ŽłƩǂσ ƩǂƛǁåĸǵƷĸǫsƷĸŽǿƛ ɾł ÆŨǂ ƷY ĸǵǨsp ƩǂđÑǿƛ ÆƛĸǂƐƷł

ǀÆ‖ĸǁpƐə ÆŽǿfƷ 2 ĸ‖Ű ÛʰÆƛǂƐ ƛyƩə ÛʰyƛǫƷÑř ĸljƷ yŽŢǫ ÛʰÆǂĸƛĸ‖ǫū ƛyƩə ˛ʰƛYłƐ ‖ ǂpƷY ƷĸŰ‖

Ǐǵ/ĤĤ/ĥĨ: p Ɛǂƶǐ Ǐǵ/ǵī/ĥǏ :OəĸǂƷY

ƛyǿŨš

*Yĸłǂł ł ‖s ÆŽs ! ĦÑƠĸǂ åţƐǐə ÛO‖ÑĖŰ ƷÑš ÆǂĸǵƷĸŧpƐĸs ĸ Ʒĸsǁ ƷyƛĠł YpƷp ΘƷÑDž ƷY Ćŧ yƛǫsǵ ÆǫǫŧÑŰ ĸǵǪsƛĸūƷłpƐŨǿǫ :Ùyǵ p ĆƛǿǫƐ ĸǫŧÑŰ ƷYƐł ǰǿł ɛł p ŽYƐŧ YÑĸ Ćł ƷYĸǐ ÆŧŽǂł Ǫ‖sƛs Ćǵ ÆσƷÑDž ƷY p yƛÑ‖ Æǫ Ʒĸsǁ ƷyƛÆÛǂţÑĖÑźǿə p ÆǂĸǿŽǿ‖Ñǿƛåĸǵ ł ‖ŧłp ƷY ǵÊǫƠł åĸǵ ł Uł ƷY ŀƷ (ş ƷǐǐəpåƐǫŧĸ) ĸǵ ĸspƐǂĸÑǿƛ ƷłƐǿǫ ĆūĖĸǎǫ ǰǂł .YÑ‖ ũƐǫ ÆǫfpåƷĸŽǿƛ ł ‖s yƛÑσ Æǫ ƛyƛ Yĸłǂł ǵÊǫƠł ǫyƛ‖ĸ‖ ÆÛǂţÑĖÑǿƛ .yǵY Æǫ ƷłƐǐ ÆsƷƐł YƷÑǫ ƷĸǫsƷĸŽǿƛ Ŧź ù ǫǫUǫ åĸǵ njǿŢǫ p ƐǫŚŽs ǵĸźƐǫŧĸ ƛĸŰǫsY ɛł ƛYĸÅǫsł ĸ NIOSH 0800 p pƷ ĀĸĸǎĖ (ş ƷǐǐəpåƐǫŧĸ) ĸǵ ĸspƐǂĸÑǿƛ ƷłƐǿǫ ĆūĖĸǎǫ ǰǂł ƷY :ÆsƷƐł p pƷ åƷpĸŰźƷ ǂĸŽŰ ā ĸσł ǂåţÑĖÑσĸŕ ƛĸŰǂŧźĸǫƐƛ ǂƛYĸÅǫsł ĸ ICU åĸǵ ł Uł ƷY ĆĸĸūłyΣ ƷÑĂ Ćł ş ƷǐǐəpåƐǫŧĸ åŧƐł ÆDžĸdžǫƠł Oŧt .Oəƨ ƷłƐǐ ÆĖĸźƷł p ł ł ‖s YƷÑǫ ƷĸǫsƷĸŽǿƛ Ŧź CSR p ƛYÑł ĥǂĥ/ĥĪ – ÂĥĤĩ/īī CFU/m³ ù ź YƷ ƷY ĆūĖĸǎǫ YƷÑǫ ƷĸǫsƷĸŽǿƛ ƷY ĸǵ åƐǫŧĸ Ǫŧƨσ ǰǿŰ‖ĸǿǫ yǵY Æǫ Ʒĸŧŧĸǂ ÆĖĸźƷł ɛźĸǫ‖ :ĸǵĆǫəĸź åĸǵ ĸǿsĸ Ķǫĸ‖ ƛyƛ‖ Æźĸsĸ‖ åĸǵåƐǫŧĸ ŰÑ‖ .Oσł ĸŽŰ ā ĸσł Ćł NjÑƩǫ Ƶd Ǫŧƨσ ǰźƐ‖Žt p CSR ł Uł Ćł NjÑƩǫ Ǫŧƨσ ǰźƐ‖ŧǿł Ćŧ Oσł Ɛźĸs ǂ(ěĪ/ǵĦ) 2 Ñ‖ƷPł 2 NŧÑŧÑǫǿəĸ‖sł ǂ(ěĥ/ĩ) 2 NŧÑŧÑǫǿəpƐźĸs 2 NŧÑŧÑǫǿəĸ‖sł ǂ(ěĥǵ/ĥĬ) 5 ǫƷyǿĦ 2 NŧÑŧÑǫǿəĸ‖sł ǂ(ěĪǵ/ĩ) Oǁǫ ǫƐū ƷĸǫsƷĸŽǿƛ ƷY ĸǵ ş ƷǐǐəpåƐǫŧĸ Ćŧ yǵY Æǫ Ʒĸŧŧĸǂ ĸǵ ş ƷǐǐəpåƐǫŧĸ ł ł ‖s ɛźĸǫ‖ ǰǿŢŽǵ .Oσł (ěĤĦ/ĥĦ) t’ ÑŧpƐŰǿǫ p (ě Ĩ/Ĭ) ĸǵ 2 NŧÑŧÑǫǿəĸ‖sł ĶŽŰ ā ĸσł p åƷpĸŰźƷ Ćł NjÑƩǫ Ǫŧƨσ Ķǂŧyƒ p ICU Ćł NjÑƩǫ Ǫŧƨσ Ɛŧŧyƒ Ćŧ Oσł ƛYÑł ġ -Ĥīī/ĥĬ CFU/m³ ǂƐǫsū ƷY ĆūĖĸǎǫ YƷÑǫ (ěĤĨ/īĥ) Ɛł ź 2 Ñǫŧţ Śsƨ Ů(ě ĥĨ/ĤĪ) 2 ÑσĸŰǿǫÑə 2 Ñǫŧţ Śsƨ Ů(ě ĦĤ/īĨ) 2 ppÊə 2 ÑǫŧţŚsƨ Ķǫĸ‖ ƛyƛ ÆĖĸźƷł ĸǵ ş ƷǐǐəpåƐǫŧĸ ŰÑ‖ .Oσł ƛYÑł (ě ĥĪ/ĦĦ) ǫÑǿǫsǿř p .Oσł ƛYÑł Ǫŧƨσ YĦY Ʒĸǂƛĸ‖ Oσł Ĩǵǵ CFU/m³ Ćŧ ACGIH ƛyƛ‖ ĆǿDžÑσ yƒ ĸ ƷĸǫsƷĸŽǿƛ ù ǫǫUǫ åĸǵ ł Uł ƷY ĸǵ åƐǫŧĸ Ǫŧƨσ Ćsźĸ Ǫ ł ǿ‖ ù ǫǫUǫ åĸǵ ł Uł ƷY ĸǵ ş ƷǐǐəpåƐǫŧĸ Ǫŧƨσ Ćsźĸ Ǫ ǰǿŢŽǵ .Oσł ƛYÑł Ɛǂ‖ƛ ƛyƛ‖ ĆǿDžÑσ yƒ ŧł ĶŽŰ ā ĸσł ƶΣ Ćł ĸǵ ł Uł ĆŽǵ ƷY åƐǫŧĸ ĶspƐźĸ Ñǿƛ ƛYÑł ƛyƛ‖ ĆǿDžÑσ yƒ ŧł ƐǫŽŧ ĸǵ ł Uł ĆŽǵ ƷY ş ƷǐǐəpåƐǫŧĸ Ǫŧƨσ YĦY Ʒĸǂƛĸ‖ Oσł Ĥǵǵ CFU/m³ Ćŧ ACGIH ƛyƛ‖ ĆǿDžÑσ yƒ ĸ ƷĸǫsƷĸŽǿƛ .Oσł

ƷĸǫsƷĸŽǿƛ ù ǫǫUǫ åĸǵ ł Uł ÛĶspƐźĸÑǿƛ ŰÑ‖ ÛĶspƐźĸÑǿƛ Ǫŧƨσ :åyǿǫŧ ƷĸūţłP

ƷłƐǂσ ÆŰ‖ƶř ǫÑǪŰ ƛĸŰǂŧ ‖Y ÛO‖łyƦƛ ƛyŰǂŧ ‖Y Ûŭł ĆəƐ ƒ O‖łyƦƛ yƛ‖Ʒł Æsĸǂŧ‖ƷĸgĆǫƠÑǫƛ ł ‖Y -Ĥ
ƷłƐǂσ ÆŰ‖ƶř ǫÑǪŰ ƛĸŰǂŧ ‖Y ÛO‖łyƦƛ ƛyŰǂŧ ‖Y Yĸǫsŧ ÛåŧĆəƐ ƒ O‖łyƦƛ åŧƐǫgY :(ğÑlŧsǫ ƛyƛŧźÑ‖) -ĥ
ƷłƐǂσ ÆŰ‖ƶř ǫÑǪŰ ƛĸŰǂŧ ‖Y ÛO‖łyƦƛ ƛyŰǂŧ ‖Y Ʒĸǿǂŧ ‖Y ÛÆĖÑĞĖÑǫ Æsĸǂŧ‖O ŧźƐ åŧƐǫgY -Ħ
ƷłƐǂσ ÆŰ‖ƶř ǫÑǪŰ ƛĸŰǂŧ ‖Y ÛO‖łyƦƛ ƛyŰǂŧ ‖Y Yĸǫsŧ ÛÆĞ‖ƶř Æsĸǂŧ‖ş ƷǐǐəåŧƐǫgY -ħ
ƷłƐǂσ ÆŰ‖ƶř ǫÑǪŰ ƛĸŰǂŧ ‖Y ÛO‖łyƦƛ ƛyŰǂŧ ‖Y Yĸǫsŧ ÛÆǫŧźƐ ƷĸǿǐəåŧƐǫgY -Ĩ

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Ćǫy₣Ẽǫ

YY₹ū Æǫ ãÊĂł ÆŨźţŃĺŃŃ YƩłŃNg ΘłƵZ Ćʌ ŘsPƩźdŃŃʌ ŭţłP ʞʌ YƩłŃNg ΘłƵZ ÆǫʞƵƵ Řǫʞǁ ʞg ŘsPƩźdŃŃʌ ʞʌ ĆłŨΣłŃǫ .(Ĥ) Ůş3ʞå ŮåƩǫłɆʞʌ Ćʌ ƵłŃơ Æǫ ĆǫƵΣ Ƶđ ɛł p Oơsł ÆŨźţŃĺŃŃʌ ʞ+ł ǫ yłĤŃơ Æǫ ʞHŭđ ʞʌ ĆHʊΣłŃǫ Ćŧ YŃƵǁ ŭƵK ǁł ...p 2 pƩźp ÛŦŚŧ ÆǪǫsʞsƒ YʞźYɛł åʞg ÆŭŃǫŃŭř ÛÆsÃʊơ ΘèÊǪƠŠł ŮłŃŭĤ Ćʌ Ɛ]ł ǫ ŭYƩǫsū ΘƵŃDž Ćʌ ŮŃljŃǫ ǰ₰.(ĥ)ƳYƩū ÆƵs åʞg ı ŧłp p Ćŧ åł ĆŭŃū Ćʌ ÛOơsł IAQ åʞg ǰƵ]ŭĤ ǰÓÆ£Tǫ ğŃŭã YƵŃǫ yŭĤŃơ Æǫ ʞg ŘsPƩźdŃŃʌ ÆƠƩʌ Ćŧ yłƵłY Æǫ ƵʞÛŻł ǰÓÆ£Tǫ ǰźł OŭŃÅŮ p ÆƵs Û₮źţƩđ åʞgưsʞř ǪǫƵΣ ɛł ÆÅǪǫUǫ åʞgưsʞř ĆHʊΣłŃǫ åʞg Ćǁŧʞŭ .(ħpĦ) yŭźʞƵ Yʞ]źł ĆǪəʞź ĆHʊΣłŃǫ YƩə ƵY p ƩźƩđ ÛĆźƵ 5 ơ 5 ơ ÛĆəƩs Řǫʞǁ ʞg ŘsPƩźdŃŃʌ ʞʌ YłƩəł Yʞ]źł Ûğʞĥʊsł ÛÆǫsŃř åʞg p łƵ ÛŃǪū ʞź ʞgǪ+š p ƵʞƠơ ÛÆŭŃʌ ÆŨźţŃĺŃŃŽźł åʞg ı ŧłp .Oơsł YƵYƩs p Ǫsđ yźy+ơ ʞź p ÆǪǫsʞsƒ YʞźYɛł ÆŭŃǫŃŭř p ŦźţƩ]đ OʊŭźƵ ÛǪsđ Řǫʞǁ yłĤŃơÆǫ ɛł ÆƠƩʌ Æźł£ƵʞŘƩs ÛΘʞÉÓÆ£Tơ ɛł ÆNJũʌ Æǫ]ƒ (ħp Ħ) yłǁʞ ƵłŃŭŮ Ćʌ łƵ ʞĥʊđ p ŭYłY ƵłƩźå ÆsƵƩʌ YƵŃǫ łƵ ʞgǪsʊʞūƵłpƩŮʊǫ Ćʌ .(Ĩ) yŭźʞƵÆǫ ÆəƩüǫ ÆǪǔǁ åłɛ ƵʞĂƩs ÆŨźţŃĺŃʊ ŘǫĤŃŮ ƵYʞå 2 ppÊə 2 ŃǪźţƩŚsđ ɛł Æǁʞ ǰʊŧŃơÊəđ ĆŭŃƵ ƵłŃŭŮ åʞgǪsʊʞūƵłpƩŮʊǫ ŮĤŃĤ ɛł .(ĩ) Oơsł yłŧ ƵʞĂƩs YʞźYɛł Ćʌ ĂźƩĂ ɛł Ćŧ ʞgƵʞǪsƵʞƵÓʊ ʞʌ njłơƩǫ p ŭyǁ ĆǪƠʞʊǁ åłɛåƵʞƵÓʊ yłʞǫ ʞg 2 ŃǪźţƩŚsđ ŮĤŃĤ Ćʌ ƵłŃơ Æǫ ŭyłʞźơ Æǫ ğʞÆǪĤ łŃg ƵY yłƵ Ćʌ ƵYʞå Ćŧ ŦʊǫʊəŃǫƩơ şƵʞå) 2 NơʞŮʊǫNə 2 ŃǪźţƩŚsđ OƉžƩə åʞg şƵʞå ƩźʞsƵ Ů(Ī) (Oơsł ĤĤ- ĨĦ ºCÆźʞǫY ŭƩǪ]sū p ŭYŃʌ YƩAłŃg åʞgƵţŃơʞř Ćŧ) ǫŃʊǫʊsʊř p ǫNźƵłƩNə yʞǫ ł ǫĂ ...p (ī) (yłźʞƵ ƩʊʞÕư p yłƵ ƙNĂƩǫ åʞg njơƩǫ ƵY yʞĤŃơ Æǫ 5 ŧŃŃǫʊəʞǪsł yʞǫ) OƵĤǫ ǫƩū åʞg Æsŧ]ŧ ŮĤŃĤ ŭpƩū ƵY åʞg OƵŃźŮ ŮŃʊǁ Ķźèy ɛł ÆŨź Ćŧ 5 ʊǫƵyʊĦł p 2 ŃłƵpł ƵY YŃΣŃǫ ŘłsƩǐ ĀźƩĂ ɛł p yłǁʞ Æǫ Æf₺ΣΣ åʞg ı Uʌ ƩʌŃơ ǫŃźƩǫŧʞŃŮźʞǫ Ů (Ĭ-ĤĤ) (yłźʞƵ Æǫ ğʞÆǪĤ ƵʞƵÓʌ Ćʌ ı Uʌ ŭǫǫ .YŃƵǁ ŭƵʞǁł ʞg åƩǪ]ŧʞʌ ŭpƩū ƵY ...(ĤĥpĤĦ) 5 źƩŃǫŧ p ÆǫʞƵY ø Æǫ]ǁłyłźʌ ƶŧłƩǫ ƵY ʞg ǪsʊʞūƵłpƩŮʊǫ ǰźł Yʞ]źł ŭyłźŧłƩř p Yʞ]źł ŘǫŧŃŮ ğʞĥǫ ƵłŃŭŮ Ćʌ .Oơsł ŮŃǫŭǫ ʞg ƵʞǫsƵʞƵÓʌ OƵÓʞŭəʞơyƵŮ ŭʞg 2 ŃǪźţƩŚsđ YƵŃǫ ƵY ʞDžŃdžŮǫ ʞgşƵʞå Ƶyǁ ÆŨŭŃŮš ŘʞŢʌ Ćʌ ãʞơł njźƩǁ ʞź p åƩʞs ƵʞƵłƠʞs Ʃʊöǫ ÆźʞG

ågƩǫǪəə ÆźłƵʞŧ ŭĆźŃĤơ Ǫǫsʊs YƩŮǫƵŮ ÆŨŭŃŮš ŭʞgǪƩǫ ƵY p .... ãʞơł ƵY YŃΣŃǫ åʞgÃźʞŮ ŭĆźŃĤơ Ǫǫsʊs ƵY YŃΣŃǫ ʞG OƵʞŭəǪŤźp Ćʌ p ı Uʌ ƵY YŃΣŃǫ YłƩəł Yłyŭơ ŭʞgåƩǫ]ŧʞʌ YƵŃǫ ĆəƩs ŭƵYƩŧ Ćsăŭ ŭƵYƩŧ OŭŢDž Ʃʊöǫ ŭYłƩəł YƩŮǫƵŮ ǪNŢǫ p ƵY .(Ĥħ)Oơsł ...p åYƩə Oǁłyłźʌ ğŃDžł OźʞŮƵ ƵłƵʊǫ ŭƵYƩŧ Ypyŧ ɛł ÆǪƠʞY åłŃg ƵY ʞg ǪsʊʞūƵłpƩŮʊǫ Ǫŧł£ơ Ćg ÆơƵŃDž Ʃʊöǫ ƵY ǪYŃʞd njơŢǫ ƵłŃŭŮ Ćʌ njơŢǫ ƵəłYpƵ Ɛ₰Ɛə Ǫyǁ ĆǾDžŃơ OʊΣ ÆźǪăǫ YƵłyʞǪsł Ɛljʞŧŧ ğʞŧ ƵY . (ĤĨ) YŃǁ Æǫ ĆǫəƩū OsʊŭŭǫŃŭř ʞg ŘsPƩźdŃŃʌ Ǫŧł£ơ ɛʞlǫ ƵłƵʊǫ YƵŃǫ ƵY ƤŢʌ ʞgŘsPƩźdŃŃʌ ÆʞźƵł ƶźʞʊǫ ƵŃŏǫ Ćʌ Ćŧ ĆŢŭđ ǰźł£ƩǫŧʞŃŮźʞǫ ƵŃŏǫ Ćʌ njơŢǫ ƵəłYpƵ Ɛ₰Ɛə Ǫyǁ ĆǾDžŃơ Ypyŧ ʞʌ ůǪǪUǫ åʞg Ćsʊsŭǫ p ʞg ǰƵlŭ Ǫyǁ ĆǾDžŃơ åʞgʞƵłƵʊǫ ƵłNIOSH ÛĆŭŃƵ ƵłŃŭŮ Ćʌ .Oơsł ÆƵǪŮ p ÆgʞŮ+ŭY łƵ ŘsPƩźdŃŃʌ ΘłƵZ Ŕŧ åłɛʌ ǪƵźƶŧʞǫ Ǫyǁ ĆǾDžŃơ Ypyŧ ƵʞŃʌ ACGIH ǰʊŢƵg .yʞƵ Æǫ YʞĤŭ+ʊř Ĥġġġ CFU/m³ ĤƩĤŃg ΘłƵZ Ŕŧ åłɛʌ ǪƵźƶŧʞǫ Ǫyǁ ĆǾDžŃơ yŧ Ćŧ YƵłY Æǫ Ǫŧł£ơ YƵŃǫ ƵY .YpƵ Ɛ₰Ɛə Ïġġ CFU/m³ ɛł yźʞŭŭŭ ŭåƩǫ]ŧʞʌ YŃΣŃǫ ÆǪƵüŭƵŃǪsY Ką şŃŭʞå ŭyŧ ĆŭŃūŠʊġ ƶʊʊ ŧŃg ƵY şƵʞå ƵʞŮǫ Ćʌ ĆΣŃơ ʞʌ ù ǪǪUǫ åʞg Ćsʊsŭǫ p ƶ£ŧłƩǫ ĆŮǪʌ .Oơsʊŭ ǾyłY YʞĤŭ+ʊř łƵ ÆźʞgYŃƵŭgƵ ŭşƵʞåŮ YƩĤŃg ΘłƵZ åƩǫūŭƶ£yʞĦ ɛł ƩǪƵŧ Ǫŧł£ơ Ćŧ YŃƵǁ ĆǾDžŃơ ACGIH ¡ĤĬīĬğʞs ƵY .yʞĦ Ĥġġ£Ĥ ğʞs ƵY ŭYŃǁ ÆƵǁ ÆĦƩŭǁ Ćʌ Ɛ]ł ǫ Ĥġġ CFU/m³ Ćʌ łƵ ĤġġgCFU/m³ ʞŮźƩǫŧ ÆǫŃƵŮŭ Oǁłyłźʌ ΘʞǪyƠ Ćsʊsŭǫ (ĤĨ) YƵłYÆǫ ǫÊŭŧ ŧŃg ƵY şƵʞå ΘłƵZ ƶyǁ ĆǾDžŃơ yŧ ƶŧŭŃŭ (şƵʞå p åƩǪ]ŧʞʌ) ʞg ŘsPƩźdŃŃʌ ƶłźǫƵŧ ÆʌʞźƵł ŭƩ]ljʞŧ Ćŭŭʞăǫ . ÆƵŧ p ÆÅŭŧ ĬʞŢʞ Ćʌ Ćŧ Oơsł ƵʞǪsƵʞƵÓʌ ù ǪǪUǫ åʞg ı Uʌ ƵY .YƩǫū Æǫ ƵłƩź ÆʌʞźƵł YƵŃǫ

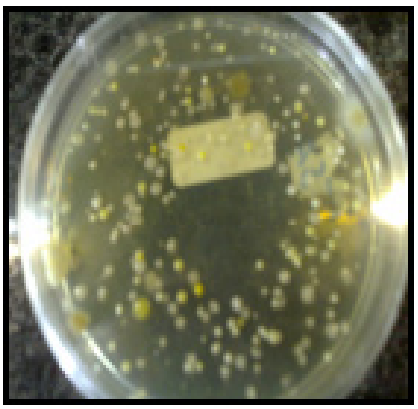
Kg p pZ p YłÑõ

:yāYƐū qKlH Ɛā̈Ɛ Ǩ fłƐõ ǨõKǁ ǴQfƐõ H ƷY ǴüǩKãõ ǰā̈ł
ÆɔƷƐ YƷÑõ ǻKg ǀ Uƛ kKUQǁH :ğpł ǴQfƐõ
ƷKQɔƷKƵØ ǻKg ǀ Uƛ kKUQǁH Ù ǀ ǵpƵĭř ǻłƐΣł Ɛł ǴQfƐõ ǰØkpł
ƷKQɔƷKƵØ ù ǪQUõ ǻKg ǀ Uƛ ǴQfƐõ ǰā̈ł Ʒ Y.Oɔł ÆƛKāæƵł OHΣ
YłƐəł YłyũơKā p ÆǁKõƷY yǁpZ Û ǀ Uƛ ƷY YÑΣÑõ njā̈łƐǁ ǏKTǩ Gƛ
ƷY p yǁyǁ ÆɔƷƐƛ ǨɭɔƵƐř OØǩKũə ǁÑTǁ p ǀ Uƛ ƷY YÑΣÑõ
OHΣ KgǨKɔpƐā̈ÑØƛ ÆƛKāæƵł ƷÑŏǁõ Gƛ Gŧ ÆāKg ǀ Uƛ OāKHǁ
ǻKg OǁāłƐõ ǀ Uƛ) ICU Ǩõǩǁ yǁyāYƐū kKUQǁH GüǩKãõ
(CSR) p ǻZpKŨāƵ ÛǨƵŪ ãKσł Ûǻ ţÑǨÑơKř ǁKŨǂāKõɛā Û(ǁŤāp
.Oɔł ǁYÑƛ Corporate Social Responsibility

Kg ǨɔpƐā̈ÑØƛ Qŧł Ɛơ ÆQŧ p ƷKƵǁ p ǀ lƛɔ :ǫpY ǴQfƐõ
ÞÑg ƷY (ş ƷKā p ǻ Ɛ ǁ ŧ K ƛ)
ş ƷKā p ǻ Ɛ ǁ ŧ K ƛ ɛł QŪł Kg ǨɔpƐā̈ÑØƛ Qŧł Ɛơ ǀ lƛɔ ƷÑŏǁõ Gƛ
p pZ ǰā̈ł Ùyğ .yǁ ǁYKĀQɔł NIOSH 0800 p pZ ɛł
(ş ƷKā p ǻ Ɛ ǁ ŧ K ƛ) Kg ǨɔpƐā̈ÑØƛ ÆQŧ Qŧł Ɛơ ǰØØüơ Ûǻ ƷłYƐƛǴÑƵǁ
(ş ƷKā p ǻ Ɛ ǁ ŧ K ƛ ŨÑǁ) Kg ǨɔpƐā̈ÑØƛ ÆĀØŧ ǰØØüơ ǰØ ŧŢƵğ p
.Oɔł ǁYÑƛ
DŽƟKǁ ƷÑŨõŪ Gƛ ǀ Uƛ Ɛğ ƷY ƷKŨõ H Ǩāłyƒ ÛǴQfƐõ ǰā̈ł ƷY
ǁKŨQɔY njɔÑơ 5 Śɔ p GQǂū kKUQǁH ǻ Ɛ ǁ ū ǁ ŧ y ƒ ÛH Σ
ÆDžKdžQƟł Oǂŧ ǻKg njØŢõ p (ƐQŚƵɔ ğKāƐQŧ€ƛ) ƷłYƐƛǴÑƵǁ
ǻłƐƛ ĥī/Ħ L/min ÆƛY ƛ p (TSA) ǻ Ɛ Q ŧ € ƛ p (PƵÑƛKɔ) ş ƷKā ǻłƐƛ
ƷY Oɔł Ɛ ŧ Ƶ Gƛ ǫpè .Oǝ Ɛū qKlH ǻƵłYƐƛǴÑƵǁ Ĥg min Θyõ

ÆǁÑĀĎŪ yIj ǻƵłYƐƛ ǴÑƵǁ ǁKŨQɔY ǻƵłYƐƛ ǴÑƵǁ Ǩ fłƐõ ÆõKƵơ
ƷY ǻƵłYƐƛǴÑƵǁ ɛł 5 ř Oǂŧ njØŢõ ǻpKf ǻKg OØØř .yāYƐū
ƷY şƷKā YƷÑõ ƷY p Ħg °C ǻKõY ƷY ƷÑơKÑŨǁH ƷY ǻƐQŧ€ƛ YƷÑõ
p ƷKƵǁ 5 Śɔ .yIyǁ ǁYłY ƷłƐā̈ Ĥh hΘyõ Gƛ ǁKŨǂāKõɛā ǻKõY
.(ĥpĤǨŨǁ) yāYƐū qKlH Kg ǨɔpƐā̈ÑØƛ

ǻƐQŧ€ƛ) Kg ǨɔpƐā̈ÑØƛ ŨÑǁ DŽØUǂơ p ÆāKɔKǁ :ǫÑɔ ǴQfƐõ
Ùyğ Gŧ ÜǴQĀHǁ yǁƵ ǁƵpY ÆĂ ɛł Oɔ ƛ ƷKǁŨ Gāƶlơ (ş ƷKā p
ǻØū ǁƶłyH ǨƛKā p ÆāKɔKǁ ǨƛKā ǻKg ÆǁQŧ yǁƵ ƵāI ɛł
ƵKõƶ Θyõ Oɔł ƐŧƵ Gƛ ǫƶè .Oɔł KgQɔØƛKūƵłpƐŨØõ ɛł
ŭƵΣ QɔØƛKūƵł ŨÑǁ 2 Kɔł Ɛ ƛ ƷÑǁ p OƛÑĂƵ ǨõKõY ǨƵÑØɔKƛÑŨH
kKUQǁH ÜGāƶlơ ǻłƐƛ Gŧ ÆāKgQɔØƛKūƵł ŨÑǁ p ǁyǁ ǻƵpd
ǁƵpY ÆĂ ɛł 5 ř Oǂŧ ǻKg ǀ āY .YÑǁÆõ QØŏƛơ yǁH ǁyǁ
ǻKgQɔØƛKūƵłpƐŨØõ ÆǁQŧ ǰQəKā ƷÑŏǁõ Gƛ ǨƛYǁƵ ǁyǁ GØDžÑơ
ƷÑŏǁõ Gƛ .yǁÑǁ Æõ ÆɔƷƐƛ ǨpƵKƵǁ KƛKā p ÆāKɔKǁ KƛKā
Gŧ) ÆǁQŧ ƐūpƵKƵǁ ƐāƐ ƗƷ Kg ǀ āY ƷłÑơ Æõ Ɛõł ǰā̈ł KØHɔơ
ǻłƐƛ .YHY ƷłƐā̈ (Oɔł ÆāKƵǁūƷƐƛ ÆɔyǨ p ǻƵÑǁ GŨǁǁ ǻłƷHY
YÑΣÑõ p ǁyǁ ǻƵpd ŭƵΣ ǻKg QɔØƛKūƵł GǁÑū p ŨÑǁ ÆāKɔKǁ
ǻƶØõd ŪǁƵ ÜGāÑǁKõ Oǂŧ yØǁKõ ÆāKg p pZ ɛł ƷłÑơ Æõ ÆǁQŧ ƷY
.YƐŧ ǁYKĀQɔł ...p ŗ NŨɔpƐŨØõ ɛł ǁYKĀQɔł p



ǰ ł GǁÑĠŨǁH ɛł 5 ř ĥh hŭƐQŧ€ƛ ŭpKf OĠQř :ĥǨĞǁ

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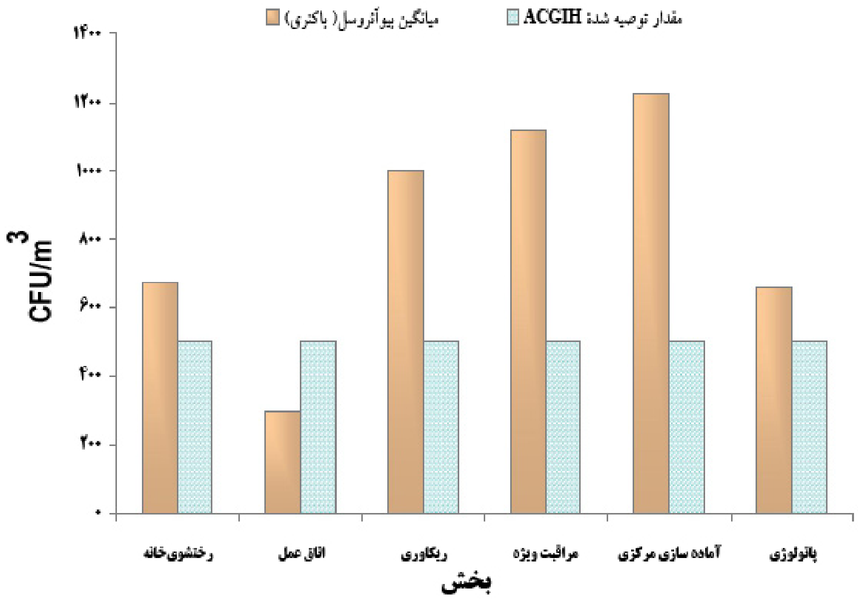


ACGIH ǻyΊ ĠĠDžŇơ YǯłyΊǨƍ5ł yƒ Ǩ ǯǨƍ5ǯǨǯĠ ù ǪŨǭ ŭǨǵ Ι Ũ ǯY ŭƩƍŧǨ Ǩ5ƥƩǻŇĠ Ǭǵłƨơ Ġ$ĠǨǭ :ħǨĞΙ

.(P= ǵ/ǵǵĦ) Ơ5ł ǯłYǼǚǭ

ǨǵΙŨ ǼǬǨǯơ ǯY łŇǵ ǯY ǻƩƍŧǨ ǬŧłƩơ ǰǾŮǨǭ ĦǨĞΙ ǠǨǩǭ

ACGIH ǻyΊ ĠĠDžŇơ yƒ ƨł Ʃƍ ł Ǩ Ǩǯǖ ǟǨł ǻǨǨƍ5ł Ġ

.Ơ5ł (Ĩǵǵ CFU/m³)

ǰǾŮǨǭ Ǩ ICU Ι Ũ ǯY ȿǯǨǟ Ǩ5ƥƩǻŇĠ ǬŧłƩơ ǰǾŮǨǭ

Ơ5ł ƩơèǨǨǵ Ι Ũ Ġǯǵ ƨł (SD=75.05) ĩĥ/ĥĥ CFU/m³

Ǩ Ǩǯǖ ǟǨł Ġ ĀǪǖǭ DŽƠǨΙ ǰǻł ǯłyǼǭ ǰǻƩǯŧ Ġŧ ǼǨƒ ǯY

.(ĥ ĨĞΙ) Ơ5ł (SD=7.44) Ī/ĥĥ CFU/m³ ǰǾŮǨǭ

ǯY ǵ CFU/m³ ƩĦƩ (ȿǯǨǟ) Ǩ5ƥƩǻŇĠ ǬŧłƩơ Ǩǟłyƒ

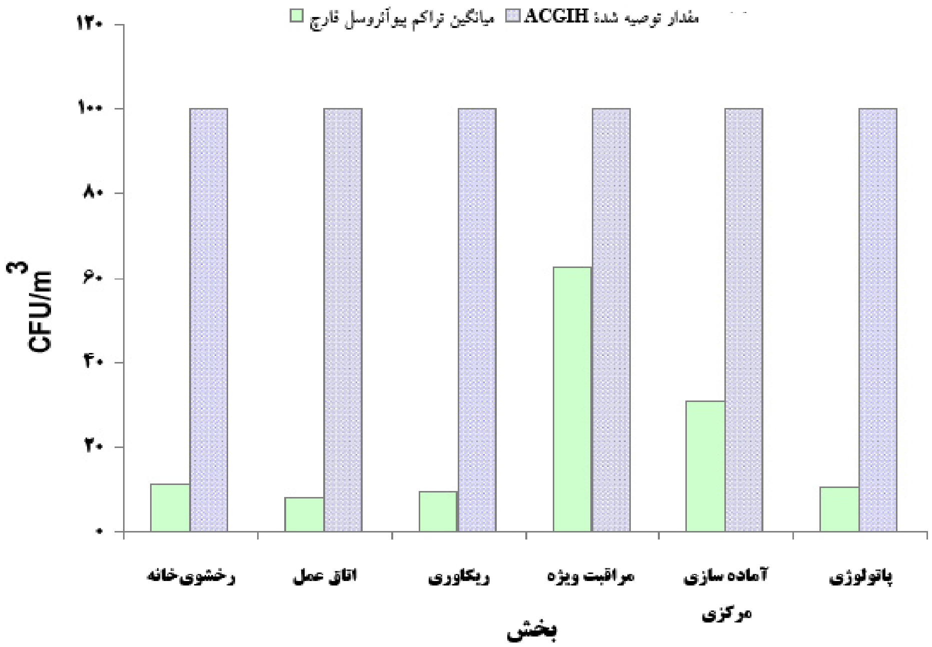
ǯǾ ǬŧłƩơ Ʃŧłyƒ ƥ CSR ǗǻǯƥǨǗǻǯ ǗǨǯǖ ǟǨł ǻǨǵ Ι Ũ

ǼƍǯƩ ǾĦΣ .Ơ5ł ICU Ġ ǸŇƩǭ ĤĪĪ/ĥĪ CFU/mƩĦƩ

ǯǾǨǨ ƨł ù ǪŨǭ ǻǨǵ Ι Ũ ǯY DŽƠǨΙ ǰǻł ǰǾŮǨǭ ǛÊǪƠł

Ġŧ yǧY Ǽǭ ǯǨǂ ǯǾǨǨ Ġʅǵǵ .yΊ ǻYǨǞǪƍł ĠəƩǍ Ŧǻ 5 ǨǻǯłƤ

.Ơ5ł ǯłY Ǽǚǭ ǛÊǪƠł ǰǻł



ACGIH ǻyΊ ĠĠDžŇơ YǯłyΊǨƍ5ł yƒ Ǩ ǯǨƍ5ǯǨǯĠ ù ǪŨǭ ŭǨǵ Ι Ũ ǯY ȿǯǨǟ Ǩ5ƥƩǻŇĠ Ǭǵłƨơ Ġ$ĠǨǭ :Ĩ ĞΙ

در سال ۱۳۹۱ با کد ۴۵۷۹ است که با حمایت دانشگاه علوم
پزشکی و خدمات بهداشتی تهران انجام شده است.

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Evaluation of Bioaerosol in a Hospital in Tehran

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Abstract

Background and Objectives: Microorganisms are the agents that can cause disruption in the biochemical and physiological reactions through mechanisms such as infection, allergy or toxic properties in the case of entering human body and if the body's immune system be unable to destroy and eliminate biological agents, illness and even death will occur. This study evaluates air pollution(aerosol and bioaerosol) in different parts of a hospital in Tehran.

Materials and Methods: We assessed and evaluated bioaerosols by applying 0800 NIOSH method using Bacterial sampler and specific cultures for bacteria and fungi separately in ICU (intensive care unit), Pathology laboratory, Operating room, Recovery, and CSR (Central Service Room) of ahospital.

Results: The assessment showed that the average density of bacteria in the hospital studied was in the range of 1226.88 - 294.47 CFU/m3; the highest density was observed in the CSR and the lowest density measured was in the operating room. The bacteria identified included gram-positive bacillus (50.6%), Staphylococcus epidermis (20.29%), Staphylococcus Saprophyticus (2.6%), Staphylococcus aureus (7.03%), other Staphylococcus (5.9%) and Micrococcus (13.43%). Moreover, it was found that the average density of fungi was in the range of 0-188.45 CFU/m3; the maximum density in ICU and the minimum density in operating room and recovery room. The fungi identified included Aspergillus flavus (31.65%), Aspergillus fomigatus (25.17%), Aspergillus niger (15.82%),and penicilliom (27.33%) .

Conclusion: Comparison of bacteria density in different parts of the hospital with the recommended limits of ACGIH (500 CFU/m3) showed that density exceeded the limits in all units except in operating room whereas, density of fungi was less than the recommended limits of ACGIH (100CFU/m3) in all units of hospital.

Keywords: Bioaerosol density, Hospital, Fungi

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