COUNCIL STAFF REPORT

CITY COUNCIL *of* SALT LAKE CITY

TO: City Council Members

FROM: Sean Murphy

DATE: January 16, 2014

RE: Wood Burning Ban

PROJECT TIMELINE:

Briefing: Tuesday, January 21, 2014
Public Hearing: TBD
Potential Action: TBD

Council Sponsor: **Council Members Luke Garrott and Erin Mendenhall**

ISSUE AT-A-GLANCE

The Council was briefed on various issues related to the health and environmental impacts of wood burning during the December 10th, 2013 work session.

During that discussion, Council Members requested additional information on the following topics:

- Local and regional initiatives to curtail wood burning in the Salt Lake Valley
- Practical enforcement measures for any potential wood burning ban
- Programs focused on converting old wood stoves to new technology
- Benefits of wood stove conversions
- Additional information about the impact of wood smoke on Salt Lake City's air quality
- Potential ordinance to curtail "time, place, duration" wood burning in residential neighborhoods throughout the year

Information on these topics follows.

I. Local Initiatives & Cooperation

The Utah Division of Air Quality, within the Department of Environmental Quality, has launched a working group to focus on wood smoke curtailment. Curtailing wood smoke has been identified as the easiest way to quickly reduce $PM_{2.5}$ pollution. The work group's initial meeting on January 15 was attended by representatives from 7 different county health departments, various legislators, administrators, researchers, industry representatives, and advocates. New data on wood smoke accumulation in the Valley was presented, and a variety of possible solutions to ending wood the practice of burning were offered. Council Staff were in attendance and plan to continue involvement in work group. A full report on the meeting is available to the Council. Additionally, a complete list of the work group's preliminary suggestions and recommendations is available in **Appendix A**.

II. Enforcement

The city's snow removal enforcement process, which is handled by the Housing & Zoning Enforcement Division of the Community & Economic Development Department, may be a useful model when considering wood burning ban enforcement. Here is a brief overview of that program.

1. Complaints are initiated by the public.
    a. When a complaint call is made, a city inspector is assigned and dispatched to the property.
    b. While on a call, that inspector will search for infractions at neighboring residencies.

2. Inspectors use tablets in the field to issue tickets and warnings.
    a. Data is tracked in real time, directly into the Salt Lake City zoning enforcement database.
        i. This dramatically reduces administrative duties once inspectors return to the office.
    b. This information links to a database overnight and tickets are automatically issued, along with references to the Salt Lake City Code that define the infraction, and photographs taken by the inspectors on-site.

3. Either a "Warning" or "Ticket Issued" placard is hung on the front door of every home inspectors investigate.
    a. The related code and infraction is listed on the front of the card along with as much pertinent information as possible.
    b. Each household gets an initial warning. A second infraction leads to penalties.

Additional information about the snow removal enforcement process can be found in **Appendix B.**

III. Change-out Incentive Programs

Successful, voluntary change-out programs have been implemented in localities around the country. Most center on public education campaigns, public meetings and stakeholder partnerships, coupled with monetary incentives offered to residents for changing their old wood burning stoves and fireplaces for new EPA-certified devices. The EPA has provided money for such programs to state and local governments under Section 105 of the Clean Air Act of 1990. There are also Federal Tax Credits for an Energy Efficiency – Efficient Biomass Stove which burns biomass fuel to heat a home or heat water.[1]

The Hearth, Patio & Barbecue Association has regularly been listed as a partner in local and regional wood stove change-out programs.

Council staff has had limited contact with these programs to assess actual funding levels but could follow up with them as a next step.

Breathe Utah recently received a grant from Utah Clean Air to implement a Wood Smoke Abatement Program. Breathe Utah will identify five households that are currently dependant on wood stoves for their sold heating source, remove those wood burning units, and install new gas furnaces. The project will be the first of its kind in Utah.[2]

[1] EnergyStar website, http://www.energystar.gov/?c=tax_credits.tx_index
[2] Breathe Utah website, retrieved Jan 2, 2014 (http://www.breatheutah.org/WoodSmoke).

IV. Change-out Benefits

Changing out one old wood stove with a newer, cleaner wood-burning stove reduces fine particle emissions by an average of 70 percent—that's equivalent to removing seven old diesel buses off the road.[3] Other heat appliances (pellet stoves, gas, oil or electric appliances) may reduce fine particle emissions more than 70 percent. EPA-certified wood stoves emit an average of 70 percent less smoke; are 50 percent more efficient, and use 1/3 less wood than models sold before 1990. Uncertified wood stoves can release 40 to 60 grams of particulate matter per hour, while the newer certified stoves release 2 to 7 grams per hour.[4]

V. Salt Lake Valley $PM_{2.5}$

A recent article published in the *Journal of the Air & Waste Management Association* indicates that when $PM_{2.5}$ level in Salt Lake City is particularly dangerous, on red air quality days, wood smoke contributes as much as 38 percent of the particulate matter in our airshed. Kerry Kelly, a researcher in the Department of Chemical Engineering at the University of Utah, who led the study, found that wood smoke and cooking emissions in Salt Lake City may be as important to city's air quality as gasoline emissions.[5]

That analysis builds on the EPA's own $PM_{2.5}$ source apportionment data from 2008, part of the EPA National Emission Inventory (NEI), the nation's standard for air quality recording. NEI data provides emissions information for localities around the country and helps track where each type of emission emanates from. For Salt Lake County, the NEI data suggests that in 2008, total emissions from fireplaces and non-EPA certified wood stoves contributed more $PM_{2.5}$ pollution than all vehicular traffic combined.[6] Additional NEI information and graphical representations are available in **Appendix C**.

VI. Outdoor Wood Burning Restrictions

Following up on a constituent comment, one Council Member requested a draft ordinance that could address the issue of open burning in residential areas. A draft ordinance has been included as **Appendix D**. Council staff can continue to research this as either a part of the entire wood smoke issue or as a separate issue.

The following excerpt on **page 6** of that Appendix addresses residential burning directly:

"Recreational Fires and open burning when the fuel is less than or equal to the authorized size of a Recreational Fire shall be:

1. Allowed only on "green burn" days determined by Utah Department of Environmental Quality, or its successor, between 7 a.m. and 11 p.m. unless otherwise permitted and approved by the fire code official;

2. Conducted in an area not within 25 feet of a structure or combustible material. Conditions which could cause a fire to spread within 25 feet of a structure shall be eliminated prior to ignition (in the case of portable outdoor fireplaces use in accordance with manufacturer's instructions and not within 15 feet of any multi-family dwelling in excess of two families); and

3. Constantly attended by a responsible person until the fire is extinguished. A minimum of one portable fire extinguisher with a minimum 4-A rating or other approved on-site fire-extinguishing equipment, such as dirt, sand, water barrel, garden hose or water truck, shall be available for immediate utilization.

D. Open burning of fuel larger than the authorized size of a Recreational Fire shall be:

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[3] "Guidance for Using State Supplemental Environmental Projects to Implement Wood Stove Changeout Programs", EPA website, retrieved Jan 2, 2014
http://www.epa.gov/ttn/caaa/t1/memoranda/wschangoutguide_042807.pdf

[4] "Keene Woodstove Changeout Campaign", NH Department of Environmental Services, Concord, NH. Retrieved January 2, 2014.
http://www.epa.gov/burnwise/pdfs/Keenecasestudyreport2011.pdf

[5] Kelly, Kerry, et al. "Receptor model source attributions for Utah's Salt Lake City airshed and the impacts of wintertime secondary ammonium nitrate and ammonium chloride aerosol." *Journal of the Air & Waste Management Association*, April 20, 2013.

[6] "EPA Air Emissions Resources" website, utilizing National Emissions Inventory data. Retrieved January 2, 2014. http://www.epa.gov/cgi-bin/broker?_service=data&_debug=0&_program=dataprog.state_1.sas&pol=PM25_PRI&stfips=49

1. Allowed only on “green burn” days determined by Utah Department of Environmental Quality, or its successor, between 7 a.m. and 11 p.m. unless otherwise permitted and approved by the fire code official;

2. Conducted in an area not within 50 feet of a structure or combustible material. Conditions which could cause a fire to spread within 50 feet of a structure shall be eliminated prior to ignition. Exception: outdoor burning in approved containers that are not less than 15 feet from a structure.

3. Constantly attended by a responsible person until the fire is extinguished. A minimum of one portable fire extinguisher with a minimum 4-A rating or other approved on-site fire-extinguishing equipment, such as dirt, sand, water barrel, garden hose or water truck, shall be available for immediate utilization.

Attachment A: DAQ Wood Smoke Working Group Recommendations and Suggestions
January 15, 2014 Meeting

Wood Smoke Workgroup Recommendations

- Put the residential wood-smoke complaint line phone number and email address on a more obvious place on the website.
- Changeout Program
    - Workforce Service Weatherization money available for changeout programs?
- Evaluate Compliance Methods
    - Enhance phone app to include mechanism for complaints.
    - More inspectors

- Eliminate source Vs. Technology available to reduce emissions from source
- Education (get the word out on wood smoke emissions)
    - Do it at the point wood is purchased (require vendor to distribute info)
    - More messaging to papers and other news outlets.
    - How do we educate the tourists?
- Businesses are also burning wood, not just people.
- Tax credit to households who do changeover.
- Workforce Service Weatherization money available for change out programs?
- Motivation for non-EPA stoves to upgrade; they are treated the same as EPA certified stoves.
- 2-tier programs
- Industrial Offsets for growth to provide funding for changeout programs
- Woodstove Round up – Turn in your old stove and get a cash payout.
- Eliminate loopholes that would allow people with natural gas available to burn wood. (shops that burn scarp wood instead of use the gas heating that is available)
    - Write a rule that extends to businesses for no-burn days.

- Permits for anyone with a wood stove. Require them to register with DAQ.
- Need to get rid of old stoves for preference for natural gas.
    - Buy back program. Don't just focus on replacing with EPA stoves as they are still large contributors
    - Education

- Offer conversion from freestanding stove to freestanding fireplace. This would be cheaper than an all-out changeout to central heating.
- DAQ's websites for wood burning need to be more consistent and better integrated.
- Increase the fine for burning on no-burn days.
- Real estate transfer for uncertified stoves. Realtors can learn to cope with a regulation like this. It's been done in other states, and they have for radon requirements.
- Pass a rule that there won't be any whole-house heating with wood after X amount of years. (Retire sole source exemptions in the future.)
- Continue to work on improving predictions of inversions.

SALT LAKE CITY CORPORATION
COMMUNITY & ECONOMIC DEVELOPMENT
Civil Enforcement 801-535-7225
www.slcgov.com/civilenforcement/snow-removal

Date ____/____/____ Time _____

Address _____

☐ **Warning** ☐ **Ticket Issued/Mailed**

An inspection was conducted at the above address. The following conditions were observed:

_____

_____

Failure to Remove Snow or Ice from the Public Sidewalk

14.20.070	Clear all snow and ice from the length and width of the entire sidewalk abutting (adjoining or next to) your property within twenty-four (24) hours after the snow has ceased falling according to the National Weather Service.
14.20.080	Do NOT move snow into the street or onto other sidewalks.
14.20.110	You may receive one or more fines for a civil violation for failure to comply with these ordinances.

I was at your residence today.

Please call:

_____

Housing & Zoning Inspector

Phone: _____

Thank You

Appendix C: EPA National Emissions Inventory (NEI) data for Salt Lake County, 2008.

The graphs below show $PM_{2.5}$ levels monitored in Salt Lake County during 2008, categorized by the source of the emission. Fig. 1 shows all emissions sectors. "Fuel Combustion" is rated as the top emission group. The "Mobile" category refers to emissions due to all mobile on-road and off-road combustion engine use, from passenger vehicles to power boats.

Fig. 1: Salt Lake County Emissions, by Source Sector

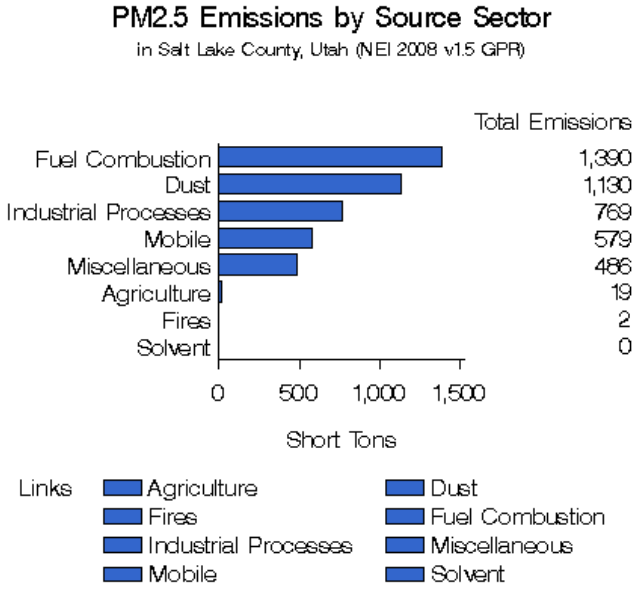
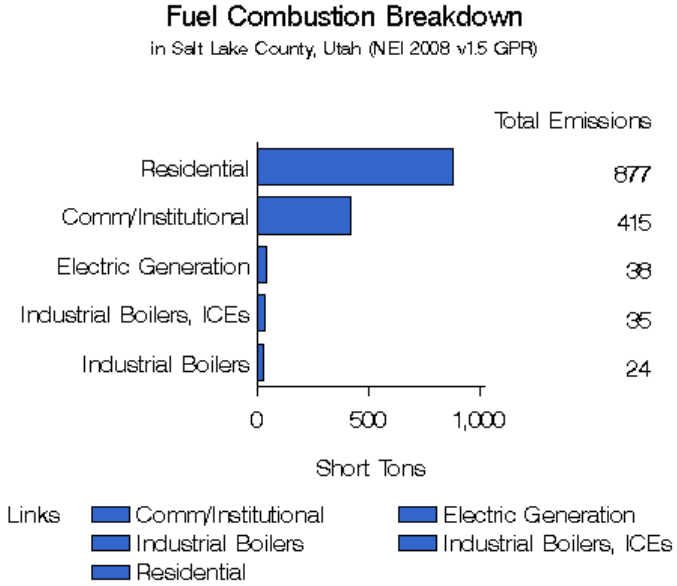


Fig. 2 is a view of the categories within "Fuel Combustion". Here, "Residential" emissions are by far the largest single source of fuel combustion emission.

Fig. 2: Salt Lake County Residential Emissions Categories



Finally, the expanded view of "Residential" emissions shows that effectively all $PM_{2.5}$ being emitted from homes in Salt Lake County is due to wood burning of various kinds. The total emissions associated with various types of wood burning in Salt Lake County account for more than "Industrial Processes" emissions and "Mobile" emissions, which includes all vehicular traffic.

Fig. 3: Salt Lake County Residential Emissions

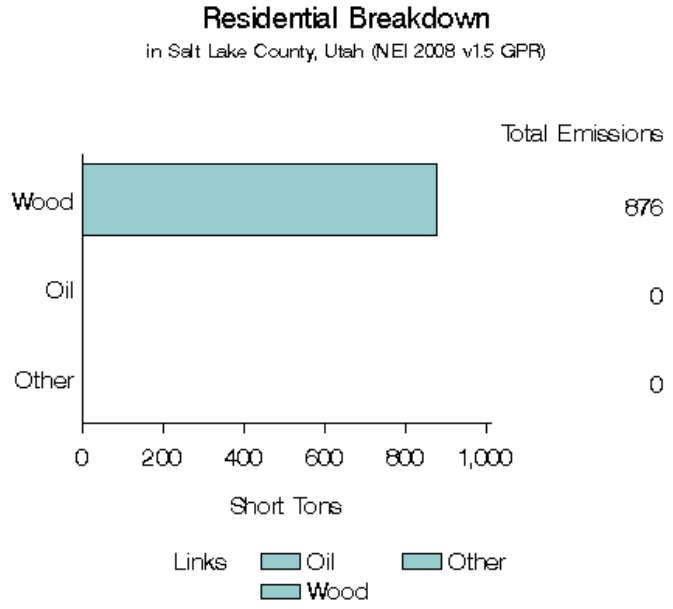


Fig. 4 is a final graph that breaks down the "Wood" category. Here we can see that the total emissions from fireplaces and non-EPA certified wood stoves alone is greater than all "Mobile" emissions.

Fig. 4: Types of Wood Emissions

Type of Emitter	**Emissions Amount**
Fireplace: general	200.973
Woodstove: fireplace inserts; non-EPA certified	419.463
Woodstove: fireplace inserts; EPA certified; non-catalytic	86.1736
Woodstove: fireplace inserts; EPA certified; catalytic	29.901
Woodstove: freestanding, general	0
Woodstove: pellet-fired, general (freestanding or FP insert)	18.0184
Furnace: Indoor, cordwood-fired, non-EPA certified	85.3974
Hydronic heater: outdoor	0.283948
Total: All Combustor Types	35.9183
Fireplace & non-EPA woodstove	**620.436**
Total	**876.128648**

9.24.030: DEFINITIONS:

For the purpose of this chapter, the following terms, phrases and words shall have the meanings given in this section:

AEROSOLS: Any dispersed matter, solid or liquid, in which the individual aggregates are larger than single molecules but smaller than five hundred (500) microns in diameter (a micron is 1/1,000,000 of a meter).

AGRICULTURAL BURNING: Open burning, in rural areas, essential to agricultural operations, including the growing of crops, the raising of fowl, animals or bees, when conducted on the premises where produced.

AIR CONTAMINANT: Any particulate matter, or any gas, vapor, odorous substance, suspended solid or any combination thereof, excluding steam and water vapor.

AIR CONTAMINANT SOURCE: Any and all places where an air contaminant originates.

AIR POLLUTION: The presence in the ambient air of one or more air contaminants in quantities sufficient to be excessive or objectionable, as determined by the standards, rules and regulations adopted by the Salt Lake Valley health department.

AIR QUALITY SECTION: Air quality section of the Salt Lake Valley health department.

AMBIENT AIR: The surrounding or outside air.

ATMOSPHERE: The air that envelops or surrounds the earth, and includes all space outside of buildings, stacks or exterior ducts.

BTU: British thermal unit, the quantity of heat necessary to raise the temperature of one pound of water one degree Fahrenheit (1°F).

BOARD: The Salt Lake Valley board of health.

BONFIRE: An outdoor fire utilized for ceremonial purposes that exceeds the size limitation of a recreational fire.

CLEARING INDEX: A number indicating the predicted rate of clearance of ground level pollutants from a given area. This number is calculated by the U.S. weather bureau, from daily measurement of temperature lapse rates and wind speed, and directions from ground level to ten thousand feet (10,000').

CONTROL EQUIPMENT: Any equipment which has the function of controlling the emissions from a process, fuel burning, or refuse burning equipment, and thus reduces the creation of or the emission of air contaminants into the atmosphere, or both.

DEPARTMENT: The Salt Lake Valley health department.

DIRECTOR: The Salt Lake Valley director of health.

EMISSION: The act of discharging into the atmosphere an air contaminant or an effluent which contains or may contain an air contaminant, or the effluent so discharged, into the atmosphere.

EQUIVALENT OPACITY: The relationship of opaqueness or percent obscuration of light to the Ringelmann chart for shades other than black and is approximately equal to the following:

Opacity	Percent Ringelmann
10	0 .5
20	1
30	1 .5
40	2
60	3
80	4
100	5

EXISTING INSTALLATION: A plant, process, process equipment or a device, construction of which began prior to the effective date of any regulation having application to it.

FACILITY: Machinery, equipment, structures or any part of accessories thereof, installed or acquired for the primary purpose of controlling or disposing of air pollution.

FUGITIVE DUST: Solid airborne particulate matter emitted from any source other than through a stack or chimney.

GARBAGE: The animal and vegetable waste and food refuse resulting from handling, preparing, cooking and consumption of food.

HEAVY FUEL OIL: A petroleum product or similar material heavier than diesel fuel.

HOUSEHOLD WASTE: Any solid or liquid material normally generated by a person or persons in a residence in the course of ordinary day to day living, including, but not limited to, garbage, paper products, rags, leaves and garden trash.

INCINERATOR: Any device used for the destruction of garbage, rubbish or other wastes by burning, or to process salvageable material by burning.

LPG: Liquid petroleum gas, such as propane or butane.

MULTIPLE CHAMBER INCINERATOR: Any device used to dispose of combustible refuse by

burning, consisting of three (3) or more refractory lined combustion furnaces in series, physically separated by refractory walls, interconnected by gas passage ports or ducts, and employing adequate parameters necessary for maximum combustion of material to be burned.

NEW INSTALLATION: A plant, process or process equipment, construction of which began following the effective date of the regulation concerned. A modified process unit or system shall be construed as a new installation if a physical change in, or change in the method of a process unit system, increases the amount of any air pollutant not previously emitted. An increase in either production rate or hours of operation alone shall not be considered a change in method of operation.

ODOR: Property of an air contaminant that affects the sense of smell.

OPEN BURNING: A fire from which the products of combustion are emitted directly into the open air without passing through a stack or chimney from an enclosed chamber. Open burning does not include road flares, smudge-pots and similar devices associated with safety or occupational uses typically considered open flames, recreational fires, use of approved portable indoor or outdoor fireplaces, and the use of approved devices for the primary purpose of preparing food, such as outdoor grills.

PARTICULATE: Any gas borne material, except uncombined water, which exists as a liquid or solid and which is capable of being suspended in a gaseous system.

PERSON: Any individual, public or private corporation, partnership, association, firm, trust, estate, the state, or any department, institution, bureau or agency thereof, any municipal corporation, county, city and county or other political subdivision of the state, or any legal entity whatsoever which is recognized by the law as being subject to rights and duties.

PUBLIC NUISANCE: As defined by Utah code sections 76-10-801, 76-10-803, and 78B-6-1107.

RECREATIONAL FIRE: An outdoor fire burning materials other than rubbish where the fuel being burned is not contained in an incinerator, outdoor fireplace, portable outdoor fireplace, barbeque grill or barbeque pit and has a total fuel area of 3 feet or less in diameter and 2 feet or less in height.

REFUSE: Any solid waste, including garbage and trash.

RINGELMANN CHART: The chart published by the U.S. bureau of mines (information circular 8333) which illustrates graduated shades of gray to black for use in determining the light obscuring capability of particulate matter.

SALVAGE OPERATION: Any business, trade or industry engaged in whole or part in salvaging or reclaiming any product or material, including, but not limited to, metals, chemicals, and shipping containers or drums.

SANDBLASTING: The use of a mixture of sand and air at high pressures for cleaning and/or polishing any type of surface.

STACK: Any chimney, flue, conduit or duct arranged to conduct emissions to the ambient air.

TRASH: Solids not considered to be highly flammable or explosive, including, but not limited to, clothing, rags, leather, plastic, rubber, floor coverings, excelsior, tree leaves, yard trimmings, and other similar material.

WASTE: All solid, liquid or gaseous material, including, but not limited to, garbage, trash, household waste, construction or demolition debris, or other refuse, including that resulting from the prosecution of any business, trade or industry. (Ord. 14-13, 2013: Ord. 1-06 § 30, 2005: prior code § 3-1-5)

9.24.140: OPEN BURNING; GENERAL PROHIBITIONS:

A. No person shall burn any trash, garbage or other wastes, nor shall conduct any salvage operations, in any open fire except in conformity with the provisions of sections 9.24.150 and 9.24.160 of this chapter, or their successor sections.

B. Open burning, recreational fires or any other fire shall be prohibited when:

1. They are offensive or objectionable because of smoke or odor emissions, or

2. Atmospheric conditions or local circumstances make such fires hazardous.

C. The fire code official is authorized to determine whether there is a violation of subsection B and order extinguishment of open burning, recreational fires, or any other fire which create or adds to a hazardous or objectionable situation.

D. If a conflict arises between the provisions of this chapter and the International Fire Code applicable to the city, the more restrictive provision shall apply.

9.24.150: OPEN BURNING; PERMITS; NO PERMIT REQUIRED WHEN:

A. A permit shall be obtained from the fire code official prior to the kindling of a bonfire or open burning for the purpose of silvicultural or range or wildlife management practices or the prevention or control of disease or pests. Prior to kindling any other type of open burning, the Salt Lake Fire Prevention Bureau shall be notified by calling (801) 799-4150 during normal business (8:00-5:00 p.m. Monday-Friday). If open burning initiates during the weekend please make notification prior to 5:00 p.m. Friday.

B. When not prohibited by other laws or by other officials having jurisdiction, and provided that a public nuisance is not created, the following types of fire are permissible without the necessity of securing a permit or notifying the Salt Lake Fire Prevention Bureau, but are subject to the requirements of the fire code:

1. In devices for the primary purpose of preparing food, such as outdoor grills and fireplaces;

2. Indoor and outdoor fireplaces;

3. Properly operated industrial flares for combustion of flammable gases;

4. Burning, on the premises, of combustible household wastes generated by occupants of dwellings of four (4) family units or less in those areas only where no public or duly licensed disposal service is available; and

5. Recreational Fires where such fires are under the control of a responsible person, subject to the requirements of subsection C of this section.

C. Recreational Fires and open burning when the fuel is less than or equal to the authorized size of a Recreational Fire shall be:

1. Allowed only on “green burn” days determined by Utah Department of Environmental Quality, or its successor, between 7 a.m. and 11 p.m. unless otherwise permitted and approved by the fire code official;

2. Conducted in an area not within 25 feet of a structure or combustible material. Conditions which could cause a fire to spread within 25 feet of a structure shall be eliminated prior to ignition (in the case of portable outdoor fireplaces use in accordance with manufacturer's instructions and not within 15 feet of any multi-family dwelling in excess of two families); and

3. Constantly attended by a responsible person until the fire is extinguished. A minimum of one portable fire extinguisher with a minimum 4-A rating or other approved on-site fire-extinguishing equipment, such as dirt, sand, water barrel, garden hose or water truck, shall be available for immediate utilization.

D. Open burning of fuel larger than the authorized size of a Recreational Fire shall be:

1. Allowed only on “green burn” days determined by Utah Department of Environmental Quality, or its successor, between 7 a.m. and 11 p.m. unless otherwise permitted and approved by the fire code official;

2. Conducted in an area not within 50 feet of a structure or combustible material. Conditions which could cause a fire to spread within 50 feet of a structure shall be eliminated prior to ignition. Exception: outdoor burning in approved containers that are not less than 15 feet from a structure.

3. Constantly attended by a responsible person until the fire is extinguished. A minimum of one portable fire extinguisher with a minimum 4-A rating or other approved on-site fire-extinguishing equipment, such as dirt, sand, water barrel, garden hose or water truck, shall be available for immediate utilization.

(The following information was presented to the Council on December 10th, 2013.)

Council Members Simonson and Garrott have requested that staff research potential public awareness measures and regulatory actions that would end the practice of wood burning for home heating and recreation purposes, either wholly or in part, in Salt Lake City. Particular emphasis has been placed on the effects of wood burning during seasonal temperature inversions.

Staff members have begun to research several issues related to the health and environmental impacts of wood burning and the practicalities of instituting both a ban and a public awareness campaign.

Staff members now seek additional guidance from the Council on key elements of this issue.

POLICY QUESTIONS

To set staff priorities around the issue of wood burning, the Council may wish to consider the following questions:

1. Does the Council wish to commit additional staff resources researching a partial or outright ban of wood burning in the city?

2. Does the Council wish to implement either a seasonal wood burning ban during the inversion season and/or a ban on recreational wood burning?

3. Does the Council wish to commit additional staff resources to research the following issues:

    a. Conducting a best practices search to compare the success of local wood burning bans and ordinances around the country?

    b. Researching public awareness strategies to educate residents about the environmental and health impacts of wood smoke?

    c. Conducting outreach to individuals and organizations for potential partnerships in enforcing or promoting a ban and/or a public awareness program at the:

        i. City level?
        ii. County level?
        iii. Regional level?

    d. Researching the availability of retrofitting grants and programs for those households dependant on wood burning for heat?

ADDITIONAL & BACKGROUND INFORMATION

General Background

The fine particulate matter ($PM_{2.5}$) emitted from burning wood is considered to be one of the most dangerous pollutants to the air we breathe.[7] [8] In geographic regions defined by valleys, and in regions that experience seasonal temperature inversions, the effect is dramatically increased.[9] California's Central Valley is one such

[7] "Strategies for Reducing Residential Wood Smoke." US Environmental Protection Agency, Office of Air Quality Planning and Standards, Outreach and Information Division, Innovative Programs and Outreach Group, Research Triangle Park, NC, March 2013.

[8] Naeher, L. P. "Critical Review of the Health Effects of Woodsmoke." White paper, Air Health Effects Division, Health Canada, Ottawa. March 31, 2005.

[9] "Strategies for Reducing Residential Wood Smoke."

example. The Sacramento Metropolitan Air Quality Management District, which monitors air quality in the Central Valley, has reported that wood smoke from residencies is the primary source of particulate pollution in the region during winter months. Since implementing a curtailment program, Sacramento has experienced 40% fewer days above the National Ambient Air Quality Standards (NAAQS) for $PM_{2.5}$.[10]

The effects of one smoking fire can impact an entire neighborhood. While the health risks are greatest for those individuals living in the home with a smoking fire, particularly for children, elderly and those with respiratory complications, neighboring homes will absorb at least 50 to 70% of the smoke found outdoors. Wood smoke particles are so fine that there is no way to prevent them from entering neighboring homes.[11] [12]

A variety of regulatory programs, either banning wood smoke completely or partially, have been implemented in localities around the country with varying degrees of success. In its advisory literature, the EPA suggests that "a public awareness program, along with a voluntary wood smoke curtailments program" may be a good place to start when developing regulatory action.[13] Similarly, the Hearth, Patio and Barbeque Association supports "Wood Stove Changeout" programs and emphasizes that "strong public awareness is critical to the success" of such efforts.[14]

Wood Burn Particulates

Airborne particles less than 10 micrometers in diameter (PM_{10}) pose a health concern because they can be inhaled into and accumulate in the respiratory system. Particles less than 2.5 micrometers ($PM_{2.5}$) are referred to as "fine" particles and are believed to pose the largest health risks. Because of their small size (less than one seventh the average width of a human hair), fine particles can lodge deeply into the lungs.[15] Residential wood smoke contains $PM_{2.5}$, carbon monoxide (CO), toxic air pollutants (e.g. benzene and formaldehyde), and climate gases (e.g. methane and black carbon).[16]

Health Impact

Wood smoke exposure causes a decrease in lung function and an increase in the severity of existing lung disease with increases in smoke concentration or exposure time.[17] Exposure increases the chance of respiratory illness in children, such as acute pneumonia, or bronchitis, which are major causes of disease and death in young children.[18] Long term exposure may lead to emphysema, chronic bronchitis, arteriosclerosis, and nasal, throat, lung blood, and lymph system cancers.[19]

Valleys & Inversions

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[10] Sacramento Metropolitan Air Quality District website, http://www.airquality.org/. Referenced December 4, 2013.

[11] Kamens, R. M., et al. "Mutagenic changes in dilute wood smoke as it ages and reacts with ozone and nitrogen dioxide: An outdoor chamber study." *Environmental Science and Technology*, Vol.18, No.7, 1984.

[12] Lewtas, J., et al. "Mutagenicity, Tumorigenicity and Estimation of Cancer Risk from Aerosol and Source Emissions from Woodsmoke and Motor Vehicles." Paper 91-131.06, 84th Annual Meeting Air and Waste Management Association, Vancouver, B.C., June 16-18, 1991.

[13] "Strategies for Reducing Residential Wood Smoke." US Environmental Protection Agency, Office of Air Quality Planning and Standards, Outreach and Information Division, Innovative Programs and Outreach Group, Research Triangle Park, NC, March 2013.

[14] "Wood Stove Changeout." The Hearth, Patio and Barbeque Association website, http://woodstovechangeout.org/index.php?id=34. Referenced December 4, 2013.

[15] "PM2.5 NAAQS Implementation." US EPA Technology Transfer Network, National Ambient Air Quality Standards website, http://www.epa.gov/ttn/naaqs/pm/pm25_index.html. Referenced 12/4/13.

[16] Ibid.

[17] Ammann, H. M. "Summary Overview of Health Effects Associated with Residential Wood Combustion: Health Effects Issue Assessment." Internal report, US EPA, Environmental Criteria and Assessment Office, Research Triangle Park, NC, 1986.

[18] Larson, T. V. et al. "Urban Air Toxics Mitigation Study: Phase I." University of Washington report, submitted to Puget Sound Air Pollution Control Authority, 1988.

[19] "Health Effects of Wood Smoke." Washington State Department of Ecology, Air Quality Program, August 2004.

A variety of localities around the nation have enforced wood burning restrictions in residential areas. Those regions that experience temperature inversions similar to Salt Lake's have identified wood smoke as a primary polluter during winter months.[20]

Davis, California, just west of Sacramento in the Central Valley, has experimented with both voluntary and mandatory "no burn days" in the past years. After finding that these restrictions have been largely ineffective in reducing the number of reported incidents of residential smoke violations, and after hearing testimony from community members that report continued suffering from wood smoke pollution in their neighborhoods, Davis has decided to implement a nuisance-based ordinance.[21]

Salt Lake City

The American Community Survey estimated that for 2012, 105 households in Salt Lake City were dependent on wood fuel as a sole source of heating.[22] Both the EPA and the California Air Resources Board have reported that the inhalable particle pollution from one wood stove is equivalent to the particle pollution emitted from 3,000 gas furnaces that produce the same amount of heat per unit.

The Utah Department of Environmental Quality's Division of Air Quality issues mandatory "No Burn Days" from November 1 to March 1. Enforcement is largely by phone, prompted by complaints emanating from neighborhoods. During the 2012-13 season, 68 complaints were reported throughout the Salt Lake Valley.[23] DAQ also maintains a registry for all sole source households throughout the state. Additional information, including that full registry, has been requested.

Residential Impact

Wood smoke does not rise and disperse during winter temperature inversions. At these times, wood smoke hangs close to the ground and enters neighbors' yards and houses, schools and hospitals. Regions that experience winter atmospheric inversions and valley locations with poor air circulation are the most affected.[24] Particles are so tiny that they remain suspended for long periods of time and readily penetrate into buildings. Indoor levels of wood smoke $PM_{2.5}$ in homes that lie adjacent to wood burning neighbors reach at least 50% to 70% of outdoor concentrations.[25]

Utah Code

The Utah Code allows for localities to regulate open burning. "R307-202-6. Open Burning - Without Permit" states as follows:

"The following types of open burning do not require a permit when not prohibited by other local, state or federal laws and regulations, when it does not create a nuisance, as defined in Section 76-10-803, and does not impact the health and welfare of the public.

(1) Devices for the primary purpose of preparing food such as outdoor grills and fireplaces;

(2) Campfires and fires used solely for recreational purposes where such fires are under control of a responsible person and the combustible material is clean, dry wood or charcoal; and

(3) Indoor fireplaces and residential solid fuel burning devices except as provided in R307-302- 2."

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[20] Sacramento Metropolitan Air Quality District website.

[21] Pryor, A. "Council to consider new wood smoke nuisance ordinance." *The People's Vanguard of Davis*, September 20, 2013, http://davisvanguard.org/index.php?option=com_content&view=article&id=7649:council-to-consider-new-wood-smoke-nuisance-ordinance&Itemid=205. Referenced 12/4/13.

[22] "Selected Housing Characteristics: Salt Lake City, UT." American Fact Finder, US Census Bureau website, http://www.http://factfinder2.census.gov/. Referenced 12/4/13.

[23] "Smoke Patrol 2012-2013 Memo." Utah Department of Environmental Quality, Division of Air Quality memo.

[24] "Health Effects of Wood Smoke."

[25] Kamens, R. M., et al.

ATTACHMENTS:

A. U.S. EPA Burn Wise Strategies factsheet. The EPA's quick reference about the determents of residential wood smoke. http://www.epa.gov/burnwise/pdfs/strategies-document-factsheet.pdf

B. U.S. EPA Burn Wise advice to consumers about the impact of wood smoke on health. http://epa.gov/burnwise/healtheffects.html

C. U.S. EPA listing of sample ordinances and regulations from around the United States. Taken from the US EPA website. http://www.epa.gov/burnwise/ordinances.html#community

D. Utah Department of Environmental Quality, Division of Air Quality's Smoke Patrol 2012-2013 Memo.

E. A letter to the Council from a Salt Lake City constituent, Dr. Brian Moench.