7. Are glove bags used? Is the surface temperature of the pipe under 150° F?	29 CFR 1915.1001 (g)(5)(ii)(B)(4) 29 CFR 1926.1101 (g)(5)(ii)(B)(4)
	8. Has ACM been packed wet?	40 CFR 61.150(a)(1) OPNAVINST 5100.23 Ch 17
	9. Are contaminated metal bands, wires, and jackets collected in separate bags from other ACM to avoid bag breakage?	
	10. Is high-pressure hot water spray necessary for the clean up? If yes, are special procedures established for complying with environmental regulations?	
	11. Are pipe and boiler insulation replaced with non-asbestos material	OPNAVINST 5100.23 Ch 17



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