

Urban Fine Particulate Matter: Causes, Health Impacts, and Responses *

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KHWWWifellkj_ed^W[c [H [ZWed['e\j^ ['c ej'fH ii_d] ~
[dl _ledc [djVWUZ^ [Vj^ Y^VW d] [i'e\j^ ['jnt djo#Hij Y djkho\$7c ed] ~
j^ ['1Vleki'fellkjVWji" _dl 'fVWj_YkBYM 'c Vj [H'adentWFC(\$' 'i" ~
fVWj_YkBYM^ VpMZeki \$J^ [i ['c _Yei Yef_YfVWj_YH i" H ii'j^ W(\$" ~
c _Yec [j [H "dZ_W [j [H'YWWf [dljHYM 'Z [f "djej^ ['Hkd] i WZ [l [d [dj [H' ~
j^ ['XleeZijH W SCWeliekhM i "dYkZ [1 [^ _YH ['n^ Vki j" YeVW^ H Zfen [H' ~
fVWj i" YedijhkY_edZkij" WZ "dZkijhW c _ii _edi \$I [WedVWVjehi'ikY" ~
Wj [c f [HYkh "dl [H _edi WUjHWj^ [i ['fellkjVWji 'Yei ['jej^ [']lekdZ" ~
\khj^ [Hneli [d_d] WlgkVWjo\$ ~
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J^ [^ [Vj^ 'Yedi [gk [dY i 'e\fleled] [ZFC(\$' [nfeikh W i [l [H \$ ~
Dkc [leki'ijkZ [i bda" jje'H if HYeloZ i [W i ba [Vj^ c WUZ Y'led Y' ~
XledY' j i" WUZ el WYkMW'leXh c i'ikY W^ [Vj VjWai WZijlea [i" ~
WZ [l [d [d [klele] _WZ ielZ [H \$Lkd [HMH ']lekfi Y _LZH d'j^ [' [LZ [Hb" ~
WZj^ ei ['nj^ fH [nij_d] YedZj _edi \Wj^ [^] ^ [ij'hi ai \$ ~
; Yedec _YWb^ c [Z_WbYei j WZfheZkYj_l jolei i [i" c fei [W] d \WVj" ~
XkdZ [d'edieY]jo\$ ~
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; \elhj je WZH ii'j^ ['iik ['c kij Yec Xdl 'f [HedVWUZfebYo#H] [l [b' ~
Wj _edi \$EdW' dZ] ZkWH [l [BYj_p [di WU'c edjehH VWj_c ['WlgkVWjo" ~
_dZ [n [i "ki ['Wifkh \ [H "dZeeli "WZ'n [WY [lj \ [Zfhej [Yj] ['c Wai" ~
ekjZeeli 'Zkhd] [^] ^ #fellkj_edf [heZi \$H [ZkYd] 'fhl Vj 'WYki [" ~
Y'eei_d] 'fkXbYjHWifelhjWj _ed" elh^ _j_d] je [H Yjhy [^ _YH i WU'ent [H' ~
[c _ii _edi Wj^ ['iekh \$ ~
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; cj Yba YbglbXa i bMUFNgdUnUWU'fc Y"GfWY Ya lggcb'gUbxXgZf ~
jY WgUbXZU'fNgZj Yga Ybglb'fYbKUY YbY [nUbxh YXj Ycda YbKZ ~
[fYbi fVub'gUWgWbXUa UjW'nja dfcj YUfei Ujhi@b [Hfa 'dc Mgh U ~
dfca chWUbYbY [nUbxg gUbuYi fVub'dUbb [UYYgYbUle dfY Ybi ~
Z li fYWgYg" ~
.

: bYdUfWUYa UHf'g [b] gVYV hXUXnion [b] fU [b] 'dMgcbU' dYWU Hcbg' ~
kjh ZfkUX'cc _b ['di VJWc MgzVWgWb'dfchW i a Ub\ YUh UbXa cj Y ~
lekUXWUbYZA YUH [M Yb] fcha YbglZf [YbYU]cbgle Wa Y" ~
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M&- M?OT, P/T* 5C' 'QRS' IT6DCH5 UNT* 5CJ/J] .
5 7UX&D5 I : T5DU" OO ĀQUM L(ĀQR5 OT5DU, T5/M) Í DU
QH 5 &G) '5 NP& G&D'K< P(TNEHME 5 &T1) HQP(GP" O
" 175 i < HDEMEH P?J/O< U(MTMI O DN&FS5 5 K MH5/I&'
O5 T5D(U< TT(QN)7CQ & O6QKUK< &(U

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5/P&ETMND5 TI5-MQHT/7DQO & TM ŽUIT5D(UNU" MR
I QH(Å5&?T' FNO7 ;' 5 " ONUD5 '5 D35 &D5 KMBON T<) &K /
K) 7" QUP/T(KMEP I7TKI? G5 < 16MMUY' E5' T/, TT/ & 6: ÷
" Q 85 D&M5 M(5 &K &K1 I] D&U

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@UWbHh JbUj bXY Ufyi fVbc'g\ UWb jYHx'Yb i bcXY`cga UmfygXgZg
La VjYbUYgnKYgi XXY'g|`cIL="gHfY`cgXg|bLgWbHh JbUjgZgdfHhUgZbUg
WbcVjLgWacDA&`gcbYgHhUa YbYdY|fcgU'gHhXa Jb iHgdfHhUgXY
a YbcgXY&`a JHh a YfcgXYX'a YfcZd YXb`dbYHf dfcZ bXh YbYb`cg
di`a cbYgYbWg`Y UfU lcfYbYgbi i Hx'G gdfbYUgZ YbYgYbWnb`cg
[UggXYgUdYXj Y HhcgZgWbHhUgYAM]WgXYWVibZY`dcj cXY UgcVUgmUg
Ya JgcbYg|bX gHUYg`gHj YgcbYgHh JggnidUgWbXVbYga YHfcI[|Wg
di YXb UHhUf`cgWbHh JbUjgWVWXY`g YcZa dcfubXc`UW|XUXY Ufy'

@UIdcgVj bdfc`cb|UHU DA&`dfcj cW|fj YgdfcVYa UgXYgi XBi a Ycgg
YgXcg`cFYUj bUb WbY Uga UZUMdci JgVj bWZUgYHh YXUg
WEXj UgUfYgYbWg Hgdfbcgbi fcI[|WgBj|cgZbW|bcgnidfcbUgWb`
YbZfa YXUgdfY Jggb`cga 1gi i bYUfYg`cgWgga AYUgnidUdXUXY
dfcX Wj|XUg dcbY UXa 1gi bu|fub W|UYWb i a JW'

@Ugc`i VcbYgfYei JfYb UWcbYg|bXj |X UYgnidc`QjWg`7UdUdfgcbUdi YXY
Wbg Hf`cgQXWgXYW|XUXY Ufyzi gU`di f|ZWAcfYgYb|bHf|cfYgni
`Y Ufa UgW|`UgWVH|ZWUgYb XUgXYUHUWbHh JbUj b'FYX Vfy i gc XY
U lca Ij|Ygdfj UcgnicdHf dcfY HfubgkfhYdOV|Wcj Y QWcgYAM]Wg
UnXUUXga Jb i f`UgYa JgcbYg'

@UgU lcf|XUXgXWb|a dYa YbHfbcfa UgXYYa JgI b'a »gYgf|Wg|bj YHf`
YbYbYf|QgYbcj UYgnLi a YbHf`Ug»fYUg YXUgi fVbUg`Dc QjWgU`Uf|c`
dUrc`ei Y|a di`gYb`UYbYf|Q`|a d|UnidUdUb|ZWVj b i fVbUggb|VYgcb`
YgYbUYgdfUdfY Yb|Z h fUgWjgg'

Hj JgVYdfc`YHUZY DA&`Y || Yi buWa VbUj bXYdfYU VcbYg`
dfgcbUYgnidc`QjWgdOV|WgdUfU|UfubHf i bUfYa »g`|a d|c`ngUi XUY
dfU`UgdI|Ja Ug|YbYUjcbYg'

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ú öÜ 'ú à · ¶ ¶ú ¶úÉód¶à² d¶

$[1/2 \div \hat{U} \hat{B} 1/2 \hat{B} \div \hat{B} \hat{O} 1/2 \hat{O} \div \hat{B} \hat{U} \hat{U} \hat{B} \div \hat{B} \hat{B} 1/2 \hat{B}$
 $1/2 \div 1/2 \hat{B} 1/2 \hat{U} \circ \hat{B} \hat{O} \hat{B} \sim 1/2 \div \hat{B} \hat{U} \hat{B} 1/2 \hat{B} 1/2 \hat{O} \hat{B} \hat{B}$
 $1/2 \hat{B} \hat{B} \sim 1/2 \hat{O} \hat{B} \hat{B} \hat{U} 1/2 \hat{B} \hat{B} \hat{B} \hat{O} \hat{B} \div \hat{U} \hat{O} \hat{B} \hat{U}$
 $\hat{U} 1/2 \hat{B} \hat{B} \hat{B} \hat{a} \hat{B} \hat{B} \hat{U} \hat{B} \hat{U} 1/2 \hat{B} \hat{B} \hat{B} 1/2 \hat{B} \hat{U} 1/2$
 $\hat{B} 1/2 \hat{n} [\hat{B} \div \hat{O} 1/2 \hat{B} \hat{O} \hat{B} \hat{n} 1/2 \hat{U} \hat{O} 1/2 \hat{B} \hat{B} \hat{U} \hat{a} \hat{O} \hat{B} \hat{B}$
 $\hat{O} \hat{B} 1/2 \hat{B} 1/2 \hat{O} 1/2 \hat{B} \hat{U} \hat{O} 1/2 \hat{B} \hat{B} \hat{a} \div \div \div \hat{U} \hat{B} \hat{B} \hat{O} \hat{B}$
 $\hat{a} \hat{B} \hat{B} \hat{O} \hat{B} \hat{B} \div \hat{B} \div \hat{a} \hat{B} \div \hat{B} 1/2 \hat{n} 1/2 \hat{B} \hat{B} \hat{O} \hat{B} 1/2 \div 1/2 \hat{B}$
 $\hat{a} \hat{B} 1/2 \hat{B} 1/2 \hat{B} \hat{U}$

[B ÷ ÷ ñB½~ B ½ Öaî ÜBñ½B ½ÜB B ÷½÷B
½õ BÖ Ö÷BÖ ÷ BÎÜB ÖB Ö½÷ ½Ö ½B ÷ ÷½Ö a+ B
â BÎÜB ½BÖ÷ B ñB B [B B ÷½ B B B B B B
½B B½ ÜB ½ÜB Ö ÷ B B à½B [B Ö
aÜ½ B ½B BÜB Ü Ö÷÷à ë B ÜB B àÖ -B

@UfjthgYdLgX UZgdfXgI YngbXj NYgThXgdHhYgdVlaYg
7UWbdlhgjfyYgblXWgXeiUhXWAlZahlgfXgdfXWbfgXaMY
YidbfrXgaLgiYgVhlgcdgXgXgXdcilh@ahfAgIYXU
jclifybXjNYYYidJlJfYgflUgblgdVNgI YgjXWgXWlaYg
fXhYgagdhg UgifW

@gũlcfhēxj YhghufY XghofagXjāggbdi gghfNēghj YfXlgy
Jm|Ngfhoj YUVgYxj YodhfXgYglwYj YlgfVlgy'8Ygd HēYg
'dh Hfaybzj YfXāhJm|NfcdYfXāhduhJm|NbfVlghXfVYgth
hēghJvYgdhfJHfXhoj YgVlgy'

@gdfhWgZbgchjlvGaLgfXkHVg'G'yibUlbWbchXg
VunlgYhXgXpSfgdFaYhFUSdchYXfUvYhThUghfdVjeY'

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