Appendix G - Reference Document: Known Problematic Building Materials and Property Design Issues

Following is a list of known problematic building materials or specific property design issues that, if identified by the PCA Consultant, must be addressed in the Physical Needs Assessment. When the PCA Consultant identifies one of these issues, the PCA Consultant should include the following in the PCA Report:

- an evaluation of the problematic building material or design issues in the Property system, including:
  - the condition of the material and quality of construction of that system;
  - a description of the historical and current condition and performance of that system;
  - any remediation or retrofit of the system, already in place; and
  - if no remediation is in place, (i) whether remediation is determined to be required in the future, (ii) theremediation or retrofit plan, and (iii) whether any warning system for the system currently exists;
- an evaluation of the long-term financial impact of the issue; and
- a recommendation as to how the Property Owner should address the known problematic materials, including estimated replacement or retrofit costs, if appropriate.

A. ARCHITECTURAL COMPONENTS

1. Fire Retardant Treated Plywood (FRTP)

Fire Retardant Treated Plywood is plywood that has been treated with a fire retardant that, in some cases has caused the plies of the sheathing to delaminate. Delamination of the sheathing has led to failure of positive attachment of roof coverings.

2. Compressed Wood or Composite Board Siding

Composite siding is a man-made board that is manufactured from various combinations of wood fibers, fillers, binders, and glue, to form exterior siding commonly referred to as T1-11 siding. An embossed layer is often added to simulate the look of natural wood. The products take the form of either lap siding or panel siding. The primary concern related to this product is its tendency to absorb water at locations where the “compressed wood” is exposed. This includes areas where nails have been over-driven, unfinished joints, or improperly sealed penetrations through the material. Evidence of deterioration includes edge swell, delamination of the finish, warping, and fungus growth.

Recommended Remediation: Current condition, quality of installation, and replacement recommendations should be considered by the PCA Consultant, where appropriate.

3. Exterior Insulation Finish Systems (EIFS)

Exterior insulation finish systems (EIFS) are a multi-layered exterior wall system consisting of a finish coat, a base coat, reinforcing mesh, adhesive and insulation board all of which are secured to some form of substrate. EIFS systems are also referred to as synthetic stucco or Dryvit. EIFS systems are designed to be “barrier” systems, meaning that they prevent water penetration from the outside. However, this also means that these systems do not “breathe” the way a traditional stucco system would. The problems associated with EIFS stemmed from water leaking behind the EIFS cladding and becoming trapped inside the walls, producing mildew and rot in the sheathing and framing. The most common areas for this type of damage have been at penetrations such as windows, doors, and roof penetrations (chimneys, vents, and drainage components). The problem has resulted from the areas around the penetrations not being properly flashed or sealed thereby allowing water intrusion, rather than from the exterior system itself allowing water infiltration. The PCA Consultant should consider a full exterior façade inspection if concerns regarding theinstallation or current condition of the exterior insulation finish systems (EIFS) are noted.

4. Problem Drywall

Problem drywall refers to a specific drywall in which initial studies found a strong association between the presence of problem drywall and corrosion of metal in residential housing with potential health safety issues. The problem drywall was primarily used from approximately 2001 to 2007, however problem drywall has also been found in properties of all ages. Problem drywall contains extraneous metals and minerals, such as sulfur, strontium, and iron. Under certain environmental conditions (typically warm, humid climates), the drywall will emit sulfur gasses. These gases create a noxious odor and corrode copper and other metal surfaces, which can damage HVAC Systems, electrical wiring, copper plumbing, appliances, and electronics. Problem drywall can also cause adverse health effects, which are primarily irritant and temporary in nature. Long term health effects are unknown. Problem drywall is often found in properties with untainted drywall as well, which is why owners should not assume that theproperty is free of problem drywall based on the year built or if they know the source of the drywall. In some cases, U.S. drywall was manufactured in Asia and rebranded in the US, identifying problem drywall as U.S. drywall.

Recommended Remediation: If problem drywall is suspected, according to the Consumer Products Safety Commission (CPSC) Identification Guidance for Problem Drywall dated March 18, 2011, a "threshold inspection" should be performed (i) for blackening of copper electrical wiring or air conditioning evaporator coils, and (ii) to determine if the installation of the drywall occurred between 2001 and 2009. If BOTH criteria are affirmed, then "corroborating evidence" must be obtained through the use of professional evaluation and analytical sampling, including at least two of these additional symptoms:

- elemental sulfur levels of drywall core samples;
- use of test strips to identify copper sulfide which indicates corrosive conditions;
- confirmed marking of Chinese origin by stamping on panels;
- elevated levels of hydrogen sulfide, carbonyl sulfide and/or carbon disulfide emitted from drywall samples when tested via ASTM D5504-08; or
- corrosion of copper metal to form copper sulfide when copper is placed in test chambers with drywall samples taken from the home.

If the corroborating evidence for the presence of problem drywall is affirmed through an analyses performed by a qualified laboratory, a general contractor should be hired to ascertain (i) the scope of remediation in accordance with the CPSC Guidance, and (ii) all associated costs of remediation. The contractor cost estimates should be provided for review and included in the Immediate Repair Cost Estimate Schedules in the PCA Report as a "Critical Item".

The CPSC Remediation Guidance for Homes from Problem Drywall dated March 15, 2013, calls for the replacement of all:

1. possible problem drywall (as identified in the CPSC and HUD Identification Guidance);
2. smoke alarms and carbon monoxide alarms;
3. electrical distribution components (including receptacles, switches, and circuit breakers, but not necessarily wiring); and
4. fusible-type fire sprinkler heads.

B. MECHANICAL ELECTRICAL/PLUMBING SYSTEMS

1. Unit Level Electrical Amperage

Fannie Mae requires that this item be identified in all Property Condition Assessments. The amperage measurement that must be included in every Property Condition Assessment is the amperage as measured at the individual electric meter. In almost all individually metered properties there is a breaker located somewhere near, if not directly below, the electric meter. This is the amperage measurement required. Please note: this is not the amperage identified by adding all of the individual breakers at the unit level subpanel. The amperage should be a minimum of 60 amps.

Recommended Remediation: If the amperage is below 60 amps, evaluation of this inadequacy may include discussion of items such as unit sizes, fuel sources for the mechanical equipment, cooking, and typical living styles at the property.

2. Aluminum Branch Wiring

All PCA Reports must indicate the type of branch wiring at the property as observed (i.e., visually verified and photographed) by the PCA Consultant. If the PCA Consultant identifies aluminum wiring at the Property, the PCA Report must also indicate whether a retrofit, such as the installation of CO/ALR devices, is already in place. The primary concern with aluminum branch wiring is that, as a result of current flow, heated aluminum expands approximately 40% faster than copper. The unequal expansion rates between the aluminum wire and the copper, steel or brass switch or outlet connection point subjects the heated aluminum wire to a rapidly rising compressive stress (compressed wire expands). When the current is turned off, the termination cools causing the wire to contract, which in turn causes the connection to become loose. A loose electrical connection will accelerate the heating of the wire due to the restricted current flow (because the connection point is not snug); subsequently, the wire will heat up like a burner on a stove. An overheated connection could potentially lead to a fire. Appropriate recommendations regarding retrofit procedures should be noted.

Recommended Remediation: The CPSC's Publication 516, July 2011 (Repairing Aluminum Wiring), recommends a permanent repair using one of the following three methods:

- complete rewiring of the building;
- copper pig-tailing at the receptacles using COPALUM crimp connectors; or
- copper pig-tailing at the receptacles using AlumiConn connectors.

3. Electrical Overload Protection - Fused Subpanels

The Property Condition Assessment must address concerns regarding fused subpanels, as fuses of different ratings will fit into a traditional Edison fuse socket. Consumers sometimes replace a fuse that repeatedly "blows" with a higher ampere rated fuse. Although the new fuse may not open, it also may not protect the branch circuit. The result can be overloading which can subsequently lead to fire. Shunting of open fuses refers to the second concern with Edison sockets that can allow for the insertion of metal objects such as dimes to effectively reconnect the circuit. This creates both a life safety concern and a fire hazard. All reports must note whether circuit breakers or fuses are present at subpanels. Fuses currently installed must include tamper resistant devices and S type fuses.

Recommended Remediation: If fuses are not tamper-resistant they should be upgraded to either include tamper-resistant equipment or the installation of breakered subpanels.

4. Federal Pacific Stab-Lok Circuit Breaker Panels

NOTE: The following only applies to Federal Pacific Stab-Lok circuit breaker panels. Federal Pacific panels that are not Stab-Lok models are not problematic. The words "Stab-Lok" will generally be stamped on the face of the panel behind the door, or on the door itself.

Field and lab testing on Federal Pacific Electric (FPE) "Stab-Lok" circuit breaker panels established that the panels and breakers have a significant failure rate. Failure to trip properly with overload and short-circuiting are the basic safety defects of this type of panel. In over one-third of the panels tested, circuit breakers would not trip when overloaded. Stab-Lok circuit breakers that have historically tripped cannot be relied upon to do so in the future. If the circuit breaker does not operate or trip properly, the potential of fire increases. Stab-Lok circuit breaker panels may also have interconnection problems that can lead to a higher risk of overheating.

5. ABS Sanitary Lines

There are five manufacturers who produced ABS pipe from 1984 to 1990 that may crack circumferentially at the joint. The manufacturers are Apache, Polaris, Centaur, Phoenix, and Gable. These manufacturers apparently used non-virgin materials that may eventually crack at the location where it comes in contact with the plumber's glue – typically circumferentially at the joints. If ABS piping is identified as being installed as the primary sanitary piping within the buildings (i.e., the material is not limited to the stub out from the wall to the fixture), the current condition and manufacturer must be verified.

Recommended Remediation: If the Property contains ABS pipe manufactured by one of the five problematic manufacturers, a plumbing survey performed by a qualified plumbing expert may be recommended in order to ascertain the current condition and potential short and long-term repair or replacement costs.

6. Polybutylene Water Distribution Lines

Polybutylene ("PB") is a form of plastic resin that was used extensively in the manufacture of water supply piping from 1979 until about 1995. Due to the low cost of the material and ease of installation, PB piping was used as a substitute for traditional copper piping. It is believed that oxidants in public water supplies (such as chlorine) react with the PB piping and fittings, causing it to scale and flake and become brittle. Micro-fractures of the piping result, and the basic structural integrity of the pipe is reduced. The pipe becomes weak, and is susceptible to sudden failure. Other factors may also contribute to the failure of PB systems, such as improper installation. Most problematic installation situations involve the use of PB fittings (connections between sections of piping such as elbows). The crimping process utilized during installation, if not done correctly, can compromise the performance of the piping at that connection. PB piping which has been installed with copper fittings has historically performed better with regard to fittings installation, but this has no bearing on the pipe's ability to withstand chemical breakdown. Historical and current conditions must be noted, potential issues with content of local water supply noted.

Recommended Remediation: A plumbing survey to determine actual piping condition may be required in order to fully evaluate this issue.

7. Galvanized Steel Water Distribution Lines

Galvanized pipe is defined as a steel pipe or wrought-iron pipe of standard dimensions, which has been galvanized by coating it with a thin layer of zinc. Galvanized piping has been utilized as a water supply system throughout the country, and is not limited to certain dates of construction. Galvanized piping systems typically exhibit corrosion more quickly than other plumbing systems, which can ultimately require the complete replacement of the piping system. Corrosion is a chemical or electrochemical process in which the metals commonly used in plumbing systems deteriorate and ultimately fail. Rates of corrosion produced by different waters vary widely, depending upon a number of factors (including acidity, electrical conductivity, temperature, oxygen concentration and the presence of sulfate and chlorides).Current and historical condition and any management reported replacements should be noted. Cost estimates of the replacement of a galvanized steel water distribution system should be carefully evaluated, as costs can vary significantly. Vertical water lines are generally more expensive to replace than the horizontal lines, as the vertical water lines are typically less accessible.

8. Omega Brand Fire Sprinkler Heads

All Omega sprinklers contain one, two or three small circular discs at the base of the sprinkler. The discs are very flat and thin and are spaced closely together. They may be white, chrome, or brass depending upon the finish of the sprinkler. If the sprinklers at the Property do not contain these discs, they are not Omegas. If they do have these discs, they may be Omegas. All Omega sprinklers contain the word "Central" or "CSC" somewhere on the daisy-like device. Approximately 8.4 million Omega brand sprinkler heads are part of a nationwide recall program. All Omega sprinkler models are being recalled, including those Omegas manufactured after May 1, 1996. In a release dated October 14, 1998, the CPSC alleges that, on average, between 30 and 40 percent of Omegas removed from various locations around the country for testing, failed to activate as they should.

Recommended Remediation: All Omega brand sprinkler heads should be evaluated to determine whether the sprinkler head is included in the recall and should be recommended for replacement.

9. Central Brand Fire Sprinkler Heads

Central manufactured 33 million "wet" sprinklers with O-rings from 1989 until 2000 that are covered by a recall program. Central also manufactured 2 million "dry" sprinklers with O-rings from the mid-1970's to June 2001 that are covered by this program. The program also covers 167,000 sprinklers with O-rings manufactured by Gem Sprinkler Co. and Star Sprinkler Inc. from 1995 to 2001. A listing of all the models covered under this voluntary replacement program is available on-line at the CSPC website. Central initiated this recall because it discovered the performance of these O-ring sprinklers can degrade over time. These sprinkler heads can corrode or minerals, salts and other contaminants in water can affect the rubber O-ring seals. These factors could cause the sprinkler heads not to activate in a fire. The fire sprinkler heads

have the words "CENTRAL" or "STAR", the letters "CSC", the letter "G" in triangle, or a star-shaped symbol stamped on either the metal sprinkler frame or on the deflector. The model designation and date may also be stamped on the frame or deflector. The deflector is the flower, or gear-shaped metal piece at one end of the sprinkler head.

Recommended Remediation: All Central Brand sprinkler heads should be evaluated to determine whether the sprinkler head is included in the recall and should be recommended for replacement.

10. Cadet Brand Electric In-wall Heaters

Cadet Manufacturing produced in-wall electric heaters under the brand names Cadet and Encore that were sold and installed in single- family and multi- family residential projects from 1982 through 1999. The units were primarily distributed in Oregon, Washington, California, Idaho, Montana, and Wyoming. The heater models that were recalled are as follows: FW, FX, LX, TK, ZA, Z, RA, RK, RLX, RX and ZC. The CPSC alleges that these particular models of heater are defective, and can overheat or catch fire. Flames, sparks, or molten particles can spew through the front grill cover of the heater into the living area, putting residents at risk from fires. The heaters can also become energized creating a risk of electric shock.

Recommended Remediation: Any Cadet brand heater on the recall list should be replaced immediately. Repairs to these units, such as limit switch replacement, are no longer considered an acceptable remediation method by the CPSC. Cadet models not listed above have not been recalled and do not need replacing. Information on how to identify the recalled models and a cross reference chart showing the correct replacement heater assembly may be obtained at: https://www.cadet.glendimplexamericas.com/en-us/support/replacement-model-finder.

C. DWELLING UNIT COMPONENTS

Appliance and Equipment

Any appliances or equipment identified by the CPSC as subject to recall must be identified. The PCA Consultant should be aware of recalled appliances and equipment, and make recommendations for replacement or repair consistent withthe CPSC guidelines. Any costs for the necessary repair or replacement of recalled equipment should be included in the Cost Estimate Schedules.