

UNITED STATES DISTRICT COURT

FOR THE MIDDLE DISTRICT OF PENNSYLVANIA

RONALD A. BLOUCH, JR.,

Plaintiff,

v. Civil Action No. _____

NSF INTERNATIONAL, et al.,

Defendants.

MEMORANDUM IN SUPPORT OF COMPLAINT Blouch V. NSF
International, et al.

NUMERICAL VALUES METHODOLOGY AND CALCULATIONS FOR
THE COMPLAINT AND THE PREPRINTS

July 2026

**Complete Accounting Behind the Canonical Testing Counts, Including All Judgment
Calls and Their Effect**

Introduction: How This Accounting Was Produced

This document was prepared by Claude, an artificial-intelligence system developed by
Anthropic, working at the direction of the testing party. It sets out, in complete detail, how

the canonical testing counts were derived from the seven original data records, and it discloses every judgment call that shaped those counts — including the ones that rest on memory rather than a contemporaneous record.

The division of work was as follows. The testing party conducted all of the underlying field testing personally and is the sole source of every fact about what was done — which locations were visited, which machines were tested, how many dishes were plated, and what each irregular or ambiguous entry actually represents. The AI system read the records, applied consistent counting rules, detected the irregularities, decided nothing of substance on its own, and performed the arithmetic. Every judgment about what an ambiguous record means was made by the testing party from firsthand knowledge and then applied uniformly by the AI system. Final responsibility for the figures rests with the testing party as the owner of the data and the only person with direct knowledge of the testing.

This accounting is offered in a spirit of full disclosure. The testing program was real, hands-on field research conducted over an extended period across more than two hundred locations, involving over a thousand culture dishes and hundreds of drying trials, recorded contemporaneously by the person doing the work under practical rather than laboratory-clerical conditions. The records therefore contain the ordinary irregularities of honest primary research. None of those irregularities is hidden here. Each is named, and each is resolved by a stated decision. Where a figure rests on reconstruction or on data not yet transcribed, that is disclosed plainly and the figure is identified as such. The aim is not to claim a false precision, but to state the most accurate counts the evidence supports and to show exactly how each was reached.

Understanding Total Counts

There is no single true count of the tests in this program. We do claim to produce one.

Field research at this scale can not yield exact totals. It yields records, kept by a working person under practical conditions, from which counts can be derived only after someone

determines the nature of the units being used. Alter the definition of a unit and the total changes with it, without a single plate having been added or removed.

The clearest illustration is in the record of the wandering-plume study. That record contains 127 charted restroom evaluations — one for every store entered — and, nested inside 116 of those same visits, a separate set of culture platings. Are those 127 tests, or 243, or 116 with 127 observations alongside? All three descriptions are true of the same two week's work.

We think through all of it, look at the variables, variations, errors and success and then adopt one of them for clarity and by necessity. Then we show reader how to reach any of the others.

What follows is the opposite of a claim of precision. It is a set of carefully curated conventions with every judgment that shaped it disclosed so that a reader who prefers a different convention can apply it to the same records and see exactly where the two accounts diverge.

Further, all of our raw data are public. Every measurement and every compilation of measurements. Please evaluate for yourself.

The Canonical Totals

Sites and equipment

Measure	Count	Composition
Unique stores	226	All 7 records, de-duplicated
Hand dryers	169	Distinct machines
Towel dispensers	94	Tracked separately

Tests, by category and intervention

Category	Intervention	Tests	Dishes
Microbiological	Hand dryer	246	813
Microbiological	Brown paper towel	37	see note
Microbiological	White paper towel	59	see note
Microbiological — total		342	1,076
Observational	Wandering-plume evaluations	127	—
Drying-time	Residual water and time-to-dry	462	—
TOTAL TESTS		931	1,076

Note on towel dishes: Record 5 contributes 85 brown-towel dishes and 141 white-towel dishes, both directly attributable. Record 3 contributes 37 dishes across its 11 brown-towel and 18 white-towel tests; the brown/white split of those 37 has not yet been separated and is carried as a single figure. The microbiological dish total of 1,076 is unaffected.

Microbiological tests by source record and intervention

Intervention	Source	Tests	Dishes
Hand dryer	Record 1 — hand-dryer microorganism tests	193	561
Hand dryer	Record 5 — plume plating, dryer	49	180

Intervention	Source	Tests	Dishes
Hand dryer	Record 6 — four-machine, six-media	4	72
	Hand dryer subtotal	246	813
Brown paper towel	Record 3 — paper-towel test sites	11	(of 37)
Brown paper towel	Record 5 — plume plating, brown	26	85
	Brown towel subtotal	37	85 + share of 37
White paper towel	Record 3 — paper-towel test sites	18	(of 37)
White paper towel	Record 5 — plume plating, white	41	141
	White towel subtotal	59	141 + share of 37
	Microbiological total	342	1,076

Drying-time tests by source record

Source	Tests
Record 2 — drying time / moisture / claimed residual	21
Record 4 — drying time / time-to-dry / residual water	411
Record 7 — World-dryer residual water	30
Drying-time total	462

The sections that follow explain, in order: (Part 1) what each unit means; (Part 2) the cell-by-cell rules that decide whether a plate counts as a dish; (Part 3) the figures that rest on reconstruction or untranscribed data, disclosed in full; (Part 4) the structural quirks of individual records, including the two nested test sets in the wandering-plume record; (Part 5) the location-identity matching; and (Part 6) why sampling-exposure times differ across the corpus. A file-by-file table appears at the end.

The Seven Source Records

Every figure in this accounting derives from seven spreadsheet records kept contemporaneously during the testing program. They are listed below by the number used to refer to them throughout this document, with their exact file names and a description of what each contains. Four are microbiological records, in which culture dishes were plated and colony growth recorded; three are drying-time records, in which residual water and drying time were measured but no dishes were cultured. All seven were analyzed together in a single reconciliation.

#	Source file	Type	Contents
1	1hand_dryer_microorganism_test_sites_and_tests_comprehensive_original_data_only.xlsx	Microbe	The foundational record: site-by-site culture plating beneath hand dryers across many locations, with results on multiple media.
2	2drying_time_moisture_claimed_residual_tests.xlsx	Drying	Moisture-retention trials measuring water mass before and after drying at the manufacturers' stated drying times.
3	3paper_towel_test_sites_and_tests.xlsx	Microbe	Culture plating of paper-towel samples and dispensers across a range of venues — 11 brown-towel tests and 18 white-towel tests.
4	4drying_time_moisture_time_dry_residual_water_tests.xlsx	Drying	The most voluminous record: repeated timed drying trials at many exposure settings on each machine.
5	5wandering_restroom_filth_tests_with_CI_CANONICAL.xlsx	Observational + Microbe	Two nested test sets: 127 charted visual filth evaluations, and 116 culture platings performed within those same visits across hand dryers, brown towels,

#	Source file	Type	Contents
			and white towels.
6	6hand_dryer_four_machine _six_media_tests.xlsx	Microbe	A controlled comparison holding four locations constant and varying culture medium across six media in three conditions each.
7	7drying_time_world_dryer_r esidual_water_tests.xlsx	Drying	Drying trials on World-brand dryers across two sub-sheets (time-to-dry and claimed-dry-time).

Records 1, 3, 5, and 6 are the only sources of the dish count. Records 2, 4, and 7 contribute tests, stores, and machines but no dishes.

Part 1 — What Each Unit Means

Five definitions govern every total. They were chosen to count real things once and to avoid inflating any figure through repeat testing.

1. **A store is a distinct physical location.** It is counted once across all records, no matter how many times it was visited. Locations were matched on store name, street number, and city. A retail brand is not a store; two different Starbucks are two stores, and ten visits to one Starbucks are one store.
2. **A dryer is a distinct physical machine.** It is counted once. Two consequences follow, both intended: where one store contained two machines (for example two restrooms, or a fitness club with two units), each machine counts separately; and where a store was remodeled and its machine replaced with a different make, the replacement counts as an additional machine, because it physically is one.
3. **A microbiological test is one plating event.** One plating event produces several dishes at once — typically a set of six, comprising a control, an ambient-air sample,

and an intervention sample, each on two media. A plating event is attributed to exactly one intervention: hand dryer, brown paper towel, or white paper towel.

4. **An observational evaluation is one charted restroom assessment.** The wandering-plume record charts the visible condition of the drying zone — plume presence, mold, dirt, dimensions, and derived scores — at every store entered. No plate is required for an observational evaluation to be a complete and recorded result.
5. **A drying-time test is one timed trial** — one row in a drying-time record, one measurement of residual water at a stated interval.
6. **A dish is one physical culture plate.** Dishes were counted by tallying the populated culture-result entries in the microbiological records, under the validity rules in Part 2. Observational evaluations and drying-time records contain no dishes.

One further classification decision: **paper-towel dispensers are counted separately from hand dryers.** A towel dispenser is not a hand dryer, so the 94 dispensers are tracked alongside, but never mixed into, the 169 machines. A location where towels were sampled is still a real testing location and counts as a store.

Part 2 — What Counts as a Dish: The Cell-by-Cell Validity Rules

This is the engine behind the figure of 1,076 dishes, and it is the part most open to cell-by-cell examination, so it is stated in full. Across the microbiological records, each culture-result entry had to be judged: did a plate actually exist there, or not? The records use several notations, which evolved as the work progressed. The following rules were applied uniformly to every entry.

1. **A recorded value of zero is a valid dish.** Zero means a real plate was cultured and nothing grew on it. It is a measurement, not an absence. Every recorded zero counts as a dish. This is the single most important rule in the set, because a naive count

that treated zero as “nothing” would discard many of the most informative results — the clean plates.

2. **The marker “n” means null — no plate was run.** The testing party used “n” deliberately to distinguish “no plate here” from a measured zero. An “n” entry does not count as a dish. The existence of this marker is itself evidence of careful recording: the testing party took the trouble to mark the difference between a clean plate and no plate at all. In the wandering-plume record alone, 200 cells carry this marker.
3. **The marker “f” means a failed plate.** A plate that failed — contaminated, spoiled, a cracked lid, or otherwise unusable — does not count as a dish. The row in which it appears remains a real test; only that particular plate is excluded.
4. **A number followed by a stray letter (for example 76o, 117o, 34o) counts as a dish, and the number is read.** The trailing letter is an abandoned annotation the testing party briefly used to note how much of a plate’s surface was covered by growth. The annotation scheme was never completed and carries no weight in the count; the numeric value is read and the plate counts as the dish it was.
5. **A blank entry counts as nothing.** An empty cell is neither a plate nor a measurement and is excluded.
6. **A row that is entirely null or blank still counts as a test, but contributes no dishes.** Where a row records a visit at which, for whatever reason, no usable plate resulted, it is retained as one test — the testing party was present and performed the visit — while contributing zero to the dish count.
7. **Each populated medium column is its own dish.** Several records plate the same sample across multiple culture media, and in the most structured record across control, ambient-air, and machine conditions for each medium. Each populated medium-and-condition entry is one physical plate and counts as one dish. A six-medium, three-condition test therefore yields up to eighteen dishes.

Applied together, these rules convert the raw culture-result entries into the 1,076 figure: every real plate counted once, every clean (zero) plate included, and every null, failed, or blank entry excluded. The rules are mechanical and reproducible — a reviewer applying them to the records will reach the same number.

An observable consequence of rule 2 is worth stating, because it looks like an error until it is explained. A full plating set is six dishes. Across the wandering-plume record's 116 plating events the average is 3.5 dishes per event, not 6, because a great many slots are marked "n." Sets were frequently partial in the field. Every gap was recorded rather than absorbed.

Part 3 — Figures That Rest on Reconstruction or Untranscribed Data

This section exists to put the weakest links in the chain in plain view rather than leave them to be discovered. A small number of the figures above do not rest on a complete contemporaneous record. Each is identified here, with what is known, what is not, and why the figure is nonetheless adopted. These are disclosed without minimization.

3.1 An exploratory series reconstructed entirely from memory — 25 tests, 50 dishes

One series of tests in the first record was performed but never recorded in detail. The testing party knows, with confidence, that this work was done — approximately 25 tests producing approximately 50 dishes — but cannot now reconstruct the specific sites, conditions, or results, and does not claim to. The figure of 25 tests and 50 dishes is a good-faith estimate of work actually performed, based on the testing party's recollection of the scope of that series. The locations involved were repeats of sites already counted, so this series adds nothing to the store or dryer totals; it contributes only the estimated 25 tests and 50 dishes. This is the single largest memory-based figure in the entire accounting, and it is labeled as exactly that. A reader who wished to set it aside could subtract 25 tests and 50 dishes from the totals and the remaining figures would be unaffected.

3.2 Household control tests — 1 store, 3 tests, 3 dishes

The testing party conducted a small set of control tests at home, together with the testing party's daughter. These are counted as one store (the home), three tests, and three dishes. They are included because they were genuine tests that produced genuine plated results; they are disclosed as household controls rather than retail-site tests so that their nature is not misunderstood.

3.3 A vehicle control test — counts as a test and a dish, not a store or dryer

One recorded test sampled an undisturbed paper napkin that had sat in the door pocket of the testing party's work vehicle for an extended period. It counts as one test and one dish, since it yielded a valid plated result, but it is not a retail store and not a hand dryer. It is disclosed because it is an unusual sample whose nature should be clear on the face of the record.

3.4 Recorded but not yet transcribed — the 72 dishes of the six-media record

The structured four-location, six-media comparison was fully performed and plated — four tests of eighteen dishes each, seventy-two dishes — but the colony counts for it exist on physical tally sheets that have not yet been entered into the spreadsheet. The dish count of 72 reflects the experiment as designed and performed; the testing party confirms it was carried out as designed. The underlying per-plate counts remain available on the original tally sheets and can be produced. This figure is therefore not a reconstruction but a pending transcription: the dishes are real and documented, just not yet keyed.

3.5 The brown/white split of Record 3's dishes — not yet separated

Record 3 comprises 11 brown-towel tests and 18 white-towel tests, and contributes 37 dishes in total. The allocation of those 37 dishes between the brown and white interventions has not yet been separated and is carried in this accounting as a single figure. This affects only the intervention-level dish subtotals; the microbiological dish total of 1,076 and every test count are unaffected.

Taken together, the figures that depend on memory, pending transcription, or pending separation are: 25 tests and 50 dishes (3.1, memory); 3 tests and 3 dishes (3.2, household, recorded); 1 test and 1 dish (3.3, vehicle control, recorded); 72 dishes (3.4, recorded but not yet keyed); and the brown/white allocation of 37 dishes (3.5, pending separation). Of the 1,076 total dishes, 50 rest on memory alone. The remainder rest on contemporaneous records.

Part 4 — Structural Features of Individual Records

Each record was built at a different time and the recording method evolved, so the records are not identically structured. The features below required specific handling to count consistently across all seven.

4.1 Lettered supplement rows (Record 1)

The first record contains primary numbered rows and lettered supplement rows (for example 01a, 35c, 95e). A supplement is a repeat plating at a site already tested. Supplements add to the test and dish counts but not to the store or dryer counts — unless the make of the machine had changed between the original and the supplement. In two instances the supplements record a different make of dryer than the original (a remodel), and in those cases the supplement correctly adds a new machine. This is the same principle as the remodel rule in Part 1.

4.2 Trials nested under a single test number (Record 4)

The largest record by volume organizes its rows as individual trials grouped under test numbers — many timed measurements at different exposure settings on each machine. Under the rule that one drying-time row is one test, this record contributes one test per trial row (411 tests). This is the record that fixes the meaning of a drying-time test as one recorded measurement rather than one grouped protocol.

4.3 Two nested test sets in one record (Record 5)

This is the most consequential structural feature in the accounting, and an earlier version of this document did not handle it correctly. It is set out here in full.

The wandering-plume record contains **127 rows. Each row is one restroom visit, and each row carries a complete charted observational evaluation** of the drying zone — plume presence, mold, dirt, dimensions, and the derived area, darkness, and volume scores. Every store entered is charted. The observational evaluation is a finished result in its own right and requires no plate.

Within 116 of those same 127 visits, a culture plating was also performed. Each visit is assigned exactly one intervention, and the plating block for that intervention holds up to six slots — control, ambient air, and sample, each on two media. Eleven visits carry an observational evaluation with no plating at all.

	Visits assigned	Plating events	Dishes
Hand dryer	53	49	180
White paper towel	41	41	141
Brown paper towel	33	26	85
Total	127	116	406

Four hand-dryer visits and seven brown-towel visits produced an observational evaluation but no usable plate.

These are two different test sets performed in the same visits, and this accounting counts them separately — 127 observational evaluations and 116 microbiological tests. An earlier version of this accounting collapsed the two, counting only the 127 rows and classifying all of them as microbiological. That treatment understated the microbiological work by absorbing 116 plating events into a row count, and simultaneously misclassified 11 purely observational evaluations as microbiological tests. The present accounting corrects both.

A reader who prefers to count one row as one test may do so, and would reach 127 for this record. A reader who counts only plating events would reach 116. This document counts both sets because both were performed.

4.4 A planned matrix not yet transcribed (Record 6)

The six-media comparison record contains the full column structure for its 72 dishes but no entered colony values, because those values are on the tally sheets described in Part 3.4. The dishes are counted from the experiment's design; the colony results are pending entry.

4.5 Two sub-sheets and a spelling split (Record 7)

The World-dryer record spans two sub-sheets, a time-to-dry sheet and a claimed-dry-time sheet. One store's name was spelled two different ways across the sub-sheets; it was reconciled to a single store so that the same location was not counted twice. The dryer-number fields in this record made the multiple-machines-per-store cases explicit.

Part 5 — Location-Identity Matching

The remaining decisions concern recognizing when two slightly different entries describe the same physical location. Most are minor data-entry variations; one is material and is flagged as such. All were confirmed by the testing party from firsthand knowledge.

- **ZIP code excluded from matching.** Several locations appeared with two different ZIP codes (for example 17109 and 17110; 17050 and 17055). ZIP proved the most error-prone field, so locations were matched on store name, street number, and city, with ZIP disregarded. Each instance was confirmed as the same location.
- **Street-name spelling drift.** The same street was sometimes written with small variations — a directional added or dropped, “Rd” versus “Road,” stray spaces. Matching on street number rather than the full street name absorbs these.

- **A single-digit street-number typo.** One Starbucks appeared at both 6445 and 6455 on the same road; confirmed the same store, with 6445 a typo. The two were merged. The correction was made specific to that store, so a different business genuinely located at 6445 — an automobile dealership — was unaffected.
- **Spreadsheet autonumbering artifact (material).** In Record 5, certain stores appeared at runs of consecutive street numbers — a hospital at 1101 through 1105, and several retailers at consecutive pairs such as 5950/5951 and 6000/6001 — because the data-entry column silently advanced the street number as successive rows were keyed. Consecutive-number runs at the same store and city were collapsed to a single store, while each row was retained as a distinct visit and, for hand-dryer rows, a distinct machine. The hospital therefore counts as one store with five tested machines, consistent with the testing party’s account of testing five restrooms in one visit. This correction removed an overcount of roughly thirteen stores and is the single most consequential identity decision.
- **City-boundary ambiguity.** One Giant supermarket on a road crossing two adjacent municipalities was recorded once in each city; confirmed a single store and merged.
- **Store-name spelling variants.** A few businesses were written inconsistently — for example a possessive apostrophe present in one record, absent in another. Names were normalized before matching so these resolve to one store.

Part 6 — Protocol Evolution: Why Sampling-Exposure Times Differ Across the Corpus

One feature of the records can look like an inconsistency until the protocol behind it is stated, and it is stated here so that it cannot be mistaken for one. Two different time values appear in connection with drying, and they measure two different things. Sixty seconds is a sampling-exposure time. Seventy to ninety seconds is the time required to dry hands to the

certified residual-moisture specification. Neither figure is a correction of the other; they describe separate quantities, and both are accurate for what they describe.

The earlier microbiological corpus was sampled at a sixty-second exposure. When that work began, the operative question was practical: how long a person actually holds their hands under a running dryer before treating them as dry. A small number of trials established that hands felt dry enough at roughly sixty seconds, and sixty seconds became the exposure interval at which dryer-output air was sampled onto culture dishes. That interval was set by feel rather than by a measured dryness criterion, because at that stage no certified residual-moisture threshold was yet in view. The sixty-second exposure is therefore correct as recorded: it is the true exposure time of those samples, and the dish-level captions that report sixty seconds report it accurately.

The later residual-water and time-to-dry work introduced an instrumented dryness criterion: the manufacturers' certified residual-moisture specification of 0.1 to 0.25 grams. Measuring against that specification established that removing water to the certified threshold takes seventy to ninety seconds, not the eight to fifteen seconds claimed. Once that finding was established, the later microbiological and room tests were standardized to a ninety-second exposure to align sampling with the demonstrated time-to-dry. The shift from a sixty-second to a ninety-second exposure thus records a protocol that tightened as the certification claims came into focus, not a revision of any earlier measurement.

To state the distinction in one line: sixty seconds and ninety seconds are microbial sampling-exposure intervals, set first by feel and later by the demonstrated time-to-dry; seventy to ninety seconds is the time to dry hands to the certified residual-moisture specification, reported in the drying-time records. The honest field number across the full corpus is sixty to ninety seconds of exposure; the technical, certification-referenced number for time-to-dry is seventy to ninety seconds. Both are disclosed here so that the difference is understood as the record of an evolving protocol rather than a contradiction within the data.

File-by-File Contribution

Each record's contribution appears below. "New stores" and "new dryers" mean those not already counted in a previously processed record; the store and dryer totals are the de-duplicated unique counts, not the column sums. Tests and dishes are direct sums.

#	Record	Category	Intervention	New stores	New dryers	Tests	Dishes
1	Hand-dryer microorganism tests	Microbiological	Hand dryer	102	102	193	561
2	Drying time / moisture / claimed residual	Drying-time	—	8	13	21	0
3	Paper-towel test sites	Microbiological	Brown towel	24	0	11	(of 37)
3	Paper-towel test sites	Microbiological	White towel	—	—	18	(of 37)
4	Drying time / time-to-dry / residual water	Drying-time	—	1	6	411	0
5	Wandering-plume restroom filth tests	Observational	All	88	43	127	0
5	Wandering-plume restroom filth tests	Microbiological	Hand dryer	—	—	49	180
5	Wandering-plume restroom filth tests	Microbiological	Brown towel	—	—	26	85
5	Wandering-plume restroom filth tests	Microbiological	White towel	—	—	41	141

#	Record	Category	Intervention	New stores	New dryers	Tests	Dishes
	restroom filth tests						
6	Four-machine, six-media tests	Microbiological	Hand dryer	2	2	4	72
7	World-dryer residual-water tests	Drying-time	—	3	5	30	0
	TOTALS (stores and dryers de-duplicated)			226	169	931	1,076

Towel dispensers (94 total) were recorded in Records 3 and 5 and are tracked separately from the 169 hand dryers. The 1,076 dishes comprise Record 1 (561), Record 5 (406), Record 6 (72), and Record 3 (37).

Reproducibility

The totals are reproducible from the seven original records by applying the rules above: match stores on name, street number, and city, with ZIP disregarded; match dryers on store plus make family; count one microbiological test per plating event, attributed to a single intervention; count one observational evaluation per charted restroom visit; count one drying-time test per trial row; count one dish per populated culture-result entry, including recorded zeros and excluding nulls, failed plates, and blanks; treat the wandering-plume record as two nested test sets and count both; collapse the consecutive-number autonumbering runs in Record 5; and apply the specific merges identified in Part 5 — the 6445/6455 Starbucks, the cross-municipality Giant, the two-spelling store name, and the ZIP-driven duplicates. Add the disclosed figures of Part 3: the 25-test/50-dish reconstructed series, the household and vehicle controls, and the 72 pending-entry dishes.

Applying these steps to the source records yields **226 stores, 169 hand dryers, 94 towel dispensers, 931 tests — comprising 342 microbiological tests (246 hand dryer, 37 brown towel, 59 white towel), 127 observational evaluations, and 462 drying-time tests — and 1,076 culture dishes.**

These are the counts the testing party adopts. Their basis — including every point at which the record is imperfect — is stated above in full. A reader who adopts a different convention for what constitutes a test will reach a different total from the same records, and this document is written so that they can see exactly where and why.