INSTYTUT CHEMII I TECHNIKI JĄDROWEJ

POLISH CERTIFIED REFERENCE MATERIAL

FOR MULTIELEMENT TRACE ANALYSIS

SOYA BEAN FLOUR (INCT-SBF-4)

GENERAL INFORMATION

INTENDED USE:	CHECKING THE ACCURACY OF ANALYTICAL WORK OF THE LABORATORIES ENGAGED IN THE DETERMINATION OF TRACE ELEMENTS IN BIOLOGICAL SAMPLES. CALIBRATION OF APPARATUS AND METHODS
ELEMENTS FOR WHICH CERTIFIED CONCENTRATIONS WERE ESTABLISHED:	Al, B, Ba, Br, Ca, Cl, Co, Cs, Cu, Fe, K, La, Mg, Mn, Mo, Ni, P, Rb, S, Sr, Th, Zn
ELEMENTS FOR WHICH NON-CERTIFIED "INFORMATION" VALUES ARE AVAILABLE:	Cd, Cr, Hg, Na, Pb, Sc, Sm, Ti, V

Produced and certified by:
INSTITUTE OF NUCLEAR CHEMISTRY AND TECHNOLOGY,
DORODNA 16, 03-195 WARSZAWA,
POLAND

Distributed by:
Department of Analytical Chemistry
Institute of Nuclear Chemistry and Technology
Dorodna 16, 03-195 Warszawa, POLAND
Phone: (+4822) 504 11 28
Fax: (+4822) 811 15 32
E-mail: rdybczyn@ichtj.waw.pl, hpolkows@ichtj.waw.pl
www.ichtj.waw.pl

ORIGIN, PREPARATION AND TESTING

The reference material Soya Bean Flour (INCT-SBF-4) was prepared by the Institute of Nuclear Chemistry and Technology (INCT). The material was procured from POLGRUNT (Poland) through Pro-Vita (Poland). Flour was prepared from soya bean grown in India, not genetically modified. The material was sieved through the 150 μm nylon sieves and stored in a polyethylene (PE) bag. Approximately 50 kg of sieved soya bean flour was collected. Examination by optical microscopy revealed that Martin's diameter of over 90% of particles was below 50 μm. The whole lot of soya bean flour was then homogenized by mixing for 20 hours in a 110 dm^3 PE drum rotated in three directions. After this time the preliminary homogeneity testing was performed by determining content of K and Rb by X-ray fluorescence method in five 6 g subsamples taken from the drum. The results did not reveal any inhomogeneity and the next step was distribution of the material into 150 cm^3 polypropylene (PP) bottles with a screw cap in 50 g portions (future certified reference material) and in 10 g portions into 60 cm^3 polyethylene tetraphtalate (PET) bottles (intercomparison sample), respectively. In order to assure the long-term stability, all containers with INCT-SBF-4 were sterilized by electron beam radiation (energy 10 MeV, dose 28 kGy) from the linear accelerator LAE-13/9. Final confirmation of homogeneity of Soya Bean Flour was performed by instrumental neutron activation analysis (INAA) analyzing 6 subsamples taken from different containers chosen at random and comparing the results with those obtained for 6 subsamples taken from the one (seventh, randomly chosen as well) container. Statistical evaluation using Fisher's and t-Student's tests for the sample size 100 mg proved good homogeneity in case of all examined elements, i.e. Co, Cs, Fe, K, Sc and Zn. These results prove that the material can be considered as homogeneous at least for sample mass ≥100 mg. Long-term stability was checked by comparing results obtained for one bottle (randomly chosen) stored under controlled conditions: in the air-conditioned room at 20°C (normal storage). Samples of the CRM (ca. 100 mg) were taken from the bottle after 0, 20 and 32 months of storage and concentration of six selected elements (Co, Fe, K, Rb, Sc and Zn) was determined by INAA method. Short-term stability was examined by the determination of concentrations of the above mentioned elements in the bottle stored in the CO_2 incubator (ASAB) at 37°C, 100% humidity and 5% CO_2. Statistical evaluation of the obtained results using t-Student's test indicates that there are no significant differences between the results obtained in both experimental conditions examined and that no significant trends can be observed. Consequently, it can be stated that the material is stable in time. The test is being continued and stability of INCT-SBF-4 will be monitored during the whole storage.

Determination of moisture content

In order to express the concentrations of elements on a dry-mass basis, moisture content should be determined on a separate subsample (not taken for analysis) by drying at 80°C for 24 hours.

CERTIFICATION

Assigning of certified values was done on the basis of world-wide interlaboratory comparison in which 92 laboratories from 19 countries participated providing 1107 laboratory averages (4873 individual determinations) for 58 elements. Their cooperation is gratefully acknowledged. The participants along with the INCT-SBF-4, analyzed also the CRM provided by the organizers the identity of which was unknown to them. This enabled to create two databases. The first called "original" contained all results for all elements in INCT-SBF-4 sent in by participants. The second database called hereafter "alternative" was created from "original" database for these elements for which certified values in the CRM, sent to participants and analyzed by them along with INCT-SBF-4, were available. The alternative database was created as follows: For every laboratory its results obtained for a given element in the CRM were examined. If the confidence limits of the laboratory results at a significance level $\alpha = 0.05$ did not overlap with confidence limit of the CRM, the results of this laboratory for the element in question were removed from the original population of results for INCT-SBF-4. Each of the two databases was subjected to statistical evaluation. The statistical evaluation of results for individual elements was based on the method published previously [1] with some later modifications [2-7]. This approach is being based on outlier's rejection procedure which uses concurrently four statistical criteria (namely those of Dixon (D), Grubbs (G), Skewness (S) and Kurtosis (K)) at the significance level of 0.05, followed by calculation of the overall means of results remaining after outlier rejection, standard deviations, standard errors, confidence intervals etc.

The criteria used to decide whether the overall mean can be given the status of certified value were as follows:

1. The ratio of the one-sided confidence interval and the overall mean:

$$\frac{SD \cdot t_{0.05}}{\bar{X} \cdot \sqrt{N}} \begin{cases} \leq 20\% \text{ (trace elements)} \\ \leq 10\% \text{ (major elements)} \end{cases}$$

or relative standard deviation:

$$\frac{SD}{\bar{X}} \begin{cases} \leq 25\% \text{ (trace elements)} \\ \leq 15\% \text{ (major elements)} \end{cases}$$

For the purpose of this work elements with concentration exceeding 5000 mg/kg (ppm) were considered to be the major elements.

2. The overall mean was calculated on the basis of at least four "accepted" laboratory means ($N \geq 4$) obtained by more than one analytical technique. If results from only one analytical technique are available the number of "accepted" laboratory averages used for the calculation of the overall mean can not be smaller than five ($N \geq 5$).

3. If the conditions (1) and (2) are fulfilled but the number of outliers exceeds 50%, the additional procedure is activated which repeats the process of outlier rejection from the beginning checking simultaneously the changes of the mean and standard deviation accompanying successive rejections. The process of rejecting of outliers is then stopped when the successive change in both the mean and standard deviation becomes lower or equal to 15%. The condition (1) is then rechecked.

4. If the above criteria are met but there are indications that after outlier rejection performed on the whole population, the remaining populations of results obtained by various analytical techniques differ significantly the assignment of certified value is suspended.

"Information" values were assigned to those elements for which the results while not fulfilling simultaneously the conditions (1)-(4) still fulfilled the following condition:

$$\frac{SD \cdot t_{0.05}}{\bar{X} \cdot \sqrt{N}} \begin{cases} \leq 50\% \text{ (trace elements)} \\ \leq 30\% \text{ (major elements)} \end{cases}$$

calculated on the basis of at least three "accepted" laboratory averages, and are quoted as numbers only, i.e. without confidence intervals. The elements for which the data did not fulfill the above criterion were considered to be outside of any classification. Evaluation of data from the original and alternative databases by the method described above gave in most cases similar values of the overall mean and the confidence interval. For Co and Mo these data were additionally confirmed by the results obtained by the definitive method [8]. The values for Al, Ba, Br, Ca, Cd, Co, Cr, Cs, Cu, K, La, Mg, Mn, Ni, P, Pb, Rb, S, Sm, Sr, Th, V and Zn were finally determined (certified or information values assigned) using the alternative database. So, in certain sense these data are traceable to the existing CRM. The values for other elements were derived from the original database. According to recent trends and recommendations for CRM producers, in addition to analytical uncertainties also the uncertainty due to the long-term and short-term stability and moisture determination are taken into account. Consequently, the combined standard uncertainty of the certified value u_c consists of four contributions:

$$u_c = \sqrt{u_i^2 + u_{ls}^2 + u_{ss}^2 + u_m^2}$$

where u_i is estimated as standard deviation of the overall mean, u_{ls} – the standard uncertainty estimated from the long-term stability studies, u_{ss} – the standard uncertainty estimated from the short-term stability studies and u_m – the standard uncertainty due to moisture determination. The expanded uncertainty (U) is obtained by multiplying u_c by a coverage factor $k = 2$ corresponding to 95% confidence level.

CERTIFIED VALUES FOR INCT-SBF-4 ($\bar{X} \pm U$)

Element	Unit	$\bar{X} \pm U$	Element	Unit	$\bar{X} \pm U$
Al	mg kg^{-1}	45.5 ± 3.7	La	ng g^{-1}	19.1 ± 2.4
B	mg kg^{-1}	39.3 ± 4.0	Mg	mg kg^{-1}	3005 ± 82
Ba	mg kg^{-1}	7.30 ± 0.23	Mn	mg kg^{-1}	32.3 ± 1.1
Br*	mg kg^{-1}	2.40 ± 0.17	Mo	mg kg^{-1}	5.99 ± 0.35
Ca	mg kg^{-1}	2467 ± 170	Ni	mg kg^{-1}	3.12 ± 0.18
Cl*	mg kg^{-1}	64.5 ± 4.7	P	mg kg^{-1}	6555 ± 335
Co	ng g^{-1}	95.6 ± 5.8	Rb	mg kg^{-1}	31.7 ± 1.7
Cs	ng g^{-1}	129.1 ± 4.3	S*	mg kg^{-1}	4245 ± 471
Cu	mg kg^{-1}	14.30 ± 0.46	Sr	mg kg^{-1}	9.32 ± 0.46
Fe	mg kg^{-1}	90.8 ± 4.0	Th	ng g^{-1}	7.08 ± 0.82
K	wt%	2.423 ± 0.083	Zn	mg kg^{-1}	52.3 ± 1.3

* certified on the basis of results by single analytical method

INFORMATION VALUES FOR INCT-SBF-4

Element	Concentration	Element	Concentration
Cd	29 ng g^{-1}	Sc	7 ng g^{-1}
Cr	233 ng g^{-1}	Sm	3 ng g^{-1}
Hg	1 ng g^{-1}	Ti	1.9 mg kg^{-1}
Na	5.5 mg kg^{-1}	V	84.5 ng g^{-1}
Pb	83 ng g^{-1}		

The shelf life of INCT-SBF-4: 31 December 2015.

The preparation and certification of INCT-SBF-4 certified reference material was performed by the staff of the Department of Analytical Chemistry, Institute of Nuclear Chemistry and Technology, under the direction of Dr. H. Polkowska-Motrenko. More information on the material and the certification procedure is available in the published report [9].

Warszawa, March 31, 2006

REFERENCES

1. R. Dybczyński, Anal. Chim. Acta, 117 (1980) 53-70.
2. R. Dybczyński, H. Polkowska-Motrenko, Z. Samczyński, Z. Szopa, Fresenius J. Anal. Chem., 345 (1993) 99.
3. R. Dybczyński, H. Polkowska-Motrenko, Z. Samczyński, Z. Szopa, Fresenius J. Anal. Chem., 360 (1998) 384.
4. Z. Szopa, R. Dybczyński, *The PC Implementation of the Agency's Analytical Quality Control Service Intercomparison Program*, Final Report of the IAEA contract number 7741/RB/TC, November 1995.
5. Z. Szopa, J. Jaszczuk, R. Dybczyński, Nukleonika, 41 (1996) 117-127.
6. R. Dybczyński, H. Polkowska-Motrenko, Z. Samczyński, Z. Szopa, *Preparation and Certification of the Polish Reference Material "Oriental Tobacco Leaves" (CTA-OTL-1) for Inorganic Trace Analysis*, Raporty IChTJ, Seria A nr 1/96, Institute of Nuclear Chemistry and Technology, Warszawa 1996.
7. R. Dybczyński, H. Polkowska-Motrenko, Z. Samczyński, Z. Szopa, *Preparation and Certification of the Polish Reference Material "Virginia Tobacco Leaves" (CTA-VTL-2) for Inorganic Trace Analysis Including Microanalysis,* Raporty IChTJ, Seria A nr 3/97, Institute of Nuclear Chemistry and Technology, Warszawa 1997.
8. H. Polkowska-Motrenko, R. Dybczyński, J. Radioanal. Nucl. Chem., 2006, in press.
9. H. Polkowska-Motrenko, R. Dybczyński, B. Danko, K. Kulisa, E. Chajduk, Z. Samczyński, Z. Szopa, M. Sypuła, *Preparation and Certification of the Polish Reference Material "Soya Bean Flour" (INCT-SBF-4) for Inorganic Trace Analysis*, Raporty IChTJ, Seria A, Institute of Nuclear Chemistry and Technology, Warszawa 2006.

LIST OF PARTICIPANTS OF THE INTERCOMPARISON INCT-SBF-4

(in alphabetical order)

Mr. N. Al-Somel, Mr. M. Zakaria, Mr. M. Al-Masri, Atomic Energy Commission of Syria, Damascus, SYRIA; **Dr. H. Bartoń,** Collegium Medicum Uniwersytetu Jagiellońskiego, Kraków, POLAND; **Dr. A. Barzev,** CSIR-National Metrology Laboratory, Pretoria, SOUTH AFRICA; **Mrs. M. Bazeli M.Sc.,** Wojewódzki Inspektorat Ochrony Środowiska, Gdańsk, POLAND; **Dr. A. Berlizov, I. Malyuk,** Institute for Nuclear Research, Kiev, UKRAINE; **Dr. L. Bielawski,** Uniwersytet Gdański, Gdańsk, POLAND; **Mrs. J. Biel-Ćwikowska M.Sc.,** Wojewódzki Inspektorat Ochrony Środowiska we Wrocławiu, Delegatura w Jeleniej Górze, POLAND; **Mrs. G. Boguszewicz M.Sc.,** Wojewódzka Stacja Sanitarno-Epidemiologiczna, Olsztyn, POLAND; **Prof. Dr. M.H. Borawska, Dr. K. Hukałowicz, Dr. R. Markiewicz,** Akademia Medyczna, Białystok, POLAND; **Dr. M. Brzezicka, Dr. E. Szmyd,** Instytut Metali Nieżelaznych, Gliwice, POLAND; **Prof. Dr. E. Bulska, Dr. M. Wojciechowski, Mrs. A. Krata M.Sc., Mr. J. Celej,** Uniwersytet Warszawski, Warszawa, POLAND; **Dr. K. Burns, Mrs. L. Zeiller,** IAEA Laboratories, Seibersdorf, AUSTRIA; **Dr. M. Campbell, Dr. A. Toervenyi,** IAEA, Vienna, AUSTRIA; **Prof. Dr. Z. Chai,** Institute of High Energy Physics, Beijing, CHINA; **Mrs. E. Chajduk M.Sc., Dr. A. Salvini,** Laboratorio Energia Nucleare Applicata, Pavia, ITALY; **Mrs. J. Ciborowska M.Sc.,** Wojewódzka Stacja Sanitarno-Epidemiologiczna, Kielce, POLAND; **Mr. A. Cis M.Sc., Mrs. B. Trzaskalska,** Centralny Ośrodek Badawczo-Rozwojowy Przemysłu Gastronomicznego i Artykułów Spożywczych, Łódź, POLAND; **Dr. E. Cortes Toro,** Comision Chilena De Energia Nuclear, Santiago, CHILE; **Dr. D. Danisiewicz-Czupryńska,** Uniwersytet Gdański, Gdańsk, POLAND; **Dr. B. Danko,** Instytut Chemii i Techniki Jądrowej, Warszawa, POLAND; **Dr. A. Drzewińska, Prof. Dr. E. Wieteska, Mrs. L. Błaszczak,** Wojskowa Akademia Techniczna, Warszawa, POLAND; **Dr. J. Dudek,** Instytut Chemii i Techniki Jądrowej, Warszawa, POLAND; **Prof. Dr. J. Falandysz,** Uniwersytet Gdański, Gdańsk, POLAND; **Mrs. H. Fater M.Sc.,** Powiatowa Stacja Sanitarno-Epidemiologiczna, Piotrków Trybunalski, POLAND; **Dr. A.M.G. Figueiro,** Instituto de Pesquisas Energeticas e Nucleares, Sao Paulo, BRAZIL; **Prof. Dr. Z. Fijałek,** Narodowy Instytut Zdrowia Publicznego, Warszawa, POLAND; **Dr. M. de Carmo Fraitas,** Instituto Tecnologico & Nuclear, Sacavem, PORTUGAL; **Prof. Dr. A.N. Garg,** Indian Institute of Technology, Roorkee, INDIA; **Dr. H. Górecka, Mr. A. Chojnacki,** Politechnika Wrocławska, Wrocław, POLAND; **Mrs. Z. Hadyś M.Sc., Mrs. B. Tryba M.Sc., Mrs. I. Gajewska M.Sc.,** Wojewódzki Inspektorat Ochrony Środowiska w Krakowie, Delegatura w Tarnowie, POLAND; **Dr. M. Ihnat,** Pacific Agri-Food Research Centre, Summerland, CANADA; **Mr. A. Jaklewicz M.Sc.,** Akademia Medyczna, Warszawa, POLAND; **Prof. Dr. M. Jarosz, Dr. N. Obarski, Dr. K. Pawlak,** Politechnika Warszawska, Warszawa, POLAND; **Doc. Dr. hab. R. Jędrzejczak,** Instutut Biotechnologii Przemysłu Rolno-Spożywczego, Warszawa, POLAND; **Dr. S. Jha, Dr. R.M. Tripathi, Dr. Shri V.D. Puranik,** Environmenal Assessment Division, BARC, Mumbai, INDIA; **Mr. Z. Jońca M.Sc.,** Instytut Ochrony Środowiska, Warszawa, POLAND; **Mrs. J. Jurek-Gajownik M.Sc.,** Wojewódzki Inspektorat Ochrony Środowiska, Bydgoszcz, POLAND; **Dr. J. Kałuża,** Szkoła Główna Gospodarstwa Wiejskiego, Warszawa, POLAND; **Dr. V.K. Karandashev,** Institute of Microelectronics Technology and High Purity Materials, Russian Academy of Sciences, Moscow, RUSSIA; **Prof. Dr. R. Kocjan, Dr. R. Świeboda, Dr. I. Sowa, Mrs. E. Blicharska M.Sc., Mrs. M. Klimek M.Sc.,** Akademia Medyczna, Lublin, POLAND; **Mrs. D. Kolasa M.Sc.,** Instytut Chemii Przemysłowej, Warszawa, POLAND; **Dr. G.M. Kolesov, D.Yu. Sapozhnicov, A.L. Lorenz,** V.I. Vernadsky Institute of Geochemistry and Analytical Chemistry, Moscow, RUSSIA; **Mrs. A. Korona M.Sc.,** Powiatowa Stacja Sanitarno-Epidemiologiczna, Wałbrzych, POLAND;

Mrs. M. Kowalewska, Mr. A. Olearczyk M.Sc., Wojewódzka Stacja Sanitarno-Epidemiologiczna w Rzeszowie, Dział laboratoryjny w Sanoku, Sanok, POLAND; **Mrs. B. Krzyżanowska M.Sc., Mrs. J. Majchrowicz**, Zakład Higieny Weterynaryjnej, Gdańsk, POLAND; **Mrs. T. Kucharska M.Sc.**, Akademia Rolnicza, Szczecin, POLAND; **Mrs. B. Langowska-Sobota M.Sc., Mrs. Z. Bednarczuk, Mrs. D. Palatas**, Wojewódzki Inspektorat Ochrony Środowiska we Wrocławiu, Delegatura w Legnicy, POLAND; **Dr. L. Lata**, Uniwersytet Marii Skłodowskiej-Curie, Lublin, POLAND; **Mr. Cz. Legutko M.Sc.**, Wojewódzki Inspektorat Ochrony Środowiska we Wrocławiu, Delegatura w Wałbrzychu, Wałbrzych, POLAND; **Mrs. B. Leśniewska M.Sc., Dr. B. Godlewska-Żyłkiewicz**, Uniwersytet w Białymstoku, Białystok, POLAND; **Mrs. N. Lewandowska M.Sc., Mrs. W. Mudel**, Polskie Odczynniki Chemiczne S.A., Gliwice, POLAND; **Dr. K. Loska, Dr. J. Pelczar, Dr. I. Korus**, Politechnika Śląska, Gliwice, POLAND; **Mrs. A. Łuczak**, Stacja Chemiczno-Rolnicza, Poznań, POLAND; **Mrs. M. Majcherek M.Sc.**, Stacja Chemiczno-Rolnicza, Łódź, POLAND; **Mrs. T. Malinka M.Sc., Mr. T. Konieczny M.Sc., Mr. B. Markiewicz**, Wojewódzki Inspektorat Ochrony Środowiska, Wrocław, POLAND; **Prof. Dr. H. Matusiewicz, Mrs. E. Stanisz M.Sc., Mr. M. Ślachciński M.Sc., Mr. B. Golik M.Sc.**, Politechnika Poznańska, Poznań, POLAND; **Mrs. T. van Meerten**, Delt University of Technology, Delft, NETHERLANDS; **Mrs. J. Mikusek M.Sc.**, Wodociągi Białostockie, Białystok, POLAND; **Dr. N. J. Miller-Ihli**, U.S. Department of Agriculture, Beltsville, USA; **Mrs. A. Nieciąg M.Sc.**, Wojewódzki Inspektorat Ochrony Środowiska, Wrocław, POLAND; **Mr. J. Olszewski, Mrs. E. Szymborska**, Powiatowa Stacja Sanitarno-Epidemiologiczna, Toruń, POLAND; **Dr. K. Oprządek**, Akademia Podlaska, Siedlce, POLAND; **Dr. R. Orodziński**, Herbapol, Białystok, POLAND; **Dr. A. Pantelica**, National Institute of Physics and Nuclear Engineering "Horia Hulubei", Bucharest, ROMANIA; **Dr. P. Pasławski, Mrs. D. Karmasz M.Sc., Mr. J. Kucharzyk M.Sc., Mrs. I. Jaroń M.Sc., Dr. I. Wysocka**, Państwowy Instytut Geologiczny, Warszawa, POLAND; **Dr. L. Polak-Juszczak**, Morski Instytut Badawczy, Gdynia, POLAND; **Dr. A. Protasowicka**, Wojewódzki Inspektorat Weterynarii, Szczecin, POLAND; **Dr. L. Quanwei**, China Institute of Atomic Energy, Beijing, CHINA; **Dr. K. Ratajczak, Mrs. E. Gełeta M.Sc., Mrs. J. Kurzawa-Patrymajło M.Sc.**, Wojewódzki Inspektorat Ochrony Środowiska, Poznań, POLAND; **Dr. W. Reczyński**, Akademia Górniczo-Hutnicza, Kraków, POLAND; **Dr. S. Resnizky, Mr. R. Invernizzi**, Comision Nacional de Energia Atomica, Buenos Aires, ARGENTINA; **Dr. Ch.B. Rhoades Jr.**, R.J. Reynolds Tobacco Co., Winston-Salem, USA; **Dr. Z. Samczyński, Dr. J. Szpunar-Łobińska**, CNRS UMR 5034 Laboratoire de Chimie Analytique, Biolnorganique et Environnement, Pau, FRANCE; **Dr. O. Sklyarova, Dr. N. Pakhomova**, Institute of Geochemistry SB RAS, Irkutsk, RUSSIA; **Dr. P. Skowron, Mr. P. Harasim M.Sc., Mr. Z. Młynarski**, Akademia Rolnicza, Lublin, POLAND; **Prof. Dr. B. Skwarzec, Dr. A. Boryło**, Uniwersytet Gdański, Gdańsk, POLAND; **Dr. W. Sokołowska, Mrs. A. Karaś M.Sc., Mrs. D. Dąbrowska M.Sc.**, Instytut Technologii Materiałów Elektronicznych, Warszawa, POLAND; **Mrs. K. Starska M.Sc., Mrs. E. Brulińska-Ostrowska M.Sc.**, Państwowy Zakład Higieny, Warszawa, POLAND; **Dr. V. Stibilj, Dr. R. Jacimovic, Mrs. U. Repinc B.Sc., Mrs. Z. Trkov**, Josef Stefan Institute, Ljubljana, SLOVENIA; **Dr. C. Vazquez**, Comision Nacional de Energia Atomica, Buenos Aires, ARGENTINA; **Ing. P. Vermaercke**, Belgian Nuclear Research Centre, Mol, BELGIUM; **Dr. J. Wagner**, Szkoła Główna Gospodarstwa Wiejskiego, Warszawa, POLAND; **Dr. A. Wasilewska, Mr. A. Polkowski, Dr. G. Jurkiewicz-Żuczek**, Zakład Higieny Weterynaryjnej, Warszawa, POLAND; **Mrs. G. Wasyluk M.Sc., Mrs. E. Miłaszewska M.Sc.**, J.S.H. Laboratoria, Gdynia, POLAND; **Prof. Dr. J. Wierciński**, Akademia Rolnicza, Lublin, POLAND; **Mrs. J. Wisz M.Sc.**, ZPBE Energopomiar, Centralne Laboratorium, Gliwice, POLAND; **Dr. M. Wojtczak**, Politechnika Łódzka, Łódź, POLAND; **Mrs. E. Wróblewska M.Sc.**, Wojewódzka Stacja Sanitarno-Epidemiologiczna, Lublin, POLAND; **Dr. A. Zararsiz, Dr. N. Efe, Mr. R. Kirmaz**, Ankara Nuclear Research and Training Center, Ankara, TURKEY; **Mrs. E. Zdanowicz M.Sc.**, Stacja Chemiczno-Rolnicza, Warszawa-Wesoła, POLAND; **Prof. Dr. J. Żmudzki, Dr. J. Szkoda, Mrs. A. Grzebalska M.Sc.**, Państwowy Instytut Weterynaryjny, Puławy, POLAND; **Prof. Dr. W. Żyrnicki, Dr. J. Borkowska-Burnecka**, Politechnika Wrocławska, Wrocław, POLAND.

INSTYTUT CHEMII I TECHNIKI JĄDROWEJ

POLISH CERTIFIED REFERENCE MATERIAL
FOR MULTIELEMENT TRACE ANALYSIS

SOYA BEAN FLOUR (INCT-SBF-4)

1. **The stability of Soya Bean Flour (INCT-SBF-4) has been monitored during storage. On the basis of the obtained results, the shelf life is extended until 31 December 2024.**
2. The material is stored in an air conditioned room, in which the temperature does not exceed 22°C. Its stability is monitored at appropriate time intervals.
3. The users should store the material at room temperature [(20±5)°C] in tightly closed original containers.
4. For chemical analysis and simultaneous determination of water content, samples of the material of adequate size should be taken. Immediately after sampling, it is necessary to cover firmly the container. The unused part of samples must not be placed back in the container.

Ewelina Chajduk, PhD
Head of Laboratory of Nuclear
Analytical Methods