

Burning Without Warning: Landfill Fire Prevention and Waste-Governance Reform Near Almaty, Kazakhstan

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Abstract

This case study based on documentary evidence is devoted to the problem of fire prevention in landfills located near the village of “Ali” in the Almaty region of Kazakhstan. The study includes field notes, a recorded interview with a journalist, general incident and enforcement action reports, government statistics, technical guidance, and comparative references to the experiences of Poland and South Korea. The study does not seek to find the cause of the fire in September 2025 or to determine whether the operator was at fault. Instead, the materials reviewed indicate national shortfalls in permitted waste disposal and treatment capacity, as well as unresolved questions about site-specific records, preventive monitoring and enforcement follow-up. Poland is an example of fire-prevention measures at the stage of issuing permits and financial guaranties. South Korea is an example of infrastructure and collection systems related to the diversion of food waste from landfills. The report proposes a public site register, traceable waste records, verification of financial safeguards, risk-based monitoring and an evaluated organics-separation pilot in Almaty.

Landfill fires, waste governance, Kazakhstan, Almaty, food-waste diversion, environmental policy, documentary evidence

Executive summary.

Kazakhstan has already restricted food-waste landfilling, set national processing targets and allocated funding for waste infrastructure.[\[1\]\[2\]\[3\]](#) Official reports, however, identify uneven site authorization and insufficient separate collection and treatment capacity.[\[4\]\[5\]](#) The public material reviewed at the Ali village site does not allow independent verification of load acceptance or preventive monitoring or completion of corrective actions. This disclosure gap does not establish that those controls are absent.

Kazakhstan generates more than 4.5 million tons of municipal waste per year. The processing rate was 28.6 percent in 2025 and the target for 2030 is 40 percent, according to the Ministry of Ecology. It also found that only 608 of 2,973 landfill sites had the required permits in 2024.[\[3\]\[4\]](#) That mix - rising headline performance with a weak disposal base - is the context in which recurring fires should be understood.

The major fire at the landfill near Ali village started on 15 September 2025 and was reported to have been extinguished on September 22 after deployment of about 150 personnel and more than 70 units of equipment.[\[6\]\[7\]](#) Almaty was second in IQAir's live major city table over the same period but the available data does not separate out the contribution of the landfill from traffic, power generation, household fuel use, weather and background pollution.[\[8\]](#)

The report contains documentary material, public records and two international comparisons. Polish literature describes fire controls, monitoring and financial security at the permit stage; South Korean literature describes the gradual development of pricing, separate collection and treatment.[\[9\]\[10\]\[11\]\[12\]](#) These cases suggest mechanisms to investigate in Kazakhstan, not demonstrate their effectiveness at the Ali village site.

The proposed priorities are to create a verifiable site record, evaluate existing preventive controls, secure lawful destinations for separated waste and assess additional monitoring and financial safeguards. Before increasing treatment capacity, urgent safety work and recording can start. The stricter rejection of incoming loads should be implemented when an alternative lawful route is available.

This is a policy analysis based on documentary evidence, and not a forensic identification of the ignition source in 2025, nor a legal compliance audit of ADC Taza A'lem LLP. Claims are categorized as field observations, public-record facts, and policy inferences.

Introduction and Research Question

What prevention and implementation gaps arise from the evidence available on the Ali village landfill? What policy options are worth testing, given Kazakhstan's institutional and infrastructure constraints?

The study is one documentary case within the framework of a national policy. It distinguishes between observations directly described, facts reported by public institutions or other sources and the author's policy proposals. It does not test a causal explanation of the fire nor does it estimate the effectiveness of the proposed reforms.

The key policy question is how households, collectors, transfer stations, treatment facilities, landfill operators and regulators can make existing waste restrictions work. The analysis includes both documented capacity constraints and information needed to assess site-specific implementation.^{[1][2][5]}

Field footage can prove what was in view at a particular place and time. It can not determine in itself the full complement of equipment on site, the makeup of the buried waste, the legal boundary, the ignition source or the culpability of the operator. The report explicitly acknowledges these limits.

Background and Context of the Study

Creation and disposal of waste

The Ministry of Ecology said that "more than 4.5 million tons of municipal waste are produced each year." The reported processing rate rose from 25.8 per cent in 2024 to 28.6 per cent in 2025. The stated target for 2030 is 40 per cent.^[3]

The disposal base is still structurally weak. The Ministry have reported 2,973 landfill sites for 2024 and only 608 with required permits.^[4] This report uses that exact formulation; it does not translate "has permits" into the wider and unproven assertion "fully complies with every environmental standard."

Current legal requirements

Environmental Code 2021 places environmental requirements on landfill operation and restricts certain waste streams. The government reporting dates the ban on landfilling construction and food waste to 1 January 2021.^{[1][2]} There is already an landfill liquidation fund required under Article 350(16), with waste acceptance and operational monitoring covered by Articles 354 and 355.^[1] Order No. 579 of 22 August 2022 specifies the formation of the fund for closure, reclamation and post-closure monitoring.^[13] The recommendations are therefore about verification, coordination and possible further safeguards; they do not assume that Kazakhstan does not already have such duties.

The Ministry said the total financing envelope for projects on waste collection, sorting and processing is 185 billion tenge, with 63 projects approved and 22 financed for 89.4 billion tenge by the end of 2025.[3] This financing represents an opportunity to develop capacity, but it does not prove that the Ali village site or Almaty organics system has already received the infrastructure outlined in this report.

Institutional duties

The Ministry of Ecology and Natural Resources develops the state environmental policy, and its territorial bodies exercise environmental control functions. Local executive bodies organize municipal waste services, operators implement site controls. Emergency fire response is coordinated by the Ministry of Emergency Situations (MES). The permit authority is determined according to the environmental category and instrument: permits for Category I impacts are under the national environmental authority and its assigned bodies, while permits for Category II impacts are issued by regional or equivalent local executive bodies.[14] The current permit category of the site needs to be identified before the permit decision is allocated to an office.

Enforcement history as reported and the 2025 fire

The Alatau landfill fire in September 2025 began on 15 September and was reported extinguished on 22 September.[6][7] Another report stated that the fire-service chairman said waste was piled up to ten meters high and smoldering deep down with the use of inert backfill and compaction.[15] The height reported is not a measured depth of combustion. Environmental and fire-safety violations were reported at the ADC Taza A'lem site in 2023-2025, and fines were collected in the amount of 1.452 million tenge.[16]

Vlast reported that a court has closed a particular administrative case over alleged sanitary violations related to the fire under Article 425(1) for lack of objective evidence of guilt. The same report also referred separately to an environmental fine under Article 336. [17] This outcome should not be construed as cancelation of all sanctions or as a determination of the source of ignition. This paper has not reviewed the underlying judgment and investigation file

The public reporting makes the emergency response visible, but the sources gathered here do not constitute a complete preventive record for the site. This limitation supports a request for documentation and independent verification, and does not in itself constitute a case of operational non-compliance.

analytical coverage

The analysis covers the waste management chain from separation and collection to treatment, acceptance, operation, regulatory follow-up and public communication. Missing record means a question to be verified. Implementation constraints are identified by a proven lack of capacity. These two findings call for different responses.

Policy Gaps

Below are six issues that combine documented national constraints with site-specific data gaps. "There is no evidence to demonstrate six proven failures at the Ali village landfill." The suggested responses are commensurate with the nature of evidence available.

The reviewed sources do not fully document enforcement follow-up.

Authorities reported repeated environmental and fire-safety violations and collected fines of 1.452 million tenge.[16] The compiled public record does not establish how each finding was linked to a corrective deadline, verification visit or permit decision. Even if this chain is not public, existing enforcement mechanisms may still apply.

Policy relevance: Obtain inspection acts, orders for correction and appeal results before recommending further escalation. Fines can be supplemented by permit conditions, credible inspections and financial safeguards, but the impact of all of these depends on implementation. The terminated sanitary case highlights the necessity of evidence particular to each alleged violation.[17]

The main institutions in the alignment process: Ministry of Ecology; territorial environmental control; Akimats; permit and judicial review bodies

Food-Waste Ban Surpasses Diversion Capacity

The food-waste landfilling ban has been in force since 2021, but the lack of universal separate collection and inadequate sorting and processing capacity are still cited as national constraints in official reporting.[2][5] When households and collectors do not have reliable lawful destinations, compliance remains challenging; the legal restriction still applies.

Policy relevance: Without transfer, sorting, composting or anaerobic-digestion capacity, rejection of mixed loads at a landfill can increase illegal dumping or just shift the load to another weakly controlled site. Infrastructure and enforcement need to be commissioned together.

Lead Institutions to Alignment: Akimats; Ministry of Ecology; collection contractors; treatment operators

Gate Records and Waste Traceability Not Publicly Verifiable

The public materials reviewed for this report, including the linked documentary clips, do not contain weighbridge logs, composition records, rejected-load records or a full chain from incoming load to lawful destination. This is a gap in disclosure and verification, not an indication of no system on site.

Policy Relevance. Acceptance procedures are already covered by Environmental Code and government infrastructure reporting identifies weighing and related site controls.[1][5] The auditable record linking collection, acceptance or rejection and final destination is the proposed improvement. The novelty is traceability and verification across the chain, not the invention of a legal duty to record waste.

Lead institutions to coordinate: landfill operators; Akimats; territorial bodies of environmental control

The Preventive Monitoring Layer Is Non Verifiable

The sources reviewed do not provide routine temperature or gas measurements at the site. The documentary description mentions smoke or vapor without visible flame, which merits investigation but cannot distinguish between combustion, chemical heating or other sources. The reviewed sources do not provide an inventory or performance information for the existing monitoring equipment.

Policy relevance: EPA guidance uses changes in gas temperature and gas composition as indicators for investigating elevated temperature conditions.^[18] The recommendation incorporates site-specific engineering assessment, instrumented measurements, and response procedures; it does not diagnose the filmed conditions based on their appearance.

Lead institutions: Ministry of Ecology; operators; Akimats; MES

“Incident information needs to be a common public record

Data on the 2025 event were distributed through emergency, local-government, media and air-quality sources.^{[6][7][8]} The report does not systematically assess the completeness of all warnings. It suggests a common format for updating to make it easier to interpret measurements, uncertainties and practical advice together.

Policy relevance: A credible protocol should say what is known, what is being measured, what is still uncertain, which districts are affected, what residents should do and when the next update will arrive. Many major pollution sources are listed on IQAir’s September 2025 page, demonstrating why temporal coincidence should not be offered as evidence of a single source.^[8]

Key actors: Akimats; MES; public health authorities; Kazhydromet.

Unknown economics of the operator and service continuity

Operator tariff, cost, throughput, debt, remediation reserve or alternative-capacity data are not included in the report. “Without them it can’t work out if stricter compliance conditions would be absorbed, passed onto households, lead to under-investment or make it impossible to keep operating financially.”

Policy relevance: Stronger enforcement without a cost-of-service and alternative-capacity assessment can result in a perverse outcome: Formal capacity closes but waste streams continues to flow. The 185 billion tenge national financing envelope is a possibility, not solution, and project eligibility and local allocation need to be demonstrated.^[3]

Lead institutions to align Akimats Tariff regulators Ministry of Ecology Operators Financiers

Findings of the Documentary

The documentary material for this report is represented by the five linked clips. The field location mentioned by the author is the landfill near village of Ali. The PDF contains external links, not embedded players. According to the author, all drone footage of the landfill was recorded on 1 November 2025. This recording date does not apply to the separate September 2025 fire clip or establish the interview date. Location labels, rough distance estimation and fire-clip description are considered as documentary metadata, not as separate geospatial or forensic validation.

A frame might include images of visible conditions . Testimony records what an interviewee says . None of them establishes the equipment outside the frame, the composition of buried waste, the measured exposure, a legal boundary or the cause of ignition. This manuscript does not include a complete visit log or georeferenced survey points. The drone recording date is supplied by the author; the interview date and the original recording date of the September 2025 fire clip are not documented here.

Finding 1 Approach and setting

Video 1. Linked Field Method

The clip shows the approach and setting of what the author calls the Ali village dump.[19] It provides visual context. Location must be confirmed independently, by coordinates or other georeferenced records.

[View the documentary clip on YouTube](#)

The clip is a visual location record, not a survey or compliance audit. It does not define the approved boundary, the full operating configuration of the site, the composition of the waste or whether any legal requirement has been met.

Policy relevance: A documented site identifier and map would link the field observations to the appropriate permit and incident record under R1.

Finding 2 Residence Proximity

Linked video 2: neighborhood proximity

The field account describes the waste mass as being close to nearby housing.[20] The author's approximate 100 meter estimate is visual and there is no recorded survey method or error range. It is not a distance measured from the video.

[YouTube link: Documentary footage](#)

The author's waste-mass-to-housing estimate and the reference distance are based on different endpoints. An informational publication of West Kazakhstan Region Department of Sanitary and Epidemiological Control describes a distance of 1,000 meters from a landfill enclosure to a settlement.[21] They cannot identify a quantified deficit. Check the actual site documents with the applicable sanitary rule, approved protection zone and legal measurement points.

The proposed action is a georeferenced boundary and sanitary-zone audit and the legal basis applicable is identified. "Here there is no finding of a breach of sanitary zone."

Policy relevance: Residential proximity requires checking for potential exposures pathways and an explicit warning protocol for the public. The video does not quantify exposure or establish an alert threshold.

Finding 3 Monitoring and smoke needs

Linked video 3: smoke/vapour

The field account describes the presence of smoke or vapor rising from portions of the waste mass with no visible surface flame[22].

[Documentary clip Watch it on YouTube](#)

The appearance does not determine whether combustion is taking place. Landfill temperature and gas can be affected by biological activity, chemical reactions, air intrusion and other processes. Methane itself is only flammable under the right mix and oxygen conditions. No gas measurements were taken in the footage . [23]

The EPA differentiates a landfill fire from an elevated-temperature landfill, which involves abnormal heating reactions. Its guidance discusses temperature and changes in methane, carbon dioxide and other gasses as indicators for investigation.[18] Suspected heating or smoke warrants an appropriate engineering and emergency assessment, but the two phenomena should not be labeled interchangeably.

Policy relevance: Supports the proposal in R4 on monitoring. Investigating visible smoke through temperature and gas measurements is worthwhile, but it doesn't prove organics caused the 2025 fire or that another fire was inevitable.

Finding 4: September 2025 incident

Linked video 4: clip called September 2025 fire

A short video is linked as a graphical representation of the fire in September 2025. [24] The date of recording, precise location and the original camera operator are not recorded in this manuscript. So the incident chronology is not only the clip label, but the public reports.

[Documentary clip Watch on YouTube](#)

The major Alatau landfill incident is said to have taken place between September 15 and 22, 2025, and involved around 150 people and more than 70 pieces of equipment. [6][7] The connection between individual documentary frames and the incident site should be confirmed using georeferenced or original recording records.

A major incident must lead to evidence preservation, investigation, corrective plan and verification by the competent authorities. An interim safety action should not be delayed pending a final determination of cause.

Policy relevance. R1, R3 and R4 should link the incident to its site record, follow up on corrective actions and set conditions for safe continuation or resumption of operations.

Finding 5 Journalist Testimony

linked video 5: interview with journalist

It includes a recorded interview with journalist Nikita Danilin as qualitative testimony, included with his permission.[25] It is one interview in the evidence set, not a sample of residents, nor an independent inspection.

[Documentary clip: View on YouTube](#)

The interview is intended to identify questions for follow-up and give a sense of the site. No direct quotation in translation is reproduced; a transcript and translation record with timecodes is not available. Promises of infrastructure projects should be checked against procurement, budget and completion documents before being reported as settled facts.

R1 shall publish documented modernization commitments, responsible body, funding allocated, milestones and completion status. Policy relevance: Interview testimony can help shape document requests, but it is not a substitute for the records.

Synthesis of evidence

Documentary account: conditions of approach, apparent residential proximity, smoke or vapor, a clip labeled the 2025 fire, and one journalist interview. The 100-metre estimate is the field estimate of the author. The drone recording date is author-reported. Location, the interview date and clip provenance need documentary confirmation before more specific site claims can be made.[19][20][22][24][25]

Major landfill fires in 2020 and 2025, the September 2025 response, prior violations and fines, and termination of one sanitary administrative case were reported publicly.[6][7][16][17][26] These reports differ from the underlying official case files, which were not reviewed.

The 2025 ignition source, buried waste composition, actual gas and temperature profile, surveyed sanitary boundary, operator economics or the landfill's quantified share of Almaty's pollution episode – none of these are established.

Benchmarks for Comparison

Poland and South Korea were chosen for contrasting policy mechanisms: regulatory controls following fire at waste sites, and the organization of food-waste diversion. This is a purposive comparison and not a systematic cross-country review or causal assessment. The settings are different from Kazakhstan and the comparison does not indicate the likely size of any local effect.

Cygańczuk, Roguski and Roman's series from the State Fire Service lists 243 waste-site fires in 2018, 177 in 2019, 111 in 2020, 62 in 2021 and 55 in 2022.[\[9\]](#)

Interpretation: A sharp decline after reform, but not a clean causal estimate and not a statistic confined to permitted municipal landfills.

2019 processing of household food waste

Kwang-yim Kim's presentation repeats the 96.2 percent recycling share for treatment of household food waste in 2019. Another slide shows 89 percent for household food waste separated in 2020.[\[27\]](#) The presentation reports different years and descriptions of the waste stream, so this report does not consider the figures as a harmonized series or report an unbroken rate above 95 percent.

Interpretation: These data support the feasibility of major diversion in a mature collection and treatment system. They do not measure anything about prevention of food waste generation, product quality or reduction of landfill fires.

Waste site controls and Poland

Polish literature describes fires in waste storage, treatment and disposal facilities including illegal ones. Cygańczuk and Janik discuss the regulatory controls, while the broader fire pattern and its environmental implications are presented by Białowicz. [\[10\]](#)[\[28\]](#) These studies support the idea of preventative regulation, and the combination of site types, and ignition contexts within them differs from the case of the Ali village.

Table 1 . Preventative controls according to the Polish literature [10]

Reform element	Operational function	Relevance to Kazakhstan
Video monitoring of storage areas	Creates a reviewable operating record.	Useful only if footage is retained, inspected and tied to enforcement triggers.
Fire-protection assessment and fire-service inspection before permit	Moves scrutiny before operation rather than after an incident.	Assess the applicable permit route and independent verification capacity.
Financial security for waste-storage liabilities	Pre-funds remediation and changes the cost of non-compliance.	Review the existing liquidation fund before assessing a distinct accident-liability gap.
Shorter storage period and tighter permit requirements	Limits long-term accumulation and shell-company strategies.	Most relevant to storage sites; less directly applicable to an operating municipal landfill.

After 2018, the legal package included video monitoring, financial security, fire-protection documentation and fire-service inspection before permit decisions.[10] The decline in recorded incidents after 2018 is consistent with these changes having an effect, but other possible explanations must also be considered: enforcement intensity, market conditions, classification and the natural fall from an extreme peak. So this report does not claim that one particular Polish measure was responsible for all the decline.

Policy implication: Poland suggests to consider together the permit-stage fire assessment, reliable records and financial safeguards. The comparison does not establish that any single measure caused the decline, or that Kazakhstan suffers from the same fraud, arson or waste-market conditions.

South Korea and food waste diversion

1995: nationwide volume-based municipal waste fees used designated bags, and separate collection of recyclables.[11]

2005: a developing separation and treatment system included a ban on direct landfilling of food waste. [12]

2013: Further expansion of weight-based food-waste charging, following earlier schemes using designated bags, chips and RFID identification. [12]

This series of policies took many years to develop. General waste charges pre-dated the food-waste landfilling ban, and collection and treatment arrangements evolved alongside later food-waste charges.[11][12] The case implies that the pricing mechanism needs a functional service and lawful treatment outlets; a ban alone does not create them.

Avoiding landfill disposal of degradable waste can reduce the material available for landfill-gas generation.[23] That mechanism does not quantify a reduction in fire probability at Ali, and the Korean diversion statistics are not fire-outcome data . Fire prevention still requires controls appropriate to the waste streams, operating practices and measured conditions at the site.

The Korean review also refers to limitations on feed utilization, contamination and treatment performance.^[12] These issues are pertinent to which outlets remain legal and commercially viable. The reported recycling volumes do not necessarily prove that all the outputs of the treatment are marketable or that less food waste is produced.

Policy implication: Kazakhstan should trial separation with secured collection and treatment capacity. The direct transfer of the Korean system is constrained by differences in density, metering, household affordability and the available outlets.

Summary of comparison

Table 2. Scope of the international comparisons .

Case	What the evidence supports	What it does not support	Policy use here
Poland	Preventive regulatory changes preceded a decline in the cited waste-fire series.	Proof that one reform caused the decline, or a direct forecast for Ali.	R1 and R3: records, preventive review and verified safeguards.
South Korea	Substantial food-waste diversion within a developed service system.	A constant recycling percentage or evidence that diversion prevents every fire.	R2 and R5: destinations, collection and evaluated pricing.

Transferability to Kazakhstan”

The options below are qualitative implementation judgments, not scored feasibility results. They consider legal authority, treatment and collection capacity, operator finance, administrative resources and affordability for households. Without a cost model and site level compliance records we cannot rank definitively.

Fire Assessment and Inspection at Permit Stage

Implementation requirement Check the authority and inspection capability.

Use the existing environmental and fire safety duties. Ascertain the right permit issuer and legal process to add additional conditions and what resources are needed to ensure compliance. Limited assurance would be provided by a document-only assessment.

Remediation funding

Implementation condition: when adding obligations, check whether there are existing funds.

First check the landfill closure fund, the required contributions and the available balance. It has a specific closure and post-closure function as distinct from a proposed safeguard for accident response. Any further guaranty needs a proven gap in coverage, a legal basis and a tariff and viability assessment.^[13]

Gates and Incidents Digital Record

Implementation condition: link records across organizations and audit data.

Use existing acceptance records and reporting responsibilities. The extra requirement should be a traceable link to a legal end point and a process to check data quality . The procurement of software alone would not produce accurate records.^[1]

Strict refuse of mixed loads containing food

Implementation condition: legal alternative destinations run first.

Strict rejection of mixed loads can be legally coherent but operationally unsafe before functioning transfer, sorting and organics-treatment destinations are available. Otherwise it can result in illegal waste dumping.

Three Stream Collection In Almaty Dense Districts

Implementation requirement: Obtain a treatment contract and measure the contamination.

Frequent collection can be supported on dense routes but is dependent upon a permitted treatment outlet, clear acceptance specifications and reliable separation. The economics of routing requires a cost assessment at the local level.

Household Pay-as-you-throw/RFID

Implementation is subject to an assessment of affordability and unintended dumping.

Testing should include metering, billing and public acceptance along with service reliability.

Compare a pricing area with a non-pricing area matched in terms of service. Protect vulnerable households. Monitor dumping.

Four constraints in Kazakhstan

1. The weakness of the national disposal network limits what a single-site reform can achieve. In 2024 2,973 landfill sites were reported but only 608 had required permits.^[4] Increasing the cost of legal disposal without addressing the alternatives can drive waste to the unpermitted majority.
2. One model cannot be used for urban and rural systems. Frequent collection of organics and metering could be possible in dense districts of Almaty. Clustered transfer points, simplified fee systems and regional treatment solutions are needed for remote settlements.
3. Tariffs, operator viability still unresolved. If current tariffs do not cover compliant operation, additional enforcement requirements can create insolvency or hidden non-compliance. Cost of service test is a prerequisite to new financial obligations.
4. Due process is important. The conclusion of the reported sanitary case points to the need for evidence on the alleged violation.^[17] A fire may be a reason for investigation and proportional interim safeguards but should not necessarily lead to final guilt or cancelation of unrelated sanctions.

Design Philosophy

Table 3. Principles of the proposed implementation

Principle	Application
Capacity before rejection	Contract lawful organics destinations and transfer capacity before enforcing strict rejection of mixed loads.
Evidence before sanction	Use verified gate, monitoring and inspection records; preserve appeal rights and distinguish incident from culpability.
Verify and strengthen existing duties	Review current permits, safety plans and the liquidation fund before adding requirements.
Pilot before national metering	Test participation, contamination, cost, illegal dumping and treatment quality in Almaty before scaling fee technology.
One public evidence trail	Join permits, loads, inspections, incidents, air data and corrective actions in a site-level record.

Suggestions

R1 and early R2 create site and load records . R4 handles investigation , monitoring and public warning . R3 reviews the existing duties and other safeguards. R5 tests organics diversion in city of Almaty. The following numeric targets and time windows are proposed planning assumptions for consultation purposes only and are not validated thresholds or existing statutory deadlines. Present duties should be enforced and emergency action continued when the law so provides.

Initial baseline dossier with proposed 90-day reporting target

The competent environmental authority and the operator, the Almaty Region and Alatau city Akimats, should collect the permit category and issuer of the site, approved boundary, sanitary-zone documentation, tonnage records, incident and inspection history, corrective actions, existing monitoring and financial obligations, and lawful alternative destinations. Public disclosure should differentiate unavailable records from confirmed deficiencies and protect information where legally required.

A complete file should inform major procurement and redesigned rejection rules, but should not delay urgent fire prevention, emergency response or existing enforcement duties. • Publish a funded transition plan before implementing more stringent load-rejection practices, if lawful treatment or service continuity is inadequate. If the Almaty Region site is to use facilities from the Almaty city pilot in R5, it will need a separate interjurisdictional agreement.

R1 Public site registry and corrective action tracking

Proposed horizon: initial register within 12 months.

Proposed lead: Ministry of Ecology and Natural Resources for common data standards; authorities of Almaty Region and Alatau city for the local inventory; operators, MES, public-health authorities and Kazhydromet for relevant records.

Assign a stable identifier to each identified disposal site, including permitted, unpermitted and status unverified sites. Operator (where known), permit status and expiry, location and boundaries, tonnage, inspections, appeal status, incidents, corrective actions and responsible body. Publish If a record was not obtained or verified, state this clearly.

Examples of service targets include initial incident entry within 24 hours of formal notification, interim corrective-action plan within 30 days of investigation mandate, and quarterly routine updates. The first entry must identify uncertainty and cannot await final determination of cause. “Try out staff feasibility before making deadlines binding.”

Legal route: Possible under data-disclosure and permit-reporting rules; check personal, commercial and appeal-status fields in legal review.

Cost profile: Low/medium. Not a new sensor network, but data integration. Make use of existing government systems wherever possible.

Proposed success metric: All sites within an independently reconciled regional inventory have a status of known or explicitly unverified. Audit incident reporting and closure of corrective action. • Don't limit scope to sites already permitted.

R2 Traceability Acceptance and Destination Records

Horizon proposed: assess and start recording within 6 months; increase audit coverage over 12-24 months

Proposed lead: Alatau city and Almaty Region service authorities for contracts and continuity; the competent environmental permit issuer for permit conditions; operators and collectors for records; territorial environmental control for audit.[\[14\]](#)

Review current weighing and acceptance records before buying equipment. Use certified weighing and a digital load ticket linking vehicle, collector, origin, time, mass, declared stream, inspection, acceptance or rejection and destination where necessary. Periodic physical composition reviews of test declarations. This adds to pre-existing duties of acceptance rather than presupposing that they don't exist.[\[1\]](#)

Dependency: Recording can start right away. A more stringent refusal must be linked to a working transfer or sorting point and contracted lawful treatment capacity, either existing or created later. A rejected load must be traced to another acceptance. The start date for rejection is a capacity decision, not automatically month 24 or the launch of R5.

Legal route: Gate and destination records should be subject to audit under permit and municipal contract conditions. Technical regulation is required under certification and retention rules.

Cost profile: Medium-high. Scales, software, audit staff and - most important - capacity for transfer and treatment.

Sample quality target: At least 98 percent of required ticket fields complete, plus an independent audit of accuracy and mass balance. First define the baseline, justify the final target and report unresolved rejected loads. Completeness does not mean accurate records or lawful disposal.

R3 Enhance preventive requirements and verify financial safeguards

Suggested Horizon: Review current duties quickly. Consider additional steps in 12-18 months.

Proposed lead: relevant environmental authority and permit issuer, with input from fire service, information from operator on finance, and Alatau city/Almaty Region service-continuity planning.

First check the fund already available for liquidation and the operator's obligations for fire prevention, monitoring and corrective actions Order No. 579 describes a fund for closure, reclamation, and post-closure monitoring. [\[13\]](#) Evaluate if existing mechanisms adequately address accident-response and remediation liabilities before suggesting a separate guaranty. Do not double up security for the same obligation, estimate any extra amount to risk and operator viability.

Triggered for review: two confirmed serious or repeated violations within a 36 month period for independent compliance review, subject to legal assessment of severity definitions and proportionality. This is a design choice, not a rule of law that exists, or an automatic finding of guilt. Restrictions on operations require legal process of the competent authority, evidence, notice and appeal rights, together with a safe alternative waste route.

Legal route: amendments of permit and administrative rules; design must be proportional and have appeal rights.

Cost profile: Middle. Operator security and remedial work; public audit and contingency-contract capacity.

Recommended success measure: Evidence of compliance with relevant fund and safety duties, documented resolution of any identified liability, and auditable closure of corrective-action. Report additional requirements and enforcement of obligations that are already in force.

R4 Surveillance and public warnings

Recommended horizon: Risk assessment Now Pilot 6-12 months Review 12-24 months

Proposed lead: Ministry of Ecology and Natural Resources and the competent permit issuer for environmental requirements; operator for site measurements and response; local Akimats, MES, Kazhydromet and public-health authorities for incident communication.

Conduct an inventory of current monitoring and an engineering risk assessment. Add waste-mass or gas-well temperature and appropriate gas measurements where justified, backed up by surface observations. Develop site-specific calibration and response procedures and baselines. Different diagnostics are needed for elevated temperature reactions and fires. This is a proposal to investigate abnormal conditions, not a claim that a single gas or temperature threshold predicts every fire^[18]

For an active event, issue one timed update with: confirmed facts; measurements and station locations; uncertainty and source-attribution status; affected areas; health advice; actions underway; next update time. Do not include a live city ranking as proof of a single source.

Legal route: Technical monitoring standard and permit conditions; inter-agency alert protocol with named data owner.

Cost profile: Medium. Site specific wells/sensors, calibration, data review and maintenance; higher for sites without gas infrastructure.

Success measure: baseline complete, alerts tested, investigation of abnormal trends within hours, public updates meet standard for completeness and timeliness

Pilot in R5 Almaty city assessed organics

Horizon proposed: preparation and an 18 month operational evaluation in an 18-36 month program.

Proposed lead: Almaty city Akimat, possibly co-financed by the Ministry, depending on eligibility; contractors for collection and treatment; an independent evaluator. Links of the waste flows of the Alatau landfill require explicit agreements between jurisdictions.

Introduce three-stream collection for organics, dry recyclables and residual waste only once permitted treatment capacity, acceptance specifications and transport contracts are in place. Choose comparable service areas in 2 or 3 dense districts and record household composition, service quality and pre-pilot waste flows. Document collection frequency and communication for at least one area with a pricing element compared to an area without one. Small nonrandom groups provide a test of feasibility, not a final determination of causality.

Evaluate after 18 months of actual service (from date of first collection). Use baseline and seasonally comparable periods; track participation, contamination, net diversion, dumping, complaints, household costs; test if differences are price or service quality driven. Prior to launch, publish quantitative acceptance and stopping criteria based on treatment specifications, affordability and baseline costs. Scale only if these criteria are met, otherwise adapt or stop the pilot.

Legal route: Pilot through municipal procurement and service rules Pricing treatment requires tariff and social-protection review.

Cost: High. Containers, vehicles, transfer, treatment, contamination control, communication, and evaluation. Before applying for the national waste-financing envelope, you must validate eligibility.

Measures: kilograms of organics accepted for treatment per household, contamination and rejected residues, participation, full cost per net ton diverted, treatment yield and output quality, complaints and recorded illegal dumping. A cost comparison should encompass collection, transport, processing, residue disposal and administration.

Methodology and Limitations

This is a purposive narrative comparison and a qualitative policy case study. It is based on five linked documentary clips, one journalist interview within that set, government publications, incident and enforcement reporting, Polish and Korean literature, and EPA technical guidance. This is not a systematic review of the literature, nor a representative survey of the community, nor a site compliance audit, nor a causal evaluation. The source set is given in References; the legal, technical and bibliographic checks for this revision were done on 5 October 2026.

Table 4. Types of evidence and limits of inference

Evidence class	Material used	Claims it can support	Claims it cannot support alone
Documentary material	Five linked clips, including a journalist interview.	The described visual record and an individual account.	Verified coordinates, measured exposure, cause or legal culpability.
Public Kazakhstan record	Government publications, legislation and incident and enforcement reporting.	Published statistics and rules; reported chronology and decisions.	Full compliance, operator finances or findings absent from the actual case files.
Comparative evidence	Polish waste-fire studies and Korean food-waste literature.	Potential mechanisms and implementation constraints.	Predicted Kazakhstan effects or a ready-made policy design.
Technical guidance	EPA technical guidance.	Questions for a site-specific engineering assessment.	A diagnosis without local measurements.

Scope and bounds of inference

Scope and selection The author identifies a landfill as a field case. South Korea for food waste diversion and Poland for preventive regulation after fires at waste sites. These are not representative country samples . These are mechanism comparisons . There was no pre-defined search or exhaustive database strategy or formal quality scoring protocol so selection bias remains a possibility.

documentary evidence. The PDF links to five clips instead of embedding video. The manuscript does not include a complete visit log, timecoded interview transcript, complete recording-date register or georeferenced map. The account can therefore not establish precise dates, distances or provenance from clip titles alone. It does not reproduce a direct interview quote and does not infer the views of the interviewee beyond the evidence provided.

Location & interview constraints. The approximately 100-metre distance is an unmeasured visual field estimate. Sanitary-zone findings require surveyed endpoints, and the appropriate approved documents. One interview does not represent the nearby residents. The author confirms that Nikita Danilin granted permission for inclusion of the interview. More detailed testimony would require a dated transcript and verified clip provenance.

No physical samples. No analysis of site specific temperature, gas, leachate or composition measurements. Smoke or vapor visible is not a determinant of fire versus other heating conditions. This report does not attribute the September 2025 fire to food waste, methane, spontaneous combustion, arson, or any other one cause.

Uncertainty of the proposal. There was no operator financial model, local treatment capacity assessment or priced engineering design. The cost ranges and implementation periods are qualitative planning judgments. The proposed thresholds in R1-R3 are options for consultation and R5 is an outline for feasibility evaluation and not a completed experimental protocol.

No full record of administration. Government and media sources report violations, fines and one court outcome, but the full inspection acts, permit file, judicial decision and ignition investigation were not reviewed. The report distinguishes between an information gap and proof of a missing control or legal violation.

Source attribution is not live air ranking. Almaty's second spot on IQAir's live table occurred during the period of the fire and the available sources identify some main urban pollution contributors and do not quantify the landfill's share.^[8]

Further evidence required

Priority evidence: Confirmed site identifier and map; current permit and sanitary-zone documentation; inspection acts, court decisions and incident investigations; acceptance, tonnage and monitoring logs; liquidation-fund and operating-cost data; legal treatment contracts; dated original footage; timecoded interview record with verified attribution and permissions.

SUMMARY

Evidence is available to support investigation of preventive controls and implementation capacity. It does not show the ignition mechanism or demonstrate that a particular unobserved control failed at the Ali village site.

The reported fires of 2020 and 2025, earlier recorded violations, national permit statistics and documented constraints on collection and treatment warrant closer attention to prevention.^{[4][5][6][7][16][26]} Site-level responsibility nevertheless demands the underlying records and competent investigation, including attention to the limited scope of the reported sanitary court case.^[17]

The Polish comparison supports looking at preventive permit controls and financial safeguards as a package, and not attributing the observed fire decline to a single reform.^{[9][10]} The Korean comparison supports staged separation, collection, pricing and treatment, and illustrates the limits of recycling percentages as a measure of prevention or treatment quality.^{[12][27]} Neither case predicts the effect of a Kazakhstan program.

The proposed sequence starts with a verified site inventory, an existing-duty review, usable waste records and prompt safety assessment. New financial safeguards should address a proven gap in existing arrangements. Redesigned load rejection should only be deployed after treatment capacity is assured. The Almaty city organics pilot should have a separate baseline, cost model and evaluation, with an explicit agreement if it intends to serve the Alatau landfill.

The contribution of this report is a set of testable policy options and a record of evidence still required to evaluate them. "Progress should be measured by verified compliance, legal destinations for waste, measured operating conditions and transparent corrective actions. Site investigation and pilot evaluation are to determine the effectiveness and affordability of the proposals.

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