

Illinois Emergency Management Agency



Considerations for Proposal on Radium Water
Treatment Residual Exemptions and Licensure

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Agenda

- Historical overview and explanation of the rulemaking process
- Existing regulatory requirements
- Issues identified and why IEMA is considering changes
- Itemized draft proposed changes to 32 IAC 330.40(d)
- Licensing actions & draft licensing proposal



Genesis of Rulemaking

- 1984 MOA between Illinois EPA and IEMA
 - Land applied wastewater treatment plant sludges
 - 0.1 picocuries per gram (pCi/g) increase allowed
 - Implemented and monitored by IEPA
- 2003 Radionuclide Drinking Water Standards Effective
 - Treatment installations/technologies increased
 - Radium concentrations in residuals increased
- Municipalities encroached upon 0.1 picocuries per gram increase in soil as a result of land application



Genesis of Rulemaking

- IPCB ruled MOU an “unpromulgated regulation”
- February 2011 – 32 Ill. Adm. Code 330.40(d)
 - Exempted all persons from licensure < 200 pCi/g
 - Implemented by IEMA & IEPA
 - Increased the land application ceiling limit to 1.0 pCi/g
 - Codified appropriate avenues for disposal of radium wastes
 - Drinking water AND wastewater facilities



What is 32 Ill. Adm. Code 330.40(d)?

- It's an exemption from licensure
 - IEMA regulates radioactive material licensees
 - No license needed, no fees associated
 - Specifically excludes this material from being considered low-level radioactive waste
- Applies to:
 - *“Persons producing or in possession of residuals or sludge resulting from the treatment of water or sewage and containing naturally occurring radium from groundwater with concentrations of total radium (sum of radium-226 and radium-228 concentrations) less than or equal to 200 pCi/g (dry weight basis) are exempt from the licensing requirements provided they comply with this subsection (d).”*



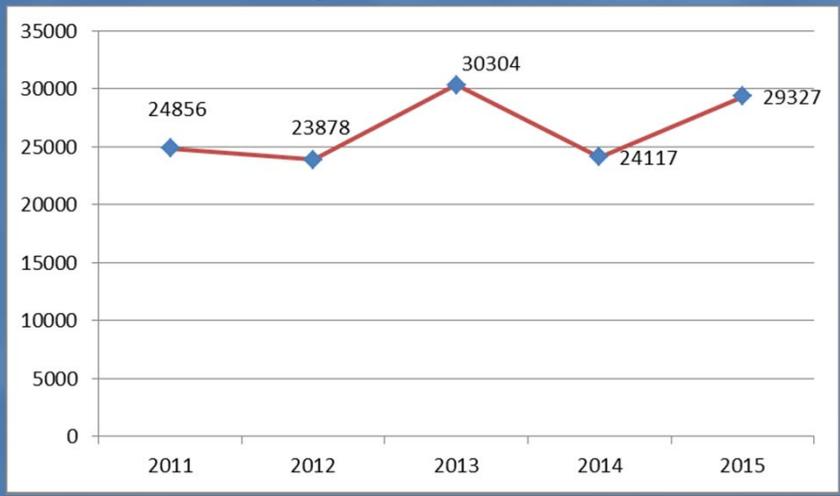
What is 32 Ill. Adm. Code 330.40(d)?

- Importantly,
 - *“Persons producing or in possession of residuals or sludge resulting from the treatment of water or sewage and containing naturally occurring radium from groundwater with concentrations of total radium greater than 200 pCi/g (dry weight basis) are not exempt and shall comply with requirements in 32 Ill. Adm. Code 330.”*
- Allows land application of biosolids ≤ 100 pCi/g
 - Field sampling & criteria, notification to landowner, ceiling limits
- Allows landfill disposal of sludges/media ≤ 100 pCi/g
- Disposals > 100 pCi/g must be reviewed and approved in advance
- Requires reporting of disposals and concentrations annually



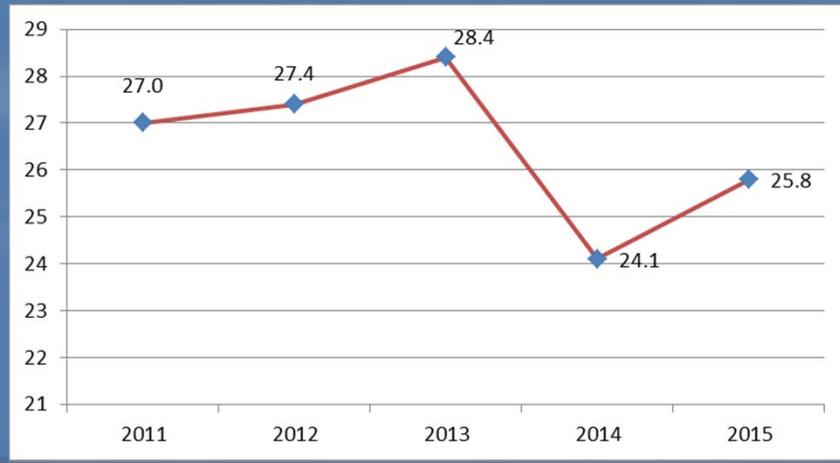
Landfilled Water Treatment Residuals

Tons per Year Landfilled



Annual average – 26,496 T/year

Annual Radium Concentration (pCi/g)



Annual average – 26.5 pCi/g



Landfilled Water Treatment Residuals

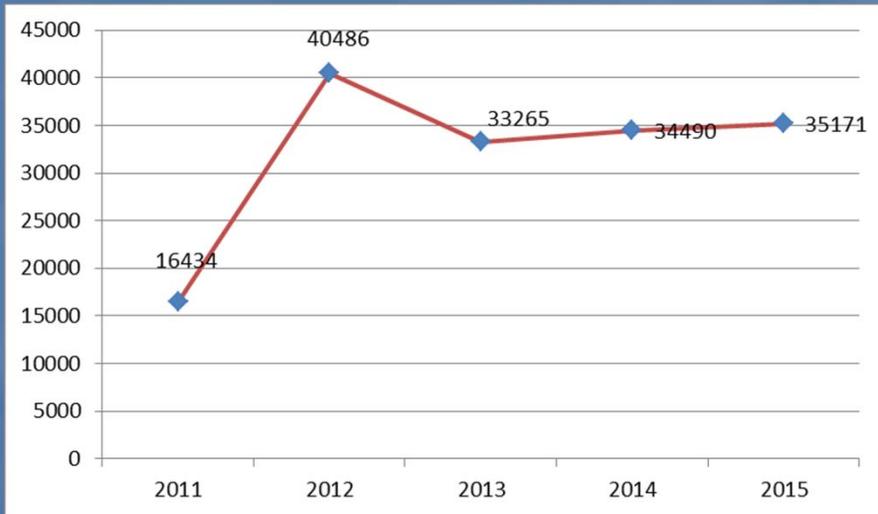
- Impacts to public exposure as a result of landfilling drinking water residuals:
 - ANL: Maximally exposed member of public is the landfill worker
 - ANL: Keeping the annual amount of TENORM to less than 25,000 tons *per landfill per year* and under 50 pCi/g, is currently modeled to keep public dose < 100 millirem per year
 - Since 2011, facilities reported 132,482 tons landfilled (*1.44 curies Ra²²⁶ and Rad²²⁸*)
 - Avg. 26,496 tons/year @ 26.5 pCi/g across 29 landfills

	EPA Landfill Disposal Report	Water Treatment TENORM Landfilled	Percent as Volume
2010	13.97 million tons	<i>Not yet tracked</i>	
2011	14.0 million tons	24,856	0.18%
2012	12.06 million tons	23,878	0.20%
2013	13.64 million tons	30,304	0.22%
2014	13.33 million tons	23,464	0.18%
2015	<i>Pending</i>	29,327	



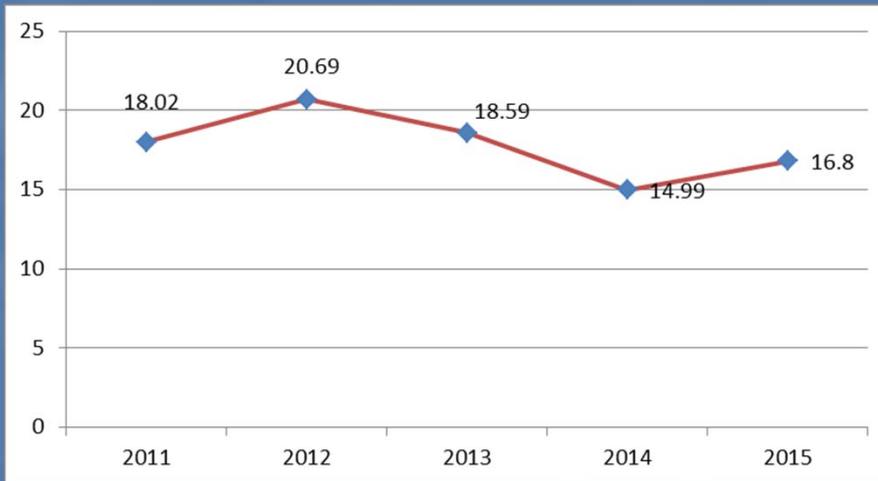
Land Applied Water Treatment Residuals

Tons per Year Land Applied



Annual average – *35,853 T/year*

Annual Radium Concentration (pCi/g)



Avg. concentration – *17.8 pCi/g*



Land Applied Water Treatment Residuals

- Impacts to public exposure as a result of land applying water treatment residuals:
 - Since 2011, water treatment facilities have reported 133,581 tons land applied ($2.33 \text{ curies Ra}^{226}$ and Ra^{228}) to 765 fields, 50,963 acres
 - Avg. field background -1.67 pCi/g ($Ra-226 + Ra-228$)
 - Avg. soil increase – 0.03 pCi/g ($Ra-226 + Ra-228$)
 - Maximum increase – 0.47 pCi/g ($Ra-226 + Ra-228$)
 - 3.3 millirem/year to the future resident
 - 14.4 millirem/year if you add in potential radon
- US EPA CERCLA has utilized 5 pCi/g above background as cleanup criteria. Given the fact Illinois sludges average 18 pCi/g (statewide), inappropriate disposal creates not only a public exposure pathway – but also a potential environmental remediation liability
 - Assuming 1 ½” thick layer of 18 pCi/g material under future resident’s lot, dose is 37.2 millirem/year. 113 millirem/year with radon



Disposal and Handling Problems

800 pCi/g, 250 uR/hr



460 pCi/g, 100 uR/hr



250 pCi/g, 70 uR/hr



1400 pCi/g, 330 uR/hr



Why Consider Changes to 330.40(d)?

- What prompted changes to 32 IAC 330.40(d)?
 - Avenues for environmental contamination require address
 - Pathways for worker exposure require address
 - Commitment to stakeholders made by IEMA in 2011
 - Warranted by a review of the data collected
 - The scope of the current rule is seemingly too wide
 - Some of the requirements are duplicative of IEPA
 - Needed flexibility on behalf of both water treatment facilities and IEMA is absent



Draft Proposals for Consideration

- Again, nothing seen here today has been proposed for draft regulation
- These are proposals that we are considering and are seeking stakeholder input on
- First, outline issues identified over the previous five years of implementation
- Then, *specific proposals* outlined



Issues Identified in 32 IAC 330.40(d)

- The opening lines create a very large scope.
 - Currently, the scope of 32 IAC 330.40(d) is “*persons producing or in possession...*”
 - Technically, “*persons*” includes homeowners, sludge haulers, trucking companies, and industry. Everyone should be a registrant
 - As currently structured, “*persons*” are exempt only if they submit samples and reports. No one is truly *just* exempt



Issues Identified in 32 IAC 330.40(d)

- Terminology differs from IEPA and definitions were required:
 - Treatment, water treatment residuals, CWS, POTW, “combined” vs “total” radium
- Land application restrictions on pH, depth to groundwater and bedrock are already implemented by IEPA
 - Inadvertently restricted lime applications



Issues Identified in 32 IAC 330.40(d)

- Statistics poorly supported to mandate sampling fields at 80% of the limits
- There is no address of liquid effluents containing radium
- Residuals less than 3 pCi/g were excluded from reporting – but only by guidance
- Employ use of IEMA soil monitoring data



Issues Identified in 32 IAC 330.40(d)

- Noncompliance
 - Unacceptable exposure to the public and/or workers
- Many other methods of disposal have been in use prior to the implementation of 330.40(d)
 - Land reclamation, sedimentation ditches, lagoons used for irrigations, road spreading, repurposed/given to public
 - Facilities not aware of radium issues
 - Poorly incorporated or improper disposals
 - Mechanism needed to ensure doses are kept low



Issues Identified in 32 IAC 330.40(d)

- No frequency for radium sampling specified
 - What if IEPA doesn't require you to sample?
 - What standards are available for representative samples?
- Septic/commercial haulers, contractual use, spray irrigation, deep well injection, mine placement, public distribution (EQB) programs...
 - Simply too many variables to encompass
 - Clearly “landfilling” and “land application” isn't sufficient
 - Facilities required “other alternative options”
 - Some facilities never get over 3 pCi/g – reduced monitoring?



Issues Identified in 32 IAC 330.40(d)

Other issues evaluated:

- No longer requiring “T” facilities to be registrants
 - However, after looking at the data:
 - ~50% of disposed media exceeds 3 pCi/g
 - ~25% of disposed media exceeds 26 pCi/g (*Illinois avg.*)
 - This doesn’t necessarily require a worker safety program and radiation surveys, but it does warrant proper management to ensure dose to the public isn’t increased through improper disposals



Issues Identified in 32 IAC 330.40(d)

Other issues evaluated:

- Specify a quantity of material exceeding 200 pCi/g requiring a license
 - Considered a certain activity at which a license wasn't necessary ($\sim > 500 \text{ g @ } 201 \text{ pCi/g, } 50 \text{ g @ } 2000 \text{ pCi/g}$)
 - Intent was to negate the need for free release
 - However, absent ANY controls, the CEDE from even small quantities was unacceptable
 - So, 199 is okay? This led to the worker dose constraint.
 - Which led to the environmental contamination constraint (i.e., don't expose the public)



32 IAC 330.40(d) Draft Proposals

What are the draft proposals to address these issues?

Current provisions of 32 Ill. Adm.
Code 330.40(d)

Draft proposed language



32 IAC 330.40(d) Draft Proposals

“Persons producing or in possession of residuals or sludge resulting from the treatment of water or sewage and containing naturally occurring radium from groundwater with concentrations of total radium (sum of radium-226 and radium-228) less than or equal to 200 pCi/g (dry weight basis) are exempt from the licensing requirements provided they comply with this subsection (d).”

Essentially, all persons must sample and report annually. They are only afforded landfill disposal and land application and must register.

All persons are exempt provided:

- 1.) They don't cause radium to accumulate in the environment beyond those limits in 340 Appendix A (5 pCi/g + background)
- 2.) Don't violate IEPA water rules
- 3.) They don't expose any member of the public to greater than 100 millirem per year.

Registrants are defined as in the guidance and they are the only ones who must sample and report annually

Records demonstrating compliance must be kept for a period of 5 years, and made available for agency inspection



32 IAC 330.40(d) Draft Proposals

Add provisions for noncompliance:

No provisions for noncompliance

Persons found to violate the three caveats specified may:

- 1.) be required to clean it up
- 2.) pay for remediation if the State does it on their behalf
- 3.) lose qualification for the exemption and made to obtain a radioactive materials license



32 IAC 330.40(d) Draft Proposals

Clarify that registrants are not all persons:

Registrants are all persons who produce or possess water treatment residuals

All persons must sample and report annually

Registrants are drinking water treatment facilities that have a treatment technology capable of concentrating radium, drinking water treatment facilities with a treatment technology and a designated aquifer, and wastewater treatment facilities downstream from the latter

Only registrants sample and report annually



32 IAC 330.40(d) Draft Proposals

Clarify that registrants are not all persons:

Registrants include land applicators and landfills

No change

Registrants include any other person or entity that the Agency determines is required to register

No change



32 IAC 330.40(d) Draft Proposals

Clarifies landfill disposal requirements and allows 'screening':

Landfill disposal afforded if the water treatment residuals are less than or equal to 100 pCi/g combined radium (dry weight basis)

Residuals must be covered during transport, packaged or stabilized, and have 10' of cover upon landfill closure

No change, but clarifies this applies to municipal solid waste (Subtitle D) landfills

Clarifies that the combined radium concentration must have been determined by an accredited laboratory

Allows for an agency approved 'screening method' as requested by municipalities

No change



32 IAC 330.40(d) Draft Proposals

Streamlines and clarifies land application requirements:

Land application afforded if the water treatment residuals are less than or equal to 100 pCi/g combined radium (dry weight basis)

Use is in accordance with 35 Ill. Adm. Code 309.208

No change

Land application must be performed in accordance with an IEPA land application permit

Clarifies that the combined radium concentration must have been determined by an accredited laboratory



32 IAC 330.40(d) Draft Proposals

Streamlines and clarifies land application requirements:

1.0 pCi/g cumulative increase afforded
(1778 microcuries per acre)

Ceiling limit is 3.0 pCi/g

Obtain a landowner acknowledgement
form

Sample in accordance with the U of I soil
sampling procedures (one sample per 8
acres, composited)

No change

Ceiling limit is 3.1 pCi/g

No change

Soil sample collection shall be conducted
so as to be representative of the entire
water treatment residual application site



32 IAC 330.40(d) Draft Proposals

Streamlines and clarifies land application requirements:

Lands used must have a pH equal to or greater than 6.0

This requirement eliminated

A 6 inch soil layer with a minimum clay content of at least 18% within the top 5 feet and above bedrock and the groundwater level

This requirement eliminated

A 6 inch layer with an organic content of at least 12 tons/acre within the top 5 feet and above bedrock and the groundwater level

This requirement eliminated

Application sites cannot be used for the cultivation of tobacco

No change



32 IAC 330.40(d) Draft Proposals

Streamlines and clarifies land application requirements:

When the cumulative increase of the radium concentration in the soil is determined by calculation to be 0.8 pCi/g or when the total radium in soil is calculated to be 2.8 pCi/g...the generator must repeat the soil sampling

This requirement eliminated

When calculating the increase in combined radium concentration, a soil density of 90 pounds/cubic foot and a mixing depth of 1 foot should be used

No change



32 IAC 330.40(d) Draft Proposals

Authorizes alternative disposal methods:

Land application and landfill disposal are the only authorized disposal/reuse options

If the water treatment residuals are greater than 100 pCi/g and less than or equal to 200 pCi/g, the disposal method must be approved in advance

“an alternative method of disposal may be reviewed and approved by IEMA, prior to disposal, in accordance with 32 Ill. Adm. Code 340.1020”

No change



32 IAC 330.40(d) Draft Proposals

Reduces sampling and reporting mandates:

Sampling:

Not specified

Sampling frequency in accordance with IEPA land application permit. If none specified, must sample at least annually

Not specified

Water treatment residual sampling must be done in accordance with American Water Works Association B100 for drinking water facilities



32 IAC 330.40(d) Draft Proposals

Reduces sampling and reporting mandates:

By June 1, 2011, all persons applying water treatment residuals or sewage treatment sludge containing radium to land in Illinois must sample fields currently being used for land application...

On an annual basis, each person producing water treatment residuals shall report...

This requirement was eliminated

On an annual basis, each registrant shall report disposals of water treatment residuals with a combined radium concentration greater than 3.1 pCi/g (dry weight basis)...



32 IAC 330.40(d) Draft Proposals

No changes to landfill disposals or reporting:

Annually report landfill disposal data:

- 1.) Name of landfill utilized
- 2.) Quantity disposed of (dry tons)
- 3.) Combined radium concentration
- 4.) Date(s) of disposal
- 5.) Additional information deemed appropriate by IEMA

No change



32 IAC 330.40(d) Draft Proposals

Reduces sampling and reporting mandates:

For Land Application:

- 1.) Location information
- 2.) Dry tons applied
- 3.) Radium concentration
- 4.) Date(s) of application
- 5.) Application Rate
- 6.) Additional information deemed appropriate by IEMA

Alternative Disposal Methods:

No provisions for alternative disposal

Changed from “field name” to “tax parcel ID number” to improve field location

Application rate no longer reported. Dry tons hauled and tillable acreage is used

Alternative disposals are reported annually



32 IAC 330.40(d) Draft Proposals

Low Level Radioactive Waste Registration and Fees:

“Registrants that produce water treatment residuals that are disposed of in a licensed low-level radioactive waste disposal facility or a Subtitle C landfill are subject to the registration requirements specified in Section 4 and the fees specified in Section 13 of the Illinois Low-Level Radioactive Waste Management Act and are subject to the reporting requirements of 32 Ill. Adm. Code 609 and 620.”

No changes



Specific Rule Requirements (continued)

- Other Proposed Changes
 - IEMA may elect to waive the requirement for a wastewater treatment facility to be a registrant if it is demonstrated that the facility's water treatment residuals are not technologically enhanced by a drinking water facility identified in subsection (d)(7)(B)
 - Registrants must maintain records showing compliance for 5 years and make those records available for agency inspection



Issued Specific Licenses

- Currently no category of license exists for water treatment facilities
- Specific licensure is the only avenue available for licensing
- Mailed 167 applications to facilities in August 2016
- 10 Facilities known to need a license



Issued Specific Licenses

- License application included a template radiation protection plan and training template
- A radiation safety officer is required under these types of licenses
- Units of government are exempt from fees
- Training, monitoring, posting are primary components



Draft General License Proposal

- Draft language proposed to create a new “general license” category
- General licenses are not applied for, simply granted
- Fewer requirements
- Tailored toward water treatment facilities.
- Implements minimum amount of training and protective measures to address worker and environmental safety while still attempting to be commensurate with the hazards present



Draft General License Proposal

- Issued to any person producing or possessing water treatment residuals not exempt under 330.40(d)
 - Water treatment residuals > 200 pCi/g
 - Registrants/persons no longer afforded exemption due to noncompliance



Draft General License Proposal

- General Licensee Requirements (continued)
 - Register with IEMA within 60 days
 - Post signage bearing the radiation symbol and the words “*Caution Radioactive Materials*” or “*Danger Radioactive Materials*”
 - > 1 microcurie activity (@ 200 pCi/g = 5 kg)
 - Employ the use of institutional engineering controls
 - Limit worker dose to 100 mR/year



Draft General License Proposal

- General Licensee Requirements (continued)
 - Ensure worker exposure to radon doesn't exceed 30 pCi/l or 0.3 WL
 - License fees and financial assurance
 - *Although units of government are exempt*
 - Acquire and maintain radiation survey instruments
 - Perform surveys to ensure compliance



Draft General License Proposal

- General Licensee Requirements (continued)
 - Notify IEMA prior to removal of non-exempt material and transport/dispose in accordance with low-level radioactive waste regulations
 - Comply with Radon Industry Licensing Act
 - Train workers and maintain records of training



Draft General License Proposal

- Licensed Material Disposal
 - Meet the requirements for discharges into a sanitary sewer
 - Advanced notification and written authorization from WWTPs receiving discharges
 - Removal of licensed material performed by specific licensee
 - General licensees are not authorized to receive water treatment residuals from another general licensee



Draft General License Proposal

- Appendix I: TENORM awareness training
 - Complexity of scope of training can vary with the level of interaction workers have with water treatment residuals
 - 1-2 hours minimum
 - Shall contain at a minimum ALARA, personnel exposure dose guidelines



Draft General License Proposal

- TENORM awareness training (*continued*)
- For workers whose occupational duties may involve exposure to water treatment residuals:
 - Fundamentals of radiation safety
 - Radiation detection instruments
 - Proper use of PPE
 - Identification of areas requiring posting and labeling
 - Containerization, storage and disposal of TENORM wastes
 - Requirements of pertinent regulations
 - Expected situations involving exposure to TENORM



Draft General License Proposal

- Use, operation, and limitations of survey and frisking equipment
- Monitoring equipment and action levels for radon
- Discussion on normal and abnormal exposure situations and ALARA procedures
- Expectation is that this initial training would be 4-8 hours in duration



Draft General License Proposal

- Licensees shall provide 1-4 hours of TENORM refresher annually or when there is significant change in policy, procedure, or regulations
- No RSO requirement
- Instructors of TENORM courses, other than a Radiation Safety Officer (RSO), should have experience in field operations associated with water and wastewater treatment facilities



Draft General License Proposal

- A copy of the draft proposals is available on the IEMA website:
 - <https://www.illinois.gov/iema/laws/Pages/regs-proposed.aspx>
- At least two additional stakeholder meetings planned (*Algonquin and Rockford area*)
- Illinois Section AWWA Annual Regulatory Update (*Elgin, 10/13/16*)
- Fox Valley Operator's Meeting (*Lake in the Hills, 11/10/16*)



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