

1 Department of Agriculture

2 Planning Division

3

4 Adopted Rule Governing Vacuum Processing of Smoked Fish

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6 Rules as Adopted

7 1545.3350 VACUUM PACKAGED HOT PROCESSED SMOKED OR HOT PROCESSED

8 SMOKE-FLAVORED SALMON.

9 Subpart 1. Applicability. Parts 1545.3180 to 1545.3260,
10 1545.3280, 1545.3290, and 1545.3310 do not apply to air tight or
11 vacuum packaged hot processed smoked or hot processed
12 smoke-flavored salmon which has been processed and packaged in a
13 processing facility in compliance with National Marine Fisheries
14 Service, chapter 2; Code of Federal Regulations, title 50, part
15 260 and which meets the requirements of this part.

16 Subp. 2. Defrosting. Defrosting of eviscerated frozen
17 salmon must be carried out in:

18 A. air at 45 degrees Fahrenheit or below until the
19 salmon is completely thawed and the internal temperature of any
20 part of the salmon does not exceed 45 degrees Fahrenheit; or

21 B. a continuous water flow tank or spray system until
22 the salmon is thawed. Salmon may not be mixed with other
23 species during thawing. Salmon may not remain in the tank for
24 over four hours after they are completely defrosted and the
25 temperature in any part of the salmon may not exceed 60 degrees
26 Fahrenheit during this period. If longer delays are
27 encountered, the salmon must be returned to temperatures of 38
28 degrees Fahrenheit or below until the salmon is brined.

29 Subp. 3. Washing. Both fresh and thawed salmon must be
30 washed thoroughly with a vigorous chlorinated water spray or in
31 a continuous water flow system prior to brining. The chlorine
32 concentration in the water may not exceed 50 parts per million
33 available chlorine.

34 Subp. 4. Dry-salting; brine. Salmon must be dry-salted at
35 a temperature not to exceed 38 degrees Fahrenheit throughout the
36 salmon, or if brined, the salmon may not be mixed with other

1 species of fish in the same tank and must be brined so that the
2 temperature of the salmon and the brine does not exceed 60
3 degrees Fahrenheit at the start of brining.

4 If the brine time exceeds four hours, the brining must take
5 place in a refrigerated room of 42 degrees Fahrenheit or lower.
6 The salmon may not be held above 38 degrees Fahrenheit for more
7 than 48 hours.

8 Brines may not be reused unless there is an adequate
9 process, such as ultrafiltration, to return the brine to an
10 acceptable microbiological level. Brine tanks that have been
11 used to brine other species of fish must be cleaned and
12 sanitized before being used to brine salmon.

13 Subp. 5. Sodium chloride, sodium nitrite content. Hot
14 process smoked or hot process smoke-flavored salmon must be
15 brined so that the final sodium nitrite content of the loin
16 muscle of the finished product is not less than 100 parts per
17 million and is not more than 200 parts per million immediately
18 after processing. These same products may not contain less than
19 the minimum concentration of one of the following combinations
20 of water phase salt and sodium nitrite in the deepest part of
21 the loin:

22 A. 3.5 percent water phase salt with 100 parts per
23 million nitrite.

24 B. 3.4 percent water phase salt with 120 parts per
25 million nitrite.

26 C. 3.3 percent water phase salt with 140 parts per
27 million nitrite.

28 D. 3.2 percent water phase salt with 160 parts per
29 million nitrite.

30 E. 3.1 percent water phase salt with 180 parts per
31 million nitrite.

32 Subp. 6. Temperature monitoring. Hot process smoked or
33 hot process smoke-flavored salmon must be heated by a controlled
34 heat process that provides a monitoring system, such as
35 calibrated probes or dial thermometers, positioned in as many
36 strategic locations in the oven as necessary to assure that all

1 products reach the minimum internal temperature.

2 The temperature monitoring devices must be tested for
3 accuracy against a known accurate standard thermometer upon
4 installation and at least once a year thereafter, or more
5 frequently if necessary, to ensure their accuracy. Graduations
6 on the temperature monitoring devices may not exceed two degrees
7 Fahrenheit within a range of ten degrees Fahrenheit of the
8 processing temperature.

9 Each salmon portion must be heated to an internal
10 temperature of 150 degrees Fahrenheit or higher and maintained
11 at 150 degrees Fahrenheit or higher for 30 minutes or longer.

12 Subp. 7. **Application of smoke.** Liquid smoke, generated
13 smoke, or a combination of liquid smoke and generated smoke must
14 be applied to the entire product. If only liquid smoke is used
15 in the process, it may be applied to the product prior to, at
16 the beginning of, or during the process. Liquid smoke added
17 during the process must be applied before the internal
18 temperature of the product exceeds 125 degrees Fahrenheit. The
19 liquid smoke must be prepared by the aqueous process (U.S.
20 Patent 3,106,473) and have a minimum of the following major
21 constituents in its compositions: ten percent titratable
22 acidity, nine milligrams phenol per gram, 12 grams carbonyls per
23 100 milliliter. The constituents must be used at concentrations
24 of 50 percent or more.

25 When only generated smoke is used in the process, dense
26 smoke must be applied to the salmon for at least 90 minutes at
27 the beginning of the process. If a drying cycle is used in the
28 smoking process, the air temperature surrounding the salmon may
29 not exceed 110 degrees Fahrenheit and the time period may not
30 exceed 60 minutes at temperatures between 60 degrees Fahrenheit
31 and 110 degrees Fahrenheit before the application of smoke. If
32 temperatures below 60 degrees Fahrenheit are used, the time
33 period may not exceed six hours. Generated smoke must be
34 produced from burning hardwood. If a combination of liquid
35 smoke and generated smoke is used, the procedures for liquid
36 smoke must be followed and the generated smoke may be applied at

1 any stage of the process.

2 Subp. 8. Cooling; storage and distribution. The finished
3 product must be cooled to a temperature of 50 degrees Fahrenheit
4 or below within five hours after cooking and further cooled to a
5 temperature of 38 degrees Fahrenheit or below within 12 hours
6 after cooking. The finished product must be maintained at 38
7 degrees Fahrenheit or lower during all subsequent storage and
8 distribution.

9 Subp. 9. Labeling. Primary packages and master cartons
10 must be clearly marked with a statement to maintain the product
11 below 38 degrees Fahrenheit. If salmon is frozen, the label
12 must clearly direct users to thaw the salmon at refrigerated
13 temperatures and to store the thawed salmon below 38 degrees
14 Fahrenheit.

15 Subp. 10. Analysis. The finished product must be analyzed
16 chemically with sufficient frequency to assure that the required
17 water-phase salt and sodium nitrite is obtained and the other
18 chemical additives are present at authorized levels. To reduce
19 the possibility of postprocessing contamination with food
20 poisoning bacteria, the product must be vacuum-packaged only
21 within the facility in which it was processed.

22 Subp. 11. Methods. Samples must be analyzed by the
23 procedures described in the 14th edition of Official Methods of
24 Analysis of the Association of Official Analytical Chemists
25 (AOAC) (Sidney Williams (ed.), 1984), which is incorporated by
26 reference, or by methods which have been demonstrated to be
27 comparable to the AOAC methods. The publication incorporated in
28 this subpart is available at the Saint Paul Public Library and
29 is not subject to frequent change.

30 A. Water-phase salt analysis method. Determine
31 sodium chloride (NaCl in the following equation) according to
32 AOAC (14th ed.), sections 18.034 and 18.035.

33 Determine moisture (H₂O in the following equation)
34 according to AOAC (14th ed.), section 24.003(a).

35 Calculate water-phase salt as follows:

36 g NaCl in sample x 100

1 _____ = percent NaCl in water phase
2 g NaCl + g H₂O in sample

3 B. Sodium nitrite analysis method. Determine sodium
4 nitrite content according to AOAC (14th ed.) sections 24.044 and
5 24.045.

6 Subp. 12. Code marks; records. Permanently legible code
7 marks must be placed on the outer layer of every finished
8 product package and master carton. The marks must identify at
9 least the plant where the product was packed and the date of
10 packing. Records must be maintained at the processing facility
11 for a minimum of six months from the date of processing to
12 provide positive identification of (1) the process procedures,
13 including process time, temperature, and sodium nitrite and
14 water-phase salt levels, used for the manufacture of hot process
15 smoked and hot process smoke-flavored salmon, and (2) the
16 distribution of the finished product.

17 Subp. 13. Sale in other containers. Salmon meeting the
18 requirements of this part may also be packaged, stored,
19 transported, sold, offered, and exposed for sale in containers
20 which are not air-tight or vacuum-packed.