PowerCheck Electrical Safety Services Inc.

An examination of electrical fire risks in 16 older houses

by Brian Cook (FSR Electrical), March 5, 2014

The following study presents the electrical fire-hazard findings of 16 older homes, examined consecutively over the course of one month (February 2014) throughout Greater Vancouver by electrical examiner Brian Cook, of PowerCheck. The purpose of this study is to shed light on where the electrical fire hazards are commonly found in older houses. All houses in this study were sent to PowerCheck because of "knob-and-tube wiring", as such these houses were built before 1950, except for one house built late-1950s and one house built 1980. Out of approximately 3000 houses that PowerCheck has examined to date, we can say that while the specific fire hazards differ from house to house the general trends as to where the fire hazards lie are absolutely common throughout all older houses.

Concerning risk of electrical fire, the one common trend in older houses is unauthorized electrical work having taken place in the house (i.e. "handyman wiring"). In older houses, electrical fire hazards due to handyman wiring is disproportionately high, compared with service size or knob and tube wiring. As such, older houses are at an increased risk of exposure to electrical fire. Hazardous handyman wiring is usually not apparent to homeowners or those untrained, as it usually consists of modern wire and modern circuit breaker panels, however the perils that this hazardous work creates is staggering.

The key indicator, to recognize houses of potential high risk of electrical fire, is AGE OF HOME. Simply put, older houses had less outlets installed by contractors at time of build than newer houses, hence are more prone to hazardous add-ons having taken place. We find houses built before 1950, which happen to have knob and tube present, typically have far more hazardous add-ons than a house built in the 1980s for example. Before the 1960s, basements were typically not wired for electrical power, other than maybe a light and one outlet. However, today most basements are fully wired with many outlets and lights, and always with modern wiring. If any of this work was done by unauthorized people, then surely they left electrical fire hazards in their wake.

In summary, to assure electrical fire safety in older houses, all older houses, those built before 1950 at minimum, or ideally 1960 or 1970 or 1980 need an electrical examination. Concerns with knob and tube, and service size shift the focus away from predominant hazards that are found in older houses; the hazardous handyman add-ons. As you will see in these following examples, representing typical houses built before 1960, all these houses are at high exposure to electrical fire; two (#15 & 16) being at extreme risk of electrical fire, regardless of knob and tube or service size. From our findings, age of house is an excellent yardstick to present houses of increased exposure to electrical fire.

The request for an examination of an older home need not discourage homeowners, as homeowners are looking for safe houses too. Homeowners are reticent to have an electrical examination as they are concerned that they will be asked to do work that they do not feel is necessary. For this reason, PowerCheck was developed, providing objective and impartial evaluations; as PowerCheck does not conduct repairs. After learning that PowerCheck examinations are impartial, most homeowners embrace having the examination, and go out of their way to show us areas that we might possibly miss. If the requirement for examination can be based solely on age of home, and at the same time recommend an examination service that is impartial, such as PowerCheck, together we can build long-lasting, safe customers.

House 1

House description:

- Construction date: pre 1950
- Service size and panelboard: 200 amp, circuit breakers
- Location: Kerrisdale, Vancouver

Examination details:

- Date of examination: January 30, 2014
- Reason for examination: Knob and tube presence.
- Risk rating: High

What were the key perils that put house at increased risk of electrical fire?

- Panelboard problems (broken ground, oversized breakers, loose connections). Very dangerous!
- Hazardous add-on circuits (Outdoors with exposed splices, basement & garage). Very dangerous!
- 3-prong outlets on knob-&-tube (no ground protection)

What were the identifiers that indicate house at high probability of fire risk?

- Age of home: pre 1950
- Basement suite: Yes (1990s) ; Permit: No
- Garage upgrade: Yes (1990s); Permit: No

Summary

- Predominant fire hazards due to handyman add-ons **(highlighted in in yellow)**
- Grounding faulty: Due to copper water-pipe repairs by plumber (ground clamp not re-attached)
- Knob & tube wiring okay but outlets require GFCI/ ground protection
- Estimated repair cost total: $2000 ($1000 for house repairs; $1000 for new garage feeder)

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Report #052 (Note: Handyman add-ons, highlighted in yellow)

SUMMARY OF REPAIRS FOR MEDIUM RISK:

Service and panelboard

- Emily knob partially detached and service conduit bent: Re-and-re
- Ground clamp on cold water pipe is detached (due to plumber repairing water pipe): Re connect
- Panelboard (Federal): 20 A brkrs. on 15 A ccts., 3 KOs require box connectors, 30 A dbl. brkr. for 15 A ccts., 30 A dryer brkr. (top left) requires tie bar; loose electrical connections: Re-&-re panelboard

Garage: Garage feeder not acceptable (overhead Lumex): Replace

Outdoors: North wall: Add-on cct. for X-mas lights (exposed splices): Decommission

Basement:

- JB by panel requires cover; 2 old cables dangling: Cut-back
- Bathroom lighting cct.: Upgrade
- Add-on cct. JB above wash tub & fluorescent light ungrounded: Re-&-re
- SE corner: Add-on cct. from JB, recept. not grounded: Re-&-re; and JB south wall: Cover required
- South-east area: Lampholder, check wiring in JB
- South-east area: 2 K&T conductors beside lights: Exposed splices: Re-&-re
- 3 Pendant lampsockets: Recommend replace each with lampholder
- NW corner: Add-on ccts (MI cable), check all connections in boxes
- NW corner: 2 add-on ccts. without wire connectors on bond conductors: Re-&-re
- Recommend check all add-on JBs in basement for correct bonding

Main floor

- Kitchen: Double-gang receptacle box: One side not grounded: Re-&-re
- Den: 2 worn-out receptacles: Replace
- Ungrounded receptacles requiring GFCI/ ground protection: Dining room: 1; Living room: 1

Second floor

- SE bedroom: Recept. worn out, north wall: Replace
- Hall: Receptacle not working: Repair
- NW bedroom: Add-on outlet: Check & remove kink in cable; Receptacle behind bed: Check

Attic: North room: 3 Receptacles: West & east walls, worn-out; West wall south, open neutral: Re-and-re

House 2

Examination details:

- Date of examination: January 30, 2014
- Reason for examination: Knob and tube presence.
- Risk rating: High

House description:

- Construction date: pre 1950
- Service size and panelboard: 100 amp, circuit breakers
- Location: Cambie, Vancouver

What were the key perils that put house at increased risk of electrical fire?

- Service problem (broken ground)
- Old hot water cable live and dangling in furnace room, near gas pipe
- Add-on lighting circuits installed hazardously
- 3-prong outlets on knob-&-tube (no ground protection)

What were the identifiers that indicate house at high probability of fire risk?

- Age of home: pre 1950
- Basement suite: Yes (1990s) ; Permit: No
- Garage upgrade: Yes (1990s); Permit: No

Summary

- Predominant fire hazards due to handyman add-ons, and hot-water-tank replacement (cable for old hot water tank left live and dangling near gas pipe). Very dangerous!
- Grounding faulty: Due to copper water-pipe repairs done with PEX. Very dangerous!
- Knob & tube wiring okay but outlets require GFCI/ ground protection
- Estimated repair cost total: $1000

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Report #053 (Note: Handyman add-ons, highlighted in yellow)

SUMMARY OF REPAIRS FOR MEDIUM RISK

Service and panelboard

- Ground disconnected (due to repair of copper water pipe with PEX): Install new service ground
- Double tap, plus breakers (Federal Pacific) have exceeded rated service life: Replace with new

Basement

- Old hot water cable dangling near hot water tank (currently switched off at panel): Decommission
- Washing machine receptacle ungrounded: Install new receptacle circuit for washing machine
- North-east storage room: JB for lampholder, ungrounded: Re-and-re
- Add-on lamp holder above washing machine, JB ungrounded: If wired with NMD3/7, repair bond
- Ungrounded 3-prong, or worn-out 2-prong receptacles requiring GFCI/ ground protection:
    - East room, below K&T splice box: 2; and west wall: 1; Rec room: 3; West room: 3

Main floor

- Kitchen counter receptacle by sink: Intermittent ground: Minimum: Replace receptacle. Recommend upgrade to current code (20 amp GFCI protected receptacle).
- Add-on stairwell light: Ungrounded: Check wiring in JB, if wired with NMD3/7, repair bond circuit
- South-east room, west wall receptacle, faulty (lower outlet not working): Replace with new
- Ungrounded 3-prong, or worn-out 2-prong receptacles requiring GFCI/ ground protection:
    - Kitchen by cooktop: 1; Kitchen nook: 1; South-east room: 2; Living room: 2; Dining room: 1

Top floor

- Ungrounded receptacles requiring GFCI/ground protection, or upgrade:
    - East room: 2; West room: 2

Garage: Add-on receptacle, work bench, reverse polarity: Repair

- Add-on outdoor & indoor lighting circuits, ungrounded: Re-and-re
- Add-on receptacle circuit for Garage door operator: Install receptacle for garage door operator

House 3

Examination details:

- Date of examination: January 30, 2014
- Reason for examination: Knob and tube presence.
- Risk rating: High

House description:

- Construction date: pre 1950
- Service size and panelboard: 100 amp,
- Location: East Vancouver

What were the key perils that put house at increased risk of electrical fire?

- Panelboard problems (spiderwebs, hazardous add ons, oversized breakers, loose connections)
- A few add-on lighting circuits installed hazardously
- 3-prong outlets on knob-&-tube (no ground protection)

What were the identifiers that indicate house at high probability of fire risk?

- Age of home: pre 1950
- Basement suite: Yes (1990s) ; Permit: No

Summary

- Predominant fire hazards due to handyman add-ons
- 2 large holes in panel (from handyman adding circuits): Build-up of spider webs in panel. Very dangerous!
- Knob & tube wiring okay but outlets require GFCI/ ground protection
- Estimated repair cost total: $500

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Report #054 (Note: Handyman add-ons, highlighted in yellow)

SUMMARY OF REPAIRS FOR MEDIUM RISK

SERVICE & PANELBOARD

- Multiple concerns with existing panelboard, listed below: Re-and-re to code. Very dangerous!!
    - 2 large knock-outs in main disconnect, resulting in build-up of spider webs: To be cleaned, plus fillers
    - Multiple branch circuits and bond conductors in main disconnect: Relocate
    - Bonding of copper water pipe (ground clamp on water pipe) not identified. Confirm or provide new
    - 1 oversized circuit breaker (30 amp) for 15 amp circuit: Replace
    - Old cable for electric hot water tank still hooked up to breaker: Decommission
    - Multiple branch circuits missing box connectors at entrance to panelboard
    - Multiple branch circuits not bonded correctly: Require termination on bond lug on panelboard
    - 1 large knock-out and 5 circuit-breaker knockouts require fillers
    - Loose electrical screws in panel: Check and tighten-up all electrical connections in panel

BRANCH CIRCUITS

Porch: - Lighting circuit, add-on, incorrectly installed: Re-&-re

Basement: - Bathroom receptacle, add-on, not GFCI protected: GFCI protect

Main floor - Add-on kitchen fluorescent light ungrounded: Provide bonding/ new circuit

- Ungrounded receptacles requiring GFCI/ ground protection:
    - Living room: 3

Top floor

- Ungrounded receptacles requiring GFCI/ ground protection:
    - South bedroom: 2; - North bedroom: 1
- Recommendation: North room, closet: Install lighting circuit in closet and remove existing clamp light

House 4

Examination details:

- Date of examination: January 31, 2014
- Reason for examination: Homeowner believed knob and tube was present, due to home inspector identifying ungrounded outlets (See below).
- Risk rating: High

House description:

- Construction date: pre 1950
- Service size and panelboard: 100 amp, circuit breakers
- Location: North Vancouver
- No knob-&-tube present, though house can easily be mistaken as having knob & tube, as it has ungrounded outlets (house was wired with an ungrounded cable, called NMD1"), common 1940 to mid 1950s.

What were the key perils that put house at increased risk of electrical fire?

- Illegal panelboard upgrade, done without permit. Very dangerous!
- 3-prong outlets on NMD1 cable (no ground protection)

What were the identifiers that indicate house at high probability of fire risk?

- Age of home: built 1949

Summary

- Predominant fire hazards due to handyman panel upgrade. Very dangerous!
- No knob and tube in house! (see note below)
- Original ungrounded wiring okay but outlets require GFCI/ ground protection
- Estimated repair cost total: $2,500 ($2000 for new panel and $500 for the additional repairs)

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Report #055 (Note: Handyman add-ons, highlighted in yellow)

NOTE: No "Knob-and-tube" in house. House wired originally with "NMD1". NMD1 shares the same concerns as knob and tube (ungrounded and insulation rated at 60°C). Introduced 1949, installed until as late as 1962. With GFCI protection, as with knob and tube, NMD1 is acceptable for the wiring of modern 3-prong receptacles.

SUMMARY OF REPAIRS FOR MEDIUM RISK

SERVICE AND PANELBOARD

- Add-on panel, with splice in service conductor between meter base and main switch. Also, service ground/ water-pipe bonding disconnected due to plumbing repairs done with PEX pipe. Solution: Panelboard installation to be corrected under electrical permit. Include installation of new service ground (e.g., artificial ground plate), copper water-pipe and gas line bonding, and waste-water stack bonding if applicable.

BRANCH CIRCUITS

Basement

- Add-on (and unapproved) transformer for door bell, ungrounded: Replace with new, on JB

Main floor

- Receptacles wired with either NMD1 or NMD3 identified throughout house. Grounding of original receptacles relied on mechanical bonding (receptacle to screw to junction box), also receptacle not independent of downstream circuit. This wiring method is not acceptable to today's safety standards.

Solution: Open all receptacle boxes. Provide bond conductor and pigtail splices, as required. If receptacle circuit fed by NMD1, in addition, provide GFCI protection (local GFCI, GFCI upstream, or GFCI breaker).

Outdoors

- Add-on lighting circuit by back door: Light ungrounded: Re-and-re bond circuit or replace circuit with new.

House 5

Examination details:

- Date of examination: February 3, 2014
- Reason for examination: Knob and tube presence
- Risk rating: High

House description:

- Construction date: pre 1950
- Service size and panelboard: 100 amp, circuit breakers
- Location: Vancouver, West side (Dunbar)

What were the key perils that put house at increased risk of electrical fire?

- Illegal sub-panel hazardously installed
- Grounding disconnected
- 3-prong outlets on knob and tube (no ground protection)

What were the identifiers that indicate house at high probability of fire risk?

- Age of home: pre 1950

Summary

- Predominant fire hazards due to handyman sub-panel upgrade. Very dangerous!
- Grounding disconnected, due to copper water-pipe repairs done with PEX. Very dangerous!
- Knob & tube wiring okay but outlets require GFCI/ ground protection
- Estimated repair cost total: $4,000 ($3,500 for new service and $500 for the additional repairs)

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Report #056 (Note: Handyman add-ons, highlighted in yellow)

SUMMARY OF REPAIRS FOR MEDIUM RISK

SERVICE AND PANELBOARD

- Main disconnect: Build-up of debris due to 1" knock out (ground conductor requires box connector), 1/2" knockout requires filler and service conduit requires putty at entrance to main disconnect.
- Service ground/ water-pipe bonding disconnected due to plumbing repairs done with PEX pipe.

Note: Cannot comment on integrity of wiring inside meter base.

- Sub-panel: Hazardous add-on with multiple concerns (feeders tapped off main; double taps; poor bonding). Solution: Upgrade existing service and panelboard to new, under permit. Include new service ground (e.g., artificial ground plate), and bonding as per Canadian Electrical Code. Very dangerous!!

BRANCH CIRCUITS

Basement

Furnace room:

- Add-on circuit, tied on to old AC60 cable (ungrounded cable), plus poor splices (not twisted): Re-&-re (suggest, run new home run cable, plus check connections at devices downstream).
- Hazardous add-on (#20 AWG lamp cord) tied on to K&T, above furnace vent. Disconnect & install new.
- Gas line to be moved clear of knob-and-tube conductor.
- BX cable from furnace switch to furnace, without antishorts: Provide antishorts

South room - Lighting circuit (switch west wall & light) not grounded: Repair bond circuit.

West south room - Lighting circuit (switch east wall & lights) not grounded: Repair bond circuit

Main floor

- Kitchen: Refrigerator ungrounded (on K&T). Install new dedicated receptacle circuit as per Canadian Electrical Code.
- Bathroom: Light switch & vanity light, ungrounded (on K&T): Re-&-re to code

Top floor

- Ungrounded receptacles requiring GFCI/ ground protection: East room, east wall, south: 1

House 6

Examination details:

- Date of examination: February 5, 2014
- Reason for examination: Knob and tube presence
- Risk rating: High

House description:

- Construction date: mid-late 1950s
- Service size and panelboard: 100 amp, circuit breakers
- Location: Vancouver East Side
- No knob-and-tube in house. Though several original ungrounded outlets (common in 1950s).

What were the key perils that put house at increased risk of electrical fire?

- Panelboard concerns. Conductors pinched in panel (against separator flap) & old breakers
- Hazardous add-on circuits installed in basement suite. Very dangerous!
- Add-on extension cord (to wall sconces) secured with nails. Very dangerous! Ditto outdoor cable

What were the identifiers that indicate house at high probability of fire risk?

- Age of home: mid-late 1950s
- Basement suite: Yes; Permit: No

Summary

- Predominant fire hazards due to handyman add-ons (highlighted in yellow)
- Panelboard wiring to be repaired and old breakers to be replaced
- No knob-and-tube in this house! However ungrounded outlets to be GFCI/ground protected
- Estimated repair cost total: $2,000 ($1000 for panel repairs & $1000 for the additional repairs)

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Report #057 (Note: Handyman add-ons, highlighted in yellow)

Description: No knob-and-tube circuits identified. However several ungrounded (2-prong) circuits (receptacles & lights) fed by grounded cable (and possibly some ungrounded cable) characteristic of mid-to-late1950s wiring.

SUMMARY OF REPAIRS FOR MEDIUM RISK

SERVICE AND PANELBOARD

- Cover of main disconnect pushing on line conductors entering distribution section of panel. Re-and-re (Suggest: move line conductors to be underneath neutral. This will provide necessary clearance).
- Original branch circuit breakers (Federal Pacific) have exceeded their rated service life: Replace with new
- Several add-on circuits double tapped off breakers: Re-and-re
- Bond conductors in panelboard twisted together, but without wire connector: Provide wire connector
- 2 add-on circuits require corrective action to bring up to code

BRANCH CIRCUITS

Basement

- Kitchen: Fluorescent light: Ungrounded: Re-and-re bond circuit or replace with fixture not requiring ground
- Living room: Fluorescent light: Ungrounded: Re-and-re
- In suite laundry room: Fluorescent light: Ungrounded: Re-and-re
- Laundry room: Fluorescent light: Ungrounded: Re-and-re
- Furnace room: Furnace switch has been removed: Re-install furnace switch &check BX cable for antishorts
- North-west storage room: Add-on lighting circuit hazardously installed (wired with lamp cord): Re-and-re
- Laundry room: Add-on light, north wall without JB behind light: Remove!

Outdoors

- West side: Add-on cable (cab tire) with plug: Deterioration & not GFCI protected: Remove & install new circuit

Main floor

- Living room: 2 extension cords, west wall feeding two wall sconces: Secured with nails. Remove!
- East bedroom: Receptacle east wall, reverse polarity: Repair
- South-east bedroom: Receptacle east wall, reverse polarity: Repair
- Ungrounded 2-prong receptacles requiring GFCI/ground: - Living room: 2; Dining room: 1; Kitchen counter: 1

House 7

Examination details:

- Date of examination: February 7, 2014
- Reason for examination: Knob and tube presence
- Risk rating: High

House description:

- Construction date: pre 1950
- Service size and panelboard: 100 amp, circuit breakers
- Location: New Westminster

What were the key perils that put house at increased risk of electrical fire?

- Knock outs in panelboard (potential for mice/spiders in panel);
- Refrigerator and copper water pipe not grounded (potential for fire/ shock/ electrocution);
- 3-prong outlets on knob and tube (no ground protection)

What were the identifiers that indicate house at high probability of fire risk?

- Age of home: pre 1950s
- No basement/ secondary suite. No garage

Summary

- House in fairly good condition. Only minor repairs required!!
- Knob & tube wiring okay but outlets require GFCI/ ground protection
- Estimated repair cost total: $500 (for 1 new circuit and GFCIs on Knob and tube circuits)

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Report #058 (Note: Handyman add-ons, highlighted in yellow)

SUMMARY OF REPAIRS FOR MEDIUM RISK

SERVICE AND PANELBOARD

Main panel

- Service ground conductor terminating in distribution section of panelboard: Relocate in main disconnect (may require install of new service ground, e.g., artificial ground plate)
- Service conduit entrance to panelboard: Provide putty
- Aluminum feeder to sub-panel requires antioxidant paste on all terminations in panelboard
- 1 x 1/2" KO and 1 CB KO: Provide fillers
- Copper water pipe to be bonded (disconnected due to plumbing repairs)

BRANCH CIRCUITS

Basement

- Add-on receptacle and old lighting circuit (fed by AC 60): JBs not grounded & 1 JB requires KO filler

Second floor

- Kitchen: Refrigerator ungrounded: Requires new circuit as per code, or if NMD90 back to panel then repair bond circuit
- Ungrounded receptacles requiring GFCI/ ground protection:
    - North-west bedroom: 2
    - South-west bedroom: 2
    - North-east bedroom: 1
    - Kitchen receptacle for microwave: 1

House 8

Examination details:

- Date of examination: February 11, 2014
- Reason for examination: Knob and tube presence
- Risk rating: High

House description:

- Construction date: pre 1950
- Service size and panelboard: 100 amp, circuit breakers
- Location: Kitsilano, Vancouver

What were the key perils that put house at increased risk of electrical fire?

- 1 knock out in panelboard (potential for mice/spiders in panel);
- Add-on range-hood ungrounded and kitchen light fixture installed hazardously by homeowner
- 3-prong outlets on knob and tube (no ground protection)

What were the identifiers that indicate house at high probability of fire risk?

- Age of home: pre 1950s
- No basement suite. No garage

Summary

- House in fairly good condition. Only minor repairs required!!
- Knob & tube wiring okay but outlets require GFCI/ ground protection
- Estimated repair cost total: $500 (for 1 new circuit and GFCIs on Knob and tube circuits)

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Report #059 (Note: Handyman add-ons, highlighted in yellow)

SUMMARY OF REPAIRS FOR MEDIUM RISK

SERVICE AND PANELBOARD

- Recommend upgrade cold water pipe bonding to current code (with stranded Cu #6 AWG). Include gas line and waste water stack bonding at that time.
- Panelboard: 1 x 1/2" knock out requires filler
- Panelboard: 2 cover screws required

BRANCH CIRCUITS

Outdoors

- GFCI receptacle faulty: Replace

Basement

- Multiple lamp holders without cages & not switched: Remove & cover plate or replace with switched lampholder & cage
- Northwest corner: Add-on doorbell transformer, ungrounded (tied on to K&T): Re & re (suggest relocate to panel)

Main floor

- Kitchen: Add-on range hood, ungrounded (possibly tied on to K&T): Re and re to code (will likely require new circuit)
- Kitchen: Ceiling pendant light supported by lamp cord & cord wrapped around metal hook: Re and re
- Kitchen: South wall receptacle, faulty (intermittent ground): Replace
- Ungrounded receptacles requiring GFCI/ ground protection:
    - Hall , by front door: 1

House 9

Examination details:

- Date of examination: February 12, 2014
- Reason for examination: Knob and tube presence
- Risk rating: High

House description:

- Construction date: pre 1950
- Service size and panelboard: 100 amp, circuit breakers
- Location: Burnaby

What were the key perils that put house at increased risk of electrical fire?

- Tree branches abrading against service conductors, putting tension on support (Emily knob)
- Multiple add-on circuits in basement hazardously installed (secured with nails/on K&T/ext. cord)
- Fluorescent lighting fixture in kitchen on knob and tube
- 3-prong outlets on knob and tube (no ground protection)

What were the identifiers that indicate house at high probability of fire risk?

- **Age of home: pre 1950s**
- No basement suite

Summary

- House in fair condition. Only minor repairs required
- Knob & tube wiring okay but outlets require GFCI/ ground protection
- Estimated repair cost total: $1000

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Report #060 (Note: Handyman add-ons, highlighted in yellow)

SUMMARY OF REPAIRS FOR MEDIUM RISK

SERVICE AND PANELBOARD

- Tree branches in contact with service conductors: Confirm branches have been cut clear of service conductors
- Ground conductor and cables in vicinity of panelboard to be secured, as per code

BRANCH CIRCUITS

Basement

- North-west room: Multiple add-on circuits, secured with nails and zip-ties. To be secured, as per code
- North-west room: North-east corner: Add-on receptacle circuit: Provide mechanical protection of cable
- 3 add-on lampholders, boxes not grounded (tapped on to K&T south-west room): Decommission & install new
- South-east room: Remove permanent extension cord and install minimum 1 receptacle circuit
- South-east room: Hot air duct lying on K&T: Provide clearance (minimum 1")
- South-west room: Old stove junction box, by entrance, to be secured
- Add-on dryer circuit: Mechanical protection of cable and cable to be secured, as per code
- South-west room: Hot air duct lying on K&T: Provide clearance (minimum 1")
- South-west room: 2 K&T conductors with free ends: Tape up, so bare conductors are not exposed
- South-west room: Recommend: Install minimum 1 additional receptacle circuit

Main floor

- Kitchen: 2 fluorescent lights ungrounded (likely on K&T): Install new lighting circuits
- Bathroom: Add-on light switch for ceiling & vanity lights, ungrounded & within 1 m of tub: Install new circuit.
- Living room: Receptacle facing up (not accept. due to dust build up): Decommission or re-and-re to code
- Front porch: Extension ring/ JB added to original K&T porch light, ungrounded: Re-&-re to code
- Front porch: Recommend install of GFCI-protected receptacle, front porch, for Christmas lights

House 10

Examination details:

- Date of examination: February 13, 2014
- Reason for examination: Homeowner concerned with service size and flickering lights
- Risk rating: High

House description:

- Construction date: pre 1980
- Service size and panelboard: 100 amp, circuit breakers
- Location: North Vancouver

What were the key perils that put house at increased risk of electrical fire?

- Poor and hazardous electrical connections of branch circuits.
- Handyman addition of under cabinet lighting

What were the identifiers that indicate house at high probability of fire risk?

- Age of home: 1980s

Summary

- Service size fine
- Flickering lights were entirely due to sloppy workmanship at time of house construction.
- Add-on under-cabinet lighting also hazardously installed
- Estimated repair cost total: $2000 (repair of branch circuit wiring & 1 new branch circuit)

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Report #061

Service description: 100 amp service

Demand: Maximum expected demand, under existing condition: 66 amps (calculated); 42 amp (measured). Thus, service size acceptable for existing house demands.

Summary of required corrective actions for Medium Risk:

- Overloading of 15 amp breaker (#17), feeding counter outlet and lights. Current measured: ~20 amps
  Solution: Decommission counter outlet & install new kitchen counter receptacle circuit, as per current code.
- Multiple concerns with switches and receptacles examined: Device not independent of downstream circuit, wire connectors on bond conductors missing, splices not twisted together underneath wire connectors, bond conductor from box to receptacle missing, and undersized wire connectors. Solution: Open all boxes for receptacles, switches and light fixtures throughout house. Check wiring. Re-&-re as required, as per code.
- Piano room, ceiling lighting not working: To be repaired. Likely a break in circuit at light fixture
- Kitchen: Add-on under-cabinet lighting hazardously installed: Remove circuit and install new under-cabinet lighting if/as required, as per code. Recommend: Install ELV lighting unit (e.g., transformer with puck lights) plugged into receptacle. May require new receptacle circuit.
- Hallway cable: Dangling and live: Receptacle to be installed

Additional recommendations:

(i) Circuit breakers, now 30 years of age. Recommend replacing all branch-circuit breakers with new.
(ii) Provide arc-fault protection of bedroom receptacle circuits
(iii) Provide gas-line bonding, as per current Canadian Electrical Code
(iv) Install hard-wired smoke alarms, as per 2005 National Building Code of Canada

House 11

Examination details:

- Date of examination: February 14, 2014.
- Reason for examination: “Confirmation that 70-amp sub-panel size acceptable”.
- Risk rating: High

House description:

- Construction date: pre 1950
- Service size and panelboard: 100 amp, circuit breakers, with 70-amp sub-panel
- Location: South Granville, Vancouver

What were the key perils that put house at increased risk of electrical fire?

- Deteriorated electrical service conductor: Potential for sparking
- Fluorescent lighting tapped on to Knob and tube (ungrounded): Potential for sparking
- Add-on sensor light hazardously installed (indoor wire in outdoor application): Potential for sparking
- 3-prong outlets on knob and tube (no ground protection)

What were the identifiers that indicate house at high probability of fire risk?

- Age of home: pre 1950s

Summary

- Sub-panel fine but main 100-amp service (from 1930s) deteriorated: Requires service upgrade
- Knob & tube wiring okay but outlets require GFCI/ ground protection
- Estimated repair cost total: $5000 ($4000 for new service and $1000 for repairs)

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Report #062 (Note: Handyman add-ons, highlighted in yellow)

SUMMARY OF REPAIRS FOR MEDIUM RISK

SERVICE, FEEDERS AND PANELBOARDS

- Service conductor deterioration at mast head and breakers. Solution: Upgrade service and main panelboard with new, including gas, waste-water stack & copper water pipe bonding. Sub-panel: 2 cover screws required
- Feeders to coach house in pipe: Pipe deterioration at joints and no bond conductor: Re-and-re
- Coach-house panelboard: 1950s ITE breakers have well exceeded rated service life: Upgrade with new panel
- Old K&T overhead conductors to coach house: Decommission and remove

BRANCH CIRCUITS

Basement

- Old hot water tank cable terminating in JB by HWT (240 volt), with KO: Clean box, plug KO/ Decommission
- South-east room: Add-on fluorescent lighting circuit, including light switch, ungrounded: Re-&-re (if NMD back to panel repair bond circuit / if tied on to K&T, decommission from K&T and install new circuit as per code)
- South-west room: Ungrounded receptacle above fireplace: GFCI / ground

Coach house: Shower room: Open box: Light fixture required

Outdoors: North-east corner: Add-on sensor light wired with cab tire: Remove/ Re-and-re to code

Main floor

- Ungrounded receptacles requiring GFCI/ ground protection:
    - Kitchen nook: 1; Dining room: 3
    - Living room: 4; Office: 3; Hall: 1

Top floor

- Ungrounded receptacles requiring GFCI/ ground protection:
    - East room: 3; Hallway: 1
    - South-east room: 3; West room: 6

House 12

Examination details:

- Date of examination: February 18, 2014
- Reason for examination: Knob and tube presence
- Risk rating: High

House description:

- Construction date: pre 1950
- Service size and panelboard: 100 amp, circuit breakers
- Location: Kerrisdale, Vancouver

What were the key perils that put house at increased risk of electrical fire?

- Copper water pipe not bonded, creating potential for sparking/ shock/ electrocution
- Some knock-outs (holes) in sub-panel, creating potential for spiders/debris/ mice to enter panel
- 3-prong outlets on knob and tube (no ground protection)

What were the identifiers that indicate house at high probability of fire risk?

- Age of home: pre 1950s

Summary

- House in relatively good electrical condition. Only minor repairs required
- Copper water pipe grounding disconnected due to plumbing repairs
- Knob & tube wiring okay but outlets require GFCI/ ground protection
- Estimated repair cost total: $500

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Report #063 (Note: Handyman add-ons, highlighted in yellow)

SUMMARY OF REPAIRS FOR MEDIUM RISK

PANELBOARDS AND FEEDERS

- Provide putty on service conductor entrance to panelboard
- Copper water pipe bonding to be installed. Recommend install gas line & waste-water stack bonding.
- Garage feeder fed from double 30 A breaker: Stranded cable: Re-and-re to code
- Splice box: 3/4" knock out missing filler: Clean box of debris and provide filler
- Sub-panel in garage: 3/4" knock out missing filler: Clean box of debris and provide filler

BRANCH CIRCUITS

Basement

- Laundry room: Add-on receptacle circuit. Cables require mechanical protection/ relocate circuit.

Main floor

- Ungrounded receptacles requiring GFCI/ ground protection:
    - North-east bedroom: 1
    - South-east bedroom: 1
    - Living room: 1

Top floor

- Ungrounded receptacles requiring GFCI/ ground protection:
    - East room: 1

House 13

Examination details:

- Date of examination: February 19, 2014
- Reason for examination: Knob and tube presence
- Risk rating: High

House description:

- Construction date: pre 1950
- Service size and panelboard: 100 amp, circuit breakers
- Location: South Granville, Vancouver

What were the key perils that put house at increased risk of electrical fire?

- Some knock-outs (holes) in sub-panel, creating potential for spiders/debris/ mice to enter panel
- Over-heating on one circuit (kitchen counter). Requires repair, and an additional outlet
- 3-prong outlets on knob and tube (no ground protection)

What were the identifiers that indicate house at high probability of fire risk?

- Age of home: pre 1950s

Summary

- House in relatively good electrical condition. Only minor repairs required
- Knob & tube wiring okay but outlets require GFCI/ ground protection
- Estimated repair cost total: $500

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Report #064 (Note: Handyman add-ons, highlighted in yellow)

SUMMARY OF REPAIRS FOR MEDIUM RISK

SERVICE AND PANELBOARD

- Main disconnect: 1 x 1/2" knock out missing filler: Clean box of any debris and provide filler
- Panel A:
    - 1 x 1/2" knock missing filler: Provide filler
    - Burn out on line conductor at breaker #2: Cut back conductor and reconnect to breaker
      Recommendation: Burn-out due to overloading on kitchen counter receptacle. Suggest, rewire circuit as a dedicated split-receptacle/ 20-amp t-slot, as per code, to mitigate potential overloads in future.
    - 4 cover bolts missing: Provide
- Panel B
    - Panel to be secured (lower part of panelboard not attached)
    - Circuit-breaker knock out requires knock-out filler
    - 1 cover screw required

BRANCH CIRCUITS

Main floor

- Living room, receptacle east wall, reverse polarity: Repair
- Bathroom, receptacle in vicinity of sink to be GFCI protected
- Ungrounded receptacles requiring GFCI/ ground protection:
    - Dining room: 1; East bedroom: 1; Living room: 1;

House 14

Examination details:

- Date of examination: February 14, 2014
- Reason for examination: Knob and tube presence
- Risk rating: High

House description:

- Construction date: pre 1950
- Service size and panelboard: 100 amp, circuit breakers
- Location: Kerrisdale, Vancouver

What were the key perils that put house at increased risk of electrical fire?

- Deteriorated electrical service: Potential for sparking
- Multiple hazardous add-ons tapped on to knob and tube (hidden on top of ceiling panels)
- Live cable dangling, due to replacement of old electric hot water heater with gas
- Garage wiring in hazardous condition (due to additional circuits added without permit)
- 3-prong outlets on knob and tube (no ground protection)

What were the identifiers that indicate house at high probability of fire risk?

- Age of home: pre 1950s

Summary

- Requires service upgrade due to deterioration of existing service (from 1930)
- Old electrical cable (for old hot water tank) live & dangling near gas pipe. Very dangerous!!
- Multiple add-ons tied on to knob and tube, in basement. Knob & tube wiring okay, add-ons to be cut-away from knob and tube, and outlets require GFCI/ ground protection
- Estimated repair cost total: $5000 ($4000 for new service and $1000 for repairs)

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Report #065 (Note: Handyman add-ons, highlighted in yellow)

SUMMARY OF REPAIRS FOR MEDIUM RISK

SERVICE AND PANELBOARD

- Multiple concerns with existing service (no drip loop, conductor deterioration, broken ground).
  Solution: Upgrade service. Also, one 1/2" knock-out in main panel missing filler: Provide filler.

BRANCH CIRCUITS

Basement

- Multiple add-on circuits tapped on to knob-and-tube identified in basement. Examples:
  - 2 conductors west of panel; NMD tie-in west of generator panel; Fluorescent lighting circuit

  Solution: Take down all ceiling panels in basement: Check for knob-and-tube tie-ins, and re-&-re to code.
- Permanently mounted extension cord, south-west corner: Remove. Install new circuit if/as required
- Live cable dangling, south wall: Decommission
- Furnace room: 2 add-on fluorescent lights & 1 receptacle, ungrounded (from open JB): Re-and-re
- Crawl space: Add-on hazardous installation at JB: Re-and-re
- Laundry room: Add-on receptacle for wash machine: Re-and-re
- Laundry room: 2 lampholders covered by wood panel: Decommission/ re-install as per code

Main floor

- Ungrounded receptacles requiring GFCI/ ground protection:
  - Living room: 2; Conservatory: 1

Garage: Add-on receptacle for garage door operator (BX without antishorts & Lumex box connector): Re-and-re

- Add-on fluorescent lighting circuit: Check BX cables for antishorts, and correct bonding in boxes: Re-&-re

Garage #2: Add-on sensor light hazardous install (BX w.o. antishorts, indoor box in outdoor location): Re-and-re

- Orange extension cord permanently mounted: Remove. Install new circuit as required.

House 15

Examination details:

- Date of examination: February 21, 2014
- Reason for examination: Possible knob and tube presence
- Risk rating: EXTREME RISK!

House description:

- Construction date: pre 1950
- Service size and panelboard: 100 amp, circuit breakers
- Location: East Vancouver

What were the key perils that put house at increased risk of electrical fire?

- Extremely dangerous installation of add-on sub-panel (done without permit)!
- Large knock out in main panel: Potential for spider webs/ debris/ mice in panel board

What were the identifiers that indicate house at high probability of fire risk?

- Age of home: pre 1950s
- Sub-panel installed without permit
- Basement suite: Yes; Permit: No

Summary

- Illegal sub-panel installed very hazardously puts house at Extreme Risk!!
- No knob and tube in house, as house has been re-wired top to bottom (unfortunately by a handyman).
- Estimated repair cost total: $3000 ($2000 for panel repair and $1000 for additional repairs)

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Report #066 (Note: Handyman add-ons, highlighted in yellow)

SUMMARY OF REPAIRS FOR MEDIUM RISK

SERVICE AND PANELBOARD

- Extremely dangerous installation of add-on sub-panel: Multiple hazardous concerns: 100 amp feeder conductors through 3/4" knock-out abrading against sharp edge of knock out, feeder conductors not in cable jacket and sub-panel not bonded to main (no ground protection). Main panel: Large knock-out and breakers at end of rated service life. Solution: Upgrade panelboards under permit, incl. new service ground, water pipe, gas-line and waste-water stack bonding

BRANCH CIRCUITS

Basement

- Furnace switch located outside furnace room feeding second furnace switch added near furnace: On three-wire and requires cover. Recommendation: Decommission old circuit and run new dedicated circuit from panel to switch near furnace.
- Basement suite: One receptacle by computer not energized: Examine and repair as required
- Recommendation: Upgrade kitchen counter receptacle-circuit near sink to current code (20-amp, GFCI protected)

Main and top floors

- Home electrical renovation work underway. All new electrical installation work to be completed under electrical permit.

NOTE REGARDING EXTREME RISK RATING:

Home rated Extreme Risk due to the imminent risk of electrical fire due to the hazardously installed sub-panel. This needs be addressed immediately. Once this installation has been corrected, along with the additional corrective actions identified in this report, house electrical system is expected to be in excellent condition.

House 16

Examination details:

- Date of examination: February 24, 2014
- Reason for examination: Knob and tube presence
- Risk rating: EXTREME RISK!

House description:

- Construction date: pre 1950
- Service size and panelboard: 100 amp, circuit breakers
- Location: Burnaby

What were the key perils that put house at increased risk of electrical fire?

- Hoarder house!!
- Grounding faulty, due to corroded ground clamp
- Multiple hazardous add-ons tapped on to knob and tube in basement
- Ungrounded 3-prong receptacles on main floor, requiring GFCI/ ground protection

What were the identifiers that indicate house at high probability of fire risk?

- Age of home: pre 1950s

Summary

- Hoarder house: Clutter piled up in all rooms on all floors, including on the stove. Very dangerous!
- Faulty grounding due to corroded water-pipe ground clamp
- Multiple add-ons tied on to knob and tube in basement. Knob & tube wiring okay, add-ons to be cut-away from knob and tube, and outlets require GFCI/ ground protection

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Report #067 (Note: Handyman add-ons, highlighted in yellow)

NOTE TO HOMEOWNER: House rated Extreme risk, due to excessive clutter (storage boxes, material, etc.) in all rooms on all three floors of house. This clutter puts house at high risk of fire, thus immediate attention to this matter is advised.

SUMMARY OF REPAIRS FOR MEDIUM RISK

HOUSE IN GENERAL

- At time of examination, excessive clutter identified throughout house. Check basement, main floor and top floor, and confirm all rooms are free of clutter.

SERVICE AND PANELBOARD

- Main disconnect: Some dust build up. Provide putty on service conductor entrance
- Ground clamp on cold water pipe: Tighten up/ replace clamp with new.
- Recommendation: Install new service ground (e.g., artificial ground plate)

BRANCH CIRCUITS

Basement

- Range circuit: NMD to undersized splice box with undersized wire connectors: Replace with new circuit.
- 2 K&T to NMD splice boxes located left and right of panel: Undersized wire connectors, loose wire connectors and one box with 4 K&T conductors in one hole: Re-and-re splice boxes to code (suggest larger/deeper boxes).
- NE room: Add-on NMD lighting circuit tied on to K&T: Re-and-re to code
- 3 lampholders in basement require cages
- Junction box by door to east room: Hot air duct lying on K&T: Re-and-re
- North of furnace: Hot air duct lying on K&T: Provide clearance (mininum 1 ") between conductors and ducting
- North of furnace: Ungrounded bell transformer: Decom. from K&T and install new (suggest at panel)
- Above wash tub: Ungrounded circuit on K&T: Re-&-re (suggest, decom. from K&T and run new home run)

Main floor

- Ungrounded receptacles requiring GFCI/ ground protection:
    - North-west bedroom: 1; North-east bedroom: 1