

Texas Sodium Bentonite

Alpine, TX | Alpine Processing Facility | Comanche Packaging Facility



■ CONTROLLED DOCUMENT

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Texas Sodium Bentonite Inc.

Poultry Technical Data Sheet

Feed-Grade Sodium Bentonite & Clinoptilolite Zeolite — Species-Specific Guidance for Commercial Poultry Production

TECHNICAL SHEET | TS-PO-001 | FEED-GRADE MINERALS

Document No.	Title	Revision	Effective Date	Prepared By	Reviewed By	Approved By
TS-PO-001	Poultry Technical Sheet — Sodium Bentonite &	1.0	July24, 2026	TSB Technical Services	QA Manager	Director of Operations

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	Clinoptilolite Zeolite					

► Companion Documents

This document is part of a coordinated series of species-specific technical sheets issued by Texas Sodium Bentonite Inc. Companion documents: Swine (TS-SW-001), Beef Cattle (TS-BC-001), and Dairy (TS-DA-001). All documents share equivalent QMS controls, document numbering, and revision authority.

1. PURPOSE

This technical sheet provides species-specific guidance on the use of Texas Sodium Bentonite Inc. feed-grade sodium bentonite and clinoptilolite zeolite products in commercial poultry production systems. The document is intended to support nutritional program development, quality assurance review, and feeding management decisions across broiler, layer, turkey, and broiler breeder operations.

Information contained herein reflects current technical data, published research, and field-validated inclusion parameters for Texas Sodium Bentonite Inc. products as sourced, processed, and packaged under the company's Quality Management System. This document does not constitute a label claim or

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regulatory approval for specific end-use applications. Consultation with a licensed poultry nutritionist or veterinarian is recommended when integrating these products into new or modified ration programs.

2. SCOPE

This document applies to all commercial poultry integrators, independent poultry producers, contract growers, poultry nutritionists, veterinarians, and feed manufacturers utilizing Texas Sodium Bentonite Inc. feed-grade sodium bentonite and/or clinoptilolite zeolite products in formulated rations or litter amendments. The scope encompasses the following production systems and feeding phases:

- **Broiler (Meat Chicken):** Starter (0–14 days), Grower (15–28 days), Finisher (29 days–market weight)
- **Layer (Commercial Egg Production):** Pullet Development (0–16 weeks), Peak Production (17–50 weeks), Late Lay (50+ weeks)
- **Turkey:** Poult (0–28 days), Grower (29 days–10 weeks), Finisher (10 weeks–market weight)
- **Broiler Breeder:** Grow-out through peak production breeding cycle

Both dietary supplementation and direct litter amendment applications are addressed. Litter amendment use is independent of and in addition to dietary inclusion rates specified herein.

3. PRODUCT OVERVIEW

3.1 Feed-Grade Sodium Bentonite (Montmorillonite Clay)

Texas Sodium Bentonite Inc. feed-grade sodium bentonite is a naturally occurring montmorillonite smectite clay mineral sourced from volcanic ash deposits in the Big Bend region of West Texas — among the most geologically distinct and mineralogically consistent bentonite deposits in North America. The material is mined at the company's Alpine TX facility and processed to feed-grade specification using

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controlled crushing, milling, and classification protocols. Final packaging is performed at the Comanche, TX facility under lot-controlled conditions.

The product is a fine, free-flowing powder with a typical particle size of -20 mesh, a maximum moisture content of 12%, and characteristic off-white to buff coloration. The fine grind specification is particularly critical for poultry applications, as the small particle size ensures uniform distribution throughout pelleted, crumble, and mash rations, and provides optimal surface area contact within the proventriculus and gizzard.

3.2 Feed-Grade Clinoptilolite Zeolite

Texas Sodium Bentonite Inc. feed-grade clinoptilolite zeolite is a naturally occurring aluminosilicate mineral of volcanic origin, characterized by a rigid, three-dimensional microporous framework structure. Sourced and processed from the same West Texas volcanic deposit region and packaged at the Comanche, TX facility, the zeolite product shares equivalent particle size and moisture specifications with the sodium bentonite product line. Its highly ordered channel structure and elevated cation exchange capacity (CEC) distinguish it functionally from the bentonite product and support complementary but distinct modes of action in the avian gastrointestinal tract, litter environment, and systemic metabolic pathways.

Product Parameter	Sodium Bentonite	Clinoptilolite Zeolite
Mineral Classification	Montmorillonite Smectite	Clinoptilolite (Heulandite Group)
Origin	Big Bend Region, West Texas — Volcanic Ash Deposit	Big Bend Region, West Texas — Volcanic Ash Deposit

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Product Parameter	Sodium Bentonite	Clinoptilolite Zeolite
Mining / Processing Facility	Alpine, TX	Alpine, TX
Packaging Facility	Comanche, TX	Comanche, TX
Typical Particle Size	-20 mesh (fine powder)	-20 mesh (fine powder)
Maximum Moisture Content	≤ 12%	≤ 12%
Physical Form	Fine powder — off-white to buff	Fine powder — white to off-white
Key Functional Property	Swelling, pellet binding, flow agent	Rigid microporous framework — CEC, selective ion exchange, ammonia absorption

4. MODE OF ACTION

4.1 Sodium Bentonite — Avian Physiology

The layered silicate structure of sodium bentonite undergoes swelling and intercalation upon hydration in the proventriculus and gizzard. This swelling creates an expansive internal surface area (up to 600–800 m²/g) that provides high-affinity binding sites for polar and nonpolar molecules. Key mechanisms include:

- **Pellet Binding (PDI Enhancement):** At 0.5–1.0% dietary inclusion, sodium bentonite acts as a natural binder during pelleting, reducing inter-particle friction and improving pellet durability

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index (PDI) by an estimated 3–7 percentage points. Improved PDI directly reduces feeding fines, improves feeder efficiency, and reduces broiler production cost per pound of gain.

- **Anti-Caking Agent:** Effective in mash and crumble rations for prevention of clumping and bridging in high-fat or high-moisture formulations, maintaining uniform ingredient distribution and feed flow.
- **Ammonia Adsorption / Litter Application:** When applied as a litter amendment, sodium bentonite physically absorbs moisture and adsorbs ammonia (NH_3) and ammonium (NH_4^+) ions, reducing ammonia volatilization from litter surfaces. Lower house NH_3 concentrations reduce respiratory tract damage, improve heterophil: lymphocyte ratios, and support respiratory health in both birds and house workers.

4.2 Clinoptilolite Zeolite — Avian Physiology

The rigid three-dimensional microporous aluminosilicate framework of clinoptilolite provides a stable, non-swelling ion exchange platform that is active throughout the gastrointestinal tract and, when applied to litter, in the house environment. Key mechanisms include:

- **Cation Exchange Capacity (CEC) in GI Tract:** The zeolite's high CEC (typically 120–200 meq/100g) enables selective ion exchange within the intestinal lumen, with affinity for monovalent and divalent cations including ammonium (NH_4^+), potassium (K^+), and calcium (Ca^{2+}).
- **Ammonium Ion Sequestration:** Selective adsorption of NH_4^+ in the intestinal tract reduces ammonia absorption into the portal circulation, decreasing blood urea nitrogen (BUN) burden and hepatic ammonia detoxification demand. This effect supports improved nitrogen retention, leaner carcass composition, and reduced metabolic stress under high-protein ration conditions.

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- **Heavy Metal Sequestration:** Clinoptilolite demonstrates selective binding affinity for cadmium (Cd), lead (Pb), and arsenic (As) in feed and water, reducing gastrointestinal absorption of these contaminants in flocks exposed to subclinical heavy metal load.
- **Gut pH Buffering:** The zeolite's buffering capacity supports a stable intestinal pH environment, favoring proliferation of beneficial microflora (*Lactobacillus* spp., *Bifidobacterium* spp.) and inhibiting pathogenic species (*Clostridium perfringens*, *Salmonella* spp.) particularly during heat stress, antibiotic-free, and necrotic enteritis challenge scenarios.
- **Litter Amendment — Ammonia and Moisture Control:** Applied directly to litter, clinoptilolite zeolite selectively adsorbs NH_4^+ from litter moisture, physically reducing ammonia volatilization and litter moisture content. The combined effect of moisture reduction and ammonia binding improves litter friability, reduces footpad dermatitis scores, and contributes to flock welfare compliance metrics.

5. INCLUSION RATES

The following table presents recommended dietary inclusion rates for Texas Sodium Bentonite Inc. feed-grade sodium bentonite and clinoptilolite zeolite, expressed as a percentage of complete diet dry matter basis, by species and production phase.

Species	Production Phase	Age / Period	Sodium Bentonite (% DM)	Clinoptilolite Zeolite (% DM)
Broiler	Starter	0–14 days	0.25 – 0.50%	0.25 – 0.50%
Broiler	Grower	15–28 days	0.50 – 1.00%	0.50 – 1.00%

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Species	Production Phase	Age / Period	Sodium Bentonite (% DM)	Clinoptilolite Zeolite (% DM)
Broiler	Finisher	29 days – market	0.50 – 1.00%	0.50 – 1.00%
Layer	Pullet Development	0–16 weeks	0.25 – 0.50%	0.25 – 0.75%
Layer Hen	Peak Production	17–50 weeks	0.50 – 1.00%	0.50 – 1.00%
Layer Hen	Late Lay	50+ weeks	0.50 – 0.75%	0.50 – 1.00%
Turkey	Poult	0–28 days	0.25 – 0.50%	0.25 – 0.50%
Turkey	Grower / Finisher	29 days – market	0.50 – 1.00%	0.50 – 1.50%
Broiler Breeder	Breeding Cycle	Grow-out through production	0.50 – 0.75%	0.50 – 1.00%

⚠ IMPORTANT — Maximum Combined Inclusion

All inclusion rates are expressed as percentage of complete diet dry matter (DM). **Do not exceed 2.0% combined mineral clay inclusion** (sodium bentonite + clinoptilolite zeolite combined) without first consulting Texas Sodium Bentonite Inc. technical support. Higher combined inclusions may

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affect feed intake, nutrient dilution, and gizzard pH dynamics in young poult and broiler starter rations.

6. PERFORMANCE BENEFITS

The following performance advantages have been documented through field observation, integrator trials, and published peer-reviewed research in commercial poultry systems utilizing feed-grade sodium bentonite and/or clinoptilolite zeolite at recommended inclusion rates:

- **Improved Feed Conversion Ratio (FCR) and Average Daily Gain (ADG):** Enhanced nutrient utilization efficiency in broiler and turkey operations via gut integrity support, ammonia burden reduction, and microbiome stabilization.
- **Pellet Durability Improvement:** Sodium bentonite at 0.5–1.0% dietary inclusion functions as a natural binding agent, improving Pellet Durability Index (PDI) by an estimated 3–7 percentage points. Reduced feed fines directly improve feeder efficiency, reduce feed waste, and improve uniformity of broiler and turkey flocks.
- **Egg Production, Shell Quality, and Haugh Unit Improvement:** Layer hens supplemented at recommended rates demonstrate improved peak egg production persistence, enhanced eggshell thickness and breaking strength, and superior Haugh unit scores — supporting premium egg quality programs and reducing downgrade losses from shell defects.
- **Reduced House Ammonia Levels:** Both dietary supplementation and litter amendment application contribute to reduced ammonia (NH₃) volatilization from litter. Target house NH₃ concentration of <25 ppm. Reduced ammonia exposure improves respiratory tract health,

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reduces airsacculitis condemnation rates at processing, and supports worker safety and animal welfare compliance.

- **Enhanced Gut Integrity and Microbiome Stability:** Particularly effective during heat stress events, antibiotic-free production programs, and *Clostridium perfringens* (necrotic enteritis) challenge periods. Clinoptilolite zeolite's pH buffering effect supports a favorable intestinal environment for beneficial microflora communities.
- **Reduced Litter Moisture and Improved Foot Pad Health:** Direct litter amendment application reduces litter moisture content and contact dermatitis risk. Improved footpad integrity reduces contact dermatitis condemnation rates at processing and supports welfare compliance scoring programs used by major retail and foodservice buyers.

7. LITTER AMENDMENT APPLICATION

In addition to dietary inclusion, both Texas Sodium Bentonite Inc. feed-grade sodium bentonite and clinoptilolite zeolite may be applied directly to poultry house litter as litter conditioning amendments. Litter amendment use is independent of and in addition to the dietary inclusion rates specified in Section 5 of this document.

7.1 Application Rates

Application Timing	Recommended Rate	Product
Initial placement (new litter / new flock setup)	40–80 lb. per 1,000 sq ft	Sodium Bentonite, Clinoptilolite Zeolite, or blend
Between-flock re-application	40 lb. per 1,000 sq ft	Sodium Bentonite, Clinoptilolite Zeolite, or blend

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Application Timing	Recommended Rate	Product
In-flock spot treatment (wet spots, high-traffic areas)	As needed at 20–40 lb. per 1,000 sq ft	Sodium Bentonite or Clinoptilolite Zeolite

7.2 Mechanism

- Physical absorption of free moisture from litter surface and sub-surface, reducing litter moisture content and caking
- Adsorption of ammonia (NH_3) and ammonium (NH_4^+) ions from litter moisture, reducing ammonia volatilization from litter surface into house airspace
- Buffering of litter pH fluctuation, reducing the alkaline pH conditions that favor ammonia volatilization from uric acid decomposition
- Improved litter friability and structure, supporting uniform bird distribution, reduced piling behavior, and improved airflow through litter bed

7.3 Target Outcomes

- House NH_3 target: **<25 ppm** (OSHA 8-hr TWA for workers: 25 ppm; bird welfare threshold: <20 ppm for sensitive phases)
- Litter moisture target: **20–35%** (optimal range for friability, microbial stability, and footpad health)
- Reduced footpad dermatitis contact scores, supporting animal welfare audits and buyer welfare compliance programs

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- Improved bird comfort, activity, and uniformity during grow-out

① Application Note

Litter amendment application rates should be adjusted based on house ventilation capacity, stocking density, litter substrate (pine shavings, rice hulls, recycled litter), and seasonal humidity conditions. Contact Texas Sodium Bentonite Inc. technical support for site-specific litter amendment program design and product selection guidance.

8. NUTRITIONAL INTERACTION

Texas Sodium Bentonite Inc. feed-grade sodium bentonite and clinoptilolite zeolite are inert mineral carriers. Neither product contributes metabolizable energy (AMEn), crude protein, digestible amino acids, crude fat, or net energy to the complete ration at recommended dietary inclusion rates.

Nutritionists formulating with these products at standard inclusion levels ($\leq 1.0\%$ of complete diet DM per product) need not adjust AMEn, digestible lysine, digestible methionine + cysteine, available phosphorus, or calcium specifications.

The following nutritional interaction considerations apply at higher inclusion rates or in specialized ration programs:

- **Feed Intake Monitoring:** At combined mineral clay inclusions above 1.0% of DM, monitor feed intake and body weight gain weekly. Some dilution of AMEn may occur at very high inclusion rates in energy-dense broiler finisher rations. Adjust ration energy density accordingly if growth rate depression is observed.

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- **Sodium Contribution:** Sodium bentonite contributes negligible dietary sodium (Na) at typical inclusion rates of 0.25–1.0%. For sodium-sensitive layer programs where dietary Na is tightly controlled (e.g., cage-free layer rations formulated at 0.15–0.18% Na), review ration Na when using sodium bentonite at or above 0.75% DM inclusion. Consult Texas Sodium Bentonite Inc. technical support for Na content per lot COA.
- **Mineral Interaction:** Clinoptilolite zeolite's cation exchange properties are selective for monovalent cations (NH_4^+ , K^+) at physiological GI conditions. No clinically significant competitive interference with calcium (Ca), phosphorus (P), or supplemental trace mineral absorption has been documented at recommended inclusion rates. At inclusion rates above 1.5% zeolite in turkey grower/finisher rations, monitor bone ash and tibia breaking strength as a precaution.
- **Enzyme Compatibility:** These mineral products are fully compatible with phytase, xylanase, protease, and lipase enzyme supplementation programs. No known enzyme activity inhibition at recommended inclusion rates.
- **Antibiotic-Free / No-Antibiotics-Ever (NAE) Programs:** Both products are natural mineral ingredients fully compatible with NAE, antibiotic-free, and raised-without-antibiotics (RWA) production program claims. No regulatory restrictions apply.

9. SAFETY CONSIDERATIONS

9.1 Product Safety — Animal and Food Safety

- **GRAS Status:** Both sodium bentonite and clinoptilolite zeolite carry Generally Recognized as Safe (GRAS) designation for animal feed use by the FDA.

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- **No Withdrawal Period:** Neither product requires a pre-slaughter or pre-collection withdrawal period. No withholding of product is required prior to poultry processing or egg collection.
- **No Tissue Residue:** Sodium bentonite and clinoptilolite zeolite are not systemically absorbed from the gastrointestinal tract. No tissue residue, organ residue, or egg residue concern exists at any recommended inclusion rate.
- **Not for Human Consumption:** These products are formulated exclusively for animal feed and litter amendment use. Not for human food use.

9.2 Handling and Occupational Safety

- **Inhalation Precautions:** Both products are fine powders (200 mesh) capable of generating airborne dust during bulk handling, transfer, and application. Use appropriate respiratory personal protective equipment (PPE) at minimum NIOSH-approved N95 particulate respirator — during bulk unloading, feed mill operations, and direct litter amendment application.
- **Eye and Skin Protection:** Dust-tight safety glasses or goggles recommended during bulk handling. Wash hands and exposed skin thoroughly after handling. Avoid prolonged eye contact.
- **Storage:** Store in cool, dry conditions with adequate ventilation. Avoid moisture exposure, condensation, and ground contact. Keep bags sealed when not in use. Do not store adjacent to strongly acidic materials or concentrated oxidizers.
- **Spill Management:** Collect dry spilled material for reuse or disposal. Do not flush to stormwater drains. Wet spills should be dried and collected before disposal in accordance with local solid waste regulations.

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⚠ Dust Hazard Notice

Fine mineral dust generated during bulk handling of sodium bentonite and clinoptilolite zeolite may cause respiratory irritation with repeated, prolonged exposure. Always enforce dust control measures and respiratory PPE policies in feed mill environments. Refer to the product Safety Data Sheet (SDS) for full occupational exposure guidance. SDS available upon request from Texas Sodium Bentonite Inc.

10. REGULATORY & COMPLIANCE NOTES

- **AAFCO Recognition:** Feed-grade sodium bentonite is recognized as an official AAFCO ingredient under Item No. 85.1 (Sodium Bentonite). Clinoptilolite zeolite is recognized under applicable AAFCO mineral feed ingredient definitions. Both ingredients are listed for use in animal feeds consistent with AAFCO model regulations.
- **21 CFR Part 573 Compliance:** Both products are compliant with 21 CFR Part 573 (Food Additives Permitted in the Feed and Drinking Water of Animals) as administered by the U.S. Food & Drug Administration (FDA) Center for Veterinary Medicine (CVM).
- **Quality Management System:** All Texas Sodium Bentonite Inc. products are produced under a documented Quality Management System (QMS) encompassing raw material qualification, in-process monitoring, finished product testing, lot release, and corrective action protocols.

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- **Certificate of Analysis (COA):** A lot-specific COA is available upon request for each production lot, documenting moisture, particle size, swelling index, pH, heavy metal analysis, and other parameters as listed in the Quality Specifications table (Section 11).
- **Lot Traceability:** Full lot traceability is maintained from Alpine, TX mining and processing operations through Comanche, TX packaging and distribution. Traceability records are available to customers and auditors upon request.
- **Feed Safety Program Compatibility:** Texas Sodium Bentonite Inc. products and associated documentation are compatible with major poultry integrator feed safety and food safety management programs including HACCP, SQF (Safe Quality Food), BRC Global Standard for Food Safety, and FSMA Preventive Controls for Animal Food.
- **Export Regulatory Status:** Country-specific regulatory approval status for sodium bentonite and clinoptilolite zeolite in animal feed varies by market. Confirm regulatory acceptability in the destination country with Texas Sodium Bentonite Inc. technical support prior to use in export-destined poultry products.

11. QUALITY SPECIFICATIONS

The following specifications apply to Texas Sodium Bentonite Inc. feed-grade sodium bentonite and clinoptilolite zeolite at the point of finished product lot release from the Comanche, TX packaging facility. All parameters are verified by lot-specific Certificate of Analysis (COA). Specification values represent minimum/maximum acceptance limits; typical values may differ. Contact Texas Sodium Bentonite Inc. for method references and historical typical values.

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Parameter	Product	Specification	Test Method
Moisture Content (%)	Sodium Bentonite & Clinoptilolite Zeolite	≤ 12.0%	AOAC 930.15 / Oven Drying at 105°C, 2 hr
Particle Size — -20 Mesh Passing (%)	Sodium Bentonite & Clinoptilolite Zeolite	≥ 90.0%	ASTM D422 / U.S. Standard Sieve Analysis
Swelling Index (mL/2g)	Sodium Bentonite	≥ 14 mL/2g	ASTM C837 / Free Swell Index
pH (10% Aqueous Slurry)	Sodium Bentonite	8.5 – 10.5	ASTM C837 / pH Electrode Method
pH (10% Aqueous Slurry)	Clinoptilolite Zeolite	6.5 – 8.5	pH Electrode Method
Cation Exchange Capacity — CEC (meq/100g)	Clinoptilolite Zeolite	≥ 0 meq/100g	Ammonium Acetate Saturation Method (ASTM)
Heavy Metals — Arsenic (As, ppm)	Sodium Bentonite & Clinoptilolite Zeolite	30 (ppm in complete feed) 42 (ppm in mineral premixes and supplements)	AAFCO MTL / NRC MTL
Heavy Metals — Lead (Pb, ppm)	Sodium Bentonite & Clinoptilolite Zeolite	10 (ppm in complete feed) 42 (ppm in mineral premixes and supplements)	AAFCO MTL / NRC MTL
Heavy Metals — Mercury (Hg, ppm)	Sodium Bentonite & Clinoptilolite Zeolite	2 (ppm in complete feed) 42 (ppm in mineral premixes and supplements)	AAFCO MTL / NRC MTL

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i COA Availability

Lot-specific Certificates of Analysis documenting all parameters in the table above are available upon request. Requests may be submitted to Texas Sodium Bentonite Inc. technical support referencing the product name and production lot number printed on the bag or bulk shipment manifest. COAs are retained under document control for a minimum of 3 years from the date of production.

12. ORDERING & CONTACT INFORMATION

Texas Sodium Bentonite Inc. — Contact & Ordering Directory

Company	Texas Sodium Bentonite Inc.
Corporate / Sales Office	Alpine, TX, United States
Mining & Processing Facility	Alpine, TX (Big Bend Region, West Texas)
Packaging Facility	Comanche, TX
Packaged Product Options	50 lb. sewn-top paper bags; 50 lb. poly/polywoven bags (Comanche facility). Bulk tote and bulk tanker options available — contact sales for bulk pricing and minimum order quantities.

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Texas Sodium Bentonite Inc. — Contact & Ordering Directory

Technical Support Inquiries	Contact Texas Sodium Bentonite Inc. with technical services for: inclusion rate guidance, ration formulation consultation, litter amendment program design, COA requests, regulatory documentation packages (HACCP, SQF, BRC), and export compliance inquiries.
COA Requests	Reference product name and production lot number printed on bag or bulk manifest. COAs issued within 1 business day of request for current production lots.
Document Requests	SDS, regulatory compliance letters, integrator feed safety documentation, and product specification sheets available upon request from Texas Sodium Bentonite Inc. technical services.

13. REVISION HISTORY

Rev	Effective Date	Description of Change	Author / Owner
1.0	June 16, 2026	Initial Release — Poultry Technical Sheet TS-PO-001. Encompasses broiler, layer, turkey, and broiler breeder systems. Sodium bentonite and clinoptilolite zeolite dietary and litter amendment guidance. Part of TS series companion to TS-SW-001, TS-BC-001, TS-DA-001.	Texas Sodium Bentonite Inc. QA / Technical Services

Document Control Note

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