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OXIDATES AS A GEOCHEMICAL SAMPLING
MEDIUM IN GRANITIC TERRAIN.
FINAL REPORT
Project no. 2249

Norges geologiske undersøkelse

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Sammendrag:
The main objective for the project is to develope a geochemical method for exploration of ores associated with granitic rocks.

Oxidates were sampled in streambeds and lakes from 129 localities in Southeastern Norway. 65 of these localities are situated in the northern Oslo Graben. The samples were examined mineralogically and chemically by a variety of methods. Geochemical maps of the element content in oxidates show regional distribution patterns for several elements.

Sampling and analysis of oxidates can be used in exploration for mineralizations such as the Skrukkelia Mo-deposit in the northern Oslo Graben. New anomalies (especially for Zn and W) have been detected.

Appendix I contain description of samples, chemical and mineralogical determinations performed on the samples, backscattered electron image-, X-ray image- and scanning electron image pictures of the oxidate preparates.

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Geokjemi	Geologisk undersøkelse	Mangan
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OXIDATES AS A GEOCHEMICAL SAMPLING MEDIUM IN GRANITIC TERRAIN.

SUMMARY.

The main objective of the project "Oxidates as a geochemical sampling medium" is to develope a geochemical method for exploration of ores associated with granitic rocks. Oxidates are defined as sediments consisting of secondary oxides and hydroxides of iron and manganese, precipitated from aqueous solutions. They occur in lakes and streams as coatings on mineral grains, as crusts and nodules.

Oxidates were sampled in stream beds and lakes from 129 localities in southeastern Norway. 65 of these localities are situated in the northern Oslo Graben, an intracontinental rift zone with alkaline rocks which host several Mo-deposits. The samples were examined microscopically and analysed mineralogically and chemically by X-ray diffraction, quantitative microprobe, backscattered electron image, secondary electron image, inductively coupled plasma, X-ray fluorescence spectometry, instrumental neutron activation analysis etc.

The mineralogical analyses shows that goethite, ferrihydrite lepidocrosite and hercynite are present in the Fe-phase and vernadite, birnessite and psilomelane in the Mn-phase of the oxidates. Quartz, feldspars, amphiboles, chlorite, muscovite and stilpnomelane are also identified.

The Fe- and Mn-phases of the oxidates are normally intermixed, although colloform structure can be seen. Occasional continous lamination occurs around silicate cores. Several types of textures varying from rough to smooth appear on fracture surfaces. Diatoms are frequent.

The major elements occuring in oxidates are Mn,Fe,Al,C and Si. H_2O occur in various amounts. As,Ba,Be,Br,C,Cd,Ce,Co,Eu,Fe, Hf,Hg,La,Lu,Mn,Mo,Nd,Ni,P,Pb,S,Se,Sm,Ta,Tb,Th,U,W,Yb and Zn are enriched in the oxidates relative to crustal abundance (Table 4). Al,Au,Ca,Cl,Cs,Cr,Cu,K,Li,Mg,Na,Rb,Sc,Si,Sr,Ti,V,Y and Zr are depleted in the oxid ates relative to crustal abundance (Table 4).

Geochemical maps of element contents in oxidates shows regional distribution patterns for several elements. The known Mo deposit in the Skrukkelia of the northern part of the Oslo Graben is indicated by high Mo values in the oxidates. In addition a strong Mo,Zn,W oxidate anomaly has been detected close to the near-by lake Svartungen. Oxidates have not been found in the stream draining the main known Mo deposit of the Oslo Graben (Nordli), which also lacks a traditional stream sediment Mo anomaly. Outside the Oslo Graben strong Zn,W anomalies in oxidates have been detected west of lake Femunden, where no economic mineralizations are known at present.

The work shows that sampling and analysis of oxidates can be used in the exploration for ores associated with granitic rocks. The problems of genesis of large FeMn-provinces should be further studied.

1. INTRODUCTION

In 1982 the Norwegian department of Industry requested the Royal Norwegian Council for Scientific and Industrial Research (NTNF) to evaluate the interest for and value of Norwegian participation in the European Communities research program " Primary raw materials". The committee for Metallurgy and Rock and Mineral Engineering were then asked by NTNF to appraise the exploration and mining technology part of the program. A project proposal were later composed by a working group headed by Dr.K.S.Heier director at the Geological Survey of Norway (NGU). Norway became a member of "The Commission of Primary Materials" and a program called "Ores assosiated with granitic rocks-prospecting methods - the MGB-programme was initiated. The programme is carried out as a co-operation between NGU, the University of Oslo and the Foundation for Scientific and Industrial Research (SINTEF) at the Norwegian Institute of Technology (NTH). One of the subprosject in this programme is called "Oxidates as a geochemical sampling medium".

The project was started in May 1985, and finnished by the end of 1986. It is carried out at the Geochemical Division of the Geological Survey of Norway ,under the direction of Rolf Tore Ottesen, head of the Geochemical section. Siv Kjeldsen has been appointed as research assistant.

Oxidates is a term used for freshwater precipitates consisting of secondary oxides and hydroxides of iron and manganese (Goldschmidt 1954).

Freshwater oxidates occur in soils,springs,bogs,lakes and streams in glaciated regions of the Northern Hemisphere and are widely distributed in Karelia, the Kola Peninsula, Finland, Southern Norway , Southern Sweeden and North America (Roy 1981). They occur as coating, crusts and nodules.

The mineralogy of freshwater ferromanganese nodules is reported to be similar to marine nodules with birnessite, todorokite and goethite as the most common minerals reported (Callender and Bowser 1976).

The Fe and Mn content in oxidates are highly variable. In addition to regional variation in Fe/Mn ratio the Fe/Mn ratio varies locally within lakes (Naumann 1922) and within single nodules (Ottesen and Volden 1983).

Generally the concentration of chemical elements of freshwater nodules is lower than that of deep-sea nodules (Goldberg 1954, Mannheim 1965, Price 1967, Callender and Bowser 1976, Calvert and Price 1977). The organic carbon content of freshwater nodules is significantly higher than that of deep sea nodules (Callender and Bowser 1976).

The chemical nature and generally high specific area of iron and manganese precipitates in particles and as coating on other particles makes them efficient sinks for anions and cations in soils, stream sediments and lake sediments (e.g. Goldberg 1954, Jenne and Wahlberg 1965, Canney 1966, Nichol et al. 1967, Brotzen 1967, Murray et al. 1968, Jenne 1968, 1977, Posselt at al. 1968, Horsnail and Elliot 1971, Anderson et al. 1973, Carpenter et al. 1975, Burns 1976, Chao and

Theobald 1976, Nowlan 1976, Schwertmann and Taylor 1977, Carpenter and Hayes 1979a,b, Kontas 1979, Robinson 1981). This scavenging property has been regarded as a complicating factor in geochemical prospecting (Canney 1966, Brotzen 1967, Nichol et al. 1967) since varying amounts of oxidates in the stream sediments may cause anomalies that are not related to mineralizations. Recent studies (Carpenter et al.1975,Chao and Theobald 1976, Nowlan 1976,1982, Carpenter and Hayes 1979,Filipek et al. 1981, Whitney 1981) have, however, suggested that sampling of the oxidates may be advantageous in geochemical exploration. This is in the line of Vogt (1942) who states that the trace elements in oxidates may give more or less a chemical characterization of the ore minerals in the fluvial basins of bogs and lakes. Likswise, Carlson et al. (1977) states that the trace element composition of oxidates clearly reflects that found in the surrounding bedrock.

Resent geochemical mapping in Scandinavia indicates that the presence of oxidates is not ubiquitous but varies geographically in a systematical way: they tend to occur in large provinces. For example in the Permian Oslo Graben boulders in streams draining the granites are heavily coated with oxidates (Ottesen and Volden 1983). This is not the case in the surrounding areas of Precambrian granitic rocks. Geochemical mapping in the Nordkalott Project (Ottesen et al. 1985) revealed extensive oxidate accumulations in a 20000 km^2 large area draining the Lina granite in the northern Sweden.

This appearent close relationship between granitic rocks and oxidate occurences and the scavenging properties of Fe,Mn precipitates led to the idea of using oxidates as a geochemical sampling medium in prospecting for ores associated with granitic rocks.

The task has been solved by regional sampling of iron and manganese nodules in streambeds and lakes from areas with known deposits and from background areas. The sample collection has been analysed mineralogically and chemically.

The results are promising. Oxidates are probably a very poverful sampling medium in geochemical exploration. The genesis of large iron-manganese provinces is not solved with the current genetic models. This problem is a great challenge in geochemistry and should be further studied.

2. EARLIER STUDIES OF FRESHWATER OXIDATES.

The brown and black mainly X-ray amorphous crusts developed on streambed material is described differently by separate groups of scientists. It is common for geochemists to describe the crusts as inorganic iron and manganese coatings (e.g. Harriss and Troup 1969, Cronan and Thomas 1970, Rose et al. 1979, Varentsov and Grasselly 1980) while water chemists and biologists speaks of brown and black organic crusts (Greenland 1965a,b).

Although apparently simple, oxidates actually represent a complex, multhiphase system consistion of various iron and manganese oxides and hydroxides, with differing degree of organic components and silicates such as clay minerals (e.g. Vogt 1915, Naumann 1922, Ljunggren 1953, Greenland 1965 a,b, Varentsov 1972, Vasari et al. 1972, Halbach 1976, Gjessing 1976, Potter and Rossman 1979, Carpenter and Haynes 1980, Filipek et al. 1981, Carlson 1982, Robinson 1982, Ottesen and Volden 1983).

2.1 Morphological description

Nodules (spherical or subspherical form) are the most common and noticeable morphological form of oxidates in lakes (Callender and Bowser 1976) and in the oceans (Mero 1965, Manheim 1965). The nodules commonly have a nucleus of quartz and/or feldspar, but stiff glacial clay, limestone-dolostone and wood have also been observed (Callender 1970, Rossman 1973). The typical concretionary structure is alternating iron- and manganese-rich bands about a nucleus. The nodules are black when wet and orange- brown when dry (Rossmann 1973).

Crusts on pebbles, cobbles and boulders on the sediment surface is a common form of oxidates in stream beds and lakes (e.g. Goldschmidt 1954, Hem 1964, Nowlan 1976).

Surficial muds from several English lakes show the phenomenon of ferromanganese oxide-enriched layers consisting of dark-brown muds,associated oxidate crusts, and underlying rusty-colored clay (Gorham and Swaine 1965). Some of the crusts from the English Lake District resemble the Oneida Lake pancakes (Dean 1970), others occur as fragments in oxidized surface muds.

2.2 Mineralogical composition

The Fe- and Mn-minerals which have been reported in Fennoscandian oxidates are goethite, lepidocrocite, ferrihydrite, siderite and vivianite, and birnessite and vernadite, respectively (Puustjarvi 1952, Ljunggren 1955b, Armands 1967, Varentsov 1972, Halbach 1972,1976, Koljonen et al. 1976, Carlson et al. 1980, Carlson and Schwertmann 1980,1981, Carlson 1982, Bergseth 1983).

Psilomelane is reported in concretions from Lake Pinnus- Yarvi, Karelia (Shterenberg et al. 1966). Here manganoan carbonates occur in intimate association with ferromanganese nodules. Nodules and crusts from Eningi-Lampi lake, Central Karelia are composed by birnessite, X-ray amorphous Fe-hydroxides, hydrogoethite, goethite and lepidocrocite (Varentsov 1972).

Goethite, birnessite, todorokite and psilomelane are identified in American and Canadian lake ores (Bowser et al. 1970, Schoettle and Friedman 1971, Damiani et al. 1973, Rossman 1973).

2.3 Chemical composition

Some major and trace element data for lacustrine and marine oxidates are given in table 7-9. The wide variation in iron and manganese contents are also reflected in the minor element content (Table 7).

The concentration of chemical elements in freshwater nodules is typically lower than that of deep-sea nodules (Goldberg 1954, Manheim 1965, Price 1967, Callender and Bowser 1976, Calvert and Price 1977).

Most types of oxidates, including oceanic, shallow marine and lacustrine varieties, appear to have higher concentrations of minor and trace elements compared with terrigenous sediments (Calvert and Price 1977). Low concentrations of trace elements are found in bog ores (Crear et al. 1981).

The contents of Fe and Mn in Fennoscandian lake ores generally decreases towards the north, and in such a way that the Mn/Fe ratio also increases towards the north (Carlsson et al 1978).

In adition to this regional variation , the Mn/Fe ratio also varies considerably both locally within one lake (Naumann 1922) and even within single nodules (Ottesen and Volden 1983).

Within Fennoscandia there appear to be regional variation in the content of organic carbon in oxidates (Carlsson et el. 1978). Precipitates from northern Fennoscandia seems to be especially rich in organic matter.

The trace element content varies considerably. Stream nodules from different regions have for example Mo content which range over three orders of magnitude (Ottesen and Volden 1983).

Worth mentioning, is the high Sn content (above 600 ppm) reported from some Finnish oxidates (Carlson et al. 1977), these oxidates contains more Sn than oceanic iron and manganese nodules.

Carlsson et al. (1977) have given some data on the rare earth element composition in Fennoscandian oxidates (Table 8). The concentration is lower than in oceanic iron and manganese nodules. The La/Yb ratio is higher than usual in continental rock types, which indicates slower migration of the light REE (La-Sm) than of the heavy (Gd-Lu) in the surfical environment. A concretion from Lake Shebandowan,Ontario (Table 8) have low content of total REE .

A high degree of correlation between P and Fe is shown by the data on the composition of Swedish lake ores (Naumann 1922).

Co, Ni and Zn appear to be present in higher consentrations in Mn-rich oxidates which is supported by a study of inter- element correlations in lake Ontario (Cronan and Thomas 1972).

In the oxidates from Green Bay,Lake Michigan (Rossman 1973) Ba,Co,Cu,Ni,Mo,Sr and Zn are all positively correlated with Mn while As and Cr are correlated with Fe. These correlations except for Pb,Zn and Cu are consistent with those found for many shallow marine concretions (Calvert and Price 1970).

2.4 Chemical composition in relation to age

The chemical composition of oxidates is to a large extend affected by dissolution. Accordingly, it depend on the relative dissolution rate of individual elements and on the chemical composition of minerals and other solid phases present in the precipitate (Carlson et al. 1977). Vuorinen et al. (1983) reported that on aging the amount of adsorbed elements decreases and the dissolution rates turn slower. The chemical composition thus depend considerably on the age of the oxidate, and on the chemical processes it has undergone after precipitation.

Young oxidates contain microorganisms (Carlson et al. 1980), while this is not reported in old Fennoscandian oxidates (Halbach 1972,1976).

2.5 Scavenging

The scavenging of heavy metals by oxidates may take place by one or a combination of the following mechanisms: 1) coprecipitation, 2) adsorption, 3) surface complex formation, 4) ion exchange and 5) penetration of the crystal lattice (Chao and Theobald 1976).

The determinating factors for the relative scavenging importance of Mn-oxides and Fe oxides are: 1)the existing pH-Eh conditions, 2) the reactivity and degree of crystallinity of the oxides found at the time when a given ion is introduced , 3) the relative abundance of the oxides, 4) the postdepositional chemical changes of the oxides and 5) the presence of organic matter as a chelating and fixing agent in competition with the oxides, pH-Eh implications of organic matter etc. (Chao and Theobald 1976).

2.6 Charge

Hydrous oxides of manganese and iron carry surface charges which vary in sign and intensity with the pH of the surrounding water. Determinations of the isoelectric points of well- characterized synthetic manganese oxides have been provided by Healy et al. (1966) and Murray (1974). They obtained values between pH 1.5 and 7.3, though most of the values were quite low. On the basis of this evidence, without determination of the charge of natural Mn-precipitates, it is generally assumed that the Mn-component of the precipitate is electronegative (e.g. Calvert and Price 1977).

The isoelectric points of synthetic Fe-oxides is well documented and usually between pH 7 and 9 (Parks 1965, Schwertmann and Taylor 1977). Schwertmann and Fechter (1982) determined the isoelectric points of natural ferrihydrites from freshwater deposits in Finland. The values were between pH 5.3 and 7.3 and were lower than those usually obtained for synthetic ferrihydrites. The results shows that Fe-oxides may be both positive and negative charged in the natural stream environment.

The isoelectric points of Mn- and Fe-oxides are thus quiet different. The iron oxides beeing much closer to the pH values of natural stream water. This means that the iron oxides carry a much weaker surface charge than manganese oxides at these pH-values. Usually, in natural precipitates from streams Fe and Mn phases are mixed. The surface charge will than be determined by the dominating phase.

In nature the oxidates are encrusted in or incorporated into an organic matrix. Little is known about the adsorptive characteristics of oxide surfaces modified by adsorbed organic compounds (Davis and Leckie 1978).

2.7 Partitioning of elements in oxidates

Roy (1981) lists some reported correlations of elements in oxidates. The large differences between the results probably reflects the heterogenity of the precipitates, with organic and inorganic impurities. But in general the Mn-suite has a strong chalcophil and the Fe-suite a lithophile character.

Callender and Bowser (1976) showed that the concentrations of minor elements in freshwater lacustrine nodules are fairly well correlated with the stability order for metallo-organic chelates of the Irwing-Williams series (Irwing and Williams 1948).

2.8 Age

Limits on the growth rates are given by the length of time the environment have been ice-free. The time period is probably not more than 10000 years, the end of the Gothi-glacial period (Charlesworth 1957).

The old Sweedish bog ore miners have observed that after a given lake has been cleared of concretions, mining could be resumed after 30-50 years as a new "crop" of concretions would have formed. Naumann (1922) discounts this belief as an exaggeration of the possible growth rates and that the actual rates obvious lie somewhere between these wide extremes.

Kurbatov (1936) estimated the age on two concretions by using the content of radium in the different layers of the concretions. The concretion from the Kara Sea appear to be 5300-5500 years, and the concretion from Lake Uksche, Karelia about 2000 years old.

Accretion rates of about $0.3x\ 10^{-3}$mm/year are obtained for Loch Fyne and Jervis Inlet nodules (Ku and Glasby 1972). These rates are considerably greater than those found in deep-sea nodules, of the order 1 to $4x\ 10^{-6}$mm/year (Bender et al.1966,Barnes and Dymond 1967, Ku and Broecker 1969). These rates give maximum ages for the concretions of 10000- 20000 years. Calvert and Price (1977) states that the rate may be nearer $1x10^{-2}$ mm/year based on their maximal concretion age.

An estimate for concretions in lakes in Nova Scotia and Ontario is 0.1-1.5 mm/year assuming that the fine laminations in the concretions represent annual growth increments (Harriss and Troup 1969).

Estimated accretion rate of concretions from Lake Alstern, Sweeden and Oneida Lake, New York using the ^{226}Ra method are $1.4x\ 10^{-3}$ mm/year and $2.6x10^{-3}$ mm/year, respectively (Krishnaswami and Moore 1973). The authors point out that the rate is surprisingly low in view of the geological occurence of the concretions.

2.9 Distribution

Oxidates, or iron manganese precipitates are generally believed to be rather ubiquitous as coating on the surfaces of stream bed material in shallow, rapidly flowing , well areated parts of the streams (e.g. Goldschidt 1954, Rose et al. 1979), as local enrichments in down stream bog areas (e.g. Nicol et al. 1967, Nowlan 1982), and as deposits around springs or ground water seepages (Whitney 1981).

Even though little systematic information exists, there are data to indicate that oxidates are not ubiquitous and that they show large scale regional distribution patterns in stream beds and lakes of Fennoscandia.

2.10 Geographical distribution

Lake and bog ores are common in Småland, southern Ostergothland, northwestern part of Dalerna, Herjedalen and parts of Jamtland, and inn whole Norrland. They are less common in Helsingland, southeastern parts of Dalerna and Warmland. They are missed almost complete in provinces like Upland, Sødermanland, Westergothland etc. (Stapff 1865). Oxidates occurs in the Oslo Graben (Vogt 1906, Ottesen and Volden 1983) and in lake Storsjøen (Vogt 1915, Alfsen and Christie 1966). Arnio (1915,1918) reports that most Finnish lake ores are situated between northern latitude 61 and 65 degrees. In southern Sweden and in the Varmland district oxidates are common (Naumann 1922, Ljunggren 1951,1953). Låg (1964), Carlson et al.(1976) and Bergseth (1983) reports oxidates in gravel deposits in Finland and Norway. Ottesen et al. (1985) reports extensive oxidate accumulations in a 20000km^2 area in Norrbotn.

The best documented occurences of lacustrine oxidates in North America, are found in Nova Scotia (Kindle 1932,1935,1936, Beals 1966, Harriss and Troup 1969,1970, Terasmae 1971) and in the Great Lakes region (Rossmann and Callender 1969, Cronan and Thomas 1970,1972, Callender 1970, Damiani et al. 1973, Moore et al. 1973, Mothersill and Shegelski 1973, Sly and Thomas,1974).Other occurences are known in Loughborough Lake (Kindle 1932), Mosque Lake (Harriss and Troup 1969,1970, Terasmae 1971)and Lake Schebandowan (Carpenter et al. 1972) in Ontario, Trout Lake (Twenhofel et al. 1945) in Wisconsin, Lake Ossipee (Kindle 1935) in New Hampshire, Lake George (Schoettle and Friedman 1971), Oneida Lake (Gillette 1961, Dean 1970,Dean et al.1973 & 1981,Ghosh and Dean 1974) and Chatauqua Lake (Clute and Grant 1974) in New York, Lake Champlain (Johnson 1969) and the Minnesota lakes (Zumberge 1952). Coatings are reported from the northern part of Lake Ontario (Cronan and Thomas 1970),the northern part of Green Bay,Lake Michigan (Callender 1970) and from all of the St.Lawrence Great Lakes. Ferromanganese coating on rocks in streams are common in northern Maine and Colorado(Hem 1964, Nowlan 1976). Oxidate crusts occur in abundance from several lakes in the English Lake District (Gorham and Swaine 1965).

2.11 Distribution in relation to overburden and lithology.

In Sweden lake and bog ores are confined to areas rich in forests and bogs, where the soil consist of gravels and sands. Typically limestones, calcareous clay and marl are missing. Greenstones and other rocks which high iron content are dominating (Stapff 1865).

Vogt (1906) states that most of the manganese and iron precipitates in bogs and lakes occurs in areas of granites and other acid rocks, only a few occurences are found associated with basic rocks.

Ascan (1906,1932) demonstrates the relation between regional distribution of Finnish lake ores(oxidates) and the distribution of humus rich water.

Vogt (1915,1942) stated that the contents of trace elements in oxidates may give a chemical characterization of minerals occuring in the draining area. This relationship is also indicated by Ottesen and Volden (1983) and Ottesen et al. (1985).

Aarnio (1915,1918) reports that most Finnish lake ores are situated between northern latitude 61 and 65 degrees, and that the distribution is dependent on climate and sediment covering. Oxidates appears to be associated with gravel and coarse grained sand.

In southern Sweden the regional distribution of lake and bog ores are confirmed to areas where the bedrock is primarily silicate rocks or where the land escaped the first post- Pleistocen marine incursion, the Yoldia sea 9600 YBP (Naumann 1922).

Lake ores are uncommon and very small north of the artic circle in Fennoscandia because most of the iron and manganese is precipitated before reaching the lakes (Carlsson et al. 1978).

Carlsson (1982) have observated that Sweedish streams with much suspended sediment lack oxidates. Thus oxidates are uncommon in glacial fed streams or in drainage basins developed in clay areas.

The majority of the lakes in Karelia with ferromanganese concretions are found on gravels and coarse-grained sand (Strakov 1966, Shterenberg et al.1966,Varentsov 1972a,b).

All oxidates from lakes in Nova Scotia examined by Kindle (1932,1935,1936) and in Lake Ontario examined by Harriss and Troup(1969) are found on gravels and coarse-grained sand.

In northern Green Bay , the ferromanganese oxides typically coat medium to coarse sands comprized of quartz and feldspars, but limestone cobbles and boulders with coating have also been dredged. In the St.Lawrence Great Lakes coatings occur on sand grains, cobbles, boulders and glacial clay in localities where the sedimentation rate is very low and/or currents keep the sediment swept clean of finer material (Callender and Bowser 1976).

The most common nodule sediment type is a lag deposit consisting of glacial cobbles,granules and sand (Callender and Bowser 1976). Generally the ferromanganese is present as an oxide coating. Occasionally ferromanganese nodules and coated sand have been found associated with muddy sands. These nodules have a corroded appearance as if the oxides were undergoing some dissolution. Stiff glacial clay represent a lag deposit where no active sediment accumulation is presenty occuring.

2.12 Shallow marine oxidates.

Shallow marine oxidates are for instance found in Loch Fyne,Scotland (Murray and Irvine 1894, Calvert and Price 1970a), in the Baltic Sea (Gripenberg 1934, Winterhalter 1966, Gorshkova 1967, Shterenberg 1971, Varentsov 1973, Burmann 1982, Ingri 1985), in the Barents and the Kara seas (Manheim 1965) and in the North Sea (Larsen pers. comm. 1986).

3. METHODS

3.1 Sampling

Oxidates have been sampled from 129 localities in streambeds and lakes in Southeastern Norway (Table 1). Chemical analysis have been performed on 114 of these oxidates, which are shown in Figure 1. 65 of these localities are situated in the northern Oslo Graben ,where the search for and sampling of oxidates have been done systematically. Outside the northern Oslo Graben the search for oxidates are more occasional but mainly concentrated to granitic terrain. Oxidates(nodules) with a diameter of more than 2mm were handpicked in the field from streambed material, dried and stored in paper bags. Lake ores were sampled by dredging.

3.2 X-ray diffraction analysis

X-ray diffraction analysis has been performed on 34 samples (Table 2) using a Philips diffractometer PW 1730/10, having a Cu Kα radiation and a scanning speed of 2° per minute have been used. The X-ray tube was operated at 800 W (40kV, 20mA). The X-ray investigations was made by scanning over the area 3°-63° ,2θ .

3.3 Microscopic analysis

34 samples have been examined with a Leitz Orthoplan microscope in transmitted light.

3.4 Microprobe analysis

All microprobe analysis were performed at the Continental Shelf Institute (IKU),Trondheim,Norway with a Jeol Superprobe 733. Backscattered electron image (BSI), X-ray image and spectral plots has been investigated on 33 samples (Table 2). Secondary electron image (SEI) has been studied on 10 samples (Table 2). Quantitative analysis of the Fe and Mn phases respectively has been performed on 33 samples (Table 2).

3.5 Chemical analysis

114 samples (Table 2) were analysed for 35 elements (Table 3) at the Swedish Geological Company , Luleå, Sweeden. One gram of material was digested in warm HCl and the solution was analysed by optical emission spectroscopy using an inductively coupled plasma (ICP) as exitation source (Burmann 1979, Burmann et al. 1981).

86 samples (Table 2) were analysed for 29 elements (Table 3) at the Geological Survey of Norway. One gram of material was attacked by 5 ml of 7N HNO_3 at 110° C for 3,5 hours. The solutions were analysed by ICP (Ødegård 1981).

71 samples (Table 2) were analysed for the sulphur and clorine content by X-ray fluorescence spectrometry (XRF) at Midland Earth Science Associates , United Kingdom.

114 samples (Table 2) were analysed for the total carbon content at the Agricultural University of Norway. One gram of material was

combusted with oksygen in a LECO (EC-12 Carbon determinator, Model 752-100) Inductive Furnace using copper and iron as accellerator.

90 samples (Table 2) were analysed for 32 elements (Table 3), including the rare earth elements and gold, by instrumental neutron activation analysis (INAA) at Nuclear Activation Services Limited, Canada.

8 samples (Table 2) were analysed for the mercury content by cold vapor atomic absorption spectrophotometry at the Geological Survey of Norway (Kuldvere and Andreassen 1979). One gram of material was dissoluted in 5 ml aqua regia at about 90 °C overnight.

14 samples (Table 2) were analysed for the content of water (H_2O Tot, H_2O^- and H_2O^+) by the Method of Pennfill, at the Geological Survey of Norway.

All samples were examined for fluorescence with a short-wave ultraviolet lamp.

^{14}C dating have been performed on to samples at the Laboratory for Radiocarbon Dating at NTH.

Before analysis the samples were put in random order.

3.6 Data treatment

All sample sites were digitized . Geochemical maps were made using a graphic terminal (Tetronix 4012). Summary statistics, correlation matrixes and scatterplots were produced by computer.

4. RESULTS

4.1 Morphological description

Streams nodules (Fig 2-3) have a rough, gritty or botryoidal surface, but smooth surfaces also occurs probably as a result of downstreams transport and/or chemical dissolution (Fig 3 , sample 56).

Oxidates from lakes occur as nodules, discoidale concretions (penny ores), irregular flattened concretions and crusts on stones (Ulvsjøen) and on lake bottoms (Fig 4-10).

Stream nodules are generally smaller (around 1cm in diameter) than lake ores. Many oxidates contain rock or mineral fragments. Oxidates from lakes (crusts, nodules and discoidale concretions) appears to contain more such fragments than stream nodules (Appendix I: BSI- and X-ray image pictures).

Several types of textures appears on fracture surfaces. Figure 15 shows a cross section of a stream nodule. The surface of the nodule has a botryoidal texture. Between the surface and the core the textures are typical smooth. The core is characterized by a rough texture. Diatoms occurs on the surface and are especially frequent in the core. In this nodule diatoms are almost completely missing where the textures are smooth.

The color of Norwegian oxidates varies between black, reddish brown, brown and dark grey. Most nodules from stream beds in the northern Oslo Graben have a dark reddish brown or black color (Munsell soil colors: 5YR 2/2, 3/2-3/4 and 5YR 2/1). Very dark grey and reddish brown nodules are also present, but less frequent (Munsell colors: 5YR 3/1 and 5YR 4/3). The colors of stream nodules from Trysil are dark reddish brown, reddish brown, dark reddish grey and dark grey (Munsell soil colors: 5YR 3/3 , 5YR 4/3 and 4/4, 5YR 4/2 and 5YR 4/1). The colors of Sweedish stream nodules from the area around lake Tisjøen are dark reddish brown, dark brown and dark brown to brown (Munsell soil colors: 5YR 3/2, 5YR 3/4, 7.5YR 3/2 and 7.5YR 4/4).

The color of oxidate crusts from lake Ulvsjøen is very dark grey (Munsell soil color: 5YR 3/1).

The colors of nodules from lake Storsjøen are dark reddish brown, black,reddish brown, yellowish red and very dark grey (Munsell soil color: 5YR 3/2, 5YR 2/1,5YR 4/4, 5YR 4/6 and 5YR 3/1). Oxidates from lake Storsjøen have often a rest of pink, pinkish grey or pinkish white clay cover (Munsell soil color: 7.5YR 7/4, 7.5YR 7/2 and 7.5YR 8.2). The colors of crusts from lake Storsjøen are mostly strong brown and dark brown (Munsell soil colors: 7.5YR 5/6-8 and 7.5YR 3/2). The colors of discoidale concretions from lake Storsjøen are mostly dark reddish brown to yellowish red (Munsell soil colors: 5YR 3/2-3.5 to 5YR 4/6-8).

4.2 Mineralogical composition

Goethite (α-FeOOH), ferrihydrite ($Fe_5O_7(OH)4H_2O$), lepidocrosite (γ-FeOOH) and hercynite ($FeAl_2O_4$) are the main minerals present in the Fe-phase . Vernadite ($MnO(OH)_2$) and birnessite ($(Ca,Na)Mn_7O_{14}3H_2O$) are the main minerals in the Mn-phase (Fig 11-12). Psilomelane ($(Ba,H_2O)Mn_8O_{16}$) occurs in some samples. Quartz, feldspars, amphiboles, chlorite, muscovite and stilpnomelane have been identified mixed within the oxidates (Appendix II: Figure 6.1-6.34).

MnBa phases have been identified by various microprobe analysis. The element content of the different phases in oxidates (Table 10) show clearly that Ba occur together with Mn. This is supported by BSI- and X-ray image pictures (Figure 12, sample 100). The chemical composition of these MnBa phases are very similar to the chemical composition of hollandite and psilomelane (Fleischer 1960,1964). According to Fleischer and Richmond (1943) the difference between these minerals is that the water content in psilomelane is essential and not in hollandite. The MnBa phases have a certain content of water (Table 10), and is therefore interpretated as psilomelane.

Most minerals identified have earlier been reported from oxidates elsewhere in the world (see Chapter 2.2). Hercynite are not reported in the studied litterature on oxidates and psilomelane are not reported in litterature on Fennoscandian oxidates.

The Fe- and Mn-phases of the oxidates are normally intermixed, although colloform structure can be seen (Fig 14). Occasionally continuous lamination occurs around silicate cores (Fig 13).

Most oxidates contain both Mn and Fe minerals and amorphous substances composed of Fe and Mn (Table 10). Both oxidates from streams and lakes can consist of pure Mn or Fe minerals.

Fe,Mn minerals in oxidates from different regions in Southern Norway:

	Oslo Graben	Trysil	Lake Storsjøen	Lake Ulvsjøen	Østerdalen valley
Bedrock:					

Granitic rocks	X	X	X		X
Sandstones				X	X
Minerals:					

Birnessite	X				X
Vernadite		X	X		X
Goethite	X	X	X	X	X
Lepidocrocite	X				
Ferrihydrite		X			X
Hercynite	X	X		X	X

Birnessite is the main Mn-mineral in the Oslo Graben samples while Vernadite is the typical Mn-mineral in samples from Trysil. Goethite is the dominating Fe-mineral in all samples. Ferrihydrite occurs in samples from Trysil and the Østerdalen valley . Birnessite and ferrihydrite are only found in stream nodules.

4.3 Chemical composition

Results from the chemical analysis are presented in table 3-6 and 10-15. These data shows:

- The major elements of oxidates are Mn,Fe,Al,C and Si (Table 3). The content of Si and Al are dominated by the amount of rock and mineral fragments (Appendix I: BSI and X-ray image pictures), but they also occur in the Fe and Mn phases of the oxidates.

- The average total water content in the oxidates is 23.4% (Table 3). It is dominated by adsorptive water.

- The chemistry of the oxidates is not uniform throughout the nodules or concretions (Table 10). The different phases consists of pure Fe- and Mn-phases and amorphous phases of mixed Fe and Mn.

- As,Ba,Be,Br,C,Cd,Ce,Co,Eu,Fe,Hf,Hg,La,Lu,Mn,Mo,Nd,Ni,P,Pb,S,Se, Sm,Ta,Tb,Th,U,W,Yb and Zn are enriched relative to crustal abundance (Table 4).

- Al,Au,Ca,Cl,Cs,Cr,Cu,K,Li,Mg,Na,Rb,Sc,Si,Sr,Ti,V,Y and Zr are depleted relative to crustal abundance (Table 4).

- The La/Yb ratio is higher in the studied oxidates than in oceanic nodules (Table 6,8 and 9).

- The base metal content of Norwegian continental oxidates are much lower than the content of marine oxidates (Table 5 and 7).

- Relative to other Fennoscandian oxidates the Norwegian samples are enriched in Zn (Table 5 and 7).

- Oxidates developed in streambeds draining the Permian granites from the Oslo Graben have a chemical composition which clearly differs from the samples collected above the Precambrian Trysil and Varmland granites (Table 5). The Oslo Graben samples have a high Mn and trace element content, while the samples from the Trysil and Varmland granites have a high content of Fe.

- The HCl extractable Fe are positive correlated with Si and Zr and negativly correlated with Sc and Th (Table 12-13 and Appendix II: Figure 9).

- Positive correlation exists between Mn and P,Ba,La,Ni,Zn,U,Th and Cd in the HCl-solutions (Table 12-13 and Appendix II: Figure 9).

- Positive correlation exists between Al and Be,La,Li,Ni,Sc,Zn, Y,W,Th and Cd in the HCl-solutions (Table 12-13 and Appendix II: Figure 9).

- The sum of the three major elements Fe,Mn and Al are relatively constant in the Norwegian oxidates (Fig 20 A,B). It is therefore possible to compare the results without using normalized data.

- The iron minerals have generally a low trace element content while the manganese minerals contain most trace elements. This is indicated by the lack of correlation between iron and trace elements and significant positive correlations between manganese and trace elements (Table 11-15 and Appendix II: Figure 9-11).

4.4 Age and aging

^{14}C determinations have been performed on two oxidates. The age determined for stream nodules (sample 56) from the northern Oslo Graben is 1220 ± 120 years B.P. The age determined for concretions from Lake Storsjøen (sample 76) is 2760 ± 200 years B.P. These ages lies between those reported in the litterature (see Chapter 2.5). The age determined for stream nodules is about 1500 years lower than the age determined for lake concretions. This may be explained by the size of the oxidates. Maximum size for lake oxidates is several times greater than the size of stream nodules (Fig 2-11).

Most oxidates from this survey are enriched in Ce relative to La and Nd. According to Carlson et al.(1977) the content of Ce in relation to La and Nd reflects the age of an oxidate. Oxidates with a smooth graph (Fig 30) should therefore be relatively younger than oxidates with a high content of Ce in relation to La and Nd. Crusts and discoidale concretions from lake Storsjøen could therefore be younger than nodules from lake Storsjøen.

4.5 Distribution in relation to lithology and overburden.

The sample sites from this project have been plotted on the Bedrock map of Norway with scale 1:1 mill (Sigmond et al. 1983). This indicates that oxidates occurs in different geological environments, such as the Permian granites in the northern Oslo Graben and in Precambrian granites,gneisses and sediments.

It seems that oxidates are widespread in the Trysil granite -Varmland granite, the Trysil Quartz porphyry and the Solør gneisses and granites. Both the Odal granites where lake Storsjøen are situated and the Trysil granite, are continuations of the Swedish Granite province, called the Småland-Varmland granites that covers the eastern part of south Sweden. Some of the localities outside the Oslo Graben are situated in granitic windows in the Caledonides.

The Permian rift of the Oslo Graben and the Precambrian Protogine zone in the Trysil- Varmland area contains large oxidate provinces. It therefore appears to be a connection between major tectonic zones and oxidate provinces (Fig 25).

Most of the oxidates are found in areas covered by till (Holmsen 1971). The domenating soiltype in southern Norway is podzols (Låg 1983).

4.6 Geochemical maps.

All geochemical maps are presented in Appendix III. The geochemical maps shows:

Southeastern Norway:

- The contents of Au,Be,Cd,Mo,Sc,Ta,Th,Y,W,Zn and REE are high in the northern Oslo Graben. Mo is shown as an example in figure 18 A and 27 A.

- The contents of Au,Ba,Cd,Y,W,Zn and REE are high in the area west of lake Femunden. W and Zn are shown as examples in figure 18 B-C and 27 B-C.

- The Ba consentrations are high in the area south and west of lake Femunden (Figure 27 D).

- The highest Au content is found in a sample from Åstadalen valley.

- One sample in the southern part of Norway have a high content of Pb (310 ppm,Enrichment factor: 23.9).

Northern Oslo Graben (Hurdal):

- The known Mo-deposit in Skrukkelia (northwestern area on fig 26) is manifested as a strong Mo-anomaly in the oxidates (Fig 19 A and 28 A, sample 31 and 33 with 620 and 920 ppm Mo, respectively).

- Oxidates from the Svartungen area have a high content of Mo (in the same order as oxidates from the Skrukkelia Mo-deposit) , Zn and W (mean value for 19 samples: 396 ppm Mo, 3306 ppm Zn and 64 ppm W, Fig 19 A-C and 28 A-C). The contents of Li,Ni and Y are also high in this area (Appendix III: fig 20.13,20.18,20.30,mean values: 26 ppm Li, 174 ppm Ni, 49 ppm Y, enrichment factors relative to crustal abundance are: Mo: 264, Zn: 47.2, W: 42.7, Li: 1.3, Ni: 2.3, Y: 1.5).

- One sample (44) from the area south of Øyangen have a high content of Pb (900 ppm, Enrichment factor: 69.2).

- The content of Co is high in the oxidates outside the Permian Oslo Graben (Fig 28 D), in the Precambrian gneisses (northwestern area on Fig 26). Mean value for 4 samples (30-34) is 424 ppm Co. Enrichment factor relative to crustal abundance is 17.

5. DISCUSSION

The Oslo Graben is a part of an intracontinental rift zone characterized by Permian alkaline intrusive and extrusive rocks (Olerud and Sandstad 1983). These rocks are hosts for several Mo-deposits.

The results obtained shows a strong Mo-anomaly in oxidates collected in the northern Oslo Graben compared with oxidates outside the Oslo Graben (Fig 18 A and 27 A). This study shows clear reflection of the bedrock geochemistry in the oxidates. For instance the rocks of the Oslo Graben is known for high content of REE, U and Mo, which is clearly reflected in the oxidates (Table 5). This indicates that the chemistry of the oxidates reflects the composition of the bedrock. This agrees with earlier studies made by Vogt (1942) and Carlson et al. (1977).

The following table demonstrates a high contrast between anomaly and background for the oxidates compared with stream sediments.

Mo-content in oxidates and stream sediments from the northern Oslo Graben and southeastern Norway:

STREAM SEDIMENTS		OXIDATES	
Northern Oslo Graben N=316	Southeastern Norway N=1650	Northern Oslo Graben N=65	Southeastern Norway N=18
33.3 ppm	3.7 ppm	212 ppm	7.3 ppm

The metal content of oxidates are generally high, much higher than the content in stream sediments. This is a clear analytical advantage.

In addition to high trace element content in oxidates the variation in major element consentrations are small in oxidates compared with stream sediments, and this reduces the possibility of analytical errors caused by matrix effects.

These factors are in favour of oxidates as sampling medium.

The regional availability of this medium is not studied in detail. Hovever, resent geochemical mapping (Ottesen and Volden 1983, Ottesen et al. 1985) in Scandinavia shows that oxidates are present in large provinces.

The genesis of continental oxidates is only partly known. A key to the understanding of oxidate provinces is perhaps provided by studying local formations of secondary iron and mangenese oxides in streams. Figure 30 shows a situation which is frequently met in Scandinavia and also reported elsewhere in the world (Nichol et al 1967). Local occurences of oxidates are found at places where streams, that originate in bogs with impeded drainage, enter an airated freely drained environment (Fig 30). This local phenomena can be explained as follows: Low redox potentials due to organic matter in the bog cause reduction of Fe^{3+} and Mn^{4+}, into more soluble divalent ions, which will move downstream in solution. When the stream enters oxidating environments below the bog, then the divalent ions will be reoxidized causing reprecipitation of Fe^{3+} and Mn^{4+} as hydrous oxides.

If the genesis of provinces of secondary iron and manganese is analogous to the genesis described for these local occurences, then there must exist reducing agents acting over very large areas. Possible agents could perhaps be carboniferous shales and sulphide mineralizations in the bedrock or organic matter in the overburden. None of these agents seem, however, to be more prevalent inside the oxidate provinces indicated in figure 21, 22 and 23.

In figure 23 the Fe content of the stream samples form a pattern of low values in the western greenstone belt (Fig 24). These greenstones contain extensive deposits of graphitic shales often with sulphide mineralizations. Figure 21 and 22 show that the high Fe and Mn values are confined mainly to areas of Permian granites, wheras the Cambro-Silurian alum shales have low Fe and Mn values in the stream sediments.

We have arrived at the conclusion that the reducing agent must be gases. Since we can see no reason why biogenic gases should be especially prevalent at all types of marine oxidates and in all the large areas of continental oxidates we know of, we suggest that the reducing gases could be either biogenic or abiogenic depending on the circumstances.

The existance of biogenic gases in the crust is widely accepted (Selley 1985, MacDonald 1983), but abiogenic gases is a matter of controversy. Researchers in USA (MacDonald 1983, Gold and Soter 1980, Abelson et al. 1980), USSR (Porfirev 1974, Kropotkin and Valyaev 1984, Ovchinnikov et al. 1973, Mekhtiev et al. 1984, Zolatov et al. 1984), China (Zuofeng 1984) and Sweden (Malmquist and Kristiansson 1984, Whitshard 1984) have, however, suggested that mantel derived methane and other gases of deep seated origin migrate upwards through the lithosphere. This theory is supported by many empirical facts among them the existence of hydrocarbons at great depths in Archean rocks within the Baltic Shield on the Kola Peninsula (Kozlovsky 1984).

Abiogenic gases could also emanate due to galvanic cells (Bølviken 1979).

6. CONCLUSION

Sampling, analysis and map production of element contents in oxidates can be used in exploration for mineralizations associated with granitic rocks. This work shows that the method works for mineralizations such as the Skrukkelia Mo-deposit in the northern Oslo Graben. In addition a strong Mo,W,Zn anomaly has been detected close to the near-by lake Svartungen. This area is a promising object for follow up studies. Outside the Oslo Graben strong Zn,W anomalies in oxidates have been detected west of lake Femunden, where no economic mineralizations are known at present. This area might be interesting, but are only based on two oxidate-localities, in an area where no systematic search for oxidates have been done.

At present we know that oxidates occur in some provinces, such as the northern Oslo Graben, the Trysil-Varmlands granites and the Lina granite. But it is probably not so that all granites are oxidate provinces. If oxidates in the future should be used in exploration, we need more information on the geographical distribution of oxidates.

Further, the problem of genesis of large iron-manganese provinces is a great challenge in geochemistry and should further be studied.

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9. FIGURES AND TABLES

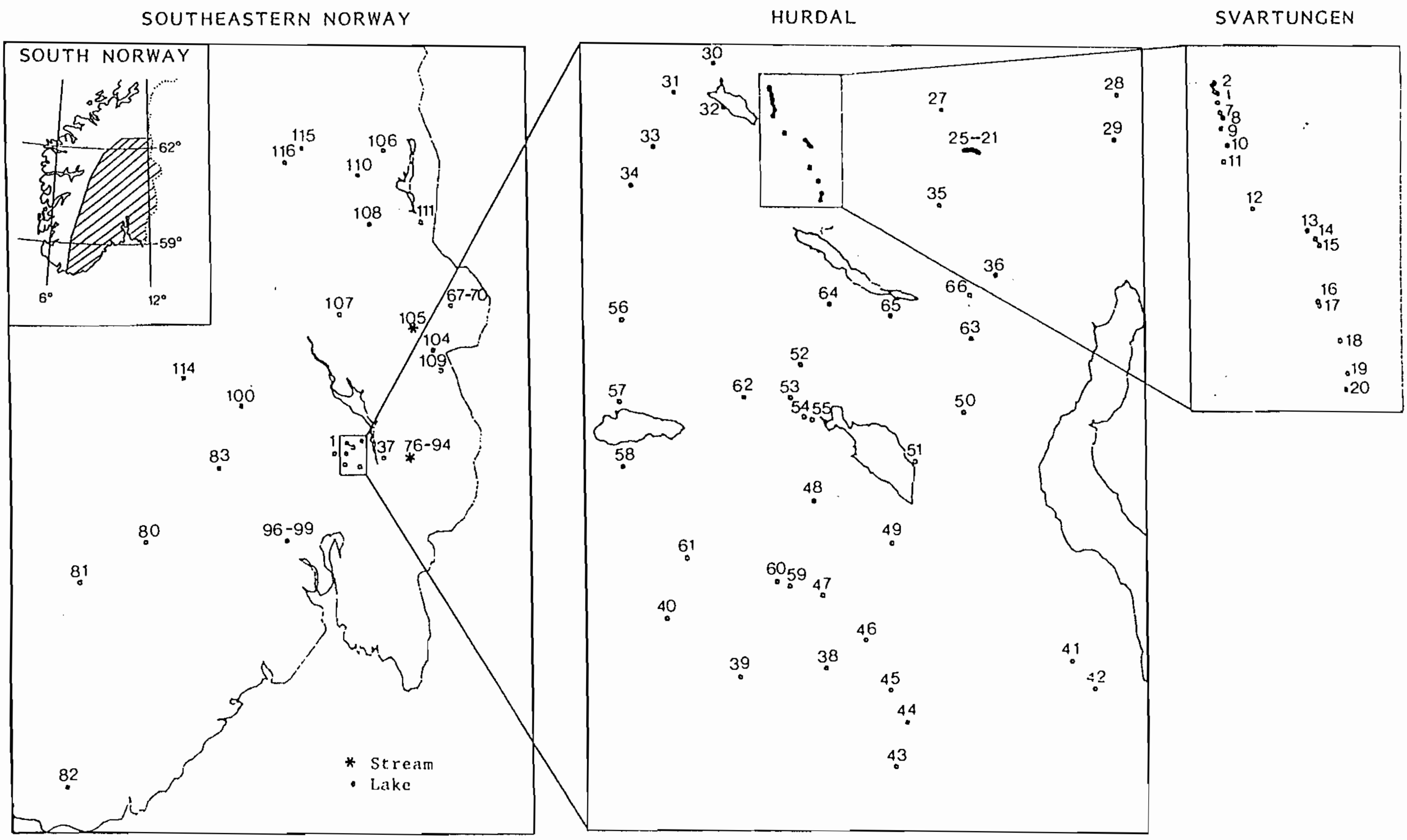

Fig 1. Survey area and sample sites.

Fig 2. Stream nodules from the northern Oslo Graben.
Irregulary nodules with rockfragments.

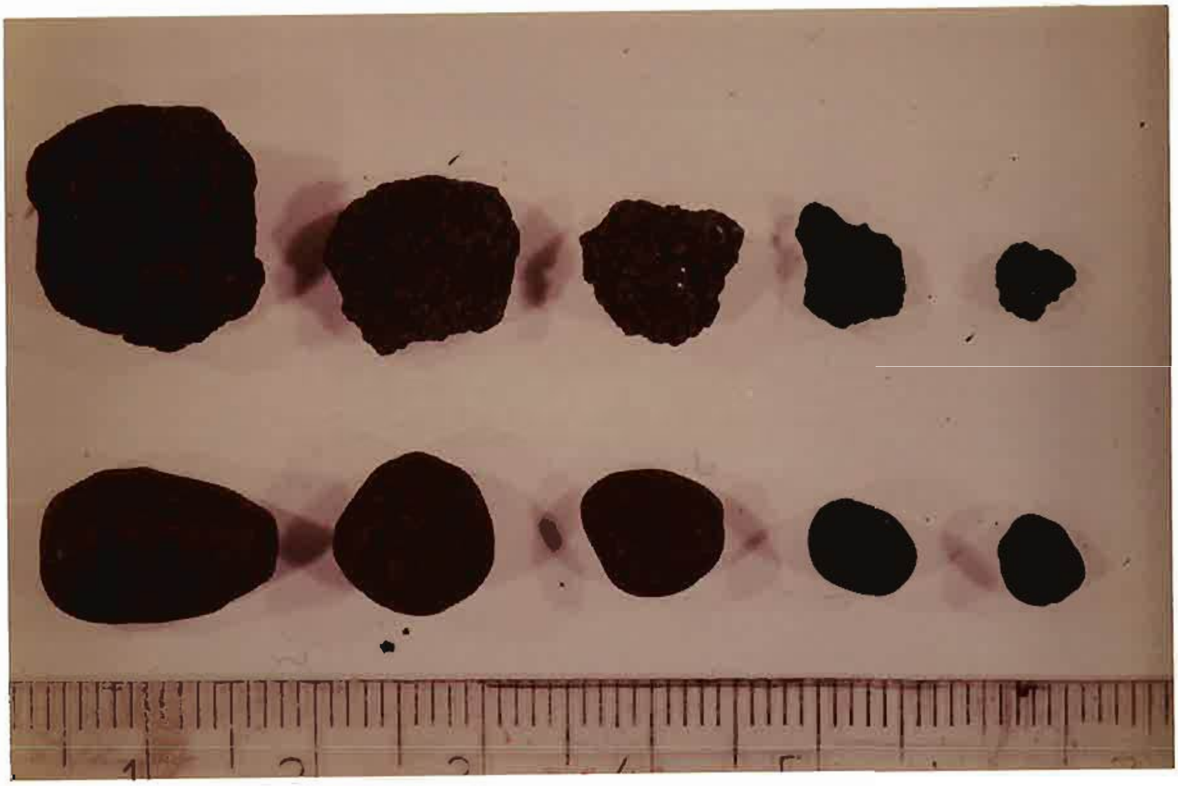

Fig 3. Stream nodules from the northern Oslo Graben.
Upper row: Irregulary nodules with botryoidal surface texture. Lower row: Well rounded nodules with smooth surface texture, due to transport downstreams.

Fig 4. Spheroidale nodules from lake Storsjøen.

Fig 5. Small discoidale concretions (penny ore) from lake Storsjøen.

Fig 6. Iron rich crust from lake Storsjøen

Fig 7. Discoidal concretion (iron rich outher sone) from
lake Storsjøen.

A

B

Fig 8. Assymetric, irregular "mushroom like" concretions from lake Storsjøen.
A. Upper smooth surface, the lake-water facing side.
B. Lower knobby surface, the sediment facing side.

A

B

Fig 9. Irregular concretion from lake Storsjøen.
A. Upper surface, the lake-water facing side.
B. Lower surface, the sediment facing side.

Fig 10. Oxidates from lake Ulvsjøen. Irregulary knobby crusts on stones.

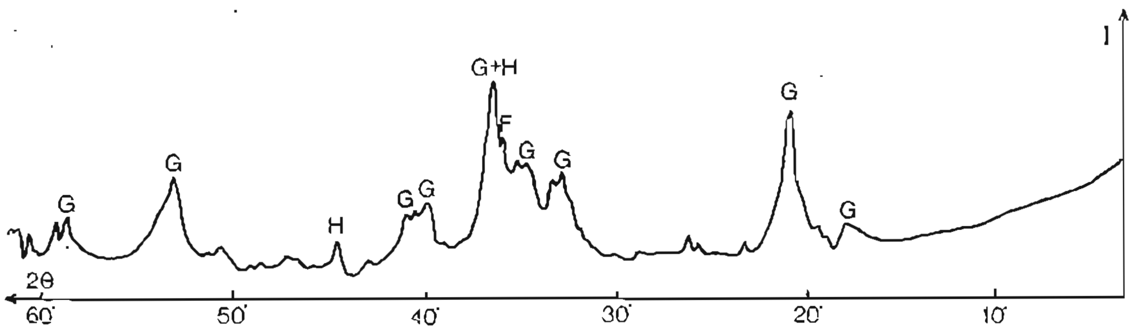

Fig 11. X-ray diffractogram. Goethite (G), hercynite (H) and ferrihydrite (F) are identified in sample 99.

BSI

X-ray image
Mn

X-ray image
Fe

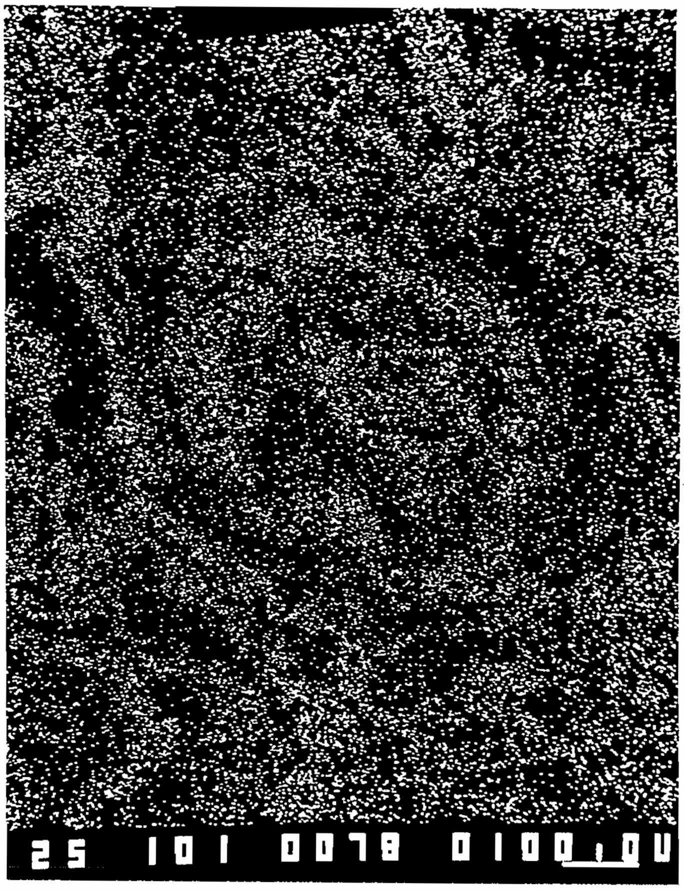

Fig 12. Locally irregular concentric lamination around psilomelane. BSI- and X-ray image pictures.

BSI

X-ray image
Ba

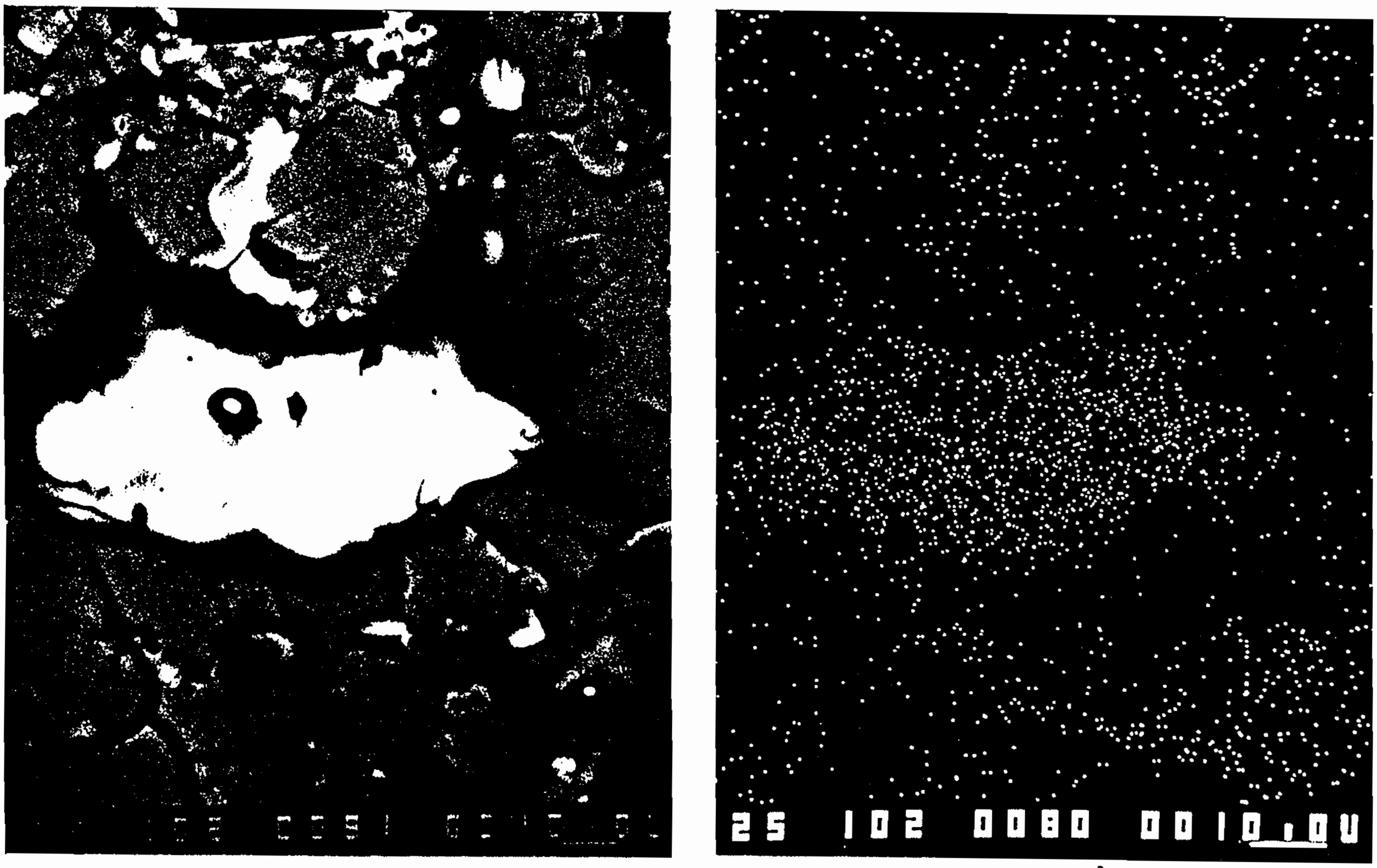

Fig 12.

P.NO.	MN	FE	ZN	AL	SI	MO	S	BA	O	C+H2O
	WT %									
1	1.12	44.85	0	0.13		0.08?	0.03		41.34	12.44
2	23.71	9.58		0.43	0.03		0.14	0.24	40.80	25.09
3	32.66	10.65		1.47	0		0.06	0.64	38.94	15.52
4	36.32	8.29	0.06?	1.14		0.10	0.05	0.25	35.01	18.72
5	0.68	53.11		0.64	0.80				33.10	11.47
6	10.31	9.68	0	0.51			0.02	0.12	27.26	52.01
7	22.79	14.04	0	1.18	0.12			0.34	34.07	27.34
8	30.01	11.75		1.59	0.08	0	0.06	0.35	35.06	21.02
9	38.90	9.86		1.37	0	0	0.09	0.88	34.19	14.60
10	7.54	42.00		0.89	0.76				32.11	16.50
11	18.80	24.20		1.81	0.54			0.69	38.30	15.57

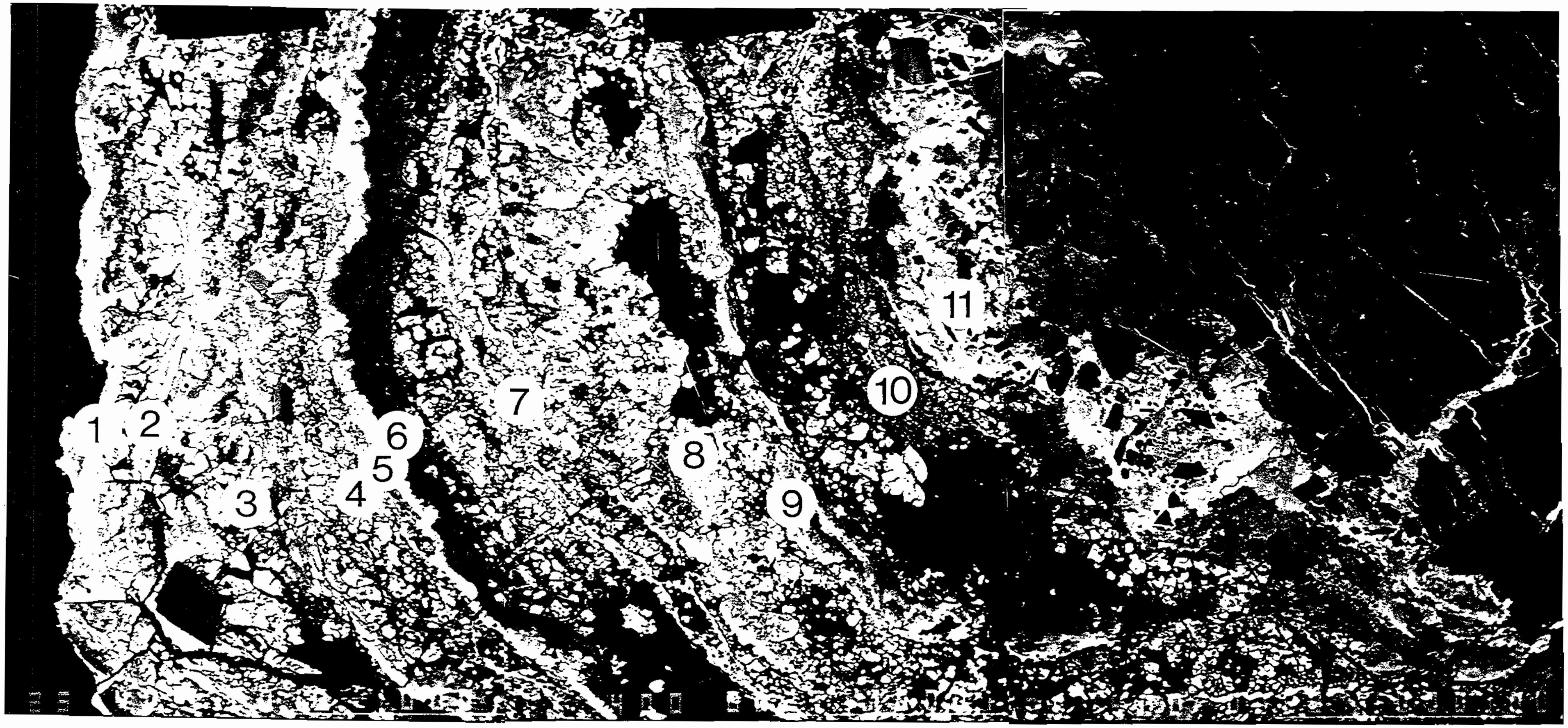

Fig 13. Consentric lamination around a silicate core. BSI- and X-ray image pictures. 11 point analysis of different phases.

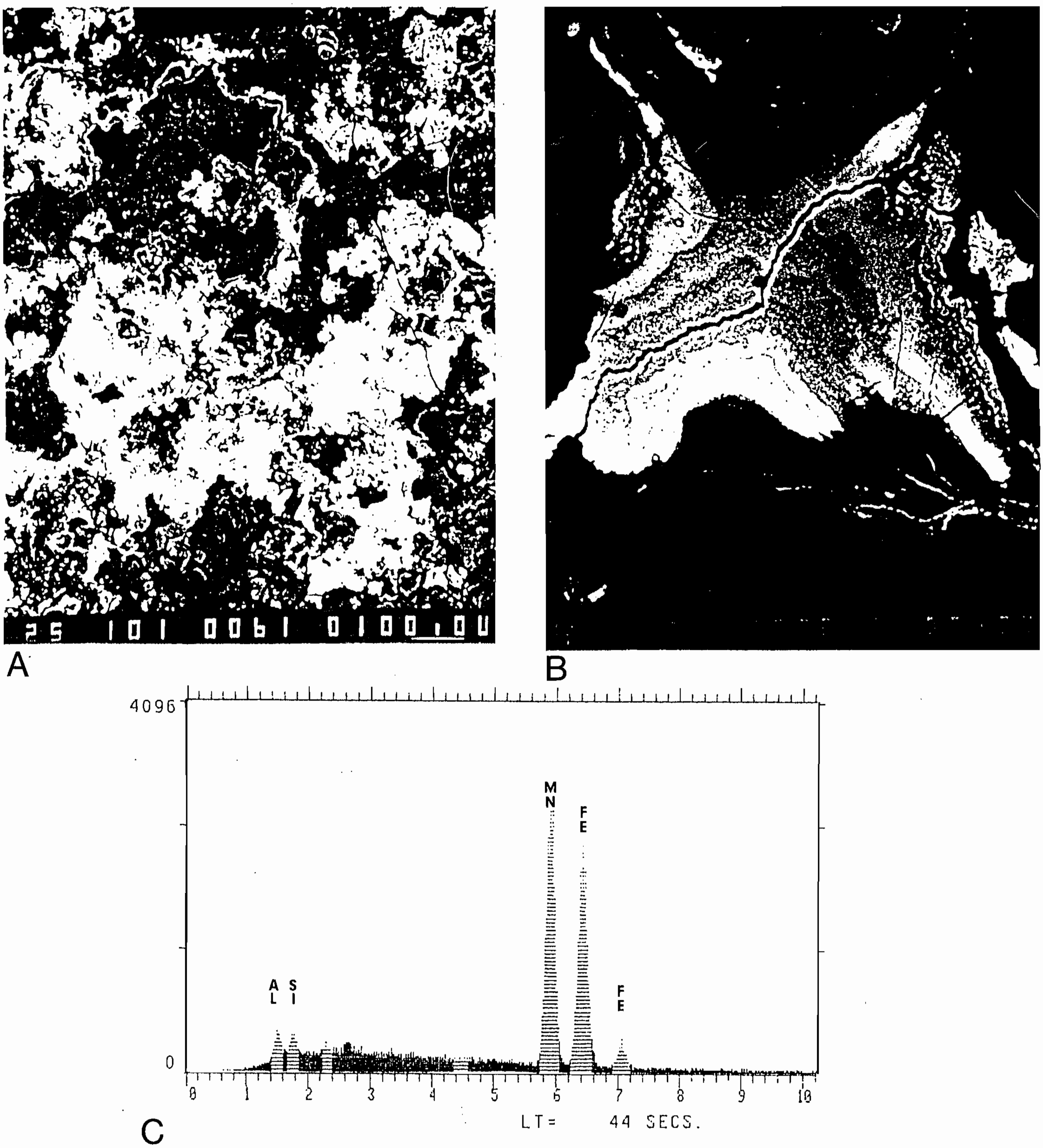

Fig 14. BSI-pictures and a spectral plot.

A. Typical irregular internal structure. Bright areas are rich in Mn, darker areas are rich in Fe.

B. Colloform lamination inside a main phase.

C. Spectral plot of the area on A.

Point 1. Outer part , Mn-phase
Point 2. Mn-phase
Point 3. Mn-phase (with minor Al)
Point 4. Core , Mn-Al phase

Area 1

Area 2

Area 3

Fig 15. SEI-pictures of a fracture surface through a nodule. Fragments of diatoms are found throughout the nodule, but are more frequently found in the core.

Area 4

Area 1

Area 4

Fig 15.

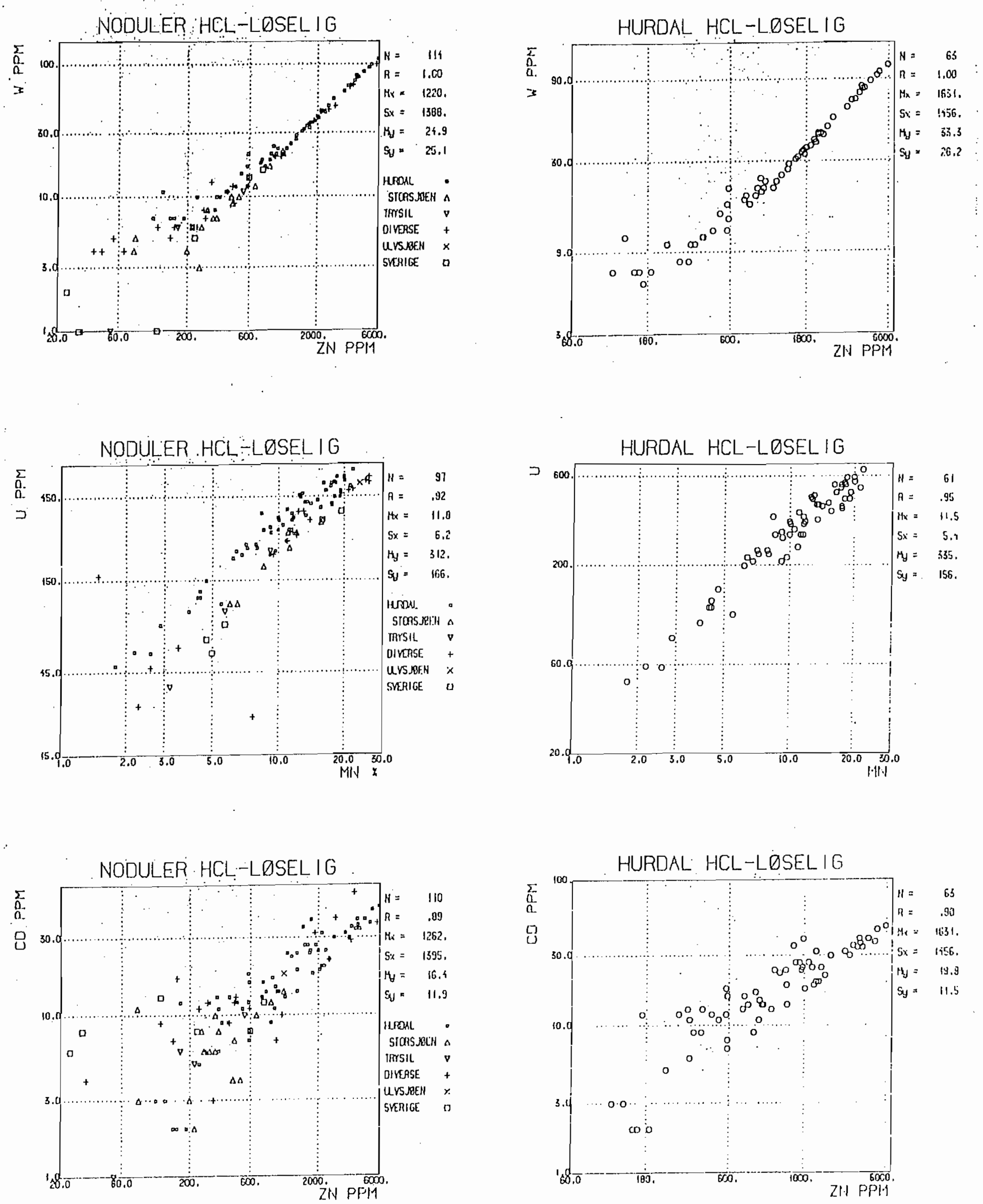

Fig 16.A. Scatterplots. HCl-extract: W versus Zn, U versus Mn and Cd versus Zn.

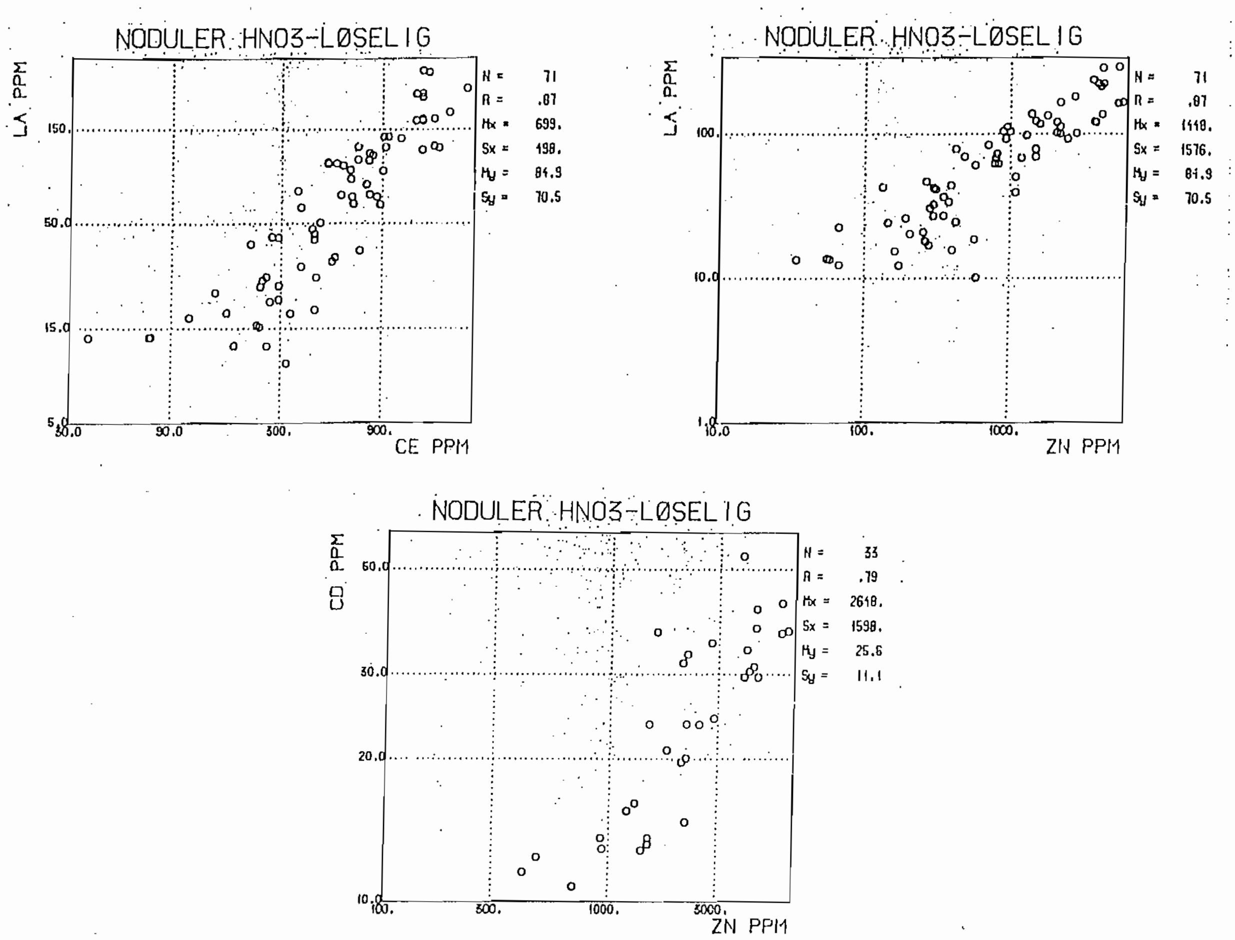

Fig 16 B. Scatterplots. HNO_3-extract: La versus Ce, La versus Zn and Cd versus Zn.

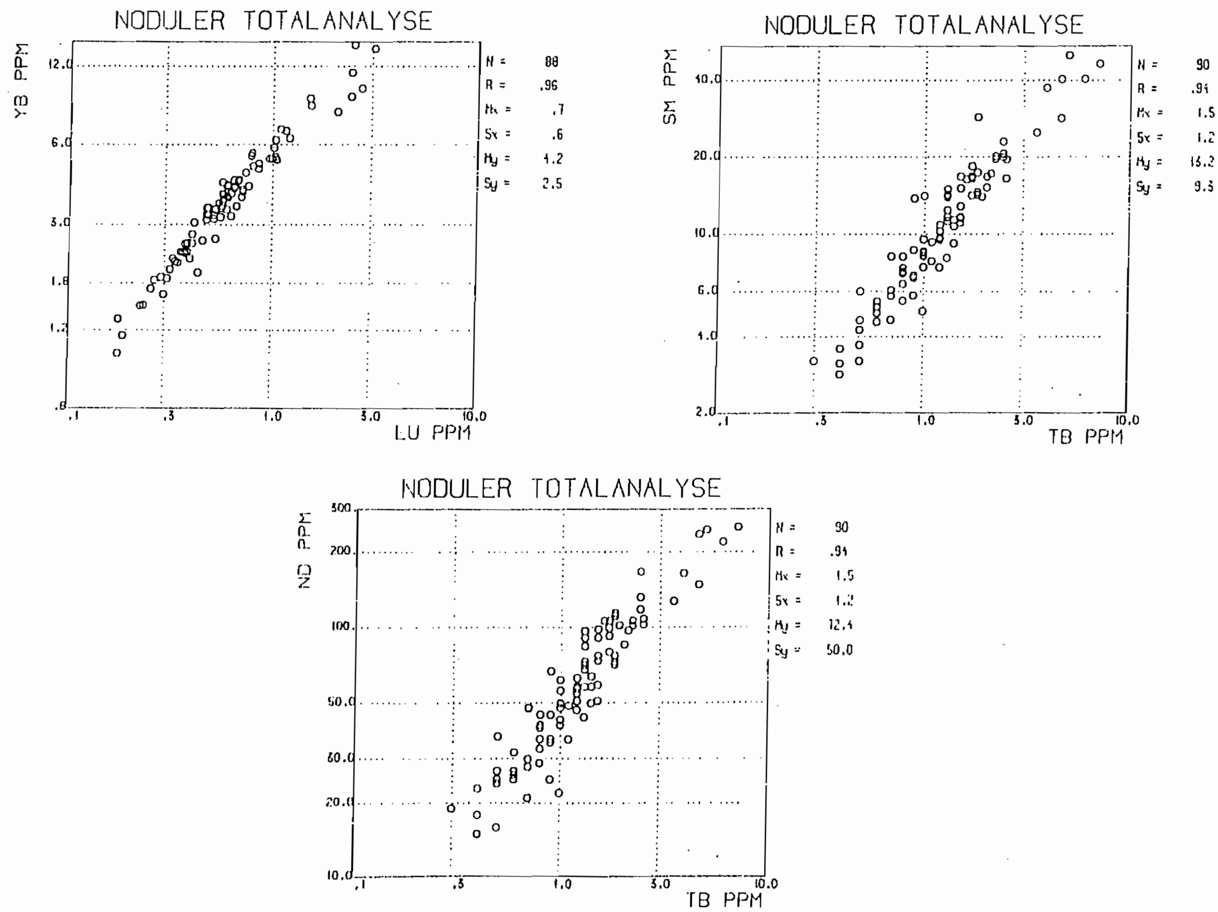

Fig 16 C. Scatterplots. Total content: Yb versus Lu, Sm versus Tb and Nd versus Tb.

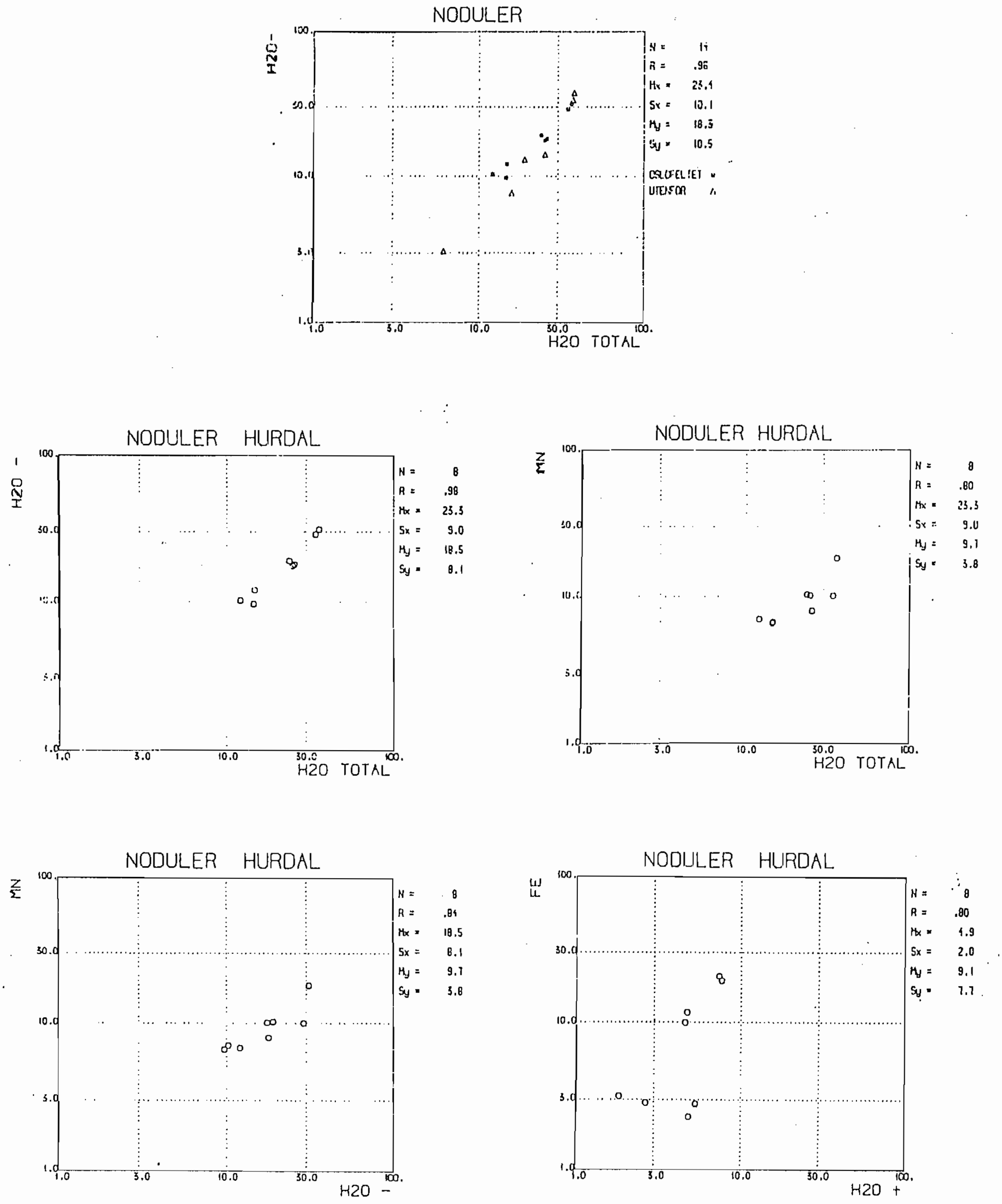

Fig 17. Scatterplots for the watercontent in oxidates. H_2O^- versus H_2OTot, Mn versus H_2OTot, Mn versus H_2O^- and Fe versus H_2O^+.

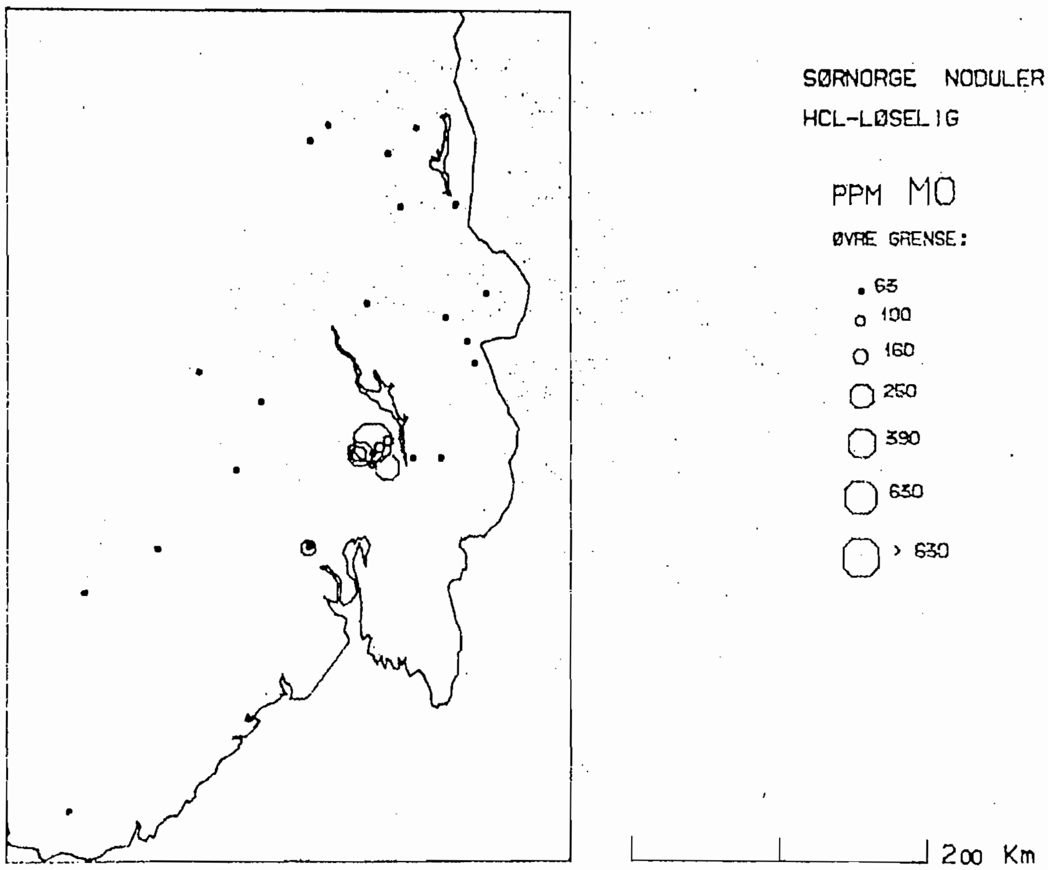

Fig 18 A. Geochemical map of the Mo content in oxidates, Southeastern Norway.

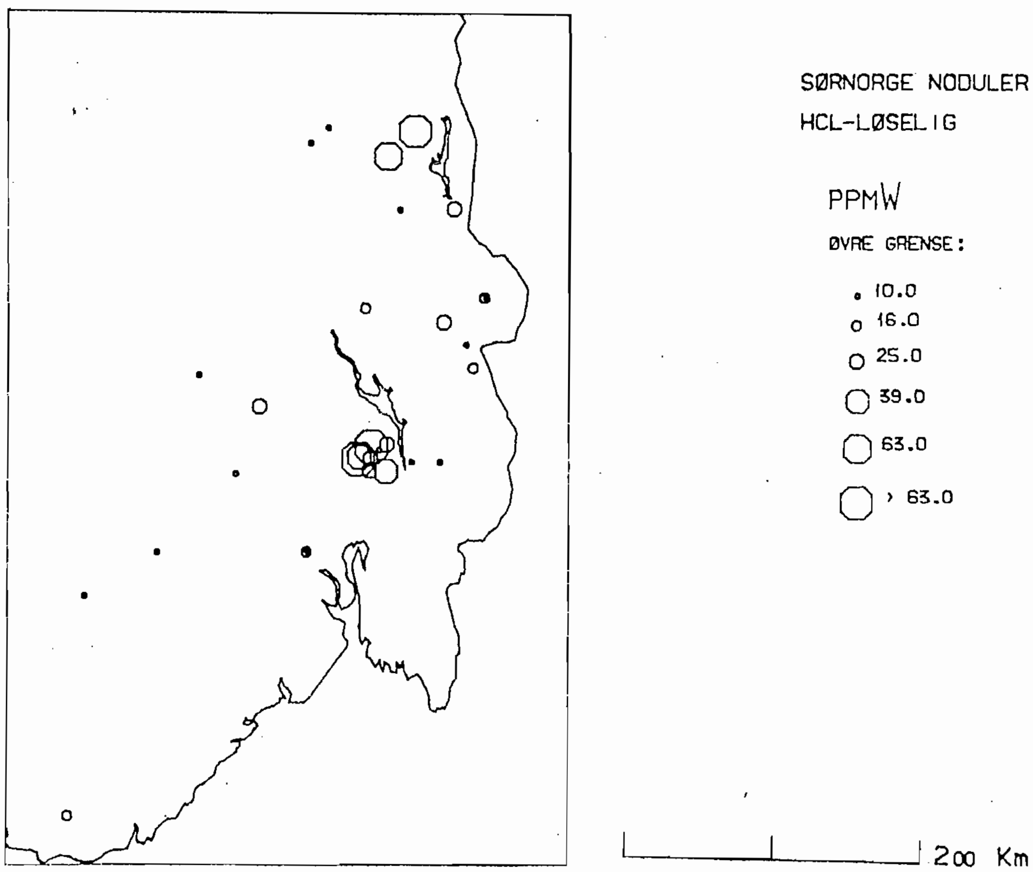

Fig 18 B. Geochemical map of the W content in oxidates, Southeastern Norway.

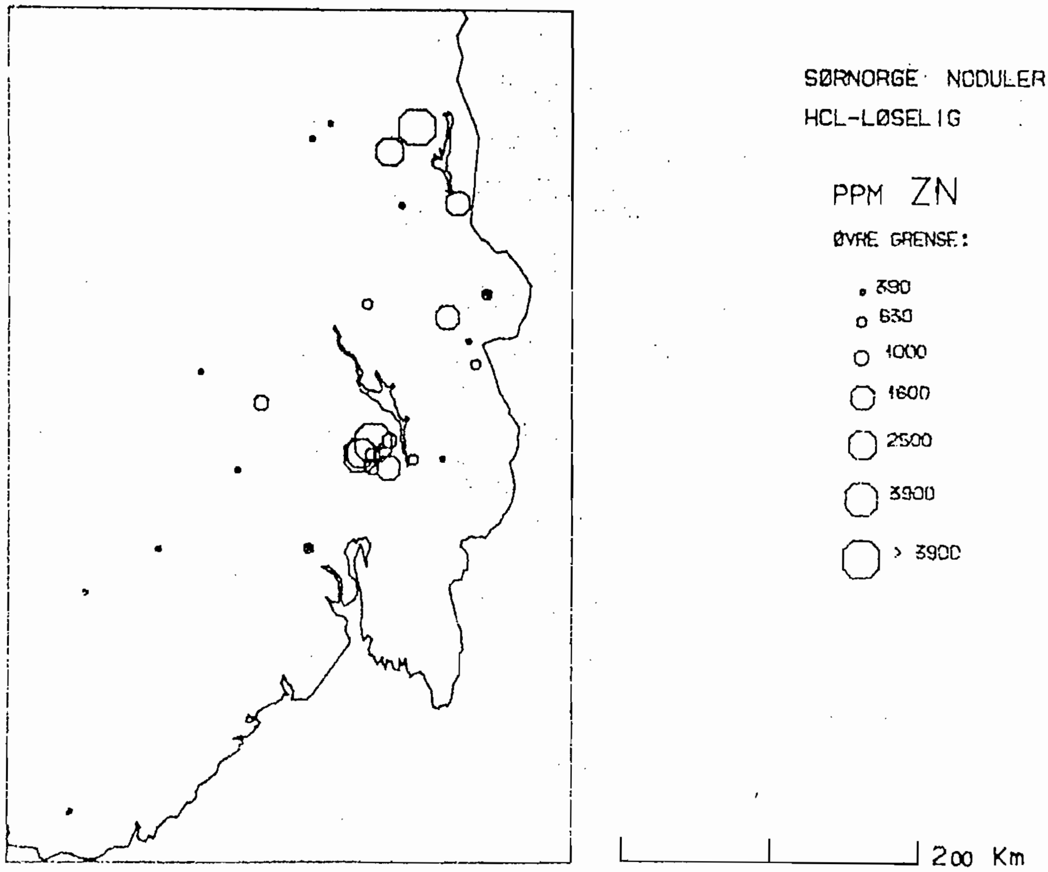

Fig 18 C. Geochemical map of the Zn content in oxidates, Southeastern Norway.

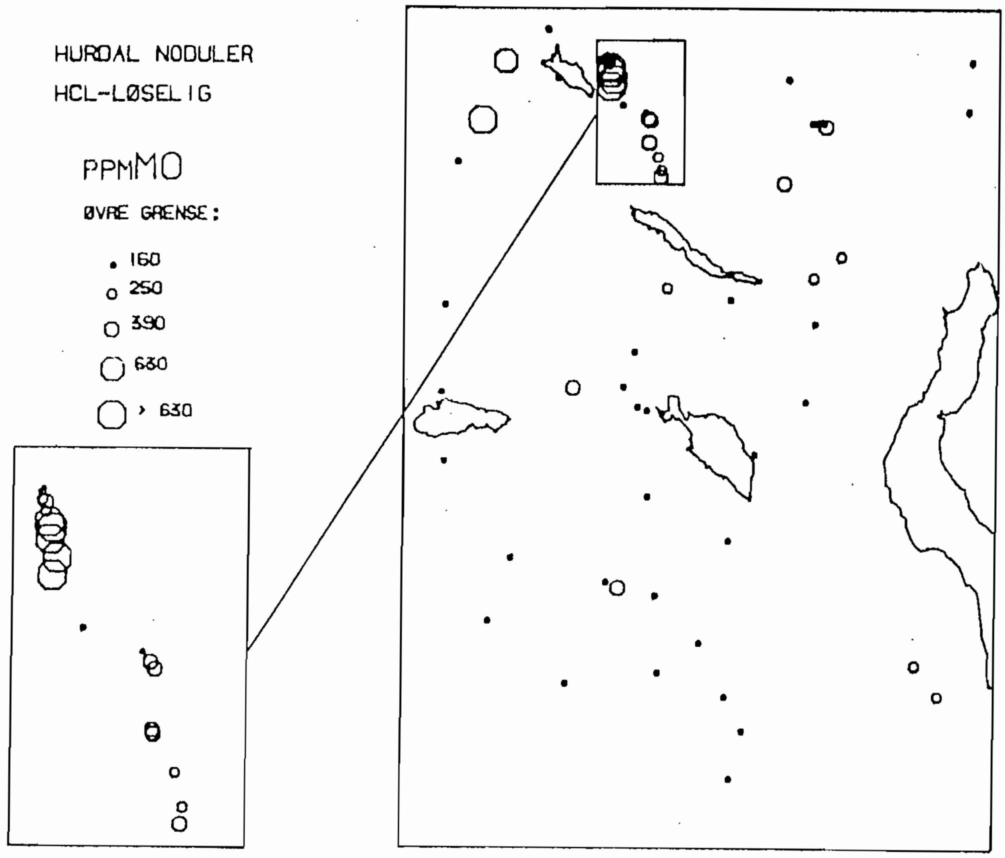

Fig 19 A. Geochemical map of the Mo content in oxidates, Hurdal.

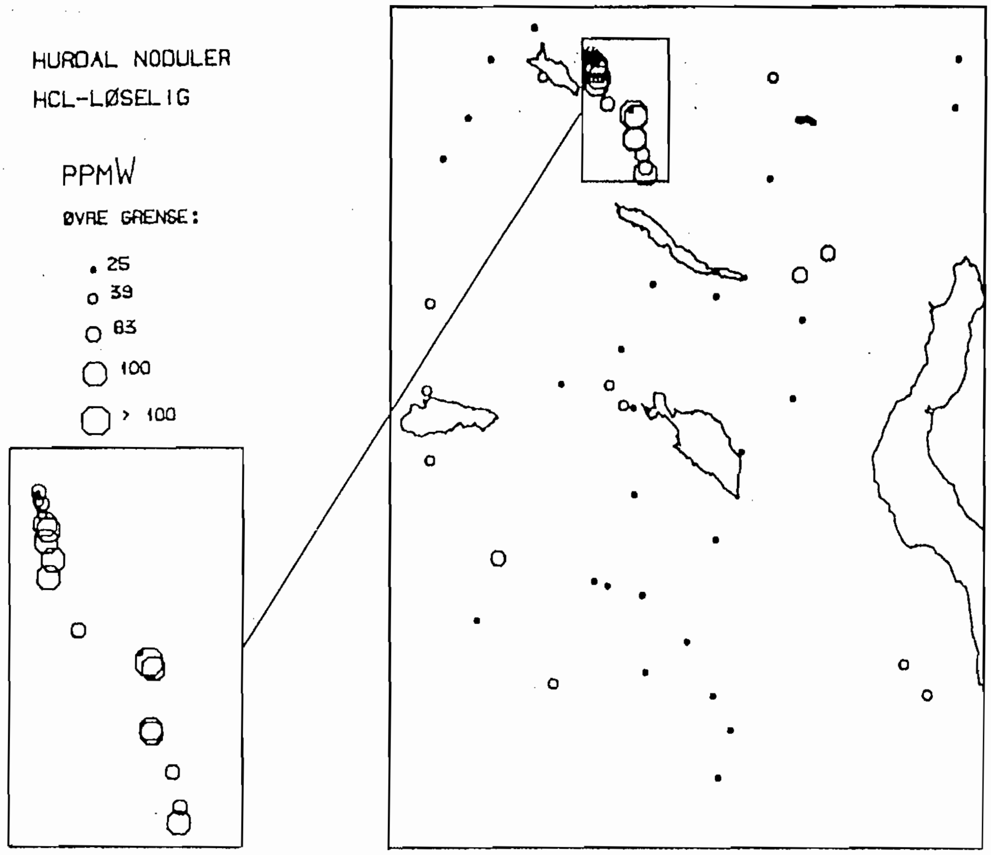

Fig 19 B. Geochemical map of the W content in oxidates, Hurdal.

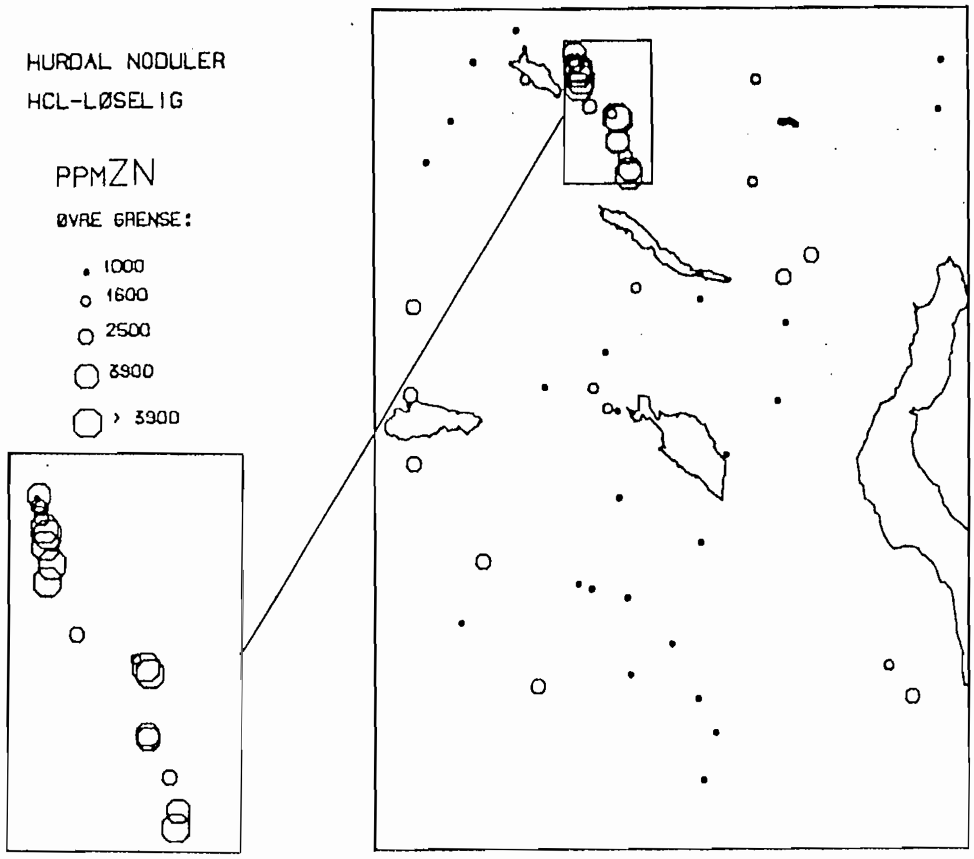

Fig 19 C. Geochemical map of the Zn content in oxidates, Hurdal.

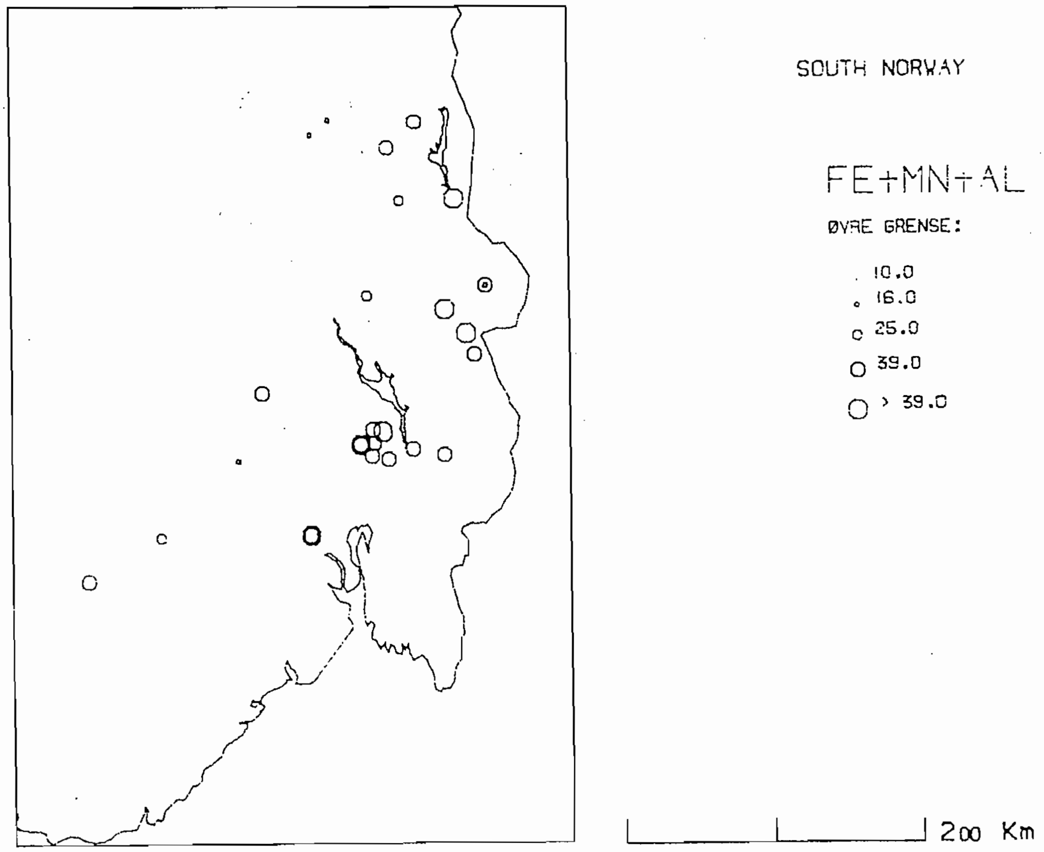

Fig 20 A. Geochemical map of the Fe+Mn+Al content in oxidates, Southeastern Norway.

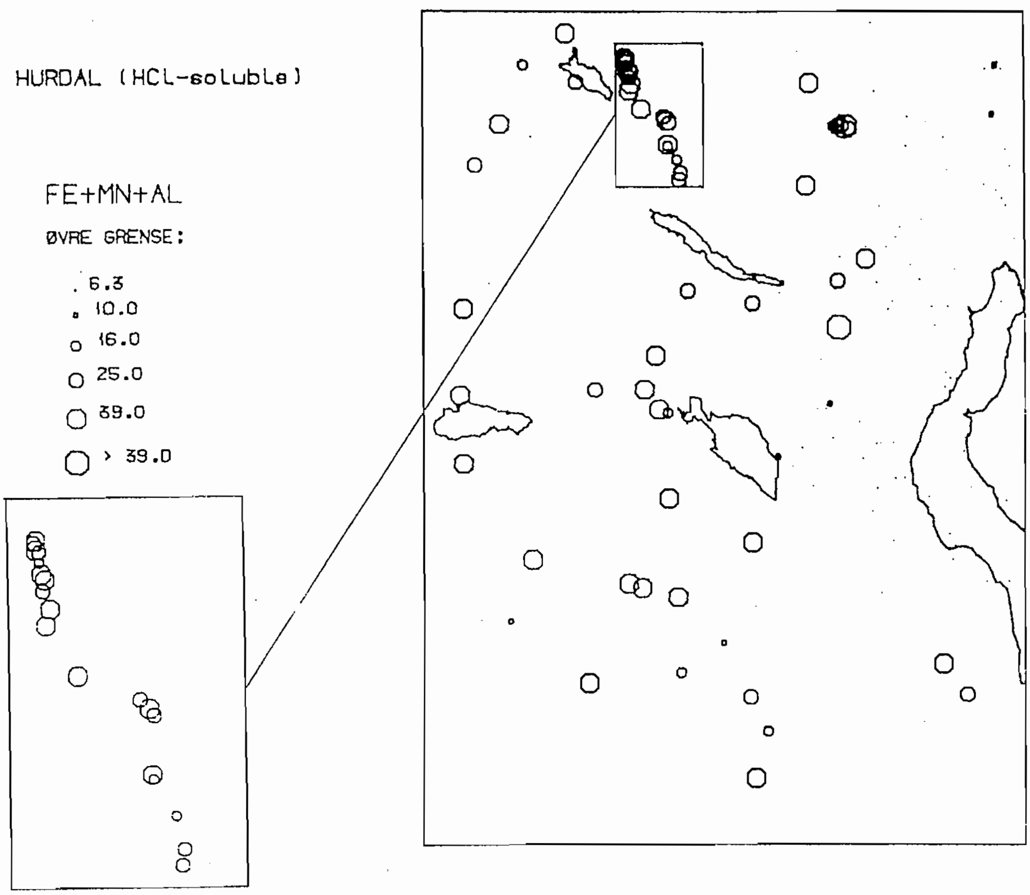

Fig 20 B. Geochemical map of the Fe+Mn+Al content in oxidates, Hurdal.

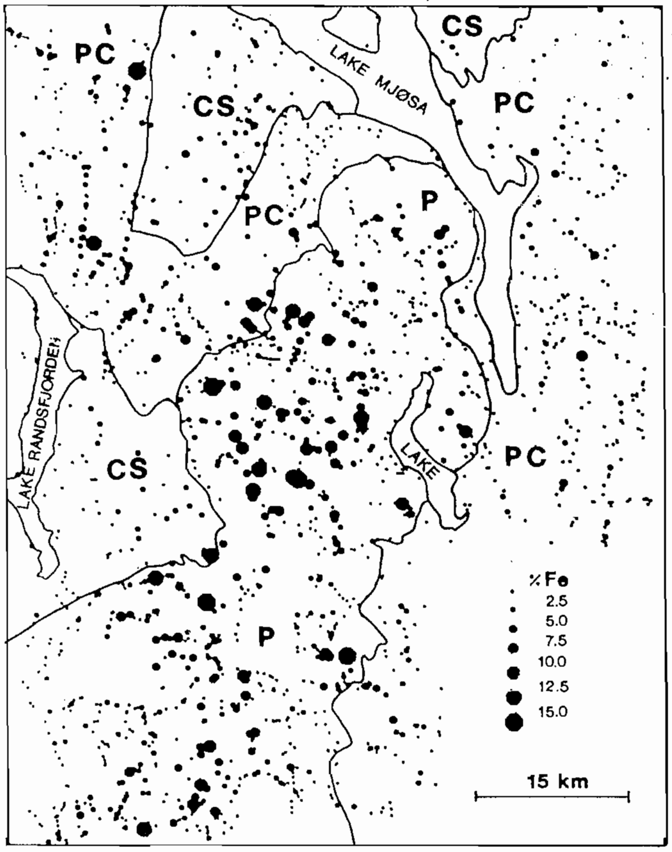

Fig 21. Contents of acid soluble iron in stream sediments from the Permian Oslo Graben (P) (mainly alkaligranites), and the surrounding areas of Precambrian gneisses (P.C) and Cambro-Silurian sediments (mostly carboniferous alum shales) (C.S).

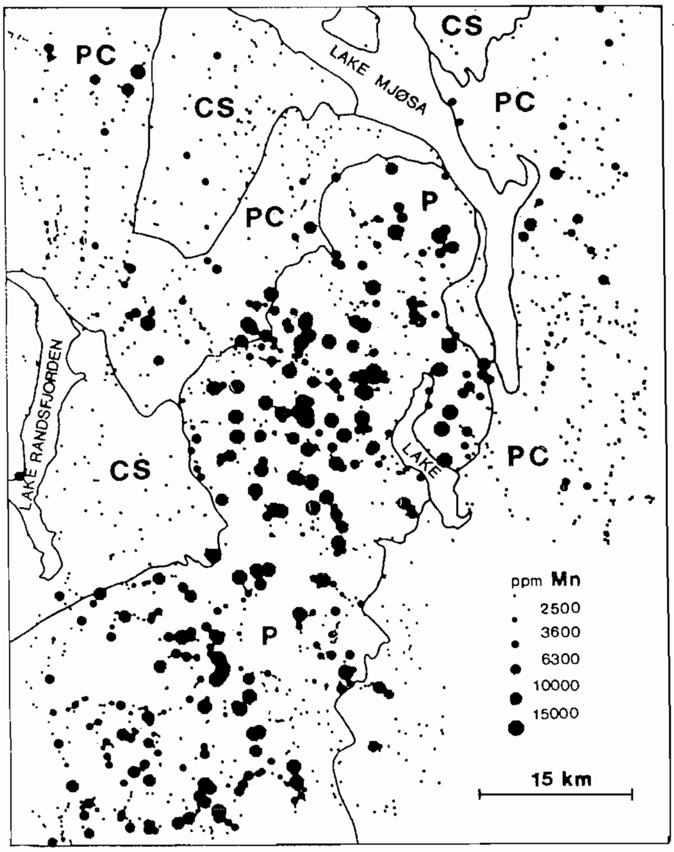

Fig 22. Contents of acid soluble manganese in stream sediments from the granitic Permian Oslo Graben (P) and surrounding areas of Precambrian gneisses (P.C) and Cambro-Silurian sediments (C.S).

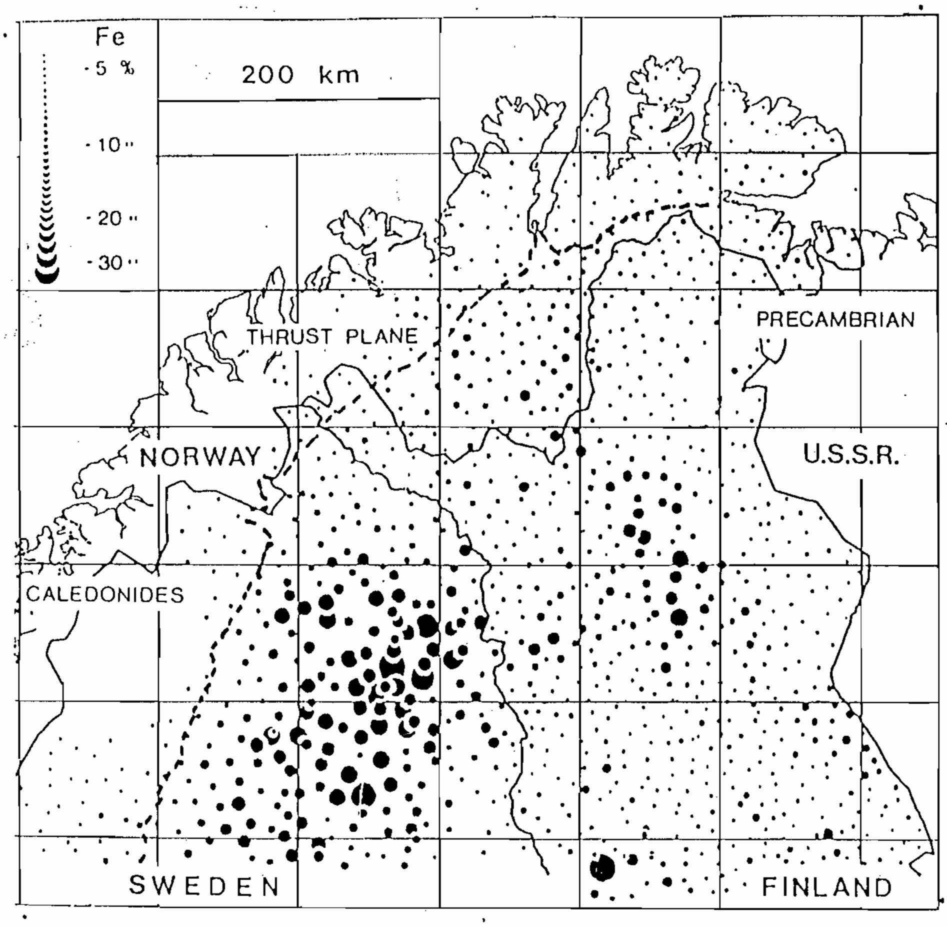

Fig 23. The content of acid soluble iron in stream sediments from the area north of the 66th parallell in Scandinavia.

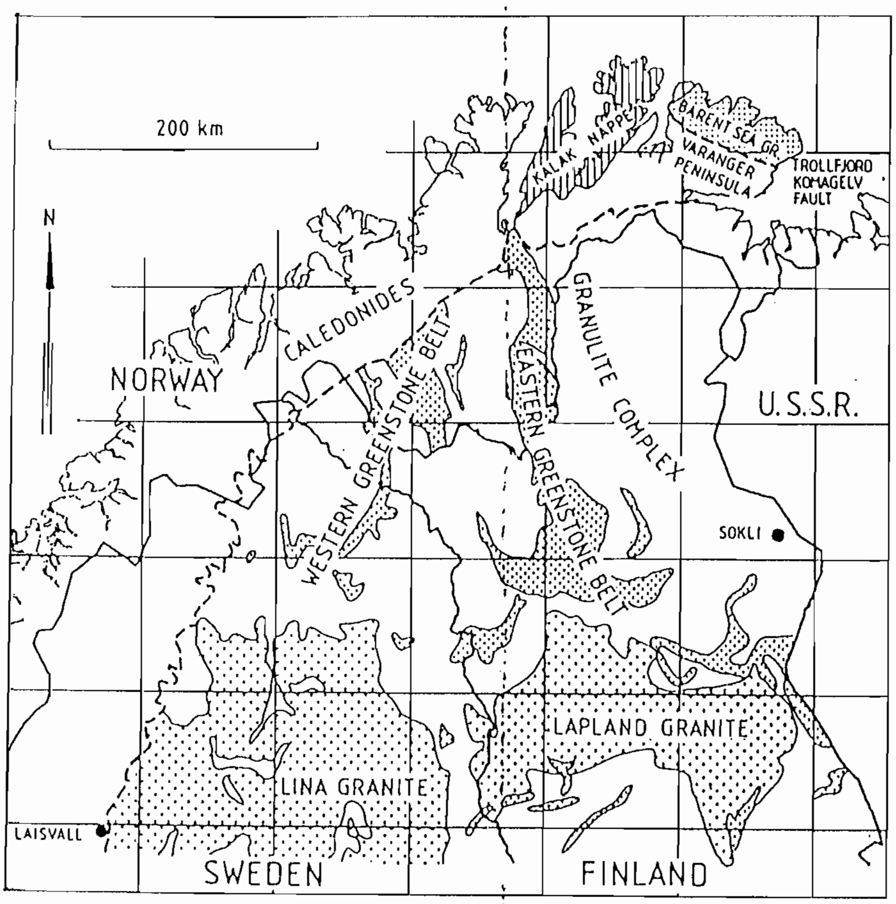

Fig 24. Simplified geological map of the Nordic countries north of the 66th parallell. Data from the Nordkalott Project.

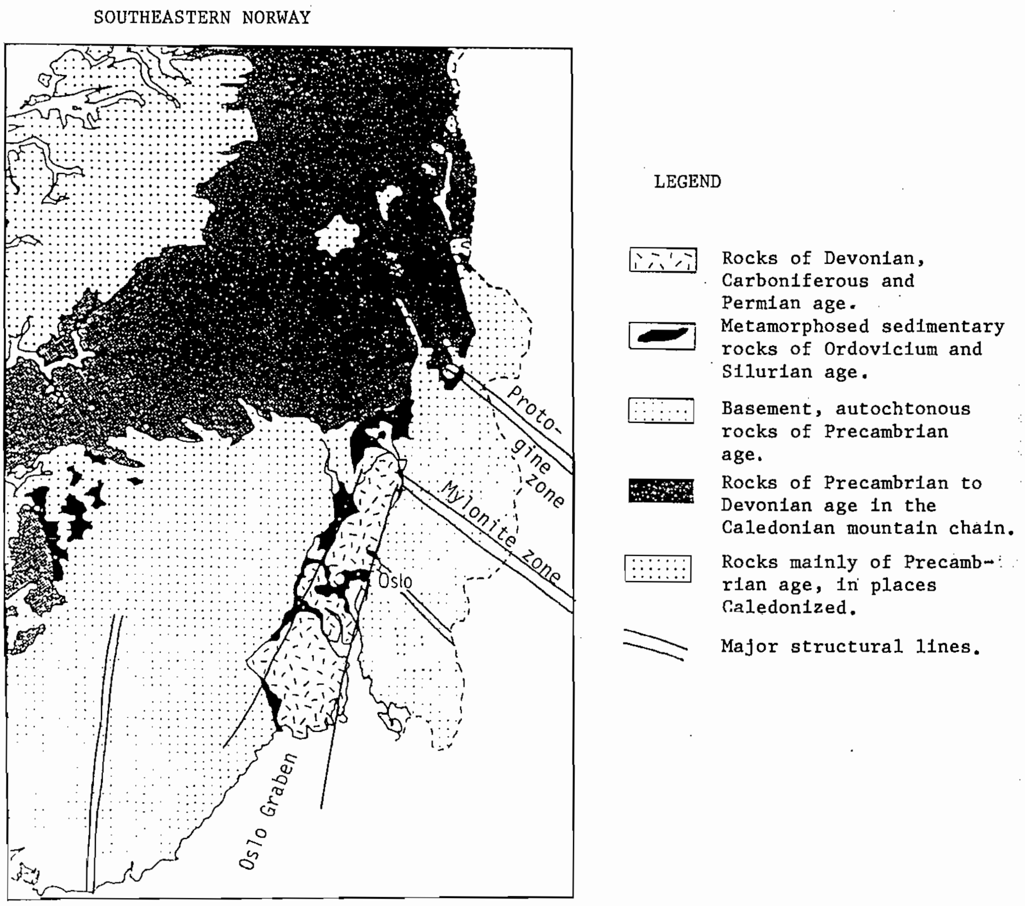

Fig 25. Simplified geological map of Southeastern Norway.

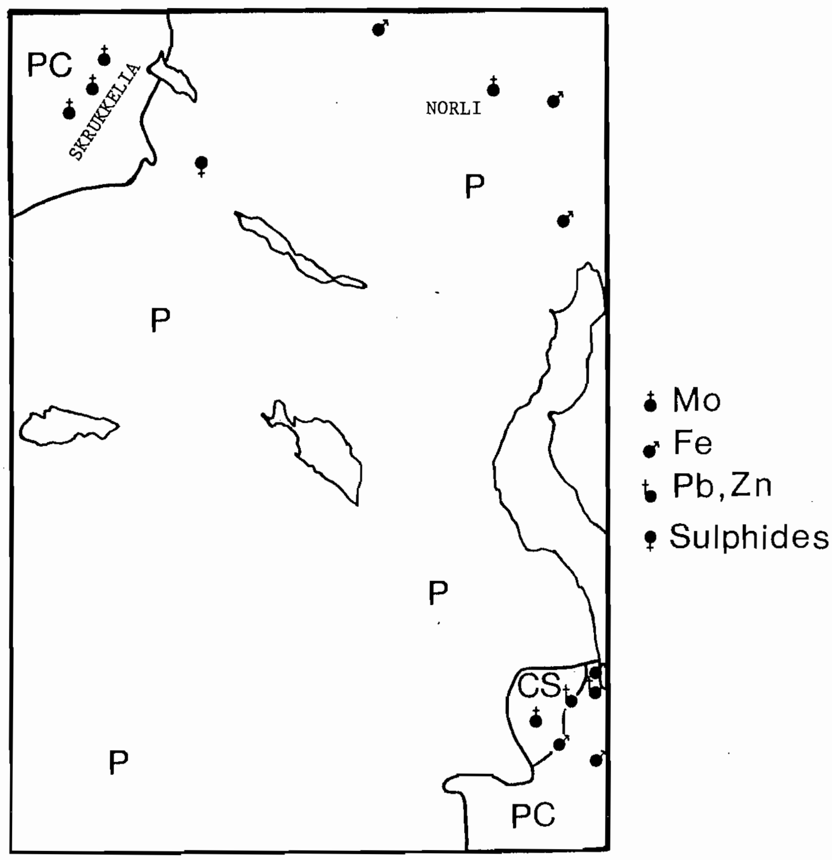

Fig 26. Simplified geological map of the Hurdal area with the registrated mineralizations from "Bergarkivet".
P: Mainly alkali-granites from the Permian Oslo Graben
P.C: Precambrian gneisses
C.S: Cambro-Silurian sediments

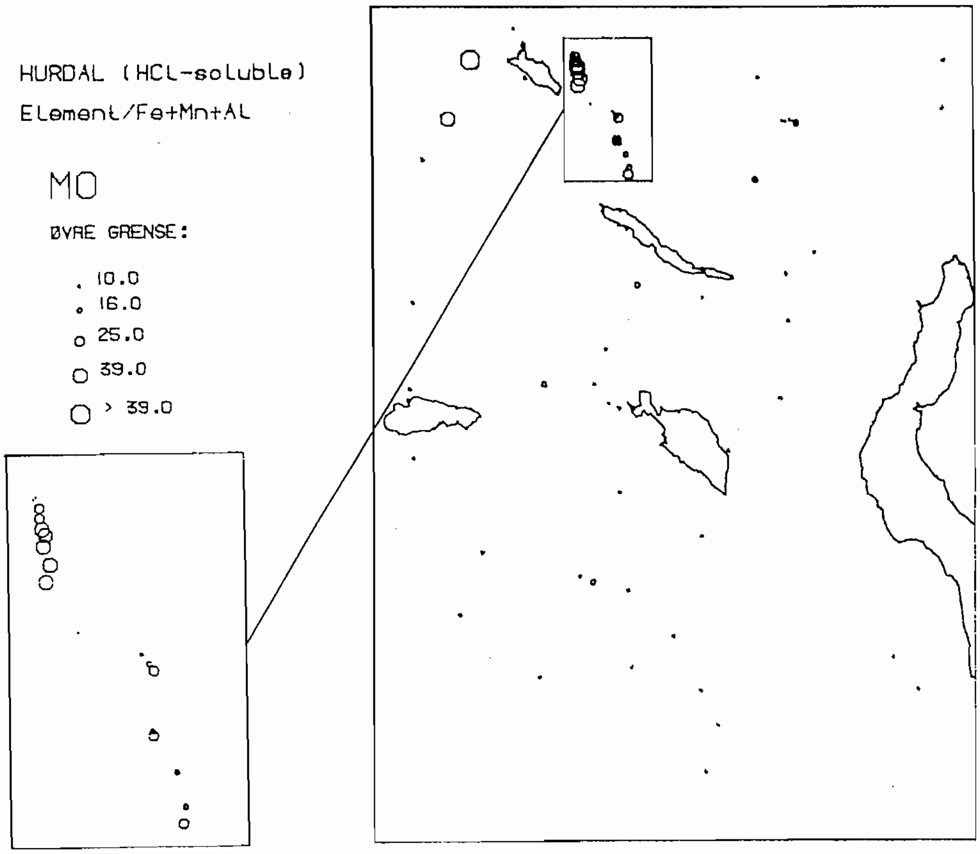

Fig 28 A. Map of Mo/Fe+Mn+Al, Hurdal.

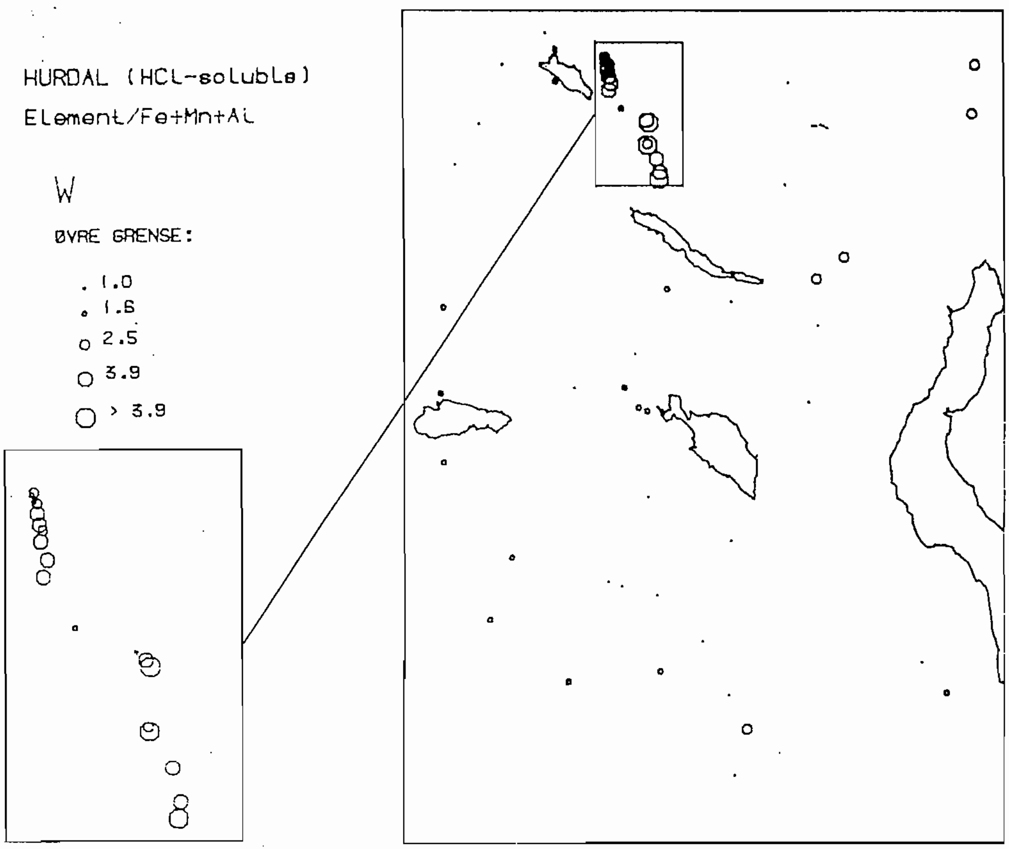

Fig 28 B. Map of W/Fe+Mn+Al, Hurdal.

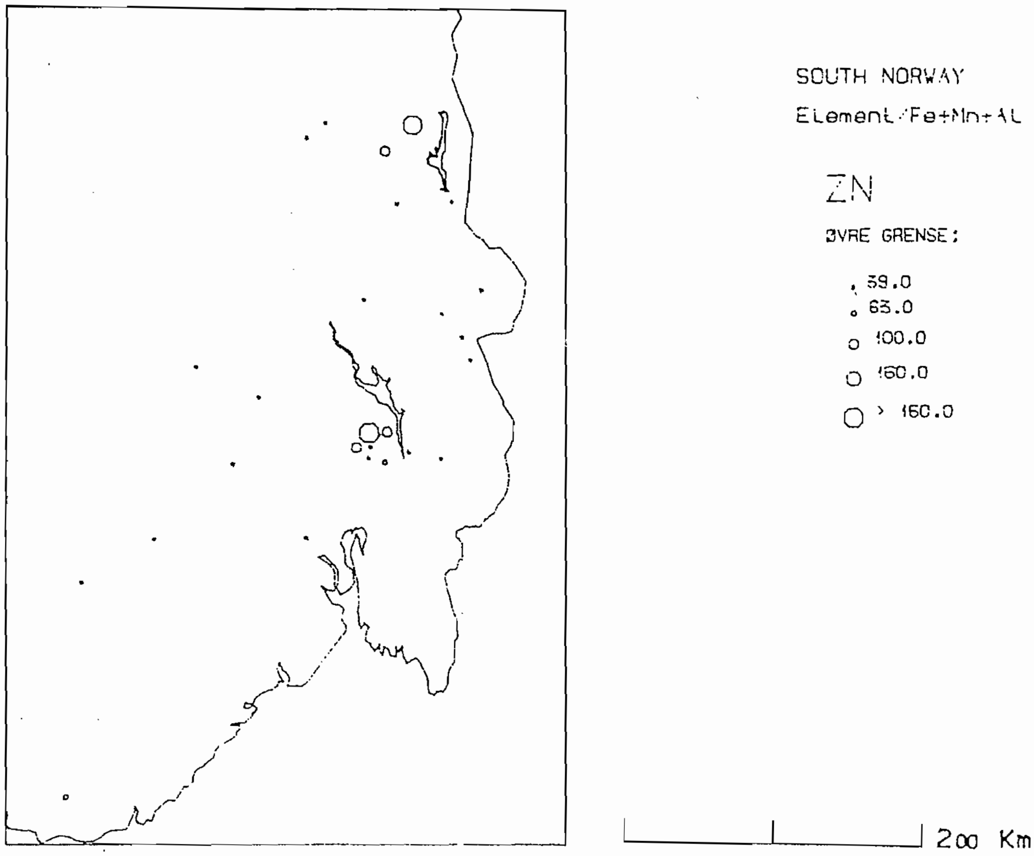

Fig 27 C. Map of Zn/Fe+Mn+Al, Southeastern Norway.

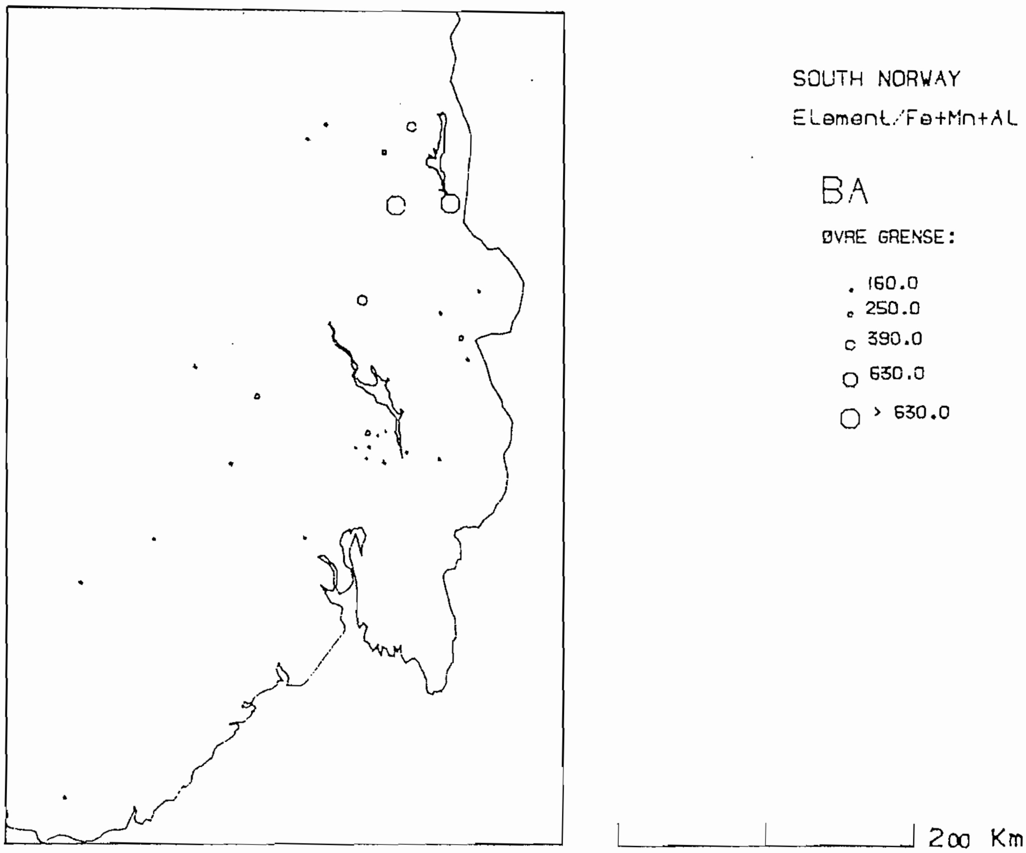

Fig 27 D. Map of Ba/Fe+Mn+Al, Southeastern Norway.

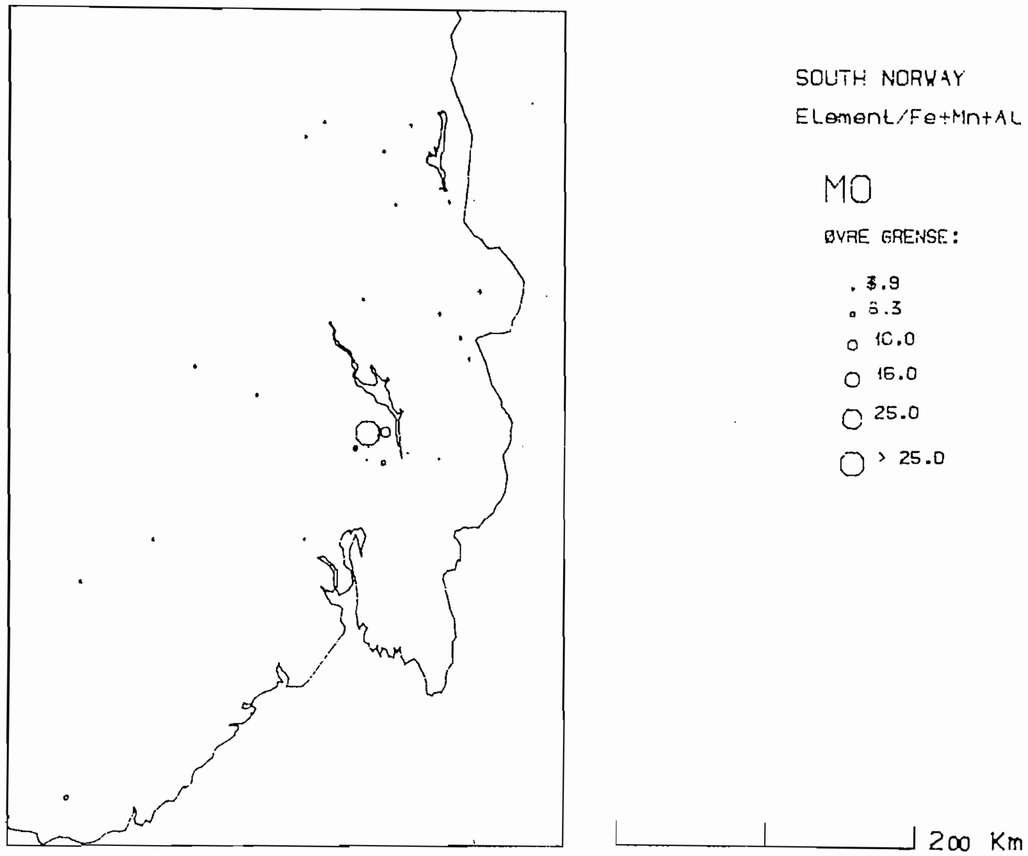

Fig 27 A. Map of Mo/Fe+Mn+Al, Southeastern Norway.

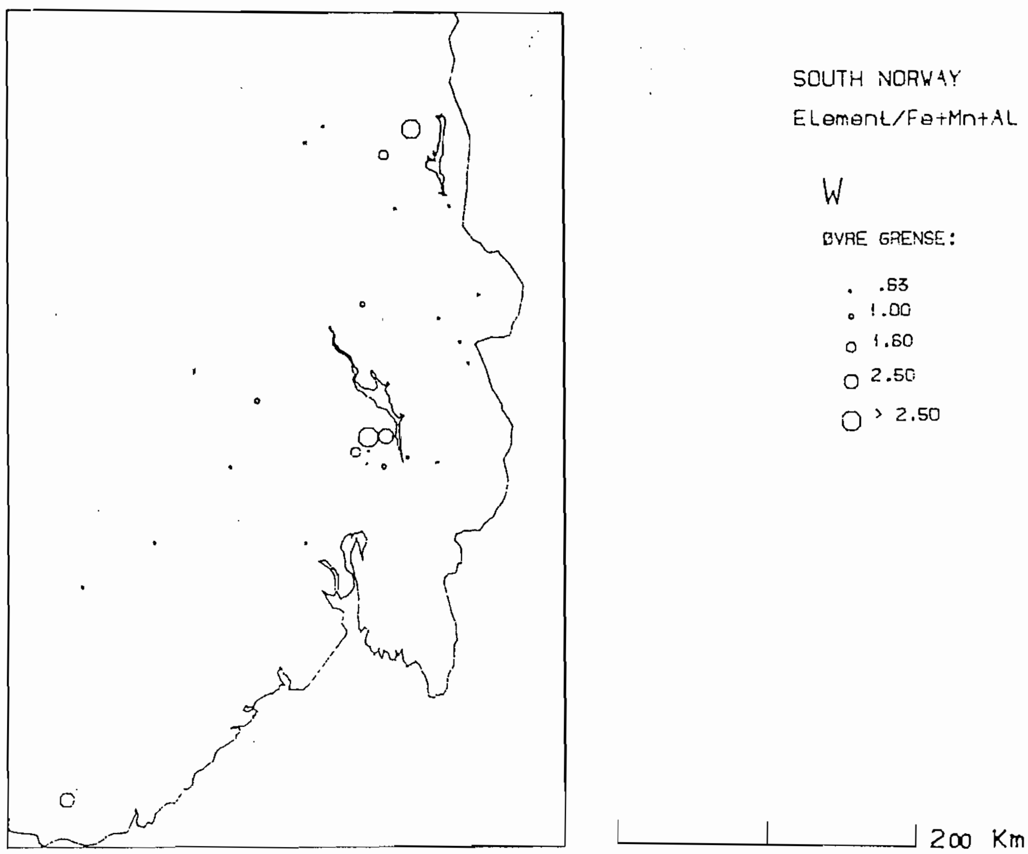

Fig 27 B. Map of W/Fe+Mn+Al, Southeastern Norway.

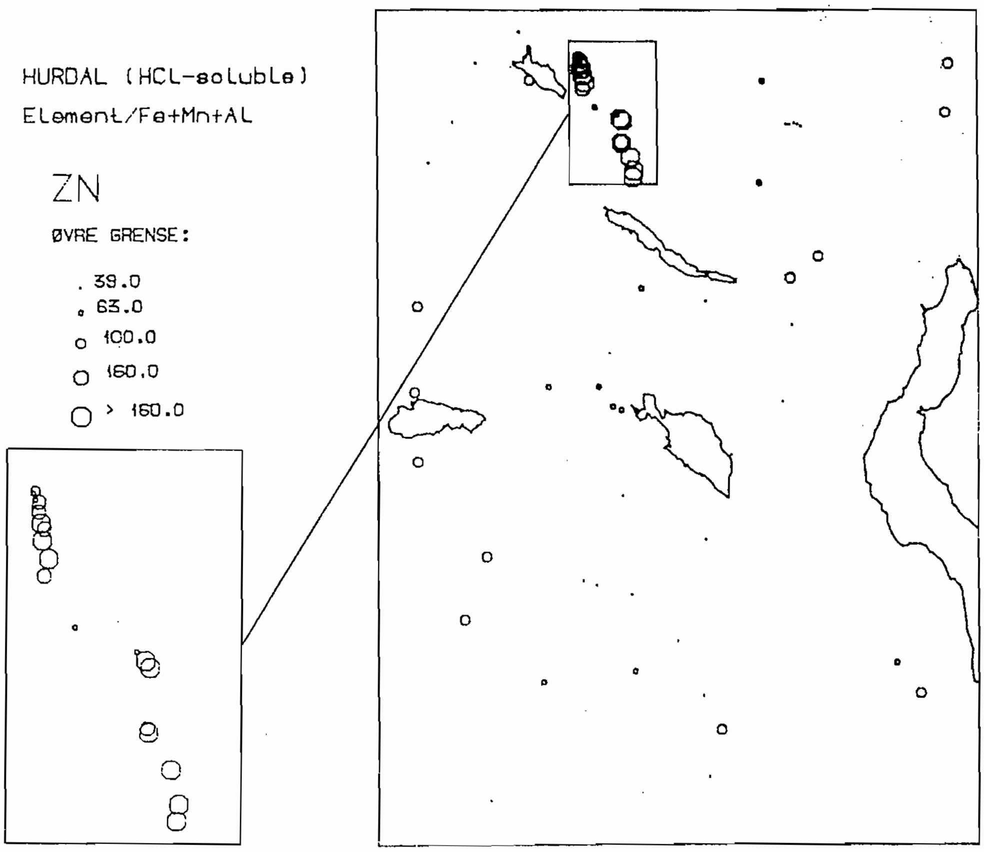

Fig 28 C. Map of Zn/Fe+Mn+Al, Hurdal.

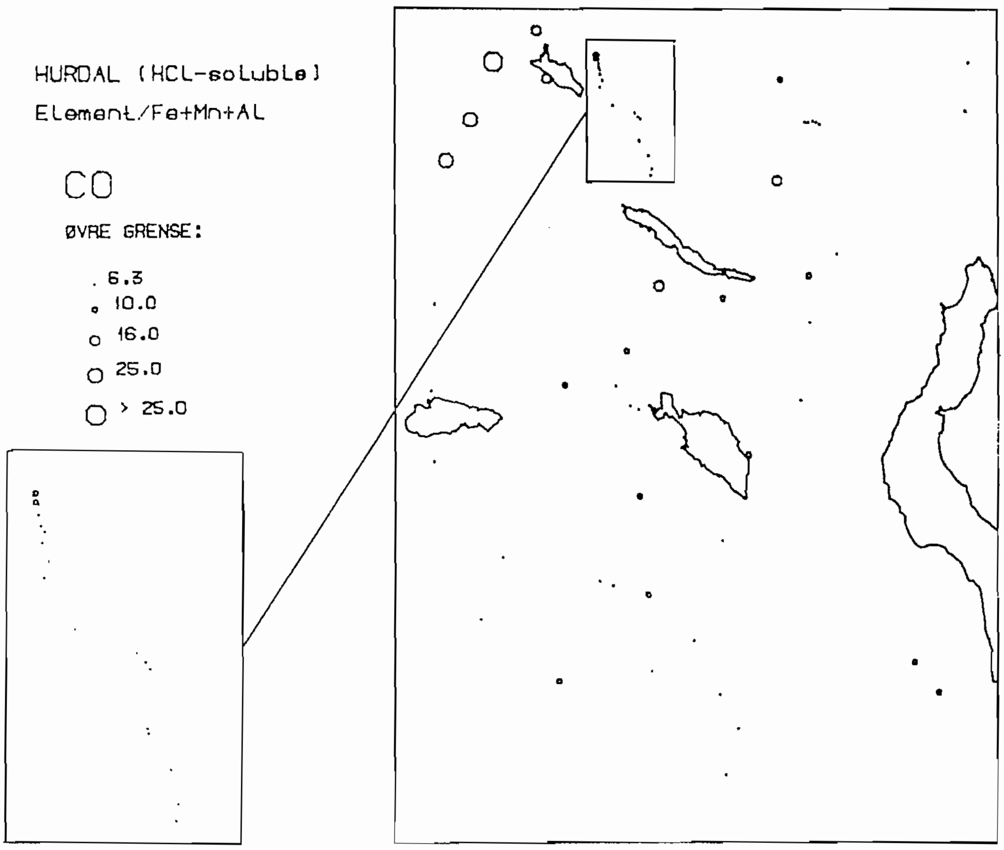

Fig 28 D. Map of Co/Fe+Mn+Al, Hurdal.

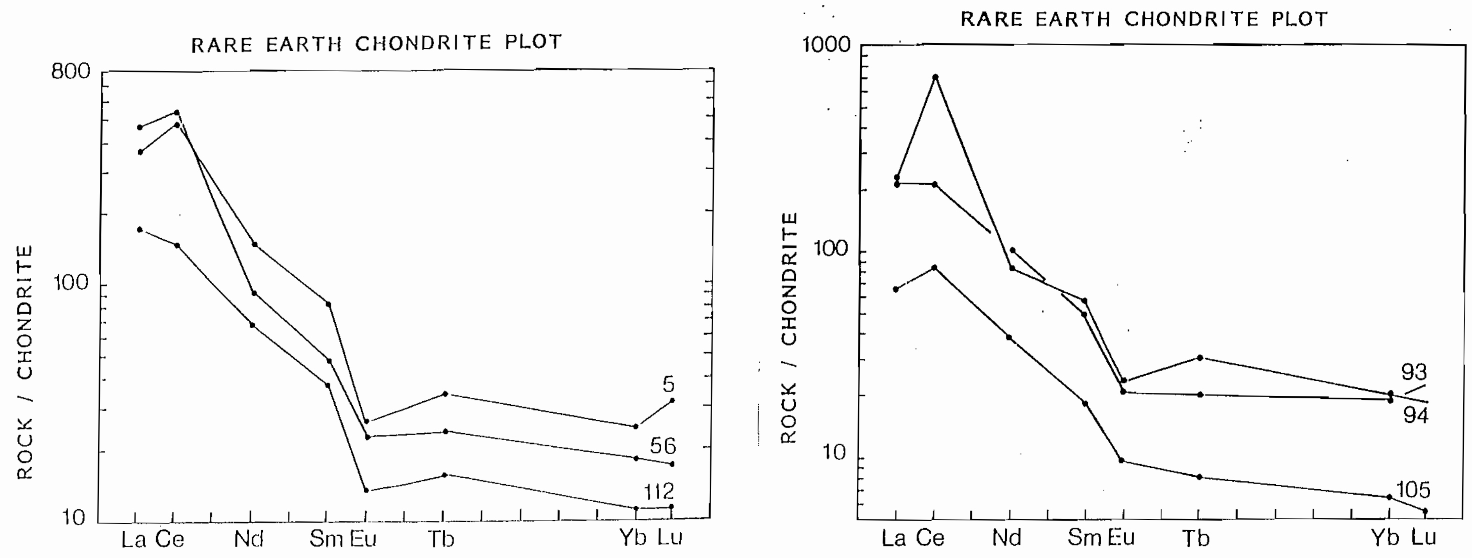

Fig 29. Rare earth Chondrite plots.
Sample 5. Stream nodules from Hurdal.
Sample 56. Stream nodules from Hurdal.
Sample 93. Discoidale concretions from lake Storsjøen.
Sample 94. Nodules from lake Storsjøen.
Sample 105. Crusts from lake Ulvsjøen.
Sample 112. Crusts from lake Storsjøen.

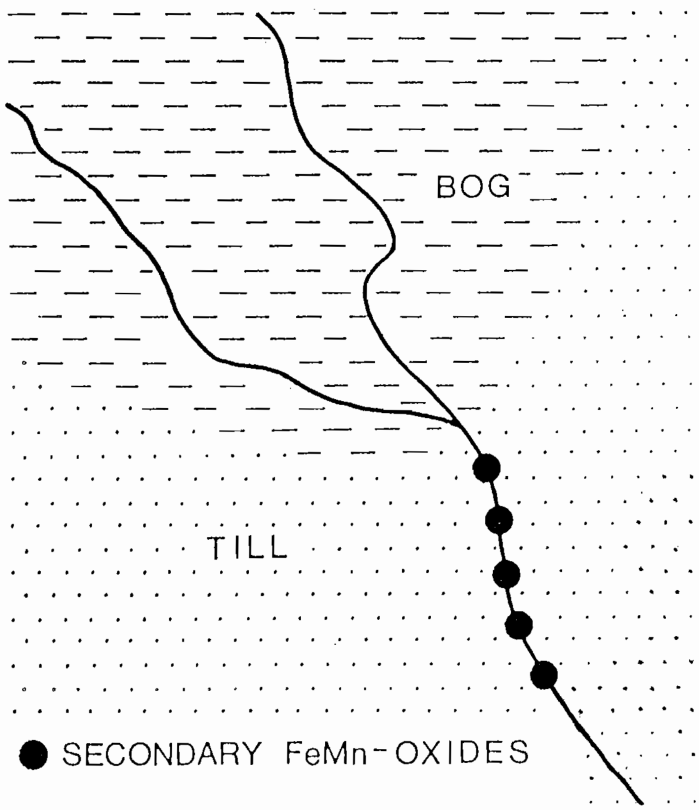

Fig 30. Illustrative sketch showing local oxidate formation in a freely draining, airated stream orginating in a bog with impeeded drainage and a low redox potential due to organic matter in the bog.

Table 1. Description of samples.

Sample no.	UTM X km	UTM Y km	Map 1:50000	Type of oxidates
1	594.60	6694.50	1815 I	Stream nodules
2	601.39	6707.47	1915 IV	Stream nodules
3	601.36	6707.44	1915 IV	Stream nodules
4	601.39	6707.36	1915 IV	Stream nodules
5	601.43	6707.32	1915 IV	Stream nodules
6	601.44	6707.20	1915 IV	Stream nodules
7	601.46	6707.06	1915 IV	Stream nodules
8	601.50	6706.98	1915 IV	Stream nodules
9	601.48	6706.84	1915 IV	Stream nodules
10	601.56	6706.62	1915 IV	Stream nodules
11	601.50	6706.40	1915 IV	Stream nodules
12	601.91	6705.76	1915 IV	Stream nodules
13	602.67	6705.46	1915 IV	Stream nodules
14	602.79	6705.34	1915 IV	Stream nodules
15	602.84	6705.26	1915 IV	Stream nodules
16	602.81	6704.49	1915 IV	Stream nodules
17	602.83	6704.44	1915 IV	Stream nodules
18	603.11	6703.95	1915 IV	Stream nodules
19	603.22	6703.51	1915 IV	Stream nodules
20	603.20	6702.30	1915 IV	Stream nodules
21	608.98	6705.05	1915 IV	Stream nodules
22	608.86	6705.14	1915 IV	Stream nodules
23	608.73	6705.17	1915 IV	Stream nodules
24	608.60	6705.13	1915 IV	Stream nodules
25	608.50	6705.10	1915 IV	Stream nodules
27	607.60	6706.70	1915 IV	Stream nodules
28	614.00	6707.30	1915 IV	Stream nodules
29	613.90	6705.50	1915 IV	Stream nodules
30	599.33	6708.36	1915 IV	Stream nodules
31	597.84	6707.26	1915 IV	Stream nodules
32	599.68	6706.68	1915 IV	Stream nodules
33	597.03	6705.20	1915 IV	Stream nodules
34	596.21	6703.77	1915 IV	Stream nodules
35	607.50	6703.10	1915 IV	Stream nodules
36	609.50	6700.60	1915 IV	Stream nodules
37	629.20	6693.40	1915 I	Stream nodules
38	603.23	6686.61	1915 IV	Stream nodules
39	600.08	6686.24	1915 IV	Stream nodules
40	597.40	6688.30	1915 IV	Stream nodules
41	612.23	6686.92	1915 IV	Stream nodules
42	613.10	6685.90	1915 IV	Stream nodules
43	605.79	6683.00	1915 IV	Stream nodules
44	606.20	6684.60	1915 IV	Stream nodules
45	605.61	6685.82	1915 IV	Stream nodules
46	604.70	6687.60	1915 IV	Stream nodules
47	603.13	6689.20	1915 IV	Stream nodules
48	602.82	6692.50	1915 IV	Stream nodules
49	605.66	6691.01	1915 IV	Stream nodules
50	608.32	6695.69	1915 IV	Stream nodules
51	606.50	6693.90	1915 IV	Stream nodules
52	602.36	6697.35	1915 IV	Stream nodules
53	601.98	6696.17	1915 IV	Stream nodules
54	602.49	6695.50	1915 IV	Stream nodules
55	602.80	6695.40	1915 IV	Stream nodules
56	595.78	6698.91	1915 IV	Stream nodules
57	595.67	6695.97	1915 IV	Stream nodules
58	595.80	6693.70	1915 IV	Stream nodules
59	601.90	6689.47	1915 IV	Stream nodules
60	601.47	6689.64	1915 IV	Stream nodules
61	598.16	6690.43	1915 IV	Stream nodules
62	600.27	6696.18	1915 IV	Stream nodules
63	608.63	6698.28	1915 IV	Stream nodules
64	603.50	6699.50	1915 IV	Stream nodules
65	605.70	6699.10	1915 IV	Stream nodules

Sample no.	UTM X km	UTM Y km	Map 1:50000	Type of oxidates
66	608.58	6699.85	1915 IV	Stream nodules
67	356.30	6807.10	2117 IV	Stream nodules
68	355.80	6806.50	2117 IV	Stream nodules
69	358.30	6801.60	2117 IV	Stream nodules
70	356.30	6801.20	2117 IV	Stream nodules
71	North of Tisjøen, Sweden			Stream nodules
72	North of Tisjøen, Sweden			Stream nodules
73	North of Tisjøen, Sweden			Stream nodules
74	North of Tisjøen, Sweden			Stream nodules
75	650.50	6690.20	2015 IV	Lake crusts
76	650.50	6690.20	2015 IV	Lake concretions
77	South of Jokmokk, Sweden			Stream nodules
78	South of Jokmokk, Sweden			Stream crusts
80	459.90	6632.50	1514 I	Stream nodules
81	409.40	6606.50	1414 II	Stream nodules
82	399.70	6461.00	1411 IV	Stream crusts
83	511.80	6686.50	1615 I	Hardpan
84	650.50	6690.20	2015 IV	Lake nodules
85	650.50	6690.20	2015 IV	Lake nodules
86	650.50	6690.20	2015 IV	Lake crusts
87	649.90	6688.70	2015 IV	Lake nodules
88	649.90	6680.70	2015 IV	Discoidale Lake concretions
89	649.90	6680.70	2015 IV	Discoidale Lake concretions
90	649.90	6680.70	2015 IV	Lake crusts
91	648.90	6691.40	2015 IV	Lake nodules
92	648.90	6691.40	2015 IV	Lake crusts
93	645.80	6694.70	2015 IV	Discoidale Lake concretions
94	647.40	6694.90	2015 IV	Lake nodules
95	647.40	6694.90	2015 IV	Lake crusts
96	559.50	6635.90	1814 IV	Hardpan
97	559.50	6635.90	1814 IV	Hardpan
98	559.55	6635.69	1814 IV	Hardpan
99	559.55	6635.69	1814 IV	Hardpan
100	526.60	6731.00	1716 III	Stream nodules
101	594.60	6694.50	1815 I	Stream nodules
102	601.60	6706.50	1915 IV	Stream nodules
103	595.80	6695.90	1915 IV	Stream nodules
104	344.20	6768.00	2017 II	Stream nodules
105	650.70	6786.50	2017 III	Lake crusts
106	631.50	6914.20	1719 IV	Hardpan
107	595.80	6793.80	1917 IV	Stream nodules
108	621.50	6863.00	1918 I	Stream nodules
109	347.40	6752.80	2016 I	Stream nodules
110	612.10	6896.70	1619 II	Stream nodules
111	343.90	6864.80	2018 I	Stream nodules
112	649.20	6693.70	2015 IV	Lake crusts
113	649.20	6693.70	2015 IV	Lake nodules
114			1616 III	Hardpan
115	573.90	6917.80	1619 IV	Hardpan
116	560.50	6905.00	1519 I	Hardpan
117	591.20	6677.70	1815 II	Stream nodules
118	660.50	6781.30	2017 II	Stream nodules
119	346.00	6784.00	2017 II	Stream nodules
120	346.00	6837.80	2018 II	Stream nodules
121			2018 III	Stream nodules
122	619.90	6781.80	1917 II	Stream nodules
123	645.90	6761.80	2016 IV	Stream nodules
124	357.30	6784.00	2117 III	Stream nodules
125	635.50	6779.70	2017 III	Stream nodules
126	592.40	6793.90	1917 IV	Stream nodules
127	651.20	6798.50	2017 IV	Stream nodules
128	597.90	6706.70	1915 IV	Stream nodules
129	607.90	6705.40	1915 IV	Stream nodules

Lake Storsjøen: Sample 75,76,85-95,112,113.
Lake Ulvsjøen : Sample 105.

Table 2. Chemical and mineralogical determinations performed on the samples.

Sample no.	Chemical determination						Mineralogical determination		
	*HCl	HNO_3	INAA	XRF	H_2O	Hg	XRD	SEM **BSI	SEM SEI
1	X	X	X	X	X				
2	X	X	X	X					
3	X	X	X	X					
4	X	X	X	X	X				
5	X	X	X	X					
6	X	X	X	X		X			
7	X	X	X	X					
8	X	X	X	X					
9	X	X	X	X					
10	X	X	X	X					
11	X	X	X	X					
12	X	X	X	X					
13	X	X	X	X					
14	X	X	X	X	X	X			X
15	X	X	X		X				
16	X	X	X	X					
17	X	X	X	X	X				
18	X	X	X						
19	X	X	X	X					
20	X								
21	X	X	X	X					
22	X	X	X	X					
23	X	X	X						
24	X	X	X	X					
25	X								
27	X								
28	X								
29	X								
30	X	X	X	X		X			
31	X	X	X						
32	X	X	X	X					
33	X	X	X	X					
34	X	X	X						
35	X								
36	X								
37	X		X						
38	X	X	X		X				
39	X	X	X						
40	X								
41	X	X	X	X					
42	X								
43	X	X	X	X	X				
44	X								
45	X	X	X	X					
46	X								
47	X	X	X	X					
48	X	X	X	X					
49	X	X	X	X					
50	X	X	X	X					
51	X								
52	X	X	X	X		X			
53	X	X	X	X					
54	X	X	X	X					
55	X								
56	X	X	X	X					
57	X	X	X	X					
58	X								
59	X	X	X		X				
60	X	X	X	X					
61	X	X	X	X					
62	X	X	X	X					
63	X	X	X	X					
64	X								
65	X								
66	X	X	X						
67	X	X	X			X			
68	X		X						
69	X		X						
70	X	X	X						
71	X								
72	X	X	X	X	X				
73	X	X	X	X					
74	X	X	X	X					
75	X	X	X	X					
76	X	X	X	X					
77	X		X						
78	X								
80	X	X	X	X		X			
81	X	X	X						
82	X	X	X						
83	X	X	X						
84	X	X	X	X					
85	X	X	X	X					
86	X		X						
87	X	X	X	X		X			
88	X	X	X	X					
89	X	X	X	X					
90	X	X	X	X					
91	X	X	X	X					
92	X	X	X	X					
93	X	X	X	X					
94	X	X	X	X					
95	X	X	X	X					
96	X	X	X	X			X	X	X
97	X	X	X	X			X	X	X
98	X	X	X	X			X	X	
99	X	X	X	X			X	X	
100	X	X	X	X			X	X	X
101	X	X	X	X			X	X	X
102	X						X	X	
103	X	X	X	X			X	X	X
104	X	X	X	X			X	X	X
105	X	X	X	X	X		X	X	X
106	X	X	X	X	X	X	X	X	
107	X	X	X				X	X	
108	X						X	X	
109	X						X	X	
110	X						X	X	
111	X						X	X	
112	X	X	X	X	X		X	X	X
113	X	X	X	X	X		X	X	X
114	X	X		X			X	X	
115	X	X	X	X	X		X	X	
116	X	X	X	X			X	X	
117							X	X	
118							X	X	
119							X	X	
120							X	X	
121							X	X	
122							X	X	
123							X	X	
124							X	X	
125							X	X	
126							X	X	
127							X	X	
128							X	X	
129							X		

* Includes determination of the total carbon content
** Includes point analysis with the microprobe

Table 3. Summary statistics for the analytical results.

Element	Analytical method: ICP (HCl) Min	Max	Mean	Std.dev	No. of non-zeroes	Analytical method: ICP (HNO3) Min	Max	Mean	Std.dev	No. of non-zeroes	Total content Min	Max	Mean	Std.dev	No. of non-zeroes	Anal. meth.
Ag ppm	5*				0	5*	5.6	5.6	0.0	2	2.0*				0	INAA
Al %	0.42	7.40	2.10	1.17	114	0.50	7.94	2.03	1.18	86						
As ppm	1	110	27.5	21.1	109						1.0*	110.0	27.1	22.5	89	INAA
Au ppb											0.4*	13	1.4	1.7	84	RNAA
B ppm						3*	23.6	13.1	4.7	82						
Ba ppm	29	31390	2973.7	3999.1	114	42.8	9900.0	869.7	1499.9	86	150	19000	2939.9	2673.1	90	INAA
Be ppm	1*	36	6.7	6.2	112	1*	29.4	6.1	5.2	64						
Br ppm											1.5	120.0	6.7	12.3	90	INAA
C %											0.7	12.1	2.5		114	
Ca %	0.00	0.59	0.17	0.13	113	0.005*	0.60	0.18	0.14	85						
Cd ppm	1*	58	16.4	11.9	110	10*	53.5	25.6	11.1	33						
Ce ppm						37.0	2300.0	612.4	492.9	86	50.0	1820.0	547.5	457.6	90	INAA
Cl ppm											2	286	67.0	43.1	71	XRF
Co ppm	1*	1170	163.0	160.6	112	31.0	724.7	143.7	107.1	86	12	1300	175.9	182.5	90	INAA
Cr ppm	2	130	26.0	14.4	114	20*	95.5	40.1	26.5	8	4	190	28.6	26.2	90	INAA
Cs ppm											0.7*	3.0	1.3	0.6	78	INAA
Cu ppm	1*	180	14.3	22.1	110	3.3	102.2	18.0	14.4	86						
Eu ppm											0.35	6.10	1.76	1.11	90	INAA
Fe %	2.70	41.80	13.18	8.12	114	2.32	54.93	13.85	10.33	86	3.20	53.60	15.95	10.95	90	INAA
Hf ppm											0.2	11.0	3.7	2.5	90	INAA
Hg ppm											0.12	0.58	0.38	0.15	8	
K %	0.002*	0.42	0.05	0.06	95	0.03	0.36	0.09	0.06	86						
La ppm	8	470	85.1	75.3	114	10*	302.7	84.9	70.5	71	18.2	385.0	109.9	85.5	90	INAA
Li ppm	1*	85	16.9	14.9	84	2*	91.7	16.1	13.9	77						
Lu ppm											0.01*	3.1	0.7	0.6	88	INAA
Mg %	0.01	1.10	0.15	0.18	114	0.02	1.36	0.17	0.23	86						
Mn %	0.02	26.10	10.28	6.88	114	0.10	18.23	7.46	4.23	86						
Mo ppm	1*	940	174.6	228.8	87	10*	902.8	130.3	181.0	32	2*	1200	162.6	245.0	85	INAA
Na %	0.001*	0.02	0.01	0.00	20	0.002*	0.05	0.01	0.01	25	0.003*	2.70	0.87	0.66	87	INAA
Nd ppm											15.0	254.0	72.4	50.0	90	INAA
Ni ppm	2*	870	121.4	111.2	113	20*	749.2	90.1	106.0	60	80*	860	145.0	122.6	54	INAA
P %	0.00	1.10	0.41	0.21	113	0.01*	0.80	0.06	0.11	60						
Pb ppm	2	900	33.6	89.4	92	50*	327.0	92.0	64.7	22						
Rb ppm	30*	100	18.7	16.8	24						0	210	60.9	41.2	82	INAA
S ppm											493	5696	1472.0	991.0	71	XRF
Sb ppm	8*	12	2.4	1.5	5						0.1	3.9	1.0	0.8	90	INAA
Sc ppm	1*	10	3.9	2.2	71	2*	7.0	4.1	1.5	38	0.7	19.6	6.2	4.0	90	INAA
Se ppm											0.0	13.0	3.3	4.4	11	INAA
Si %	0.05	0.75	0.21	0.14	114	0.01*	0.07	0.05	0.03	6						
Sm ppm											2.85	50.60	13.15	9.33	90	INAA
Sn ppm	3*	8	1.1	0.8	6											
Sr ppm	0	280	34.2	39.3	112	1*	214.6	33.5	33.5	85						
Ta ppm											0.0	8.2	2.1	1.6	56	INAA
Tb ppm				1.2							0.3	7.1	1.5	1.2	90	INAA
Th ppm	6*	85	19.2	16.2	80						1.5	43.0	8.4	5.7	90	INAA
Ti %	0.001	0.22	0.03	0.03	114	0.00	0.18	0.03	0.04	85						
U ppm	20*	650	269.1	186.4	98						0.6	154.0	17.6	28.7	90	INAA
V ppm	13	500	48.3	48.7	114	5*	93.4	23.9	18.1	59						
W ppm	2*	110	24.9	25.1	110						0	17	2.6	3.6	46	INAA
Y ppm	5	97	26.8	20.7	114											
Yb ppm											0.98	14.60	4.16	2.50	90	INAA
Zn ppm	24	5960	1219.6	1388.2	114	14.4	6100.0	1229.3	1509.3	86	61	6600	1273.7	1437.3	90	INAA
Zr ppm	2	19	7.3	3.3	114	7.3	34.6	16.0	4.6	86						
H2Otot											6.09	37.62	23.38	10.14	14	
H2O-											3.08	37.48	18.31	10.55	14	
H2O+											0.14	10.95	5.08	2.83	14	

(*= detection limit).

Table 4. Analytical results (mean values) compared with crustal abundance (Mason 1966).

Element	Total content	HCl-extract	HNO3-extract	Crustal abundance	Enrichment factor
Al (%)		2.10	2.03	8.13	0.3
As ppm	27.1	27.6		1.8	15
Au ppb	1.4			4	0.4
Ba ppm	2940	2974	1870	425	7, 4.4
Be ppm		6.7	6.0	2.8	2.4, 2.1
Br ppm	6.6			2.5	2.6
C (%)	2.5			0.02	125
Ca (%)		0.17	0.18	3.63	0.1
Cd ppm		16.4		0.2	82
Ce ppm	548		612	60	9, 10
Cl ppm	67			130	0.5
Cs ppm	1.3			3	0.4
Co ppm	176	163	144	25	7, 6.5,5.8
Cr ppm	28.6	26	40	100	0.3,0.4
Cu ppm		14.3	18	55	0.3
Eu ppm	1.76			1.2	1.5
Fe (%)	15.95	13.18	13.85	5	3.2,2.6,2.8
Hf ppm	3.74			3	1.3
Hg ppm	0.38			0.08	4.8
K (%)		0.05	0.09	2.59	0.02,0.03
La ppm	110	85	85	30	3.7,2.8
Li ppm		16.9	16.1	20	0.9,0.8
Lu ppm	0.73			0.5	1.5
Mg (%)		0.15	0.17	2.1	0.1
Mn (%)		10.28	7.46	0.095	108, 78
Mo ppm	163	175	130	1.5	109,117,87
Na (%)	0.87	0.01	0.01	2.83	0.3,0.004
Nd ppm	72.4			28	2.6
Ni ppm	145	121	90	75	1.9,1.6,1.2
P (%)		0.41	0.06	0.1	4.1, 0.6
Pb ppm		33.6	92	13	2.6, 7.1
Rb ppm	60.9	18.7		90	0.7,0.2
S ppm	1472			260	5.7
Sc ppm	6.2	3.8	4.1	22	0.3,0.2
Se ppm	3.3			0.05	66
Si (%)		0.21	0.05	27.7	0.01,0.002
Sm ppm	13.2			6	2.2
Sr ppm		34.2	33.5	375	0.1
Ta ppm	2.14			2	1.1
Tb ppm	1.54			0.9	1.7
Th ppm	8.4	19.2		7.2	1.2, 2.7
Ti (%)		0.03	0.03	0.44	0.1
U ppm	17.6	269.1		1.8	9.8, 150
V ppm		48.3	23.9	135	0.4,0.2
W ppm	2.6	24.9		1.5	1.7, 16.6
Y ppm		26.8		33	0.8
Yb ppm	4.16			3.4	1.2
Zn ppm	1274	1220	1229	70	18.2
Zr ppm		7.3	16	165	0.04,0.1

Table 5. Chemical composition of the Fennoscandian oxidates.

(n.d.= not detected, - = not analysed)

	STREAM NODULES			LAKE NODULES			
	Norwegian stream nodules HCl-data		Swedish stream-nodules HCl-data	Norwegian lake nodules HCl-data			
				Storsjøen			Ulvsjøen Crust
				Spheroidale nodules	Discoidale concretions	Crusts	
Element ppm	Oslo Graben N=63	Trysil N=4	"Tisjøen" N=4	N=6	N=3	N=6	N=1
Fe (%)	9.5	17.4	27.0	11.8	24.4	23.0	18.4
Mn (%)	11.2	4.7	3.9	11.5	1.6	4.0	23.7
Ba ppm	2335	1228	687	2418.3	1223.3	1181.7	6210
W "	33	8	2	12.7	6.3	6.0	21
Zn "	1632	246	101	608.5	243.3	273.2	1100
Mo "	212	8	19	6.0	4.0	3.0	n.d.
Ni "	122	30	23	174.7	23.0	55.8	200
Co "	149	87	198	215.8	77.7	88.3	380
Cr "	25	16	19	29.2	18.0	22.5	35
Cu "	7	7	2	42.5	15.0	21.7	n.d.
U "	325	119	54	241.2	n.d.	55.0	540
Pb "	43	23	5	10.7	19.7	15.8	37

Table 6. REE content in Fennoscandian oxidates.

	STREAM NODULES			LAKE NODULES			
	Norwegian stream nodules INAA-data		Swedish stream nodules INAA-data	Norwegian lake nodules INAA-data			
				Storsjøen			Ulvsjøen N=1
Element (ppm)	Oslo Graben N=47	Trysil N=4	"Tisjøen" N=3	Spheroidale nodules N=6	Discoidale concretions N=3	Crusts N=6	
La	147.0	38.7	32.7	62.6	57.9	71.5	21.5
Ce	722.5	137.8	196.7	411.7	159.0	253.3	69.0
Nd	89.8	31.5	30.0	46.0	52.3	56.7	23
Sm	16.0	5.5	5.9	9.15	9.4	10.7	3.6
Eu	2.13	0.84	0.73	1.39	1.56	1.45	0.69
Tb	1.90	0.58	0.80	1.12	1.13	1.30	0.40
Yb	4.78	2.21	2.91	3.42	4.08	3.98	1.33
Lu	0.87	0.35	0.47	0.53	0.70	0.65	0.18
Σ REE	985.0	217.5	270.1	535.9	286.1	399.5	119.7
La/Yb	30.8	17.5	11.2	18.3	14.2	18.0	16.2
Ce/La	4.9	3.6	6.0	6.6	2.8	3.5	3.2

Table 7. Chemical composition of lacustrine and marine oxidates.

(n.d. = not detected, - = not analysed)

	LAKE NODULES		MARINE NODULES			
			Shallow marine nodules	Deap sea nodules		
Element ppm	Karelian-Finnish lakes (Manheim 1965)	Swedish lakes (Manheim 1965)	Spheroidale nodules from Gulf of Bothnia HCl-data (Ingri 1985)	Atlantic ocean (Cronan 1980)	Pacific ocean (Cronan 1980)	Indian ocean (Cronan 1980)
Fe (%)	38.1	35.6	24.5	20.8	12.0	14.7
Mn (%)	2.9	4.7	17.4	15.8	19.8	15.1
Ba ppm	-	1000	2829	4980	2760	1820
W "	-	-	-	-	60	-
Zn "	-	50	617	840	680	690
Mo "	50	30	445	490	440	290
Ni "	40	40	615	3280	6340	4640
Co "	130	80	341	3180	3350	2300
Cr "	10	10	38	70	13	29
Cu "	-	40	89	1160	3920	2940
U "	-	-	-	-	-	-
Pb "	-	-	-	1270	846	930

Table 8. REE content in freshwater oxidates.

Element (ppm)	Mn and Fe precipitates from Fennoscandia, N=13 (Carlson et al. 1977)	FeMn-concretion from Lake Shebandowan Ontario, N=1 (Glasby, 1977)
La	71	18.5
Ce	221	33.0
Nd	49	16.5
Sm	8.5	3.2
Eu	1.6	0.68
Tb	1.0	0.55
Yb	-	1.48
Lu	0.44	0.26
Σ REE	352.5	79.2
La/Yb	-	12.5
Ce/La	3.1	2.1

Table 9. REE content in marine oxidates.

	Shallow marine nodules		Pacific ocean		Bauer Basin South equatorial Pacific (Elderfield & Greaves, 1980)		Atlantic ocean	
Element (ppm)	Gulf of Bothnia. Spherical nodules (Ingri, 1985) N=4	Loch Fyne concretions (Glasby, 1973a)	Shallow nodules, <3500m, N=14 (Piper, 1974)	Deep nodules >3500m, N=20 (Piper, 1974)	Ferromanganese nodules N=4	Ferromanganese crust N=1	Nodule (Ehrlich, 68) N=1	Nodule (Addy, 79) N=1
La	75.7	5.86	253	227	78.9	121	125	216
Ce	294.3	11.36	803	735	96.1	123	1800	2050
Nd	65.8	6.01	251	272	72.7	98.2	210	230
Sm	12.6	0.96	44	51	15.3	20.0	52	56
Eu	1.90	0.19	9.4	11	4.09	5.44	13	13
Tb	n.a.	n.a.	7.1	8.1	n.a.	n.a.	5.8	7.8
Yb	3.95	n.a.	25.5	19.2	12.1	15.6	14.0	18.7
Lu	0.56	n.a.	4.4	3.2	n.a.	n.a.	2.6	2.5
ΣREE	454.7	24.4	1397.4	1326.5	279.2	383.2	2222.4	2594.0
La/Yb	19.2		9.9	11.8	6.5	7.8	8.9	11.6
Ce/La	3.9	1.9	3.2	3.2	1.2	1.0	14.4	9.5

Table 10. Point analysis with the microprobe.

S.NO	P.NO	COLOUR	WT % MN	FE	ZN	AL	SI	MO	S	BA	O	C+H2O
96	1	Light	55.59	0		3.77	0.14		0.26	0.50	39.58	
	2	Dark	35.74	0	0.06	2.49	0.08	0	0.08	0.51	61.02	
	3	Light	1.88	49.71		0.79	0.99		0.22		46.28	
	4	Light	1.22	53.66	0	1.15	2.13		0.27		41.44	
	5	Dark	8.43	19.97	0	2.57	0.49		0.11		30.57	37.73
	6	Grey	2.51	43.73		1.68	1.24	0.08	0.14		29.95	20.78
97	1	Light	1.00	50.59	0	2.12	1.65		0.16		36.28	7.72
	2	Dark	0.20	45.24		1.59	2.24	0	0.08		31.54	19.09
	3	Light	0.16	54.90	0.11	0.74	1.89	0	0.19	0	38.15	3.78
	4	Dark	0.41	35.35		1.62	0.99	0	0.06	0	27.50	33.95
98	1	Light	0.54	57.58		0.15	1.18		0.16	0	38.26	2.00
	2	Dark	17.46	7.61	0	0.49	0.14		0.10	0.15	26.51	47.47
99	1	Light	0.22	52.12	0.10	1.36	1.24		0.25		43.33	1.44
	2	Dark	1.50	52.99	0	0.74	1.22		0.18	0	36.72	6.71
100	1	Light	60.46	0	0.13		0		0	0.27	37.96	1.20
	2	Dark	34.06	5.06	0.14	0.25	0.05			2.12	32.30	26.06
	3	Light	52.76	0	0.12		0			4.53	35.02	7.48
	4	Dark	18.01	3.96	0.17	0.81				0.74	29.66	46.54
101	1	Light	0.42	55.55	0.10	0.65	0.90		0.07	0	41.34	0.99
	2	Light	0.43	54.29	0.20	0.64	1.21		0.07	0	39.46	3.58
	3	Grey	33.70	2.48	0.27	5.41			0.07	0.38	36.54	21.15
	4	Grey	33.17	4.72	0.22	5.62	0.21	0.08?	0.08	0.34	38.35	17.18
	5	Dark	21.46	2.13	0.16	2.86	0.10		0.02	0.30	30.57	42.32
	6	Dark	17.70	1.94	0.19	2.81	0.08	0.07?	0.03	0.20	27.07	49.98
102	1	Light	0.75	49.98		0.63	0.92		0.10	0	43.72	3.80
	2	Dark	17.00	20.29	0.18	1.32	0.15		0.03	0.38	22.45	38.10
	3	Dark	20.79	0	0.25	0.53	0		0.03	0.97	25.88	51.50
103	1	Light	49.20	0	0.36	0.99	0			6.14	38.65	4.54
	2	Dark	29.38	0	0.20	0.76	0			2.56	31.96	35.10
	3	Dark	19.51	0	0.20	0.44	0	0	0.03	1.43	26.39	51.99
	4	Light	46.97	0	0.37	1.45	0		0.10	3.44	35.47	12.08
104	0	Light	0.68	50.13	0	0.20	1.04			0	37.18	10.78
	1		1.12	44.85	0	0.13		0.08?	0.03		41.34	12.44
	2		23.71	9.58		0.43	0.03		0.14	0.24	40.80	25.09
	3		32.66	10.65		1.47	0		0.06	0.64	38.94	15.52
	4		36.32	8.29	0.06?	1.14		0.10	0.05	0.25	35.01	18.72
	5		0.68	53.11		0.64	0.80				33.10	11.47
	6		10.31	9.68	0	0.51			0.02	0.12	27.26	52.01
	7		22.79	14.04	0	1.18	0.12			0.34	34.07	27.34
	8		30.01	11.75		1.59	0.08	0	0.06	0.35	35.06	21.02
	9		38.90	9.86		1.37	0	0	0.09	0.88	34.19	14.60
	10		7.54	42.00		0.89	0.76				32.11	16.50
	11		18.80	24.20		1.81	0.54			0.69	38.30	15.57
105	1	Dark	30.33	8.66	0.05	0.38			0.06	0.33	33.43	26.72
	2	Dark	25.78	10.57		0.33				0.27	35.48	27.52
	3	Light	44.46	0.22	0.13	0.21	0.10	0	0.03	0.98	37.00	16.91
	4	Light	40.27	12.27	0.07	0.70			0.02	0.86	34.34	11.29
106	1	Light	47.72	0	0.06	0.13		0.09	0	0.91	38.58	2.87
	2	Light	47.01	0	0.15	0.13	0.10		0	0.37	38.65	3.67
	3	Grey	0.33	57.91	0	0	2.75			0.11	34.33	4.5[illegible]
	4	Grey	0.46	57.15	0	0.14	2.09	0		0.06	35.85	4.18
107	1	Light	0.25	55.09			1.83		0.03	0	37.24	5.57
	2	Light	50.54	0	0.06	0.78	0	0	0.07	2.21	35.70	10.60
	3	Dark		48.90		0.39	0.97		0.05	0	29.20	20.46
	4	Dark	0.06	39.09		0.50	0.31		0.05		32.42	27.57
108	1	Light	49.53	0	0	0.61	0	0		1.37	37.03	1.38
	2	Grey	20.69	32.22	0.05	0.69	0.83		0.06	1.24	37.18	6.95
	3	Grey	38.83	10.54		1.85		0	0.10	1.75	37.89	8.86
	4	Light	50.16	0	0	0.32	0		0	1.43	37.05	1.11
109	1	Light	21.64	29.88	0.08	1.50	0.69		0.11	1.36	36.08	8.55
	2	Light	6.45	47.78	0.05	2.07	1.52	0	0.14	0.04	37.66	4.37
	3	Light	21.71	29.22		2.07	0.54		0.14	0.32	34.52	11.32
	4	Dark	10.76	13.42	0	1.59	0.22	0		0.04	29.03	44.84
110	1	Grey	27.84	5.03	0.32	9.40	0.51		0.16	0.43	39.42	16.47
	2	Light	46.07	2.38	0.48	0.70	0		0.04	2.23	35.50	12.48
	3	Light	28.18	4.35	0.27	5.02	0.11	0	0.08	0.55	41.21	20.17
	4	Light	45.23		0.47	1.27	0		0	1.68	38.63	12.67
	5	Dark	13.98	8.24	0.17	7.14	1.0		0.05	0.16	34.18	35.11
	6	Dark	11.64	12.46	0.30	7.05	0.72		0.05	0.17	38.38	29.19
112	1	Light	0.56	53.28		0.20	4.09			0	36.85	4.90
	2	Light	55.64	0			0.12?	0	0	3.03	35.58	5.44
	3	Dark	17.44	27.57	0	0.12	1.43		0	0.90	28.31	24.30
	4	Dark	7.72	16.06	0	0.31	0.75			0.07	26.23	48.77
	5	Light	0.65	53.94		0.35	4.56			0	35.15	5.38
113A	1	Light	2.49	51.75	0	2.74	1.75			0.03	33.45	7.79
	2	Light	33.91	0.41	0.24	7.95	0.53		0.11	0.32	35.82	20.65
	3	Dark	24.10		0.12	3.54	0.11	0		0.23	13.65	58.25
	4	Dark	8.67	3.61		3.31	0.91		0.06	0.04	28.72	54.63
113B	1	Light	0.54	56.05		2.11	1.45		0.04	0	35.62	4.21
	2	Light	0.54	53.93		4.24	0.89		0.03		33.93	6.32
114	1	Light	52.04	0	0	0.38	0	0	0.09	1.25	35.53	10.78
	2	Light	48.02	0		0.28	0		0.02	1.34	38.99	11.37
	3	Grey	32.94	2.16		0.64			0.02	0.49	39.28	24.37

Table 10.

S.NO.	P.NO.	COLOUR	MN	FE	ZN	AL	SI	MO	S	BA	O	C+H2O
			WT %									
115	1	Light		56.90	0	0.26	1.41		0.07	0	33.67	7.60
	2	Light	0.29	56.48	0	0.32	1.51		0.10		35.77	5.56
	3	Light	17.73	38.89		0.58	1.05		0.03	0.33	33.13	8.29
	4	Light	0.65	52.72		0.73	2.78		0.09		37.26	5.60
116	1	Light	0.05	51.43		0.45	1.60		0.10		34.97	11.26
	2	Light		58.99		0.62	1.32	0	0.12	0	31.65	7.35
	3	Dark		50.93	0	0.73	1.34		0.06	0	27.92	19.04
117	1	Light	6.65	41.13	0.08	3.42	0.72			0.23	35.55	12.23
	2	Dark	18.86	1.43	0.35	6.12	0.21	0.16	0.02	0.28	40.39	32.21
118	1	Light	40.99	4.16	0.55	1.18		0	0.09	1.64	30.46	20.83
	2	Dark	19.53	17.69		0.85	0.26	0		0.47	25.21	35.93
	3	Light	32.97	5.50	0.05	1.50	0.09?	0	0.11	0.68	32.76	26.43
119	1	Light	25.58	24.58		1.16	0.10	0		0.68	31.96	15.83
	2	Dark	19.70	14.78		1.10		0		0.62	29.30	34.33
	3	Darke	22.23	3.63		0.62		0	0	0.82	22.47	50.27
	4	Light	49.10	0		0.93	0	0		5.55	36.01	8.29
	5	Light	28.86	22.71		1.52	0.13	0	0.09	0.66	32.32	13.65
120	1	Light	1.05	55.28		0.97	0.93	0	0.04	0	30.59	10.80
	2	Light	1.03	56.64		0.94	0.98	0	0.03		29.46	10.84
	3	Dark	0.89	50.55	0	1.36	0.79	0	0.03	0	28.99	17.29
	4	Dark	0.66	41.91		1.19	0.31	0.06?	0.02		22.08	33.69
	5	Dark	0.76	30.80	0	0.91	0.35	0	0.03	0	26.46	40.67
121	1	Light	0.54	52.49		1.58	0.84	0	0.07	0	34.98	9.43
	2	Light	0.37	49.80	0	1.33	0.46	0.07?	0.05	0	29.47	18.52
	3	Dark	2.26	21.87		1.67	0.25			0	22.14	51.73
	4	Dark	1.68	26.25	0	1.72	0.20	0	0.02		22.51	47.55
122	1	Light	34.83	9.10	0.07	1.74	0.09	0	0.05	0.81	39.47	13.92
	2	Light	32.84	12.94		1.83	0.18	0	0.03	0.87	38.33	13.01
	3	Dark	15.17	25.62		3.91	0.92		0.02	0.16	30.95	23.30
	4	Dark	16.61	15.51		3.82	0.52			0.13	35.56	27.71
123	1	Light	50.37	0	0.11	1.02	0	0		7.84	37.25	3.47
	2	Light	48.46	0	0.05	1.08	0			8.56	37.35	4.56
	3	Dark	36.62	1.24	0.09	5.18	0.24	0	0.10	0.74	36.84	18.89
	4	Dark	39.93	3.68	0.08	7.17	0.33	0	0.18	0.30	35.11	13.29
124	1	Light	1.44	53.27	0	0.24	0.47	0	0.03	0.03	36.23	8.37
	2	Light	1.18	54.41	0	0.24	0.36	0		0	35.88	7.99
	3	Dark	13.96	23.34	0	0.92	0.25			0.15	32.34	29.11
	4	Dark	11.76	29.51		0.71	0.64	0.07	0.03	0.09	25.95	31.29
125	1	Light	40.03	0	0.14	1.54		0	0.06	1.92	37.34	18.89
	2	Light	38.65	0	0.11	1.68	0		0.07	1.64	36.60	21.13
	3	Light	37.37	0.11	0.09	1.95	0.07		0.06	1.34	34.75	24.12
126	1	Light	0.33	55.35	0.06	1.59	0.84	0	0.05	0	35.06	6.77
	2	Light	0.36	53.75	0.05?	2.12	0.85	0	0.05		36.38	6.50
	3	Dark	23.66	4.46	0.41	1.39	1.47	0	0.05	0.88	26.50	41.09
127	1	Light	50.93	0	0.05?	0.19	0	0	0	6.08	36.48	6.21
	2	Light	44.40	5.32	0.05?	0.48	0.13	0	0.06	2.49	35.84	11.17
	3	Light	0.80	58.09	0	0.36	0.85				33.36	6.44
	4	Dark	20.44	21.63		0.65	0.47		0	0.44	27.09	29.28
	5	Dark	19.30	22.70		0.75	0.43	0	0	0.41	26.89	29.47
128	1	Light	27.77	23.69	0.05?	1.83	0.19	0.58	0.15	0.36	34.60	10.72
	2	Light	0.49	55.97	0	0.52	0.18	0.49	0.03	0	34.57	7.83
	3	Dark	25.63	12.87		1.03		0.22	0.05	0.27	31.69	28.25
	4	Dark	23.73	24.74	0	1.19	0.19	0.28	0.06	0.16	31.42	18.26

Table 11. Correlation coefficients for 32 HCl-soluble constituent in 114 oxidates from Southeastern Norway. Values > 0.32 are significant at $p < 0.001$.

	Si	Al	Fe	Mn	Ti	Mg	Ca	Na	K	P	Ba	Be	Co	Cr	Cu	La	Li	Mo	Ni	Pb	Rb	Sc	Sr	V	Zn	Zr	Y	W	As	U	Th	Cd
Si	1.00																															
Al	-.05	1.00																														
Fe	.64	-.25	1.00																													
Mn	.12	.40	-.30	1.00																												
Ti	-.30	-.15	-.23	-.41	1.00																											
Mg	-.39	-.09	-.35	-.29	.66	1.00																										
Ca	.03	.17	-.31	.15	.41	.34	1.00																									
Na	-.36	-.13	-.38	-.22	.34	.38	.20	1.00																								
K	-.21	-.20	-.31	-.19	.45	.78	.33	.40	1.00																							
P	.15	.37	-.14	.76	-.22	-.28	.17	-.21	-.18	1.00																						
Ba	.37	.02	-.06	.57	-.18	-.18	.42	-.12	-.00	.51	1.00																					
Be	.17	.54	.14	.06	-.22	-.23	.03	-.11	-.25	.09	-.04	1.00																				
Co	.03	.17	.01	.38	-.01	.03	-.03	-.16	-.02	.32	.14	-.06	1.00																			
Cr	-.03	.18	-.17	.37	.25	.38	.18	-.08	.08	.33	.26	-.10	.26	1.00																		
Cu	.08	.38	-.00	.06	.07	.09	.07	-.09	-.02	.18	.03	.08	.51	.20	1.00																	
La	.06	.52	-.29	.53	-.19	-.17	.26	-.08	-.14	.47	.20	.37	-.01	.16	.03	1.00																
Li	-.11	.78	-.47	.42	-.06	.12	.37	.01	.10	.36	.16	.26	.09	.16	.32	.51	1.00															
Mo	-.04	.38	-.23	.26	-.10	.01	.22	-.01	.02	.21	.06	.38	.05	.01	-.13	.56	.39	1.00														
Ni	.09	.66	-.33	.63	-.02	-.08	.46	-.14	-.04	.59	.47	.10	.21	.32	.32	.50	.75	.19	1.00													
Pb	-.17	-.05	-.13	-.11	.06	.10	.06	.34	.05	-.09	-.12	.02	-.06	-.15	-.03	-.08	-.03	-.07	-.12	1.00												
Rb	-.09	-.08	-.02	-.15	-.03	-.02	.05	.03	.05	-.09	-.12	.05	-.08	-.19	-.01	-.03	-.06	.01	-.15	.21	1.00											
Sc	-.27	.71	-.53	.31	.15	.26	.27	.17	.16	.25	-.01	.23	.11	.19	.25	.53	.72	.38	.49	.04	-.06	1.00										
Sr	.25	.12	-.17	.30	.19	.01	.73	.01	.13	.34	.47	.07	-.03	.11	.01	.33	.33	.31	.47	-.04	.03	.09	1.00									
V	.03	.14	.35	-.23	.07	-.01	.03	-.09	-.08	-.10	-.06	.39	.05	.02	.08	-.20	-.15	-.12	-.17	-.05	.10	-.14	-.11	1.00								
Zn	-.02	.72	-.38	.51	-.21	-.12	.38	-.03	-.10	.42	.23	.46	-.03	.10	.11	.70	.78	.64	.68	-.05	-.05	.57	.46	-.20	1.00							
Zr	.52	.16	.73	-.25	-.20	-.22	-.12	-.14	-.13	-.06	-.10	.40	-.03	-.21	.22	-.10	-.05	-.11	-.06	.17	.10	-.14	-.12	.35	-.06	1.00						
Y	.23	.59	-.07	.27	-.16	-.17	.28	-.08	-.16	.40	.16	.62	-.09	.02	.21	.74	.55	.56	.45	.10	.04	.43	.36	-.05	.71	.29	1.00					
W	-.05	.70	-.40	.50	-.20	-.10	.37	-.01	-.09	.40	.21	.46	-.03	.08	.08	.70	.76	.67	.65	-.04	-.04	.57	.46	-.22	1.00	-.09	.70	1.00				
As	.21	.21	.22	.04	-.17	-.19	.13	-.15	-.12	.32	.19	.10	.01	.00	.20	.09	.12	-.06	.25	-.05	.04	-.08	.14	.15	.17	.27	.28	.15	1.00			
U	.00	.42	-.41	.93	-.28	-.25	.21	-.14	-.15	.74	.49	.12	.34	.33	.04	.57	.45	.42	.64	-.06	-.09	.34	.41	-.27	.61	-.34	.34	.61	-.00	1.00		
Th	-.33	.55	-.54	.58	-.21	-.11	.08	.09	-.07	.40	.03	.19	.10	.11	-.01	.68	.53	.43	.48	.17	.09	.63	.10	-.26	.63	-.26	.35	.64	-.06	.66	1.00	
Cd	-.01	.70	-.25	.59	-.28	-.24	.22	-.10	-.21	.46	.18	.45	.07	.11	.04	.70	.64	.57	.62	-.05	-.09	.54	.33	-.14	.89	-.03	.55	.89	.13	.65	.74	1.00

Table 12. Correlation coefficients for 32 HCl-soluble constituent in 63 oxidates from Hurdal. Values > 0.41 are significant at $p < 0.001$.

	Si	Al	Fe	Mn	Ti	Mg	Ca	Na	K	P	Ba	Be	Co	Cr	Cu	La	Li	Mo	Ni	Pb	Rb	Sc	Sr	V	Zn	Zr	Y	W	As	U	Th	Cd
Si	1.00																															
Al	.27	1.00																														
Fe	.69	-.11	1.00																													
Mn	.23	.38	-.06	1.00																												
Ti	-.48	-.16	-.36	-.43	1.00																											
Mg	-.40	-.16	-.30	-.39	.86	1.00																										
Ca	.06	.16	-.29	-.01	.41	.49	1.00																									
Na	-.51	-.26	-.41	-.48	.53	.43	.23	1.00																								
K	-.32	-.21	-.28	-.33	.54	.80	.37	.40	1.00																							
P	.25	.42	-.09	.87	-.32	-.30	.12	-.39	-.27	1.00																						
Ba	.31	.25	.00	.74	-.30	-.16	.34	-.34	-.13	.72	1.00																					
Be	.57	.58	.20	.09	-.29	-.25	.05	-.21	-.23	.15	.13	1.00																				
Co	.13	.09	.21	.28	.14	.16	-.03	-.25	.06	.27	.19	-.17	1.00																			
Cr	-.06	.07	-.08	.28	.40	.34	.15	-.08	-.05	.25	.24	-.13	.19	1.00																		
Cu	-.06	.55	-.25	.13	.18	.14	.41	.17	.07	.23	.25	.17	.05	.11	1.00																	
La	.42	.47	-.10	.51	-.31	-.24	.27	-.21	-.20	.47	.49	.45	-.05	.08	.30	1.00																
Li	.05	.76	-.36	.24	-.01	.13	.48	-.03	.17	.32	.40	.45	-.16	.01	.54	.45	1.00															
Mo	.42	.47	.00	.24	-.09	-.04	.35	-.18	.00	.30	.38	.46	.23	-.00	.16	.47	.51	1.00														
Ni	.14	.72	-.24	.70	-.28	-.18	.27	-.31	-.14	.69	.68	.33	.02	.20	.54	.54	.74	.36	1.00													
Pb	-.17	-.12	-.07	-.17	.14	.14	.11	.36	.06	-.09	-.21	-.01	-.11	-.13	-.09	-.13	-.07	-.15	-.21	1.00												
Rb	.08	-.05	-.01	-.06	-.07	.02	.08	.12	.10	-.03	-.05	.06	-.10	-.14	-.03	.06	.06	.08	-.08	.13	1.00											
Sc	-.12	.68	-.42	.08	.32	.30	.45	.16	.21	.18	.10	.25	.08	.09	.73	.40	.65	.36	.45	-.01	-.01	1.00										
Sr	.38	.20	-.06	.32	-.02	.04	.68	-.09	.06	.39	.57	.18	-.08	.09	.20	.33	.46	.41	.43	-.03	.14	.14	1.00									
V	.11	.07	.35	-.12	.41	.41	.17	-.10	.18	-.03	-.01	-.03	.55	.36	.28	-.16	-.12	.07	-.06	.01	-.06	.20	-.04	1.00								
Zn	.26	.74	-.20	.43	-.26	-.20	.39	-.18	-.14	.47	.52	.59	-.20	-.01	.40	.60	.85	.62	.81	-.13	.02	.47	.54	-.18	1.00							
Zr	.42	.09	.56	-.29	-.16	-.01	-.01	.03	.16	-.20	-.16	.38	-.11	-.28	-.00	-.00	.11	.13	-.15	.41	.25	-.02	-.02	.17	.05	1.00						
Y	.48	.56	-.03	.30	-.25	-.19	.34	-.10	-.15	.37	.39	.75	-.18	-.05	.33	.79	.61	.64	.50	.13	.15	.43	.42	-.14	.75	.31	1.00					
W	.26	.73	-.20	.42	-.24	-.18	.39	-.17	-.13	.46	.51	.60	-.18	-.01	.39	.60	.85	.64	.80	-.12	.02	.47	.53	-.17	1.00	.05	.76	1.00				
As	.21	.62	.08	.28	-.23	-.16	.02	-.29	-.21	.29	.28	.46	.05	-.02	.33	.24	.52	.23	.64	-.16	-.05	.23	.09	.10	.57	.05	.34	.57	1.00			
U	.24	.42	-.12	.95	-.41	-.38	.04	-.41	-.31	.89	.74	.20	.25	.24	.18	.51	.33	.38	.73	-.16	-.00	.12	.39	-.12	.53	-.28	.41	.52	.32	1.00		
Th	.04	.49	-.34	.60	-.34	-.31	.06	-.09	-.17	.52	.32	.22	-.04	-.03	.22	.62	.42	.29	.53	.16	.23	.42	.13	-.27	.50	-.04	.49	.50	.18	.61	1.00	
Cd	.31	.79	-.08	.53	-.36	-.32	.27	-.31	-.27	.50	.51	.53	-.03	.01	.42	.57	.72	.51	.84	-.12	-.04	.41	.44	-.02	.90	.03	.61	.89	.61	.58	.58	1.00

Table 13. Correlation coefficients for 29 HNO_3-soluble constituents in 86 oxidates from Southeastern Norway. Values > 0.36 are significant at $p < 0.001$.

	Si	Al	Fe	Ti	Mg	Ca	Na	K	Mn	P	Cu	Zn	Pb	Ni	Co	V	Mo	Cd	Cr	Ba	Sr	Zr	Ag	B	Be	Li	Sc	Ce	La
Si	1.00																												
Al	-.14	1.00																											
Fe	.60	-.34	1.00																										
Ti	-.08	-.10	-.15	1.00																									
Mg	-.09	.01	-.25	.78	1.00																								
Ca	-.13	.32	-.34	.59	.53	1.00																							
Na	.05	.05	-.14	.50	.53	.48	1.00																						
K	-.14	-.07	-.26	.69	.81	.46	.41	1.00																					
Mn	-.26	.50	-.34	-.34	-.23	.19	-.02	-.22	1.00																				
P	-.07	-.14	.19	.09	-.00	-.06	-.02	.11	-.29	1.00																			
Cu	-.09	.30	-.05	.05	.09	.41	.09	.16	.11	.17	1.00																		
Zn	-.16	.79	-.39	-.19	-.13	.40	-.04	-.17	.56	-.18	.15	1.00																	
Pb	-.05	-.07	.06	.06	-.01	-.19	-.04	.04	-.21	.15	-.12	-.18	1.00																
Ni	-.15	.70	-.32	-.11	.02	.48	-.01	.03	.45	-.10	.69	.64	-.18	1.00															
Co	-.08	.12	-.01	-.08	-.02	.02	.05	-.05	.46	-.11	.12	-.05	-.12	.11	1.00														
V	-.08	.01	.15	.49	.46	.19	.25	.37	-.31	.24	.05	-.27	.06	-.17	.14	1.00													
Mo	.06	.10	.09	.02	.04	.02	-.02	-.00	.12	-.04	-.07	.16	-.03	-.08	.02	.13	1.00												
Cd	-.16	.73	-.37	-.19	-.12	.31	.07	-.16	.57	-.19	.03	.90	-.14	.55	-.04	-.28	.10	1.00											
Cr	-.07	-.08	-.13	.48	.78	.25	.25	.67	-.18	.01	.18	-.18	-.04	.08	.00	.29	.01	-.17	1.00										
Ba	-.21	.53	-.28	-.27	-.16	.44	-.05	-.18	.73	-.15	.40	.68	-.31	.74	.35	-.28	.05	.56	-.16	1.00									
Sr	-.08	.28	-.21	.19	.09	.75	.11	.19	.37	-.07	.37	.51	-.23	.49	-.01	-.09	.08	.37	.00	.58	1.00								
Zr	-.02	.05	.15	.30	.11	.13	.07	.26	-.14	.17	.11	-.06	.15	-.07	-.09	.43	.04	-.05	.09	-.20	.12	1.00							
Ag	-.04	-.04	.26	-.05	-.07	-.13	-.06	-.02	-.16	.01	.04	-.10	.27	-.10	-.09	.06	-.04	-.11	-.04	-.13	-.11	.18	1.00						
B	-.40	.22	-.67	.23	.16	.40	.17	.35	.20	-.07	.23	.22	.07	.26	-.04	-.00	-.09	.19	-.01	.14	.33	.08	-.11	1.00					
Be	-.15	.60	-.21	-.26	-.20	.08	-.12	-.29	.36	-.14	-.07	.68	-.09	.28	-.06	-.04	.27	.63	-.21	.32	.19	.06	-.08	.11	1.00				
Li	-.23	.86	-.52	.04	.14	.55	.07	.11	.46	-.14	.38	.84	-.19	.82	.05	-.10	.03	.71	.02	.66	.49	.00	-.13	.37	.49	1.00			
Sc	-.20	.71	-.44	.20	.38	.40	.31	.33	.32	-.13	.23	.57	-.12	.49	.06	.08	.12	.59	.24	.34	.22	.10	-.04	.25	.35	.73	1.00		
Ce	-.21	.69	-.40	-.35	-.25	.09	-.05	-.29	.67	-.21	.05	.76	-.13	.49	.09	-.35	.08	.86	-.22	.55	.19	-.12	-.09	.17	.56	.60	.57	1.00	
La	-.23	.66	-.43	-.25	-.18	.26	-.04	-.21	.58	-.16	.05	.88	-.19	.48	-.08	-.31	.22	.87	-.18	.60	.38	-.09	-.12	.21	.69	.67	.58	.88	1.00

Table 14. Correlation coefficients for 29 constituents (total content) in 90 oxidates from Southeastern Norway. Values > 0.34 are significant at $p < 0.001$.

	Br	Cs	Hf	Sb	Se	Ta	La	Ce	Nd	Sm	Eu	Tb	Yb	Lu	As	Au	Ba	Co	Cr	Fe	Mo	Na	Ni	Rb	Sc	Th	U	W	Zn
Br	1.00																												
Cs	-.13	1.00																											
Hf	-.03	.13	1.00																										
Sb	.34	.12	-.08	1.00																									
Se	.07	-.14	.19	.06	1.00																								
Ta	-.12	-.12	.75	-.17	.35	1.00																							
La	-.05	-.19	.13	-.05	-.04	.29	1.00																						
Ce	-.06	-.28	.04	.01	-.02	.24	.84	1.00																					
Nd	-.01	-.18	.12	-.07	-.01	.27	.92	.73	1.00																				
Sm	-.00	-.13	.11	-.10	-.01	.24	.86	.66	.98	1.00																			
Eu	-.04	-.06	.18	-.04	-.04	.28	.83	.65	.91	.90	1.00																		
Tb	-.05	-.09	.14	-.09	-.01	.26	.83	.62	.94	.94	.90	1.00																	
Yb	-.07	.00	.24	-.07	.06	.32	.71	.52	.82	.84	.90	.88	1.00																
Lu	-.07	.08	.23	-.07	.03	.31	.70	.48	.81	.84	.85	.87	.94	1.00															
As	.18	.13	-.17	.29	-.08	-.26	.00	-.07	.04	.02	.09	.08	.21	.15	1.00														
Au	-.02	.14	-.09	.22	-.09	-.06	.29	.19	.23	.28	.23	.24	.21	.28	.13	1.00													
Ba	-.09	-.09	-.15	.04	-.03	.00	.38	.28	.29	.25	.30	.27	.27	.23	.24	.23	1.00												
Co	-.05	.11	-.30	.15	-.11	-.16	-.13	-.00	-.18	-.19	-.14	-.17	-.18	-.16	-.02	-.07	.14	1.00											
Cr	-.03	.52	-.01	.00	-.13	-.17	-.16	-.22	-.13	-.10	-.01	-.07	-.02	.00	-.01	.04	-.17	.09	1.00										
Fe	-.03	-.08	-.50	-.02	-.10	-.47	-.39	-.45	-.26	-.21	-.37	-.27	-.28	-.25	.24	-.06	-.25	-.02	-.06	1.00									
Mo	-.04	.00	.09	.04	.06	.29	.55	.41	.63	.63	.58	.63	.50	.58	-.17	.14	.20	.15	-.07	-.21	1.00								
Na	.05	.10	.80	-.11	.18	.66	.15	.07	.11	.09	.15	.12	.17	.17	-.17	-.07	-.00	-.19	.04	-.51	.21	1.00							
Ni	-.07	-.04	.04	.06	-.05	.08	.44	.46	.41	.40	.58	.42	.62	.49	.23	.22	.34	-.04	.04	-.32	.13	.00	1.00						
Rb	.18	.22	.65	.04	.19	.56	-.14	-.22	-.13	-.13	-.06	-.07	.01	.05	-.06	-.07	-.15	-.12	.09	-.37	.13	.75	-.14	1.00					
Sc	-.13	.46	.18	-.15	-.13	.04	.03	.04	.04	.05	.21	.10	.13	.11	-.16	-.09	-.12	.09	.63	-.35	.08	.19	.14	.26	1.00				
Th	-.05	-.00	.51	-.01	.42	.66	.30	.34	.31	.33	.36	.39	.50	.49	-.15	-.04	-.01	-.09	-.03	-.43	.30	.40	.14	.34	.11	1.00			
U	.06	-.09	.12	-.13	.14	.28	.63	.39	.81	.87	.76	.82	.73	.78	-.07	.19	.18	-.18	-.06	-.13	.71	.16	.20	.03	-.01	.37	1.00		
W	-.05	.03	.12	-.02	-.05	.28	.20	.11	.23	.24	.24	.31	.20	.21	-.09	.12	.23	.14	-.04	-.16	.49	.22	.01	.28	.12	.19	.25	1.00	
Zn	-.06	-.22	.14	-.08	-.01	.31	.78	.72	.77	.75	.84	.78	.81	.73	.07	.19	.44	-.07	-.19	-.43	.53	.19	.64	-.09	.06	.38	.64	.20	1.00

Table 15. Correlation coefficients for 32 constituents (total content) in 70 oxidates from Southeastern Norway. Values > 0.38 are significant at $p < 0.001$.

	Br	Cs	Hf	Sb	Se	Ta	La	Ce	Nd	Sm	Eu	Tb	Yb	Lu	As	Au	Ba	Co	Cr	Fe	Mo	Na	Ni	Rb	Sc	Th	U	W	Zn	C	Cl	S
Br	1.00																															
Cs	-.13	1.00																														
Hf	-.30	.07	1.00																													
Sb	.08	.15	-.08	1.00																												
Se	-.08	-.13	.23	.06	1.00																											
Ta	-.22	-.12	.80	-.10	.39	1.00																										
La	.02	-.12	.13	-.01	-.05	.24	1.00																									
Ce	-.01	-.21	.07	.09	-.03	.20	.85	1.00																								
Nd	.23	-.11	.11	-.05	-.03	.21	.92	.74	1.00																							
Sm	.29	-.08	.08	-.09	-.02	.18	.85	.67	.98	1.00																						
Eu	.13	.00	.17	-.04	-.05	.21	.83	.67	.90	.90	1.00																					
Tb	.15	-.06	.11	-.07	-.02	.21	.82	.64	.94	.94	.90	1.00																				
Yb	.17	.04	.20	-.03	.07	.24	.71	.56	.82	.84	.91	.88	1.00																			
Lu	.09	.12	.20	-.05	.03	.24	.71	.52	.81	.84	.84	.88	.93	1.00																		
As	.22	.20	-.14	.26	-.12	-.28	-.01	-.07	.04	.03	.11	.09	.26	.17	1.00																	
Au	.09	.12	-.07	-.08	-.10	.00	.40	.33	.33	.39	.31	.33	.30	.37	.06	1.00																
Ba	-.03	-.07	-.09	.14	-.07	.06	.51	.43	.40	.35	.46	.36	.41	.34	.07	.23	1.00															
Co	.02	.06	-.29	.41	-.15	-.22	-.06	.08	-.15	-.18	-.11	-.15	-.14	-.13	-.08	-.03	.34	1.00														
Cr	-.18	.54	.01	-.19	-.12	-.16	-.12	-.20	-.09	-.07	.01	-.04	-.00	.03	-.03	-.03	-.20	-.19	1.00													
Fe	.47	-.10	-.47	-.06	-.10	-.46	-.41	-.49	-.26	-.20	-.37	-.27	-.28	-.25	.26	-.15	-.40	-.06	-.06	1.00												
Mo	.06	.00	.11	.17	.07	.27	.63	.49	.76	.70	-.63	.70	.54	.63	-.17	-.27	.33	.10	-.09	-.21	1.00											
Na	-.25	.03	.84	-.09	.23	.76	.23	.18	.19	.16	.23	.18	.22	.21	-.17	-.00	.01	-.25	.06	-.49	.23	1.00										
Ni	.04	-.01	.01	-.00	-.06	.01	.42	.48	.37	.36	.55	.39	.60	.46	.25	.20	.48	.05	-.01	-.33	.14	.04	1.00									
Rb	-.28	.18	.75	-.01	.24	.73	-.07	-.15	-.05	-.06	.01	-.00	.08	.12	-.06	-.05	-.13	-.27	.06	-.37	.08	.72	-.11	1.00								
Sc	-.33	.40	.20	-.13	-.12	.07	.12	.13	.13	.13	.32	.17	.20	.17	-.11	-.00	-.02	-.14	.67	-.41	.01	.13	.22	.17	1.00							
Th	-.21	.01	.51	.09	.45	.64	.26	.31	.27	.29	.33	.36	.48	.49	-.13	.03	.07	-.16	-.02	-.40	.33	.45	.10	.43	.12	1.00						
U	.28	-.05	.12	-.14	.13	.25	.64	.42	.82	.87	.76	.82	.73	.78	-.08	.27	.28	-.22	-.04	-.12	.77	.22	.18	.09	.04	.37	1.00					
W	.02	-.05	.13	.05	-.05	.29	.28	.19	.30	.31	.30	.37	.24	.25	-.09	.23	.37	.01	-.11	-.16	.40	.17	.03	.16	-.03	.22	.30	1.00				
Zn	.03	-.20	.11	-.01	-.02	.23	.77	.73	.76	.75	.84	.78	.81	.73	.08	.30	.64	-.03	-.18	-.43	.58	.23	.64	-.05	.12	.34	.64	.26	1.00			
C	.43	-.26	-.48	-.02	-.10	-.28	.07	-.02	.09	.07	-.03	.03	-.05	-.04	-.01	-.08	-.14	.18	-.14	.56	.04	-.41	-.13	-.44	-.28	-.23	.05	-.07	-.09	1.00		
Cl	.12	-.16	-.12	-.07	.03	.11	.01	-.00	.08	.07	.03	.03	-.06	-.04	-.16	-.04	-.03	.21	-.06	.13	.13	-.05	-.25	-.01	.15	-.08	.13	.02	-.06	.28	1.00	
S	.44	-.45	-.34	-.12	.05	-.08	.01	.11	.14	.21	.03	.07	.01	-.01	-.24	-.02	-.16	-.09	-.22	.39	.07	-.33	-.00	-.33	-.17	-.04	.17	-.03	.05	.39	.28	1.00

NGU-report no. 86.169.

OXIDATES AS A GEOCHEMICAL SAMPLING MEDIUM IN GRANITIC TERRAIN.

APPENDIX I.

Project no. 2249.

Norges geologiske undersøkelse

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Rapport nr. 86.169	ISSN 0800-3416	Åpen/~~Fortrolig til~~

Tittel:
Oxidates as a geochemical sampling medium in granitic terrain.

APPENDIX I.

Forfatter:	Oppdragsgiver:
Siv Kjeldsen	EF
Fylke: Akershus Oppland Hedmark	**Kommune:**
Kartbladnavn (M. 1:250 000) Hamar	**Kartbladnr. og -navn (M. 1:50 000)** 1915 IV Hurdal 2015 IV Odalen
Forekomstens navn og koordinater:	**Sidetall:** **Pris:** **Kartbilag:**

Feltarbeid utført:	Rapportdato:	Prosjektnr.:	Prosjektleder:
1984/1985	February 1987	2249	Rolf Tore Ottesen

Sammendrag:
The main objective for the project is to develope a geochemical method for exploration of ores associated with granitic rocks.

Oxidates were sampled in streambeds and lakes from 114 localities in Southeastern Norway. 65 of these localities are situated in the northern Oslo Graben.
The samples were examined mineralogically and chemically by a variety of methods. Geochemical maps of the element content in oxidates show regional distribution patterns for several elements.

Sampling and analysis of oxidates can be used in exploration for mineralizations such as the Skrukkelia Mo-deposit in the northern Oslo Graben. New anomalies (especially for Zn and W) have been detected.

Appendix I contain description of samples, chemical and mineralogical determinations performed on the samples, backscattered electron image-, X-ray image- and scanning electron image pictures of the oxidate preparates.

Appendix II contain spectral plots, point analysis with the microprobe, X-ray diffractograms, analytical results, correlation coefficient matrix, scatterplots, frequency distributions and information on data storage.

Appendix III contain maps of the element content in oxidates.

Emneord	Metode	Jern
Geokjemi	Geologisk undersøkelse	Mangan
Fagrapport	Noduler	Kjemisk analyse

CONTENTS, APPENDIX 1

FIGURES:

3.6 Sample 103
3.7 Sample 104
3.8 Sample 105
3.9 Sample 112
3.10 Sample 113

Sample no.	UTM X km	UTM Y km	Map 1:50000	Type of oxidates
1	594.60	6694.50	1815 I	Stream nodules
2	601.39	6707.47	1915 IV	Stream nodules
3	601.36	6707.44	1915 IV	Stream nodules
4	601.39	6707.36	1915 IV	Stream nodules
5	601.43	6707.32	1915 IV	Stream nodules
6	601.44	6707.20	1915 IV	Stream nodules
7	601.46	6707.06	1915 IV	Stream nodules
8	601.50	6706.98	1915 IV	Stream nodules
9	601.48	6706.84	1915 IV	Stream nodules
10	601.56	6706.62	1915 IV	Stream nodules
11	601.50	6706.40	1915 IV	Stream nodules
12	601.91	6705.76	1915 IV	Stream nodules
13	602.67	6705.46	1915 IV	Stream nodules
14	602.79	6705.34	1915 IV	Stream nodules
15	602.84	6705.26	1915 IV	Stream nodules
16	602.81	6704.49	1915 IV	Stream nodules
17	602.83	6704.44	1915 IV	Stream nodules
18	603.11	6703.95	1915 IV	Stream nodules
19	603.22	6703.51	1915 IV	Stream nodules
20	603.20	6702.30	1915 IV	Stream nodules
21	608.98	6705.05	1915 IV	Stream nodules
22	608.86	6705.14	1915 IV	Stream nodules
23	608.73	6705.17	1915 IV	Stream nodules
24	608.60	6705.13	1915 IV	Stream nodules
25	608.50	6705.10	1915 IV	Stream nodules
27	607.60	6706.70	1915 IV	Stream nodules
28	614.00	6707.30	1915 IV	Stream nodules
29	613.90	6705.50	1915 IV	Stream nodules
30	599.33	6708.36	1915 IV	Stream nodules
31	597.84	6707.26	1915 IV	Stream nodules
32	599.68	6706.68	1915 IV	Stream nodules
33	597.03	6705.20	1915 IV	Stream nodules
34	596.21	6703.77	1915 IV	Stream nodules
35	607.50	6703.10	1915 IV	Stream nodules
36	609.50	6700.60	1915 IV	Stream nodules
37	629.20	6693.40	1915 I	Stream nodules
38	603.23	6686.61	1915 IV	Stream nodules
39	600.08	6686.24	1915 IV	Stream nodules
40	597.40	6688.30	1915 IV	Stream nodules
41	612.23	6686.92	1915 IV	Stream nodules
42	613.10	6685.90	1915 IV	Stream nodules
43	605.79	6683.00	1915 IV	Stream nodules
44	606.20	6684.60	1915 IV	Stream nodules
45	605.61	6685.82	1915 IV	Stream nodules
46	604.70	6687.60	1915 IV	Stream nodules
47	603.13	6689.20	1915 IV	Stream nodules
48	602.82	6692.50	1915 IV	Stream nodules
49	605.66	6691.01	1915 IV	Stream nodules
50	608.32	6695.69	1915 IV	Stream nodules
51	606.50	6693.90	1915 IV	Stream nodules
52	602.36	6697.35	1915 IV	Stream nodules
53	601.98	6696.17	1915 IV	Stream nodules
54	602.49	6695.50	1915 IV	Stream nodules
55	602.80	6695.40	1915 IV	Stream nodules
56	595.78	6698.91	1915 IV	Stream nodules
57	595.67	6695.97	1915 IV	Stream nodules
58	595.80	6693.70	1915 IV	Stream nodules
59	601.90	6689.47	1915 IV	Stream nodules
60	601.47	6689.64	1915 IV	Stream nodules
61	598.16	6690.43	1915 IV	Stream nodules
62	600.27	6696.18	1915 IV	Stream nodules
63	608.63	6698.28	1915 IV	Stream nodules
64	603.50	6699.50	1915 IV	Stream nodules
65	605.70	6699.10	1915 IV	Stream nodules
66	608.58	6699.85	1915 IV	Stream nodules
67	356.30	6807.10	2117 IV	Stream nodules
68	355.80	6806.50	2117 IV	Stream nodules
69	358.30	6801.60	2117 IV	Stream nodules
70	356.30	6801.20	2117 IV	Stream nodules
71	North of Tisjøen, Sweden			Stream nodules
72	North of Tisjøen, Sweden			Stream nodules
73	North of Tisjøen, Sweden			Stream nodules
74	North of Tisjøen, Sweden			Stream nodules
75	650.50	6690.20	2015 IV	Lake crusts
76	650.50	6690.20	2015 IV	Lake concretions
77	South of Jokmokk, Sweden			Stream nodules
78	South of Jokmokk, Sweden			Stream crusts
80	459.90	6632.50	1514 I	Stream nodules
81	409.40	6606.50	1414 II	Stream nodules
82	399.70	6461.00	1411 IV	Stream crusts
83	511.80	6686.50	1615 I	Hardpan
84	650.50	6690.20	2015 IV	Lake nodules
85	650.50	6690.20	2015 IV	Lake nodules
86	650.50	6690.20	2015 IV	Lake crusts
87	649.90	6688.70	2015 IV	Lake nodules
88	649.90	6680.70	2015 IV	Discoidale Lake concretions
89	649.90	6680.70	2015 IV	Discoidale Lake concretions
90	649.90	6680.70	2015 IV	Lake crusts
91	648.90	6691.40	2015 IV	Lake nodules
92	648.90	6691.40	2015 IV	Lake crusts
93	645.80	6694.70	2015 IV	Discoidale Lake concretions
94	647.40	6694.90	2015 IV	Lake nodules
95	647.40	6694.90	2015 IV	Lake crusts
96	559.50	6635.90	1814 IV	Hardpan
97	559.50	6635.90	1814 IV	Hardpan
98	559.55	6635.69	1814 IV	Hardpan
99	559.55	6635.69	1814 IV	Hardpan
100	526.60	6731.00	1716 III	Stream nodules
101	594.60	6694.50	1815 I	Stream nodules
102	601.60	6706.50	1915 IV	Stream nodules
103	595.80	6695.90	1915 IV	Stream nodules
104	344.20	6768.00	2017 II	Stream nodules
105	650.70	6786.50	2017 III	Lake crusts
106	631.50	6914.20	1719 IV	Hardpan
107	595.80	6793.80	1917 IV	Stream nodules
108	621.50	6863.00	1918 I	Stream nodules
109	347.40	6752.80	2016 I	Stream nodules
110	612.10	6896.70	1619 II	Stream nodules
111	343.90	6864.80	2018 I	Stream nodules
112	649.20	6693.70	2015 IV	Lake crusts
113	649.20	6693.70	2015 IV	Lake nodules
114			1616 III	Hardpan
115	573.90	6917.80	1619 IV	Hardpan
116	560.50	6905.00	1519 I	Hardpan
117	591.20	6677.70	1815 II	Stream nodules
118	660.50	6781.30	2017 II	Stream nodules
119	346.00	6784.00	2017 II	Stream nodules
120	346.00	6837.80	2018 II	Stream nodules
121			2018 III	Stream nodules
122	619.90	6781.80	1917 II	Stream nodules
123	645.90	6761.80	2016 IV	Stream nodules
124	357.30	6784.00	2117 III	Stream nodules
125	635.50	6779.70	2017 III	Stream nodules
126	592.40	6793.90	1917 IV	Stream nodules
127	651.20	6798.50	2017 IV	Stream nodules
128	597.90	6706.70	1915 IV	Stream nodules
129	607.90	6705.40	1915 IV	Stream nodules

Sample no.	Chemical determination						Mineralogical determination		
	*HCl	HNO_3	INAA	XRF	H_2O	Hg	XRD	SEM **BSI	SEM SEI
1	X	X	X	X	X				
2	X	X	X	X					
3	X	X	X	X					
4	X	X	X	X	X				
5	X	X	X	X					
6	X	X	X	X		X			
7	X	X	X	X					
8	X	X	X	X					
9	X	X	X	X					
10	X	X	X	X					
11	X	X	X	X					
12	X	X	X	X					
13	X	X	X	X					
14	X	X	X	X	X	X			X
15	X	X	X		X				
16	X	X	X	X					
17	X	X	X	X	X				
18	X	X	X						
19	X	X	X	X					
20	X								
21	X	X	X	X					
22	X	X	X	X					
23	X	X	X						
24	X	X	X	X					
25	X								
27	X								
28	X								
29	X								
30	X	X	X	X		X			
31	X	X	X						
32	X	X	X	X					
33	X	X	X	X					
34	X	X	X						
35	X								
36	X								
37	X		X						
38	X	X	X		X				
39	X	X	X						
40	X								
41	X	X	X	X					
42	X								
43	X	X	X	X	X				
44	X								
45	X	X	X	X					
46	X								
47	X	X	X	X					
48	X	X	X	X					
49	X	X	X	X					
50	X	X	X	X					
51	X								
52	X	X	X	X		X			
53	X	X	X	X					
54	X	X	X	X					
55	X								
56	X	X	X	X					
57	X	X	X	X					
58	X								
59	X	X	X		X				
60	X	X	X	X					
61	X	X	X	X					
62	X	X	X	X					
63	X	X	X	X					
64	X								
65	X								
66	X	X	X						
67	X	X	X			X			
68	X		X						
69	X		X						
70	X	X	X						
71	X								
72	X	X	X	X	X				
73	X	X	X	X					
74	X	X	X	X					
75	X	X	X	X					
76	X	X	X	X					
77	X		X						
78	X								
80	X	X	X	X		X			
81	X	X	X						
82	X	X	X						
83	X	X	X						
84	X	X	X	X					
85	X	X	X	X					
86	X		X						
87	X	X	X	X		X			
88	X	X	X	X					
89	X	X	X	X					
90	X	X	X	X					
91	X	X	X	X					
92	X	X	X	X					
93	X	X	X	X					
94	X	X	X	X					
95	X	X	X	X					
96	X	X	X	X			X	X	X
97	X	X	X	X			X	X	X
98	X	X	X	X			X	X	
99	X	X	X	X			X	X	
100	X	X	X	X			X	X	X
101	X	X	X	X			X	X	X
102	X						X	X	
103	X	X	X	X			X	X	X
104	X	X	X	X			X	X	X
105	X	X	X	X	X		X	X	X
106	X	X	X	X	X	X	X	X	
107	X	X	X				X	X	
108	X						X	X	
109	X						X	X	
110	X						X	X	
111	X						X	X	
112	X	X	X	X	X		X	X	X
113	X	X	X	X	X		X	X	X
114	X	X		X			X	X	
115	X	X	X	X	X		X	X	
116	X	X	X	X			X	X	
117							X	X	
118							X	X	
119							X	X	
120							X	X	
121							X	X	
122							X	X	
123							X	X	
124							X	X	
125							X	X	
126							X	X	
127							X	X	
128							X	X	
129							X		

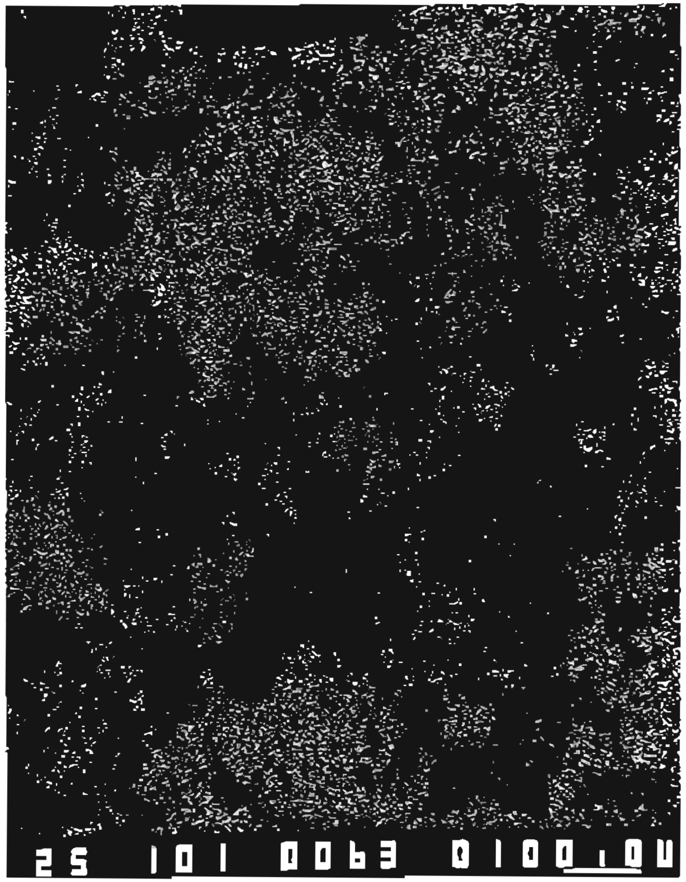
* Includes determination of the total carbon content
** Includes point analysis with the microprobe

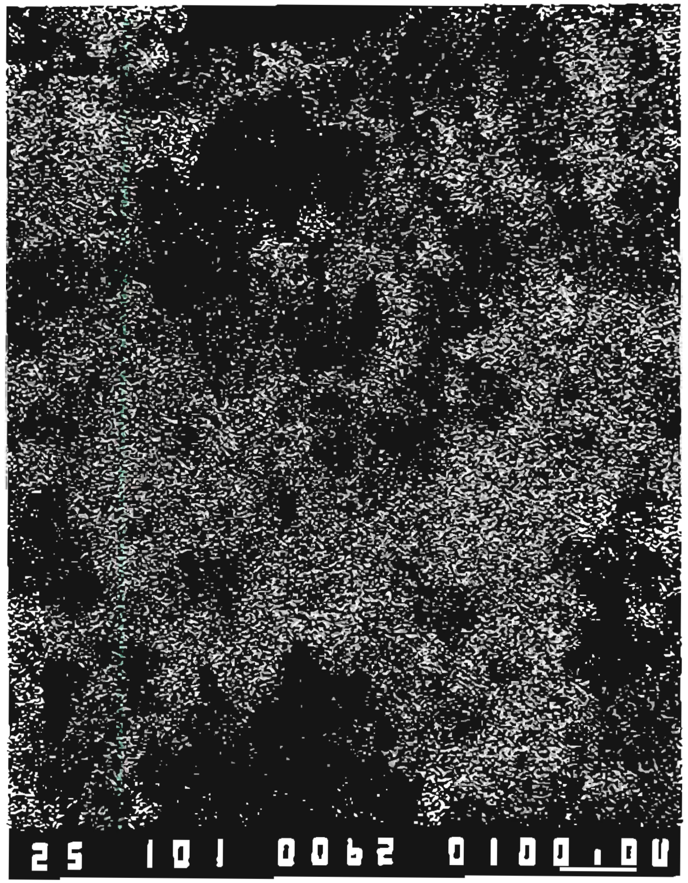
Sample no.	Map (1:50000)	UTM X	UTM Y
96	1814 IV	559.50	6635.90

BSI
Mn-rich sample

X-ray image
Mn

X-ray image
Fe



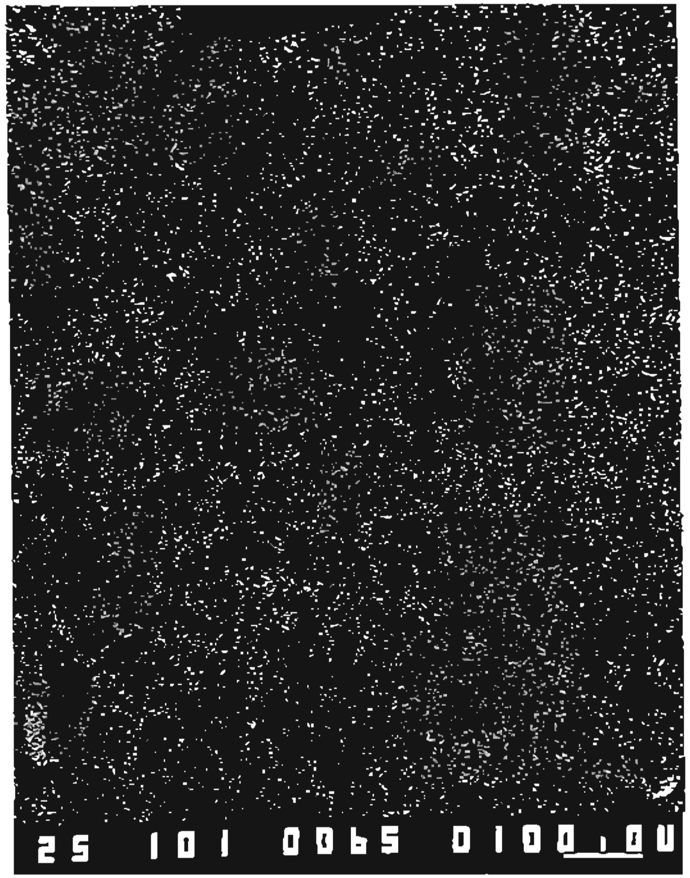


Scale (micron bar) 100 μm
Magnification 10 X 10[1]
Accelerating voltage (kV) 25kV

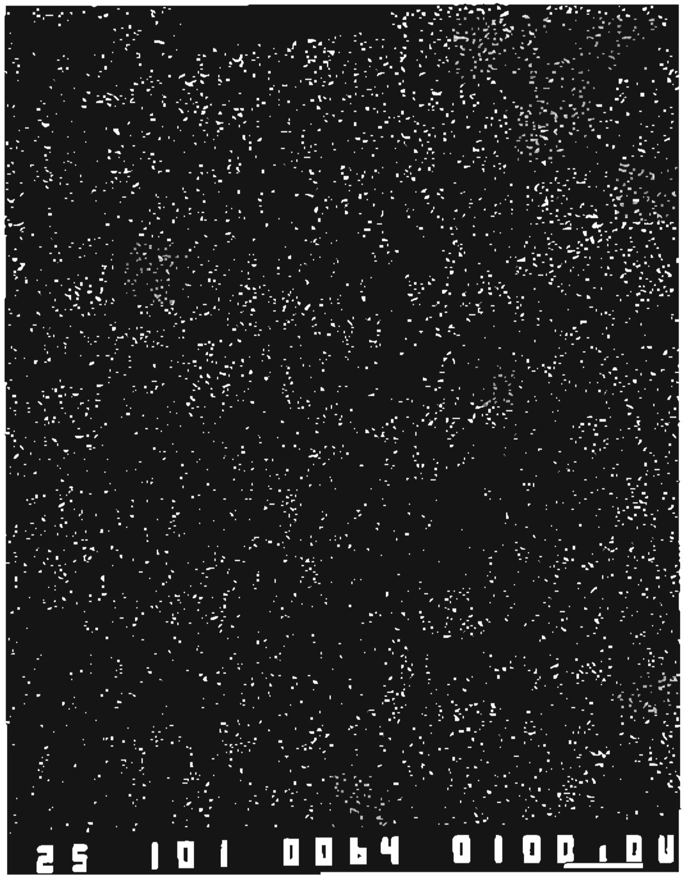
NGU-report 86.169. FIGURE 2.1

Sample no.
96 continue

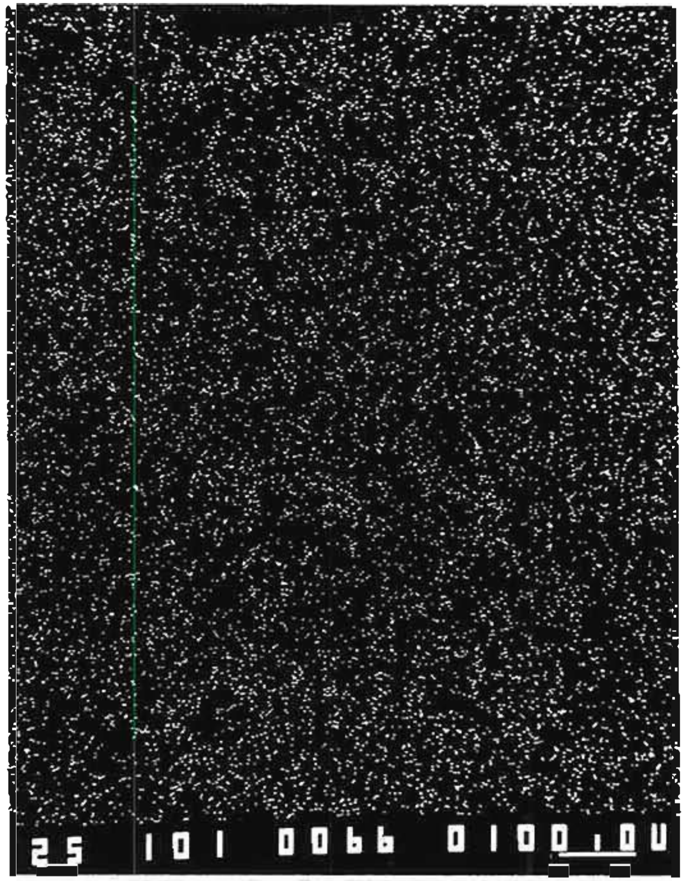
X-ray image
Si



X-ray image
Al



X-ray image
S



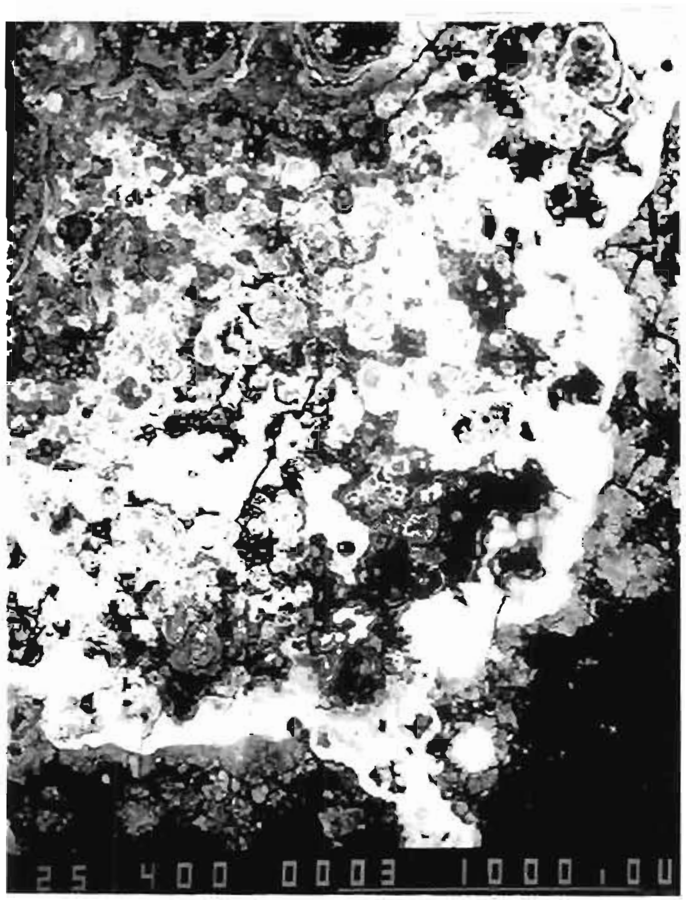
NGU-report 86.169. FIGURE 2.1

Sample no.	Map (1:50000)	UTM X	UTM Y
97	1814 IV	559.50	6635.90

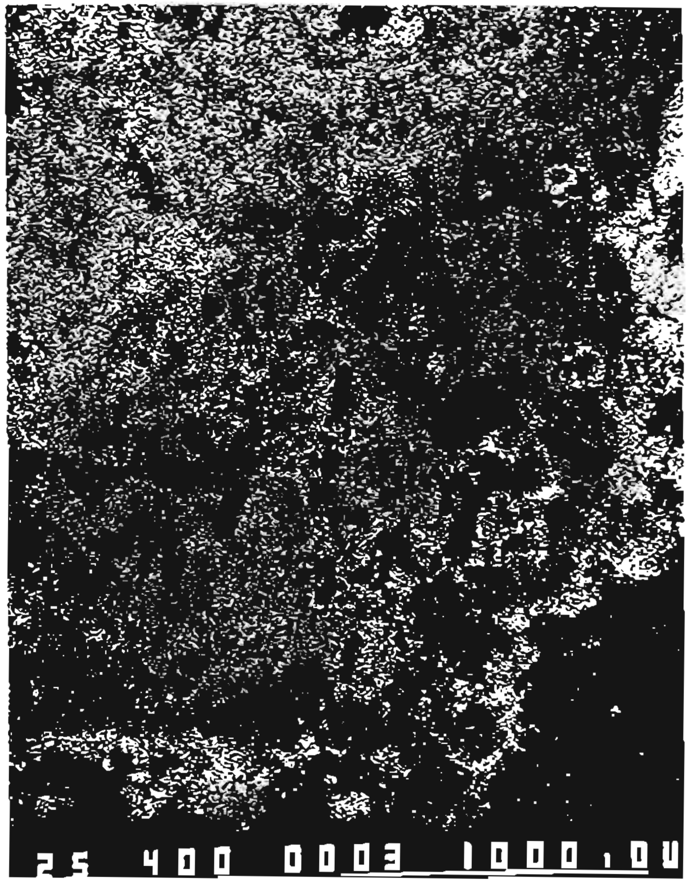
BSI
Fe-rich sample

Sample no.	Map (1:50000)	UTM X	UTM Y
98	1814 IV	559.55	6635.69

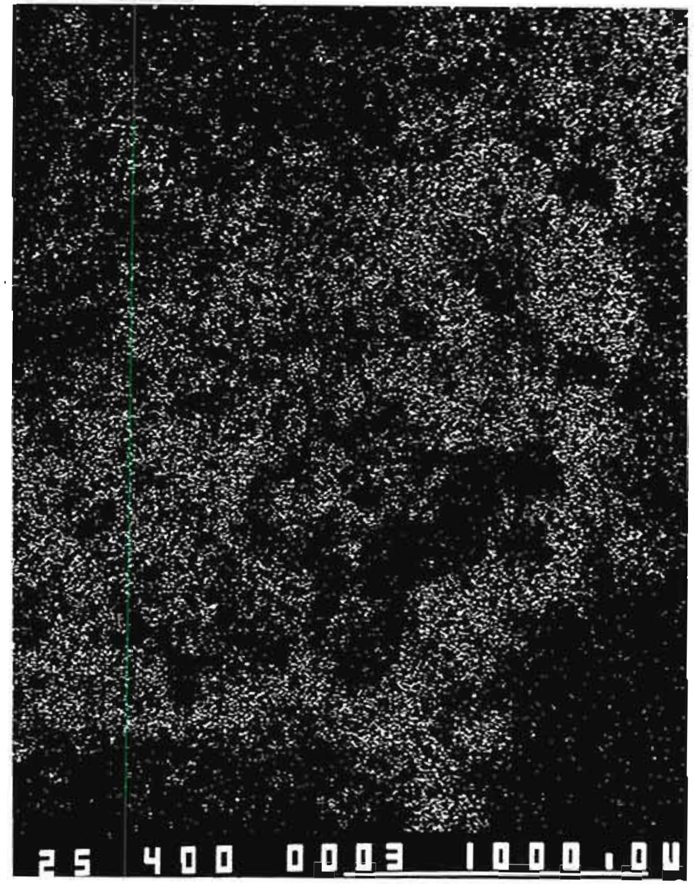
BSI



X-ray image
Mn



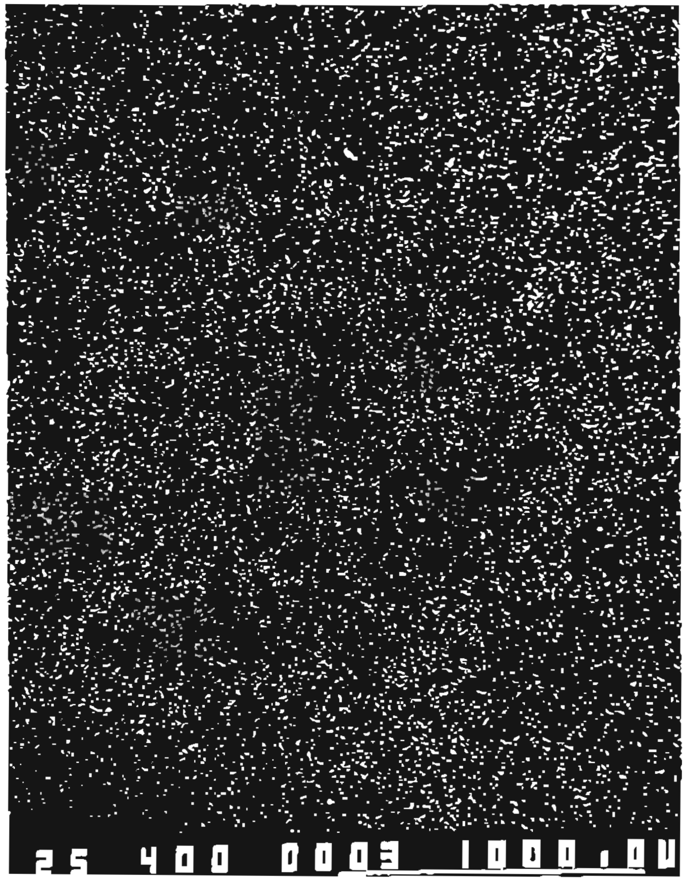
X-ray image
Fe



NGU-report 86.169. FIGURE 2.3

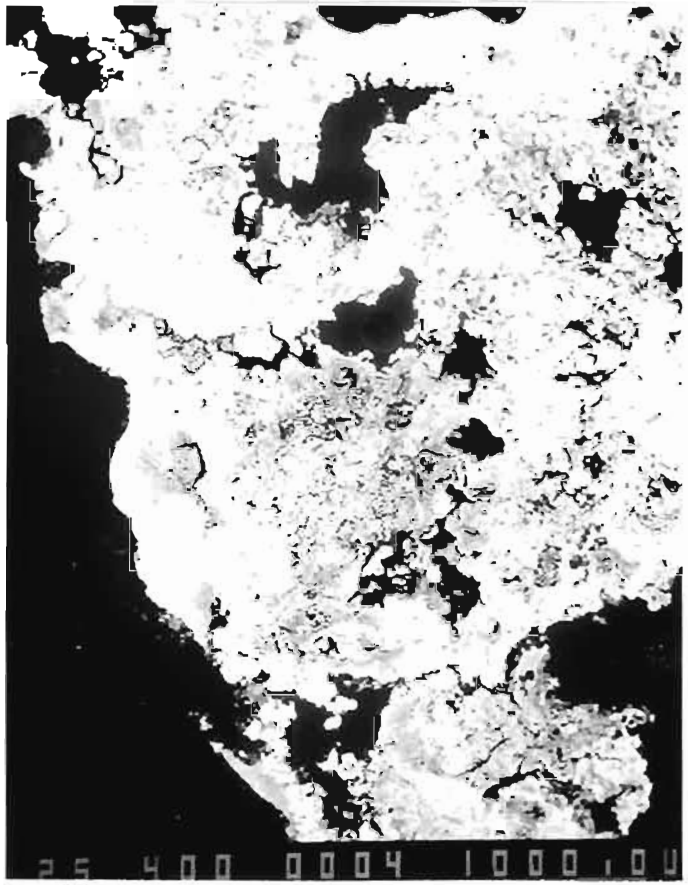
Sample no.
98 continue

X-ray image
Si

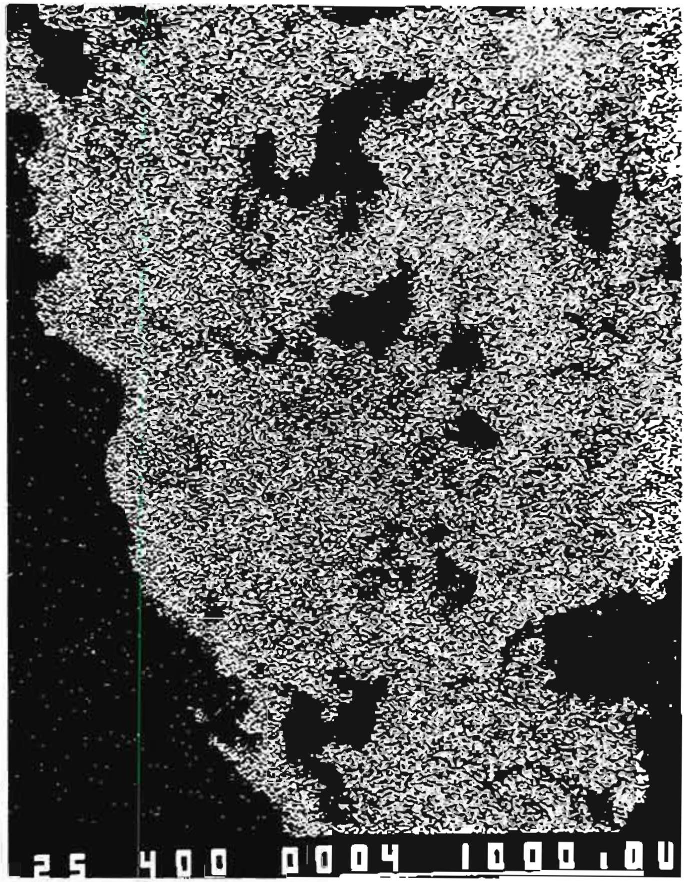


Sample no.	Map (1:50000)	UTM X	UTM Y
99	1814 IV	559.55	6635.69

BSI



X-ray image
Fe

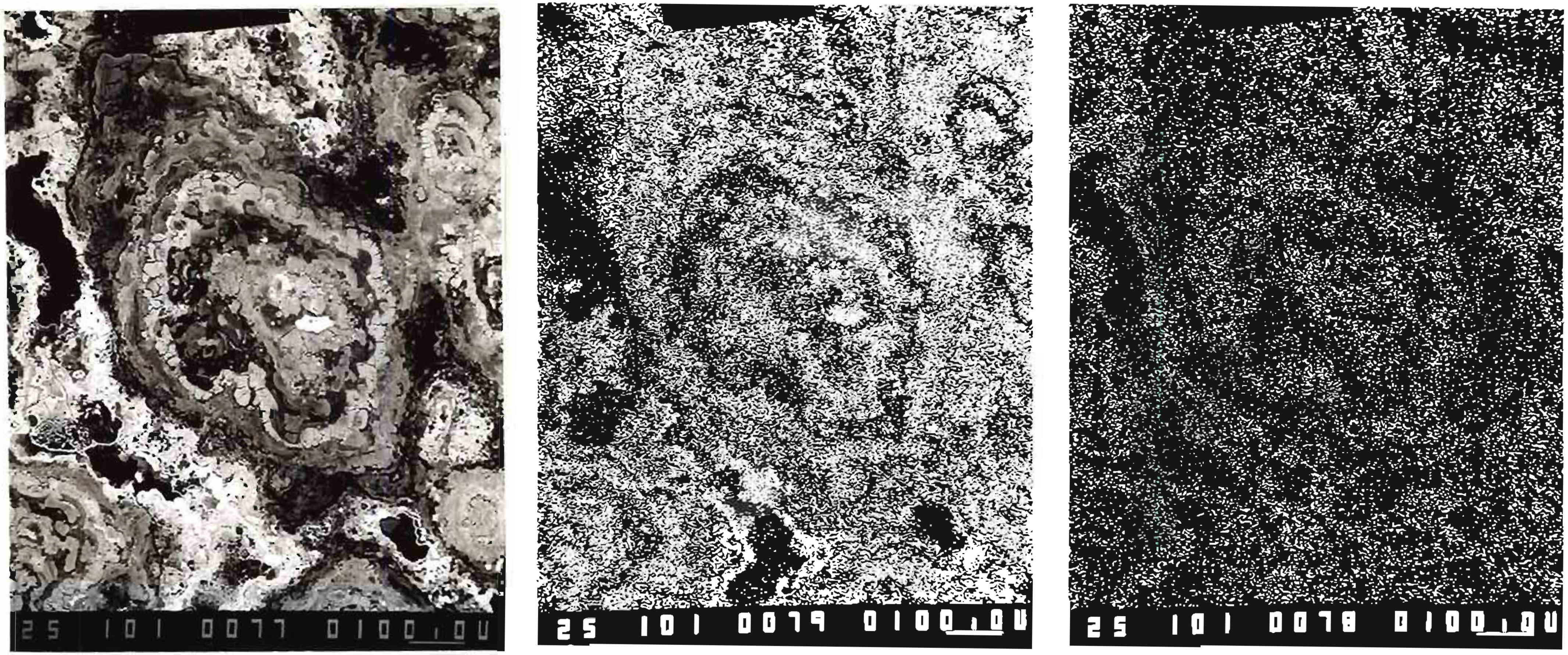


Sample no.	Map (1:50000)	UTM X	UTM Y
100A	1716 III	526.60	6731.00

BSI

X-ray image
Mn

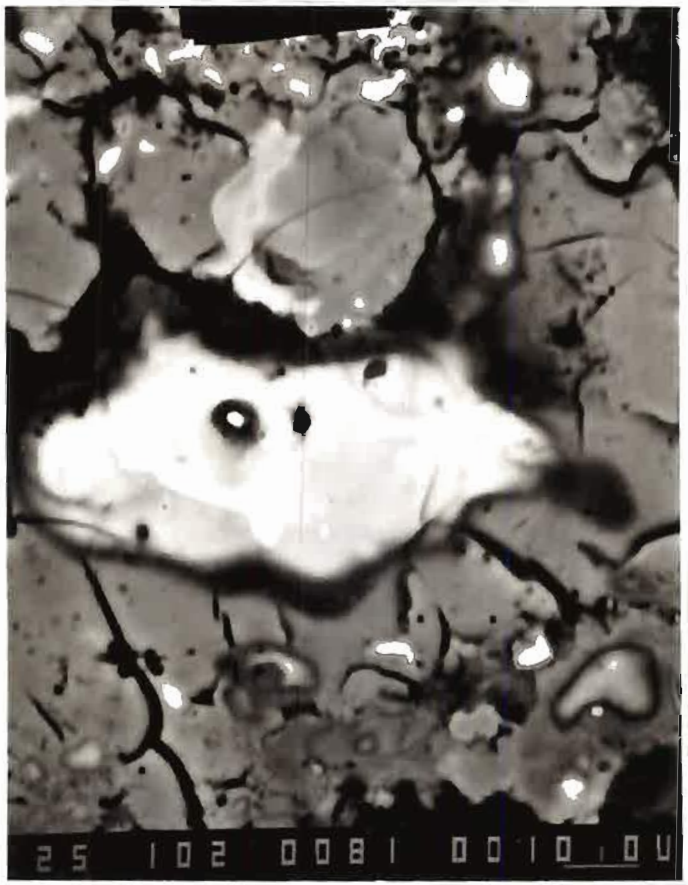
X-ray image
Fe



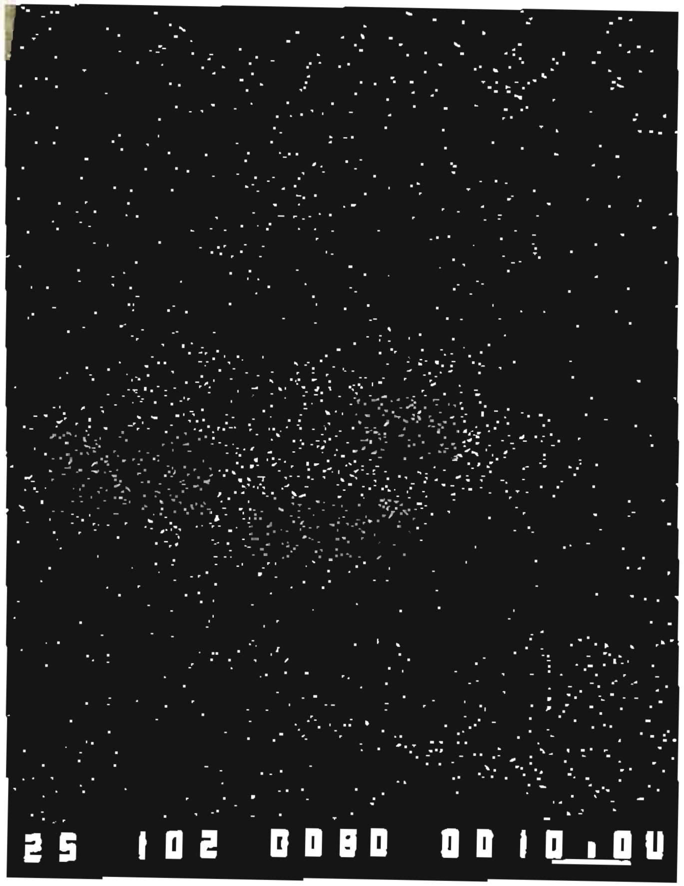
NGU-report 86.169. FIGURE 2.5

Sample no.
100A continue

BSI



X-ray image
Ba

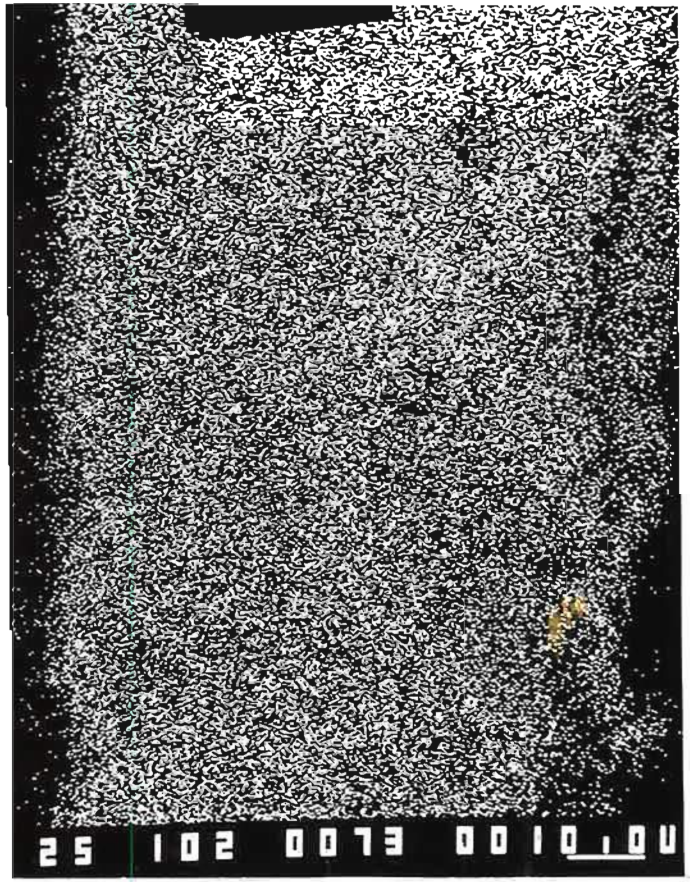


Sample no.	Map (1:50000)	UTM X	UTM Y
100B	1716 III	530.00	6734.10

BSI

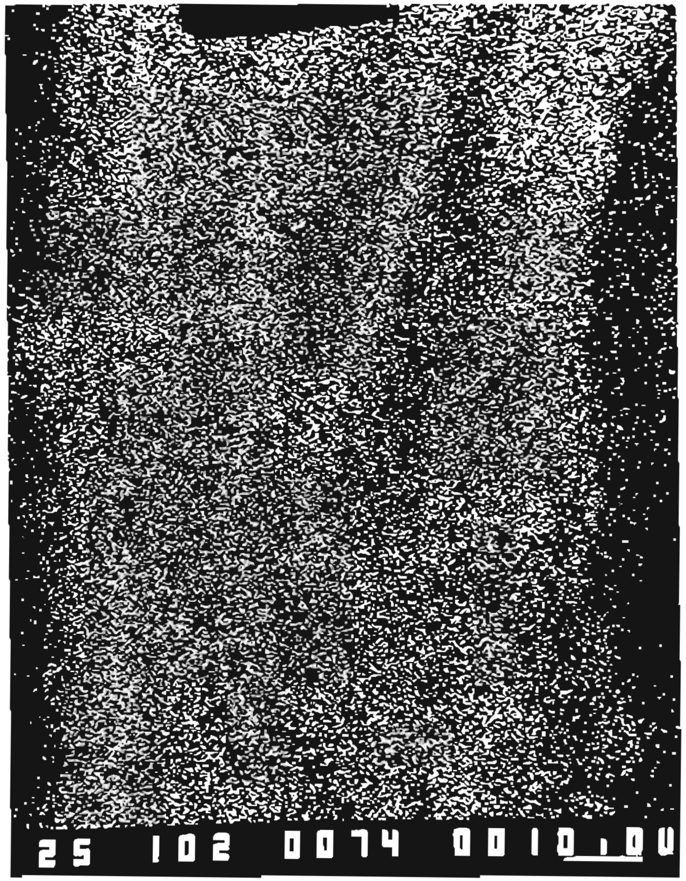
BSI
Coating

X-ray image
Mn

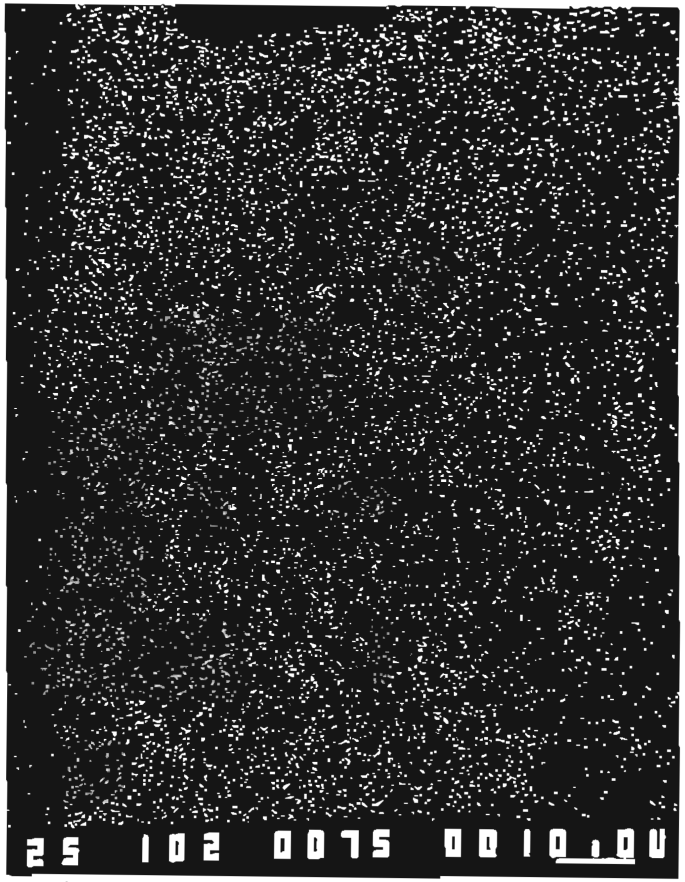


Sample no.
100B continue

X-ray image
Fe



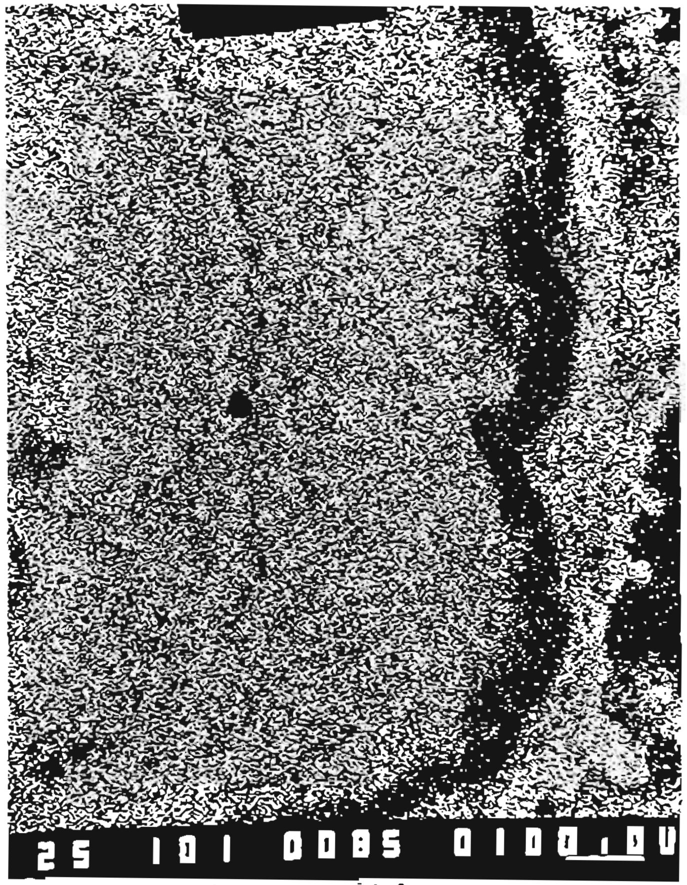
X-ray image
Zn



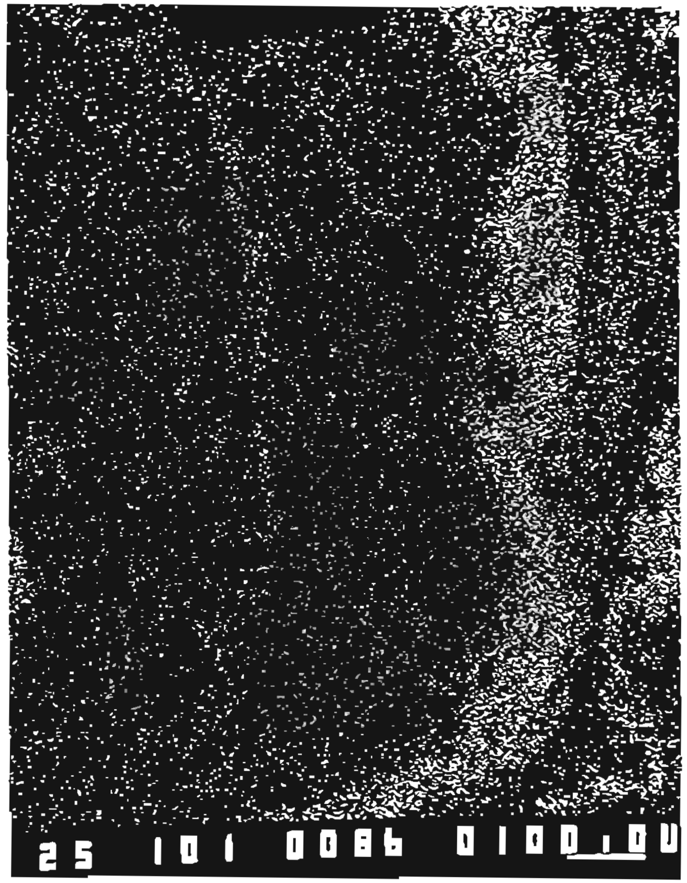
Sample no.	Map (1:50000)	UTM X	UTM Y
101	1815 I	594.60	6694.50

BSI

X-ray image
Mn

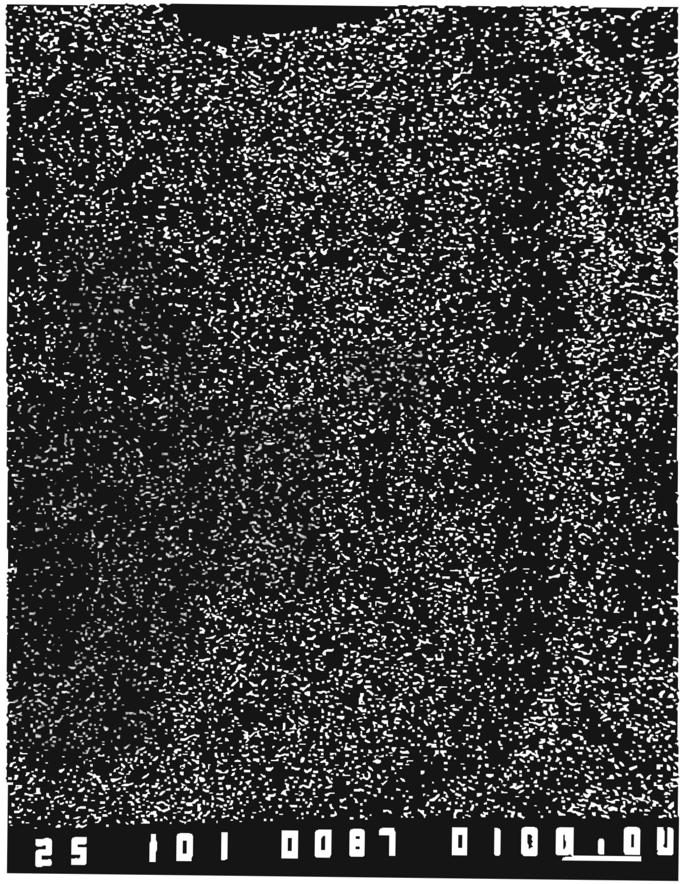


X-ray image
Fe

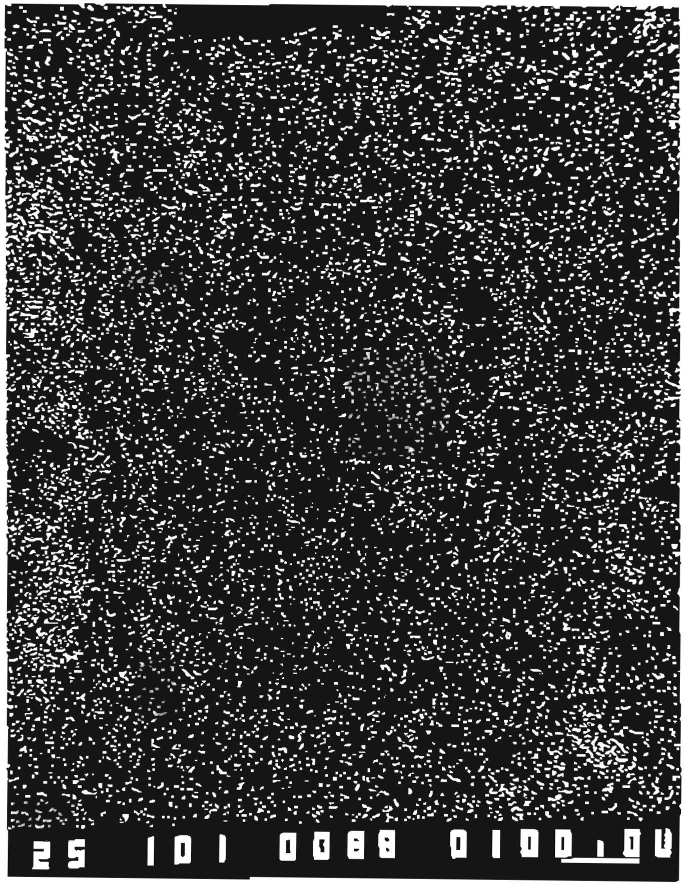


Sample no.
101 continue

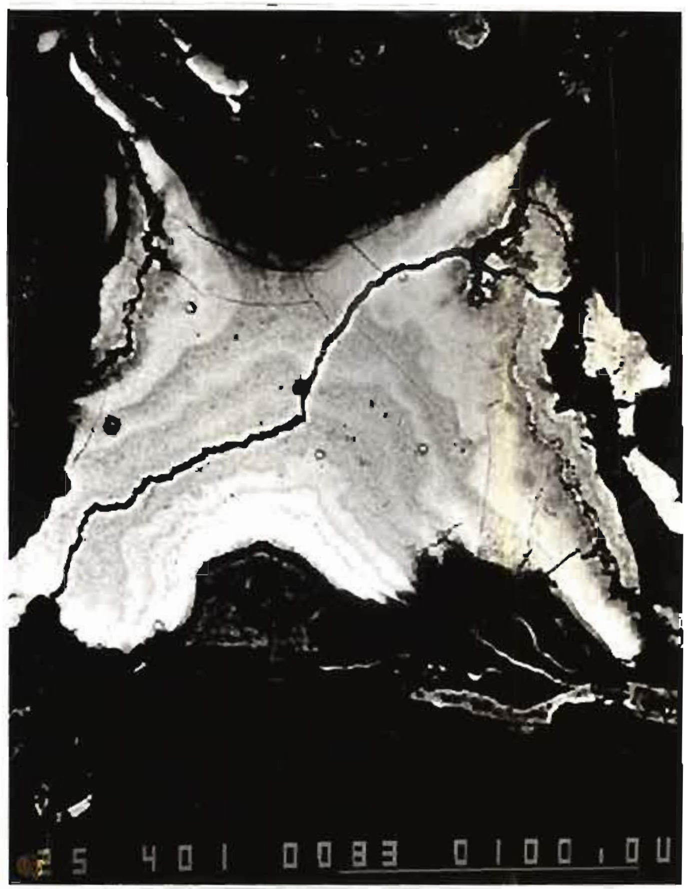
X-ray image
Al



X-ray image
Ba



BSI

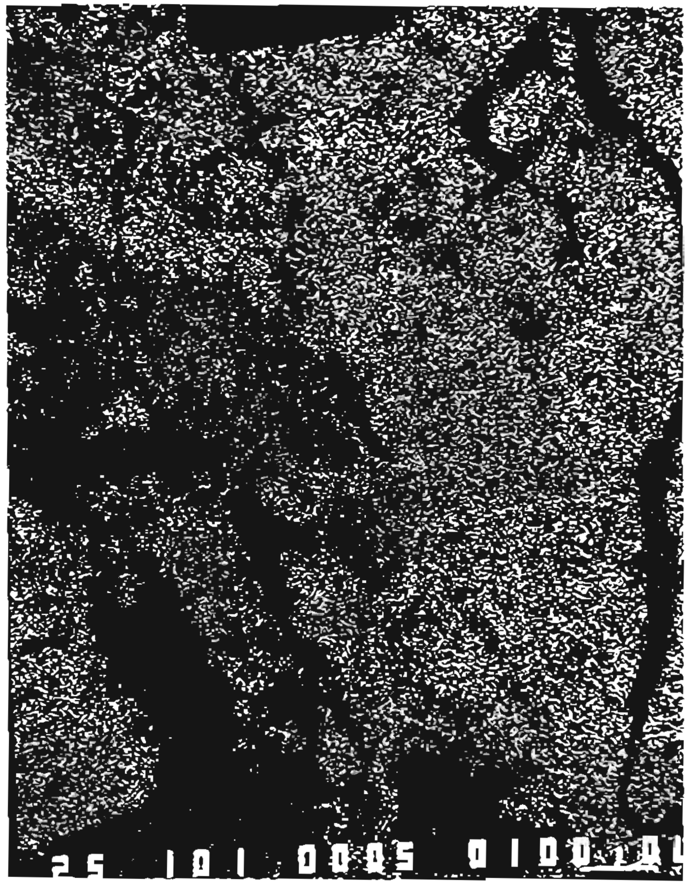


NGU-report 86.169. FIGURE 2.6

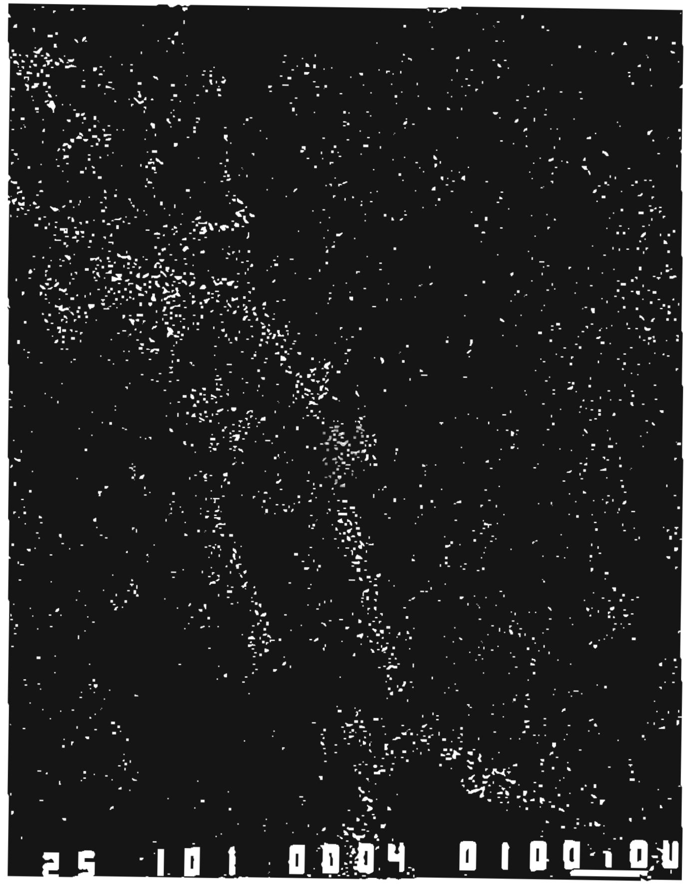
Sample no.	Map (1:50000)	UTM X	UTM Y
102	1915 IV	601.60	6706.50

BSI

X-ray image
Mn



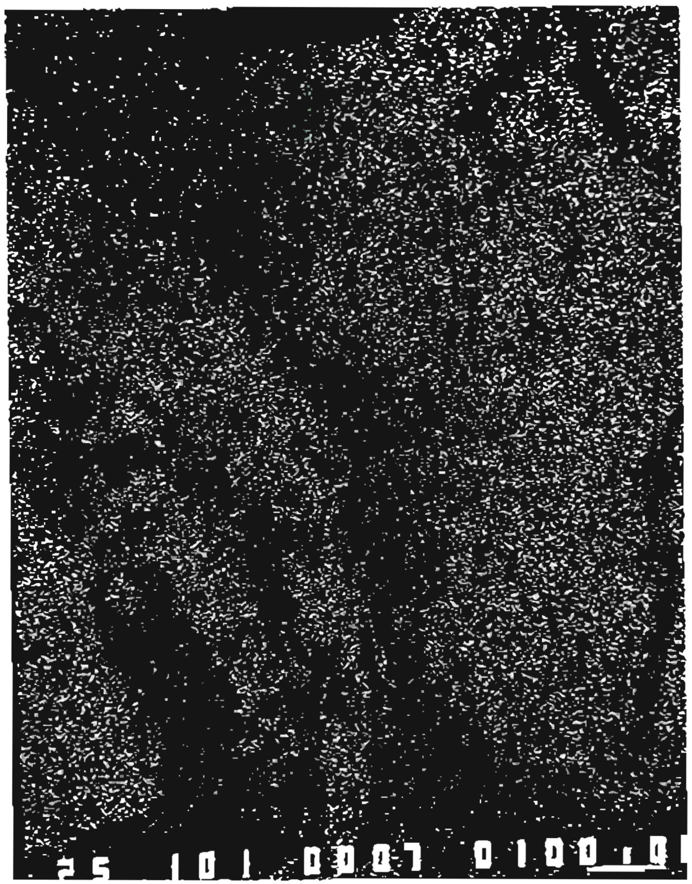
X-ray image
Fe



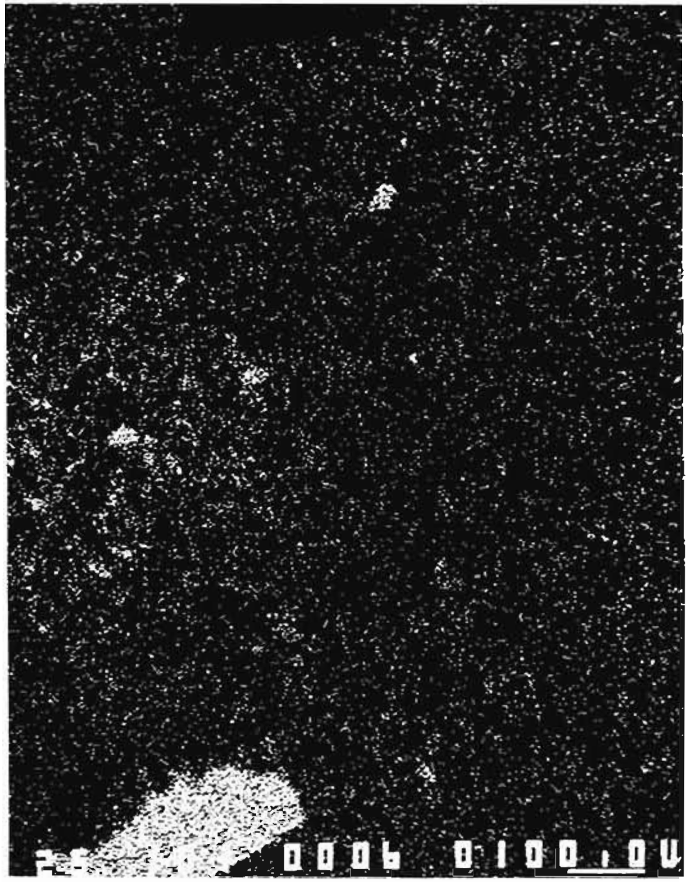
NGU-report 86.169. FIGURE 2.7

Sample no.
102 continue

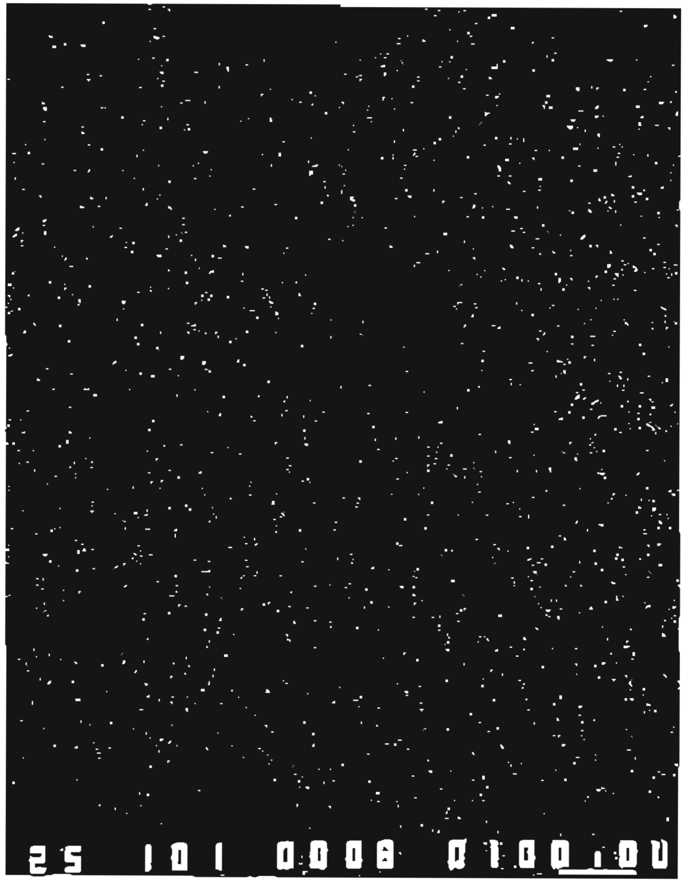
X-ray image
Al



X-ray image
Si

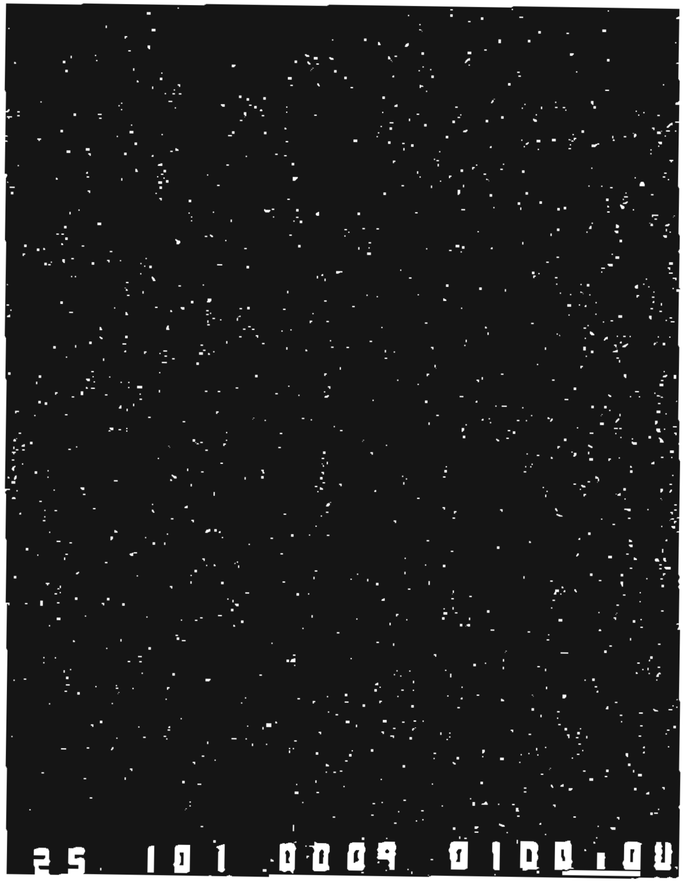


X-ray image
S



Sample no.
102 continue

X-ray image
Ca

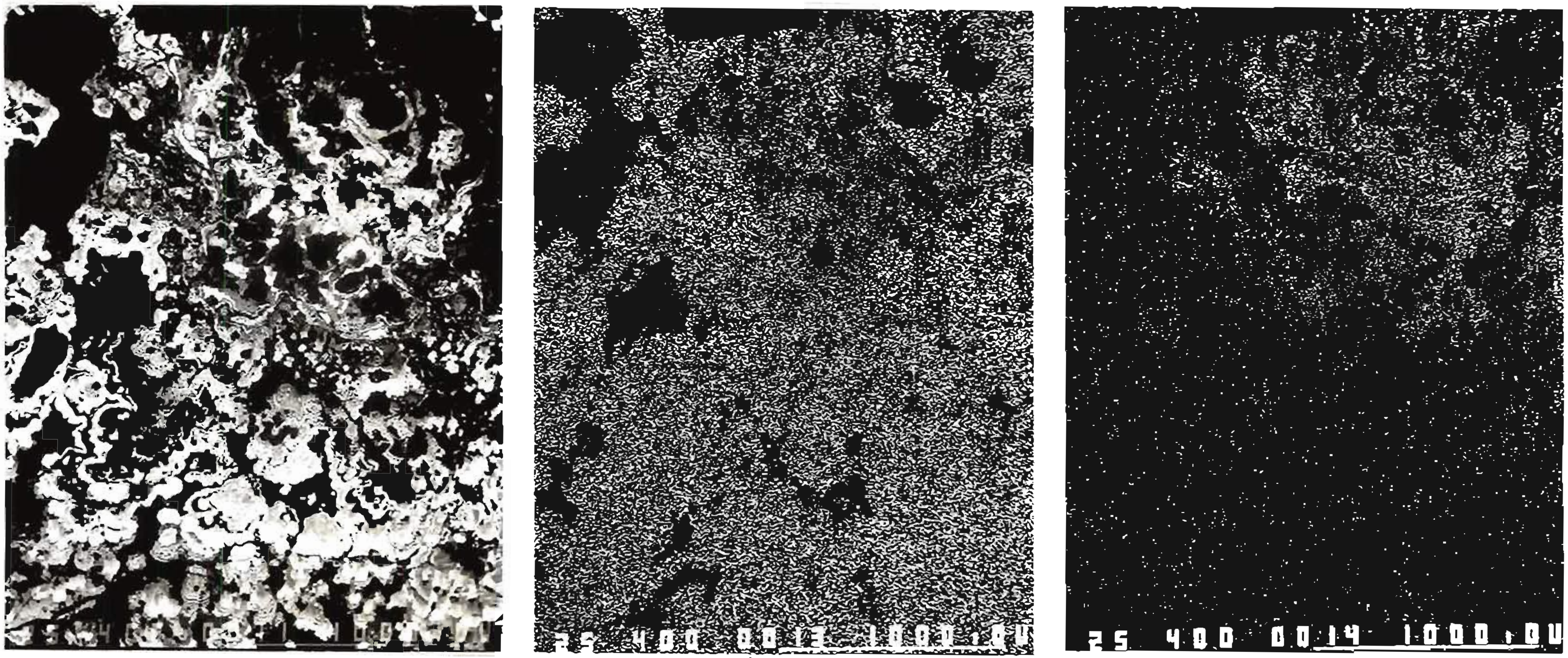


Sample no.	Map (1:50000)	UTM X	UTM Y
103	1915 IV	595.80	6695.90

BSI

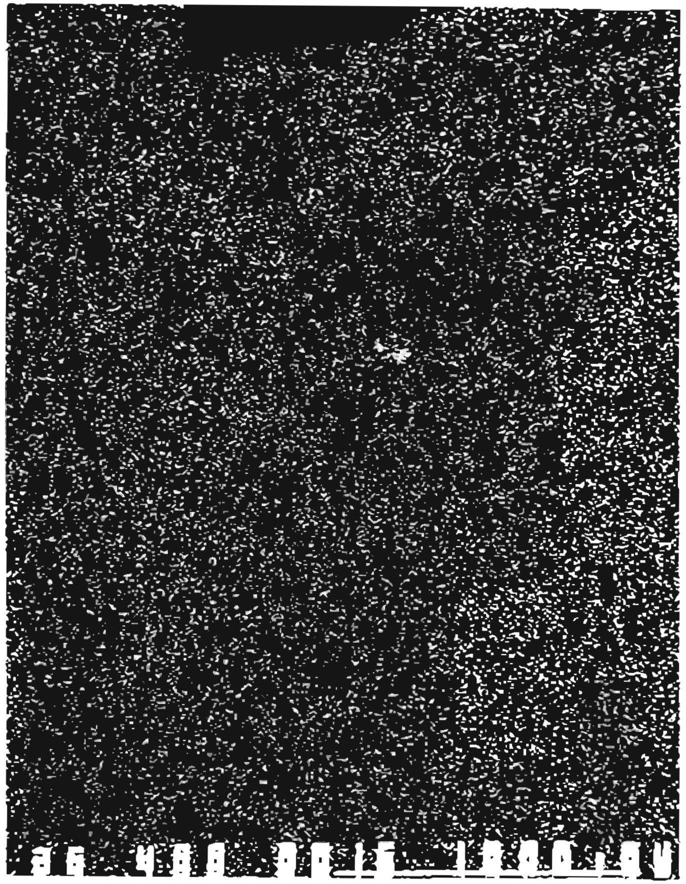
X-ray image
Mn

X-ray image
Fe



Sample no.
103 continue

X-ray image
K



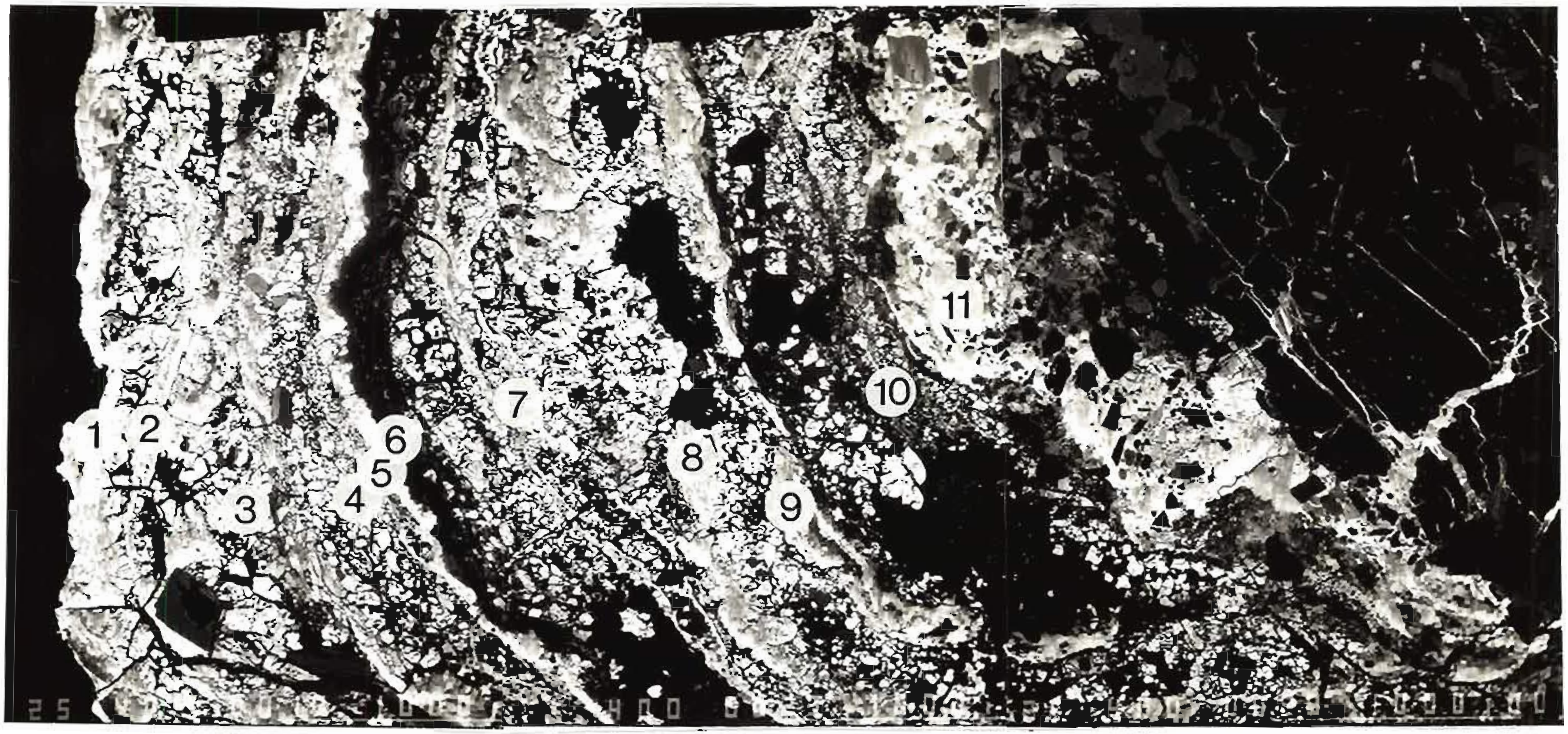
Sample no.	Map (1:50000)	UTM X	UTM Y
104	2017 II	344.20	6768.00

BSI

P.NO.	MN	FE	ZN	AL	SI	MO	S	BA	O	C+H2O
	WT %									
1	1.12	44.85	0	0.13		0.08?	0.03		41.34	12.44
2	23 71	9.58		0.43	0.03		0.14	0.24	40.80	25.09
3	32.66	10.65		1.47	0		0.06	0.64	38.94	15.52
4	36.32	8.29	0.06?	1.14		0.10	0.05	0.25	35.01	18.72
5	0.68	53.11		0.64	0.80				33.10	11.47
6	10.31	9.68	0	0.51			0.02	0.12	27.26	52.01
7	22.79	14.04	0	1.18	0.12			0.34	34.07	27.34
8	30.01	11.75		1.59	0.08	0	0.06	0.35	35.06	21.02
9	38.90	9.86		1.37	0	0	0.09	0.88	34.19	14.60
10	7.54	42.00		0.89	0.76				32.11	16.50
11	18.80	24.20		1.81	0.54			0 69	38.30	15.57

Outer part

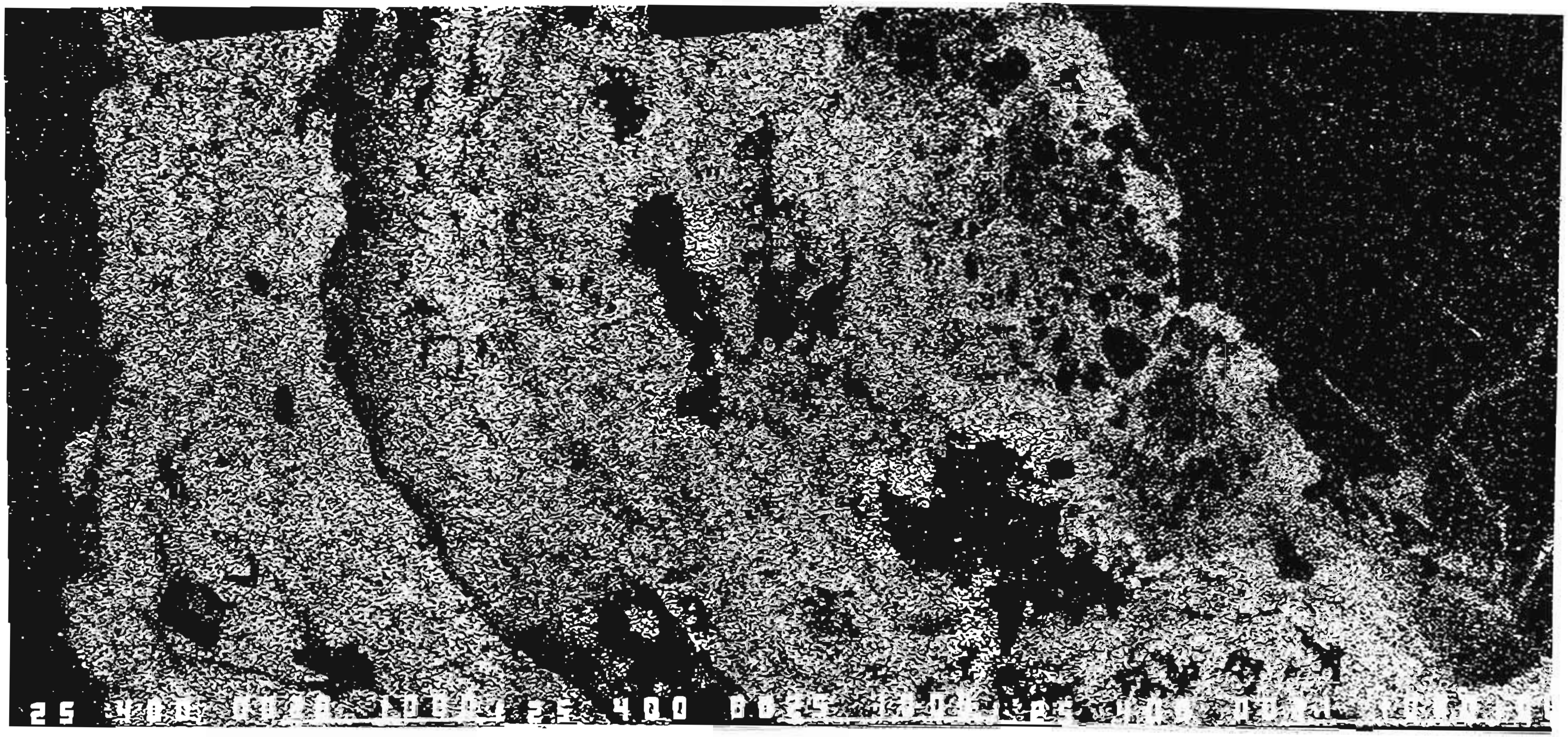
Core



Sample no.
104 continue

X-ray image
Mn

Outer part Core

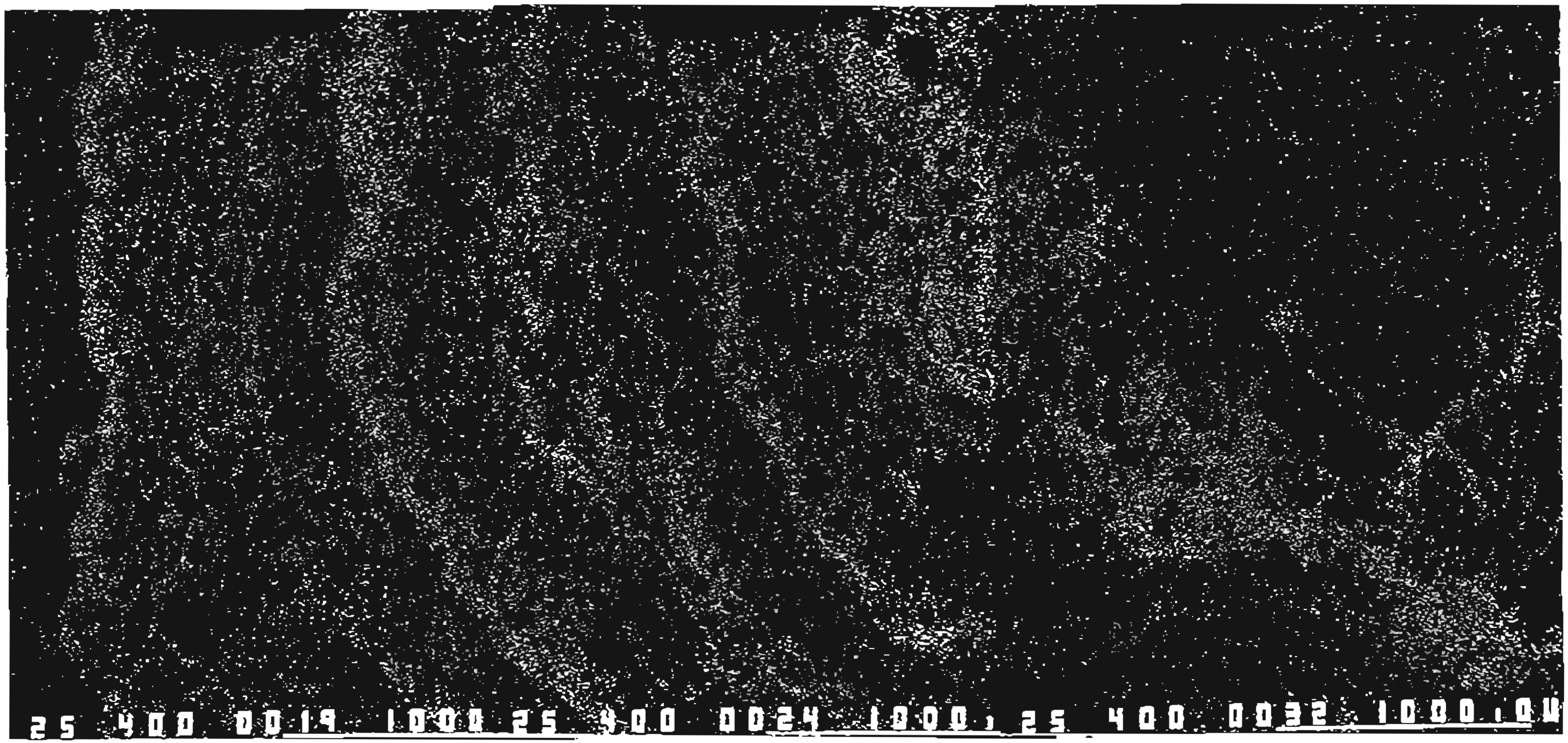


Sample no.
104 continue

X-ray image
Fe

Outer part

Core

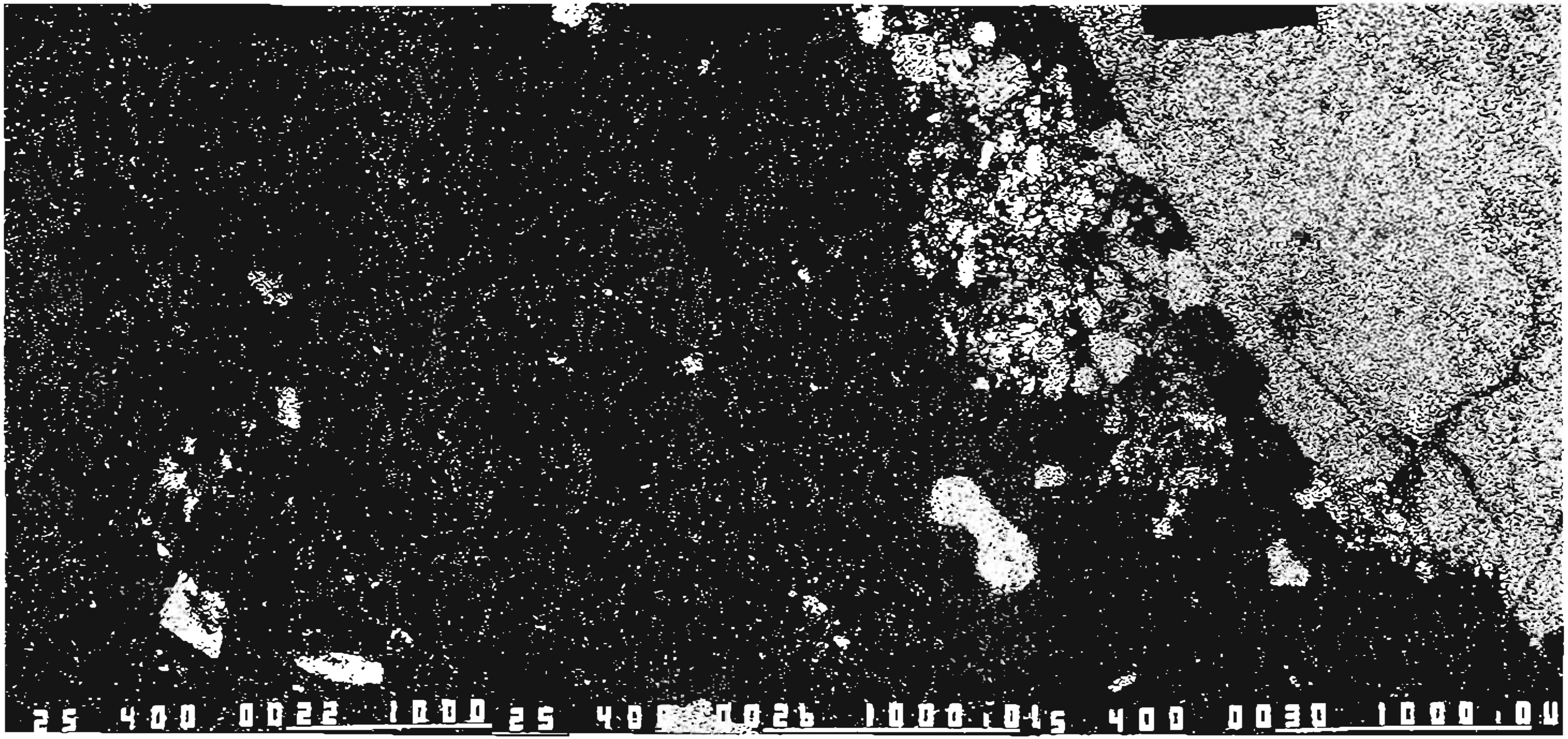


Sample no.
104 continue

X-ray image
Si

Outer part

Core



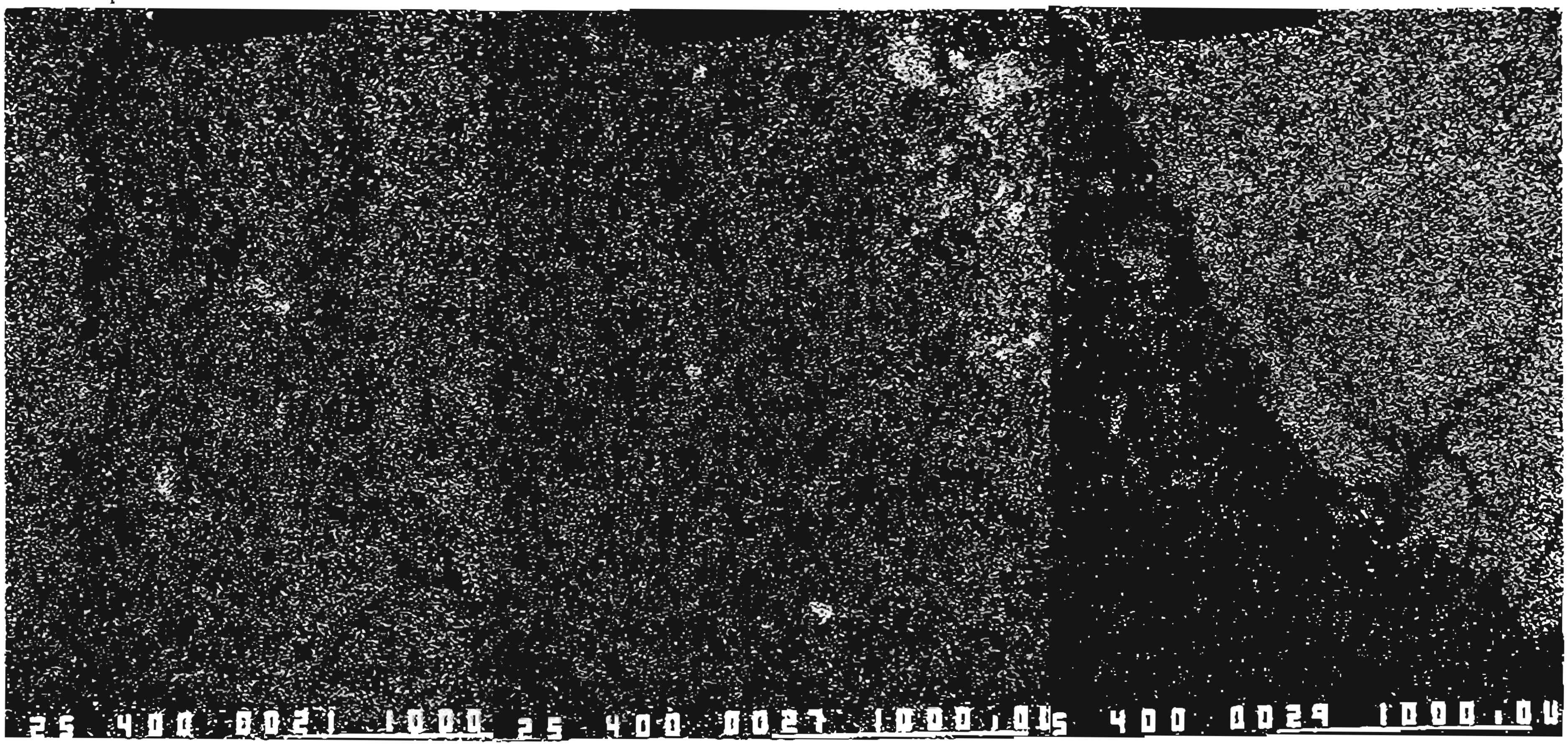
NGU-report 86.169. FIGURE 2.9

Sample no.
104 continue

X-ray image
Al

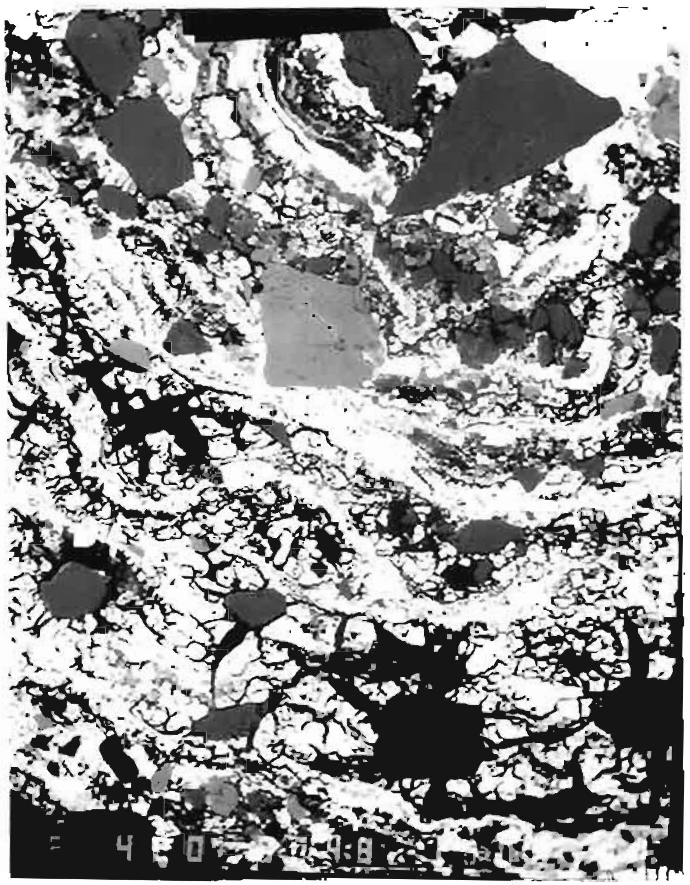
Outer part

Core



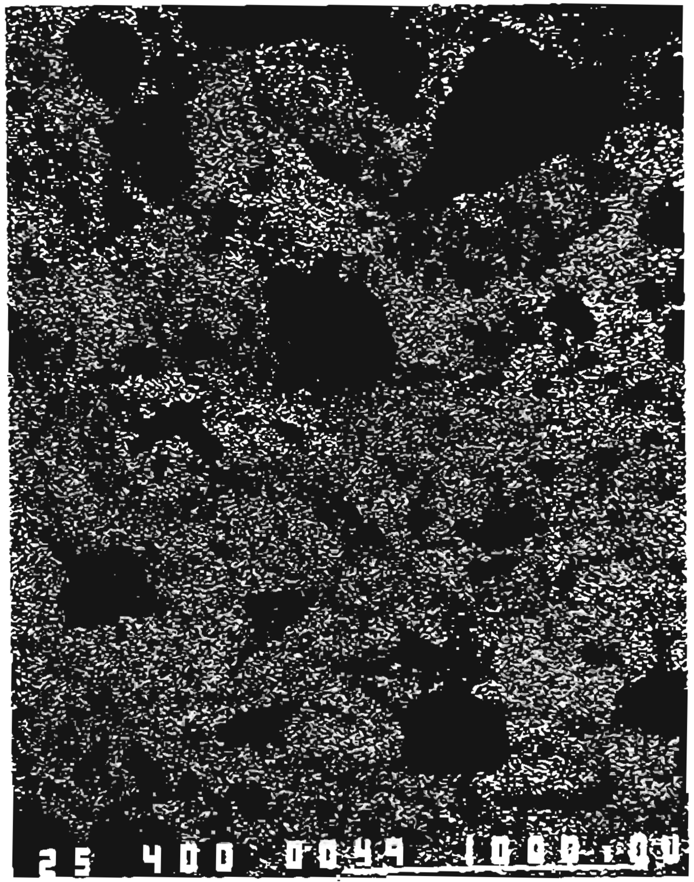
Sample no.	Map (1:50000)	UTM X	UTM Y
105	2017 III	650.70	6786.50

BSI



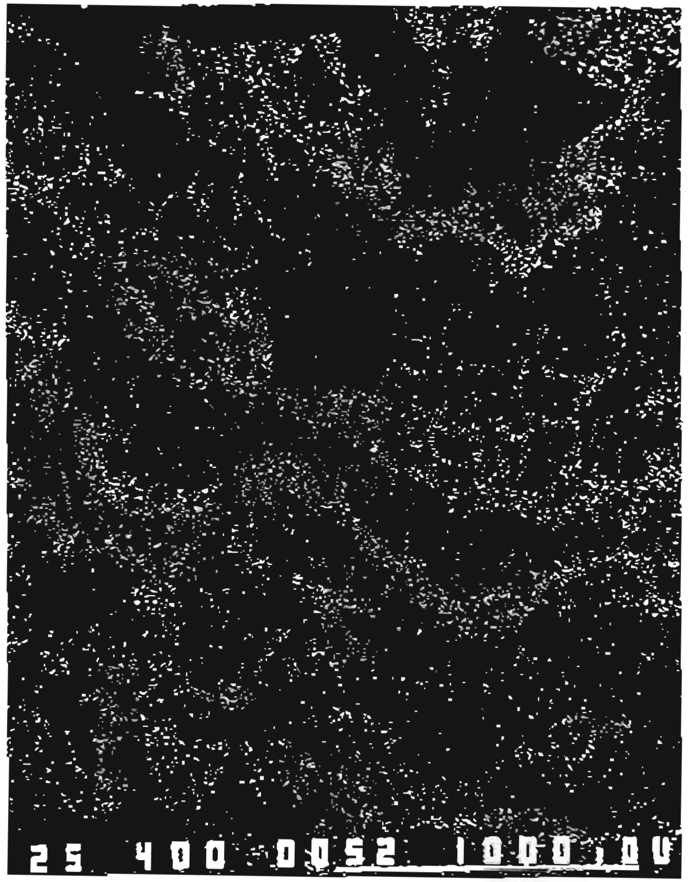
X-ray image

Mn



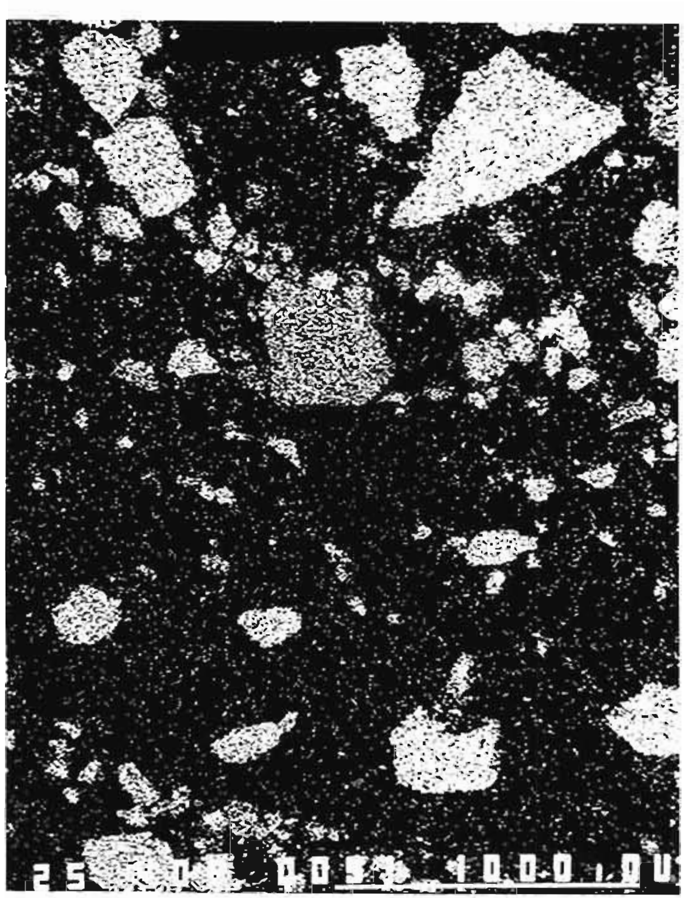
X-ray image

Fe



Sample no.
105 continue

X-ray image
Si

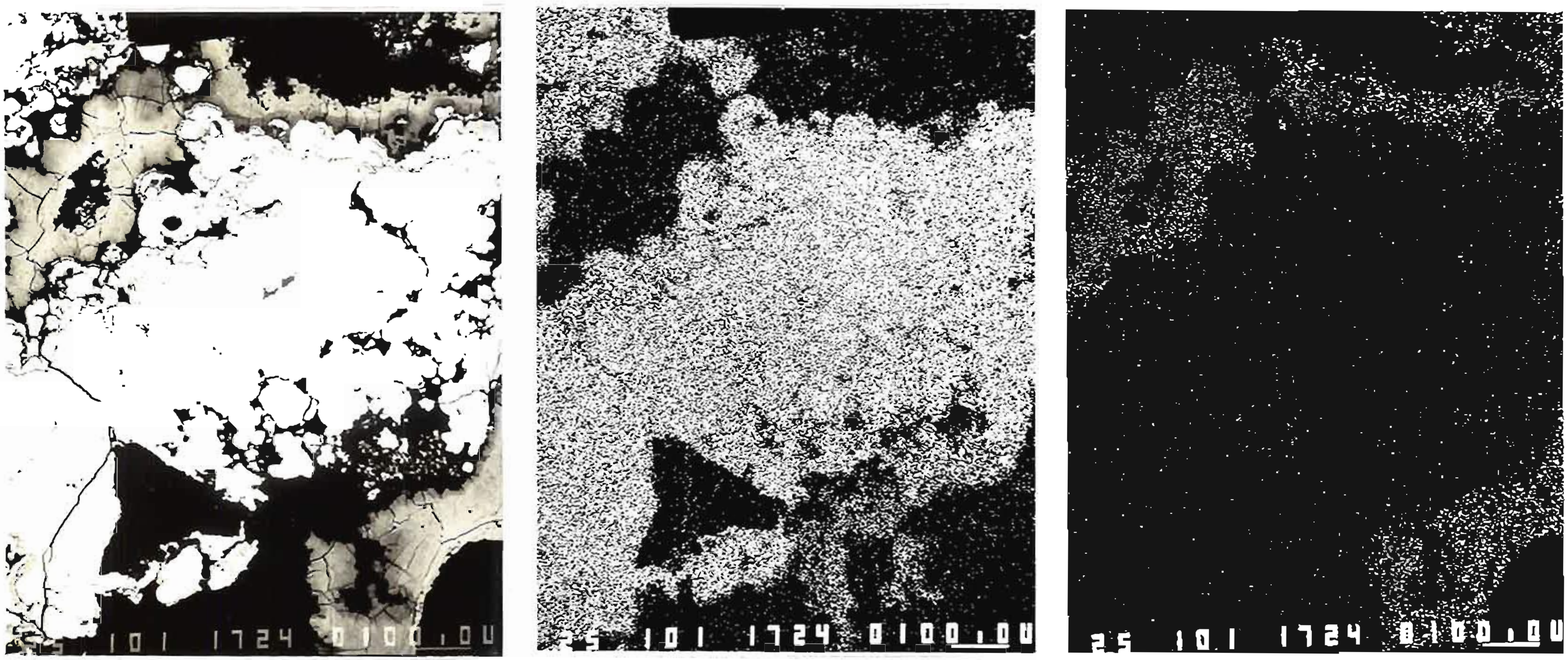


Sample no.	Map (1:50000)	UTM X	UTM Y
106	1719 IV	631.50	6914.20

BSI

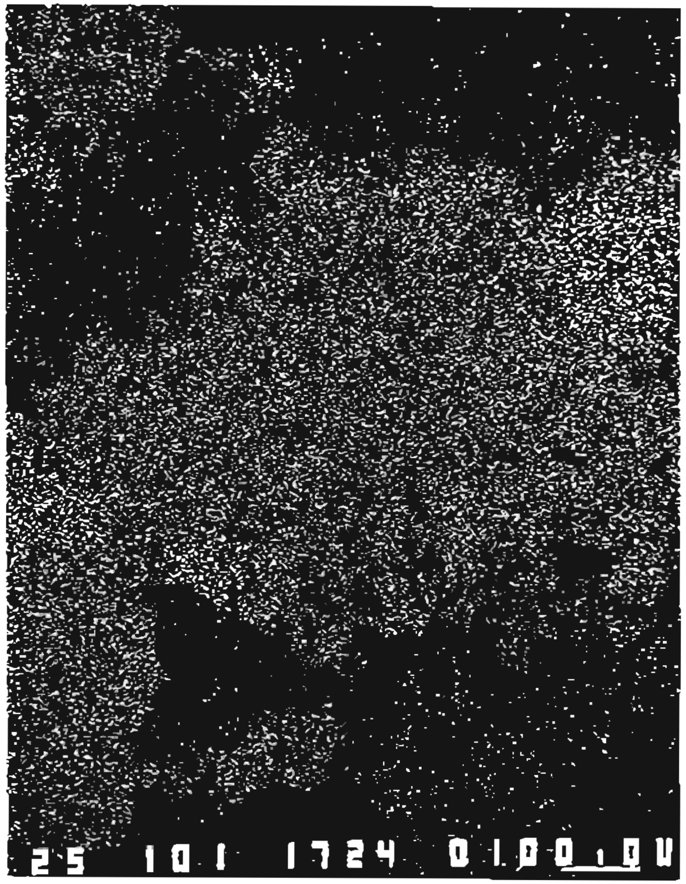
X-ray image
Mn

X-ray image
Fe



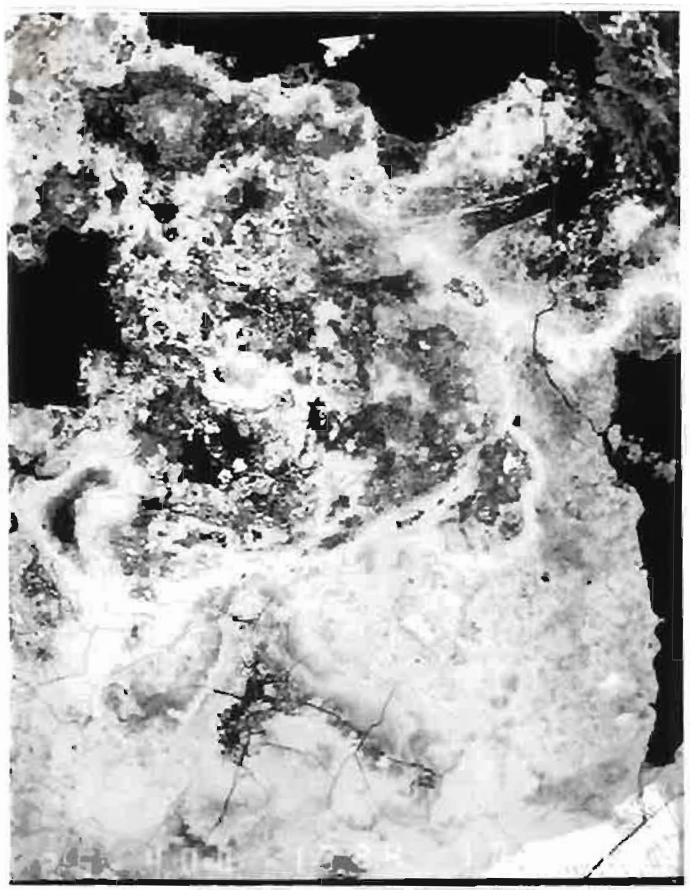
Sample no.
106 continue

X-ray image
Ba

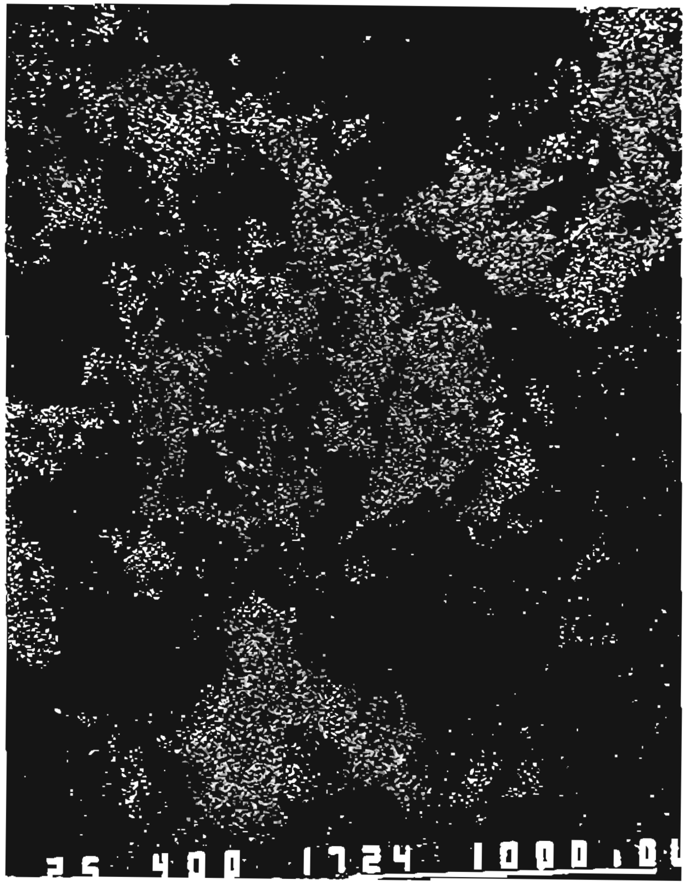


Sample no.	Map (1:50000)	UTM X	UTM Y
107A	1917 IV	595.80	6793.80

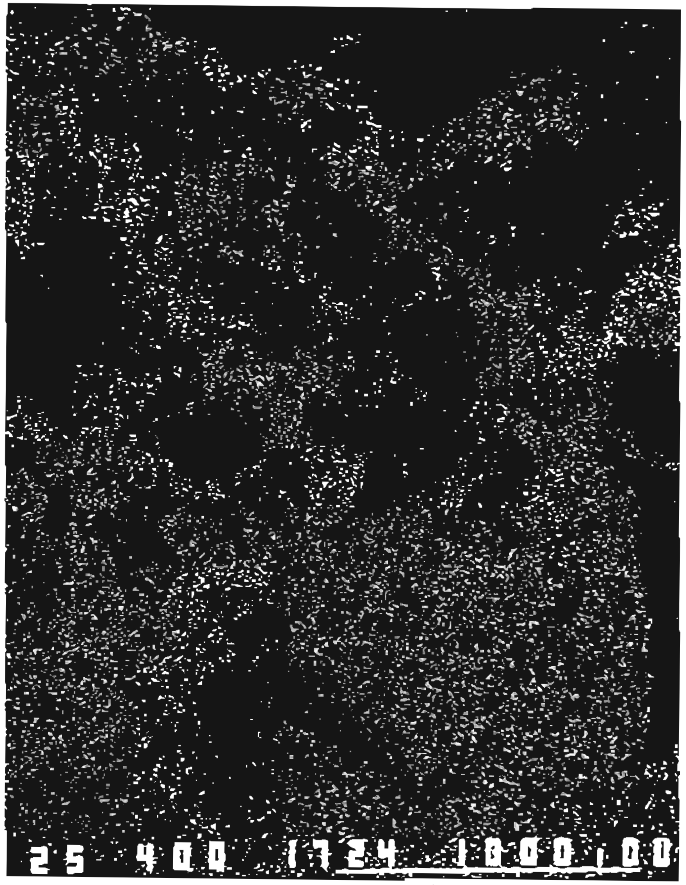
BSI



X-ray image
Mn



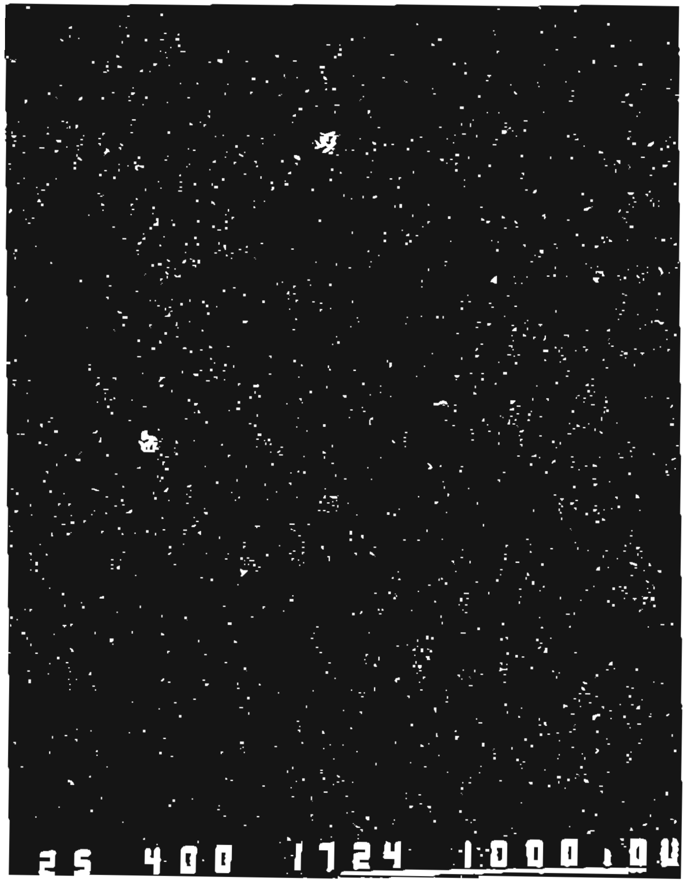
X-ray image
Fe



NGU-report 86.169. FIGURE 2.12

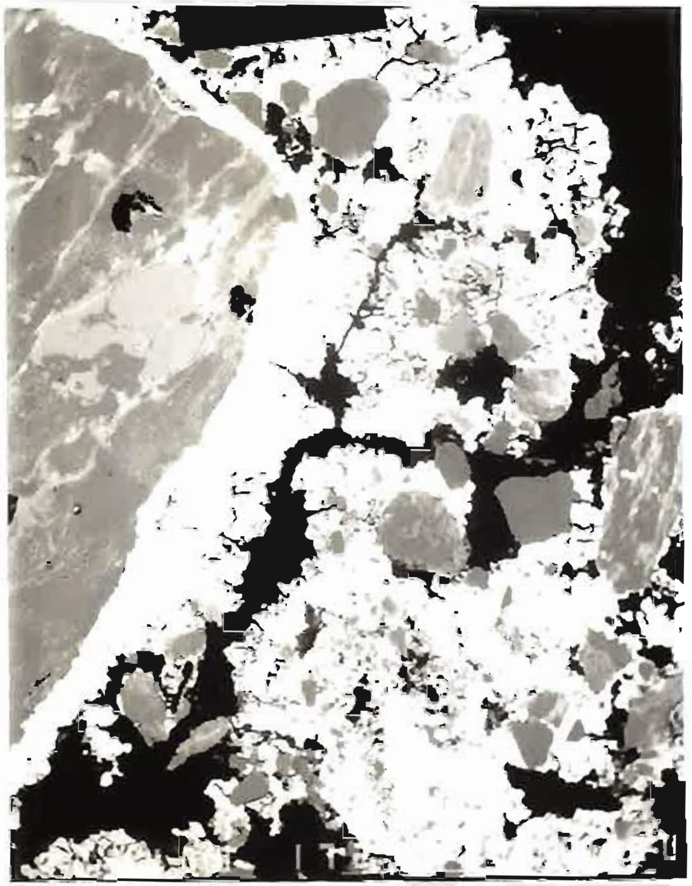
Sample no.
107A continue

X-ray image
Si

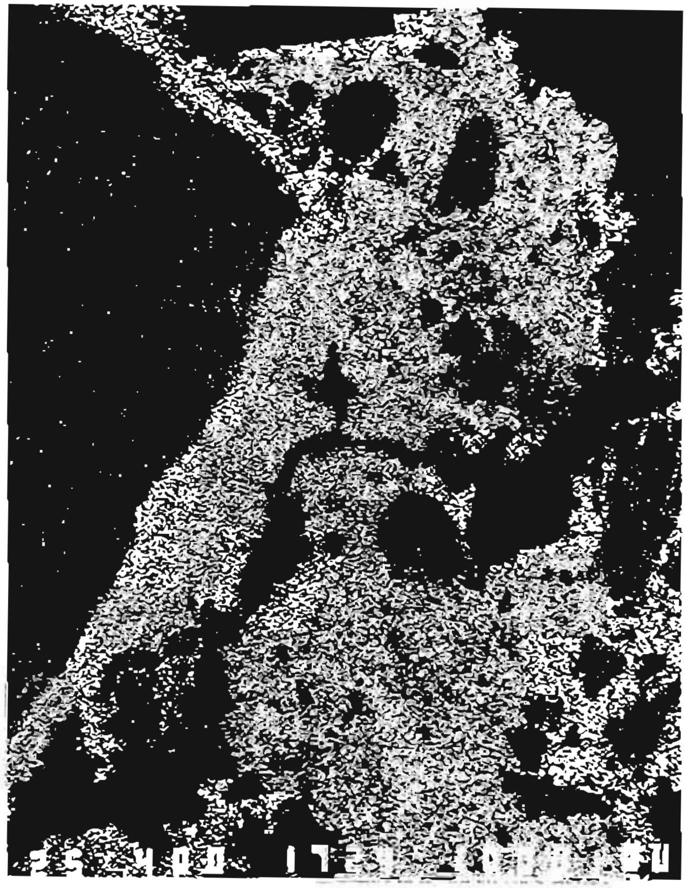


Sample no.
107B

BSI

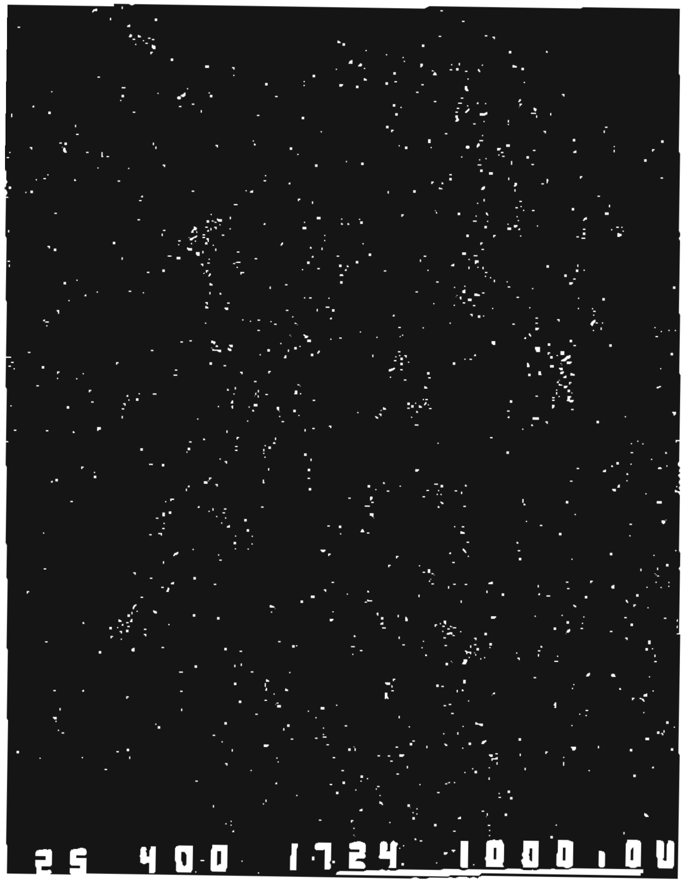


X-ray image
Mn



Sample no.
107B continue

X-ray image
Fe

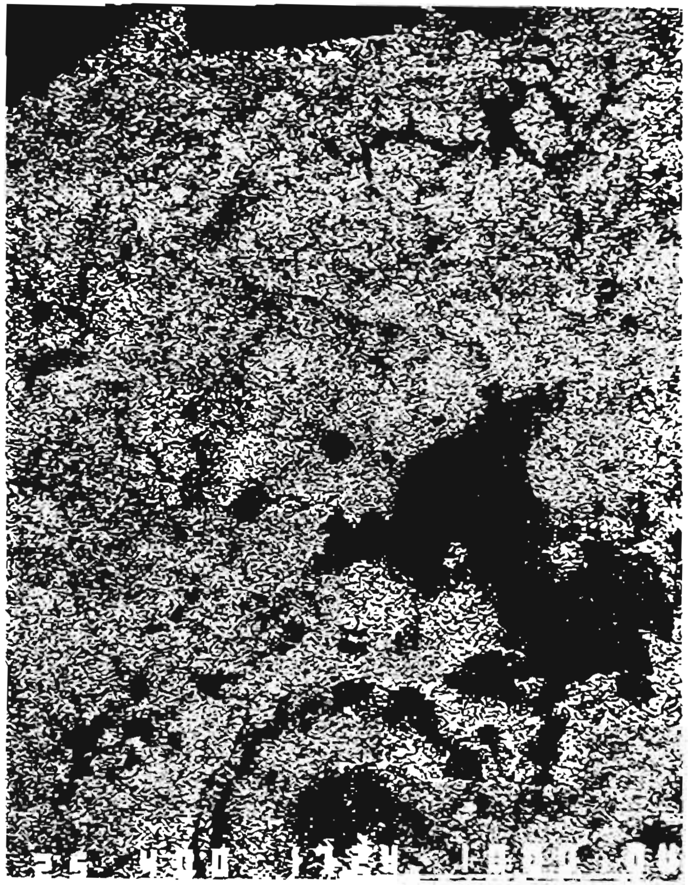


X-ray image
Si

Sample no.	Map (1:50000)	UTM X	UTM Y
108	1918 I	621.50	6863.00

BSI

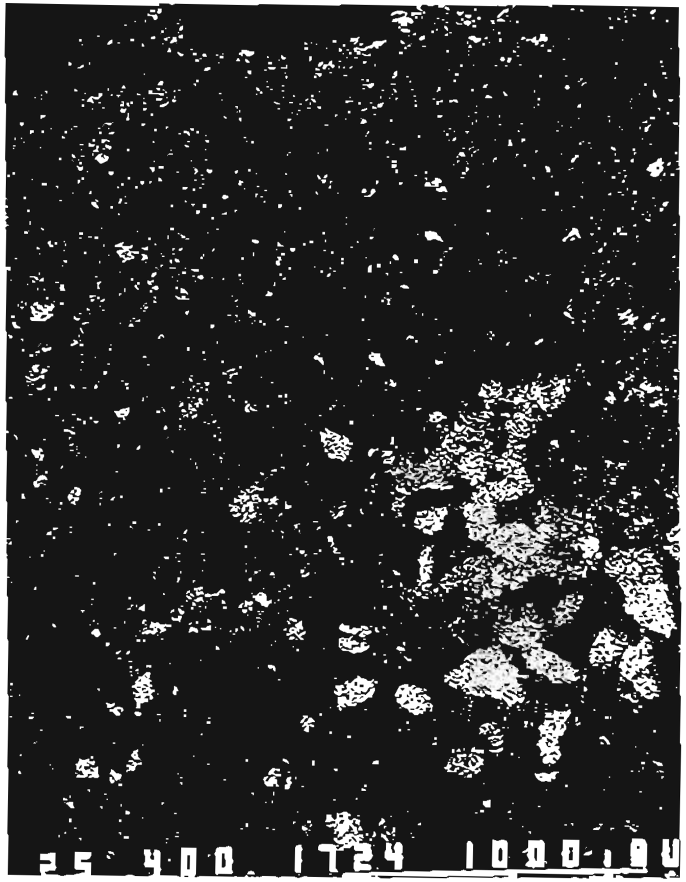
X-ray image
Mn



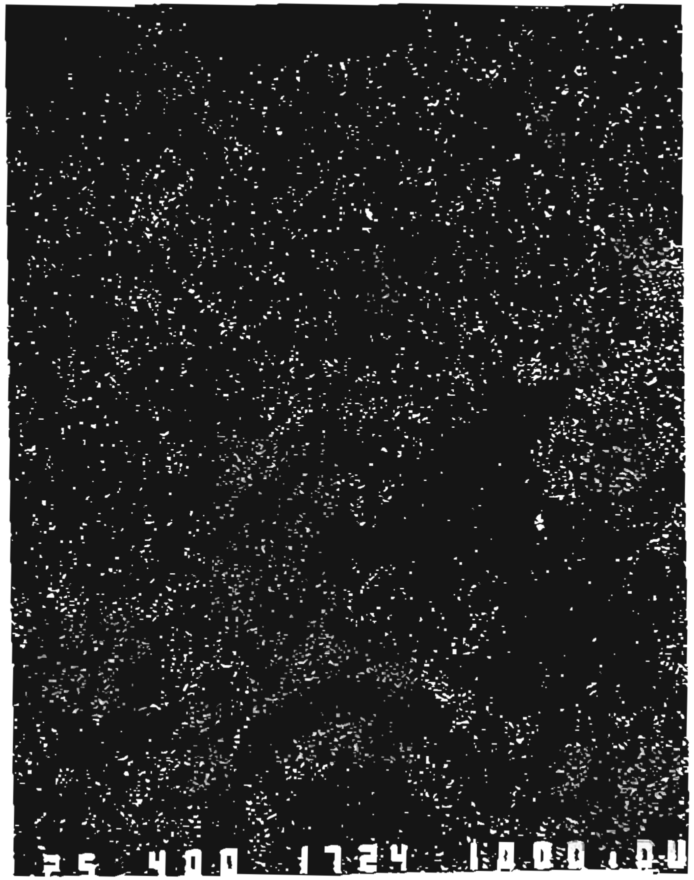
X-ray image
Fe

Sample no.
108 continue

X-ray image
Si

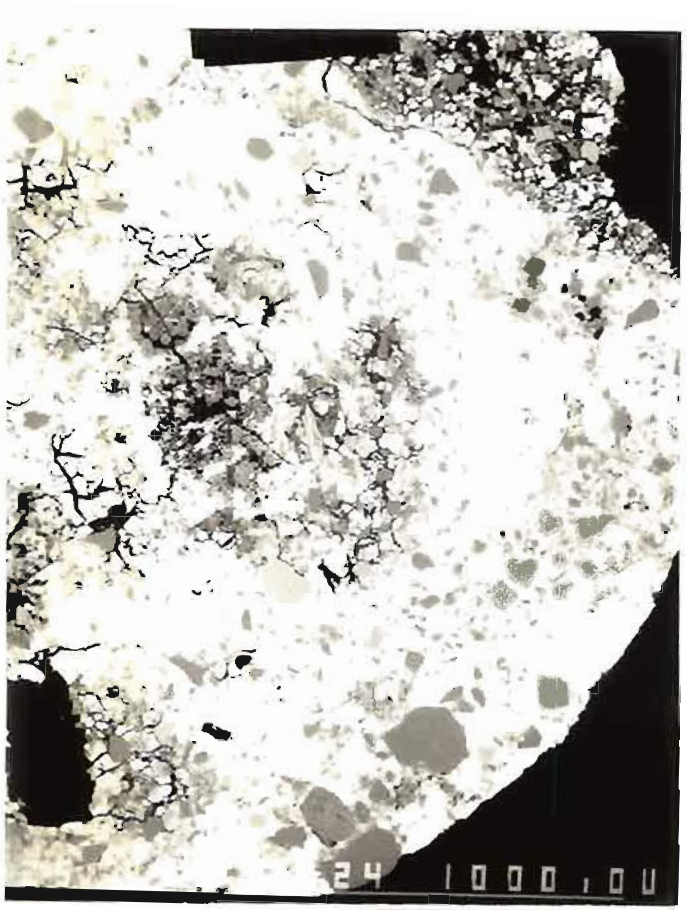


X-ray image
Ba

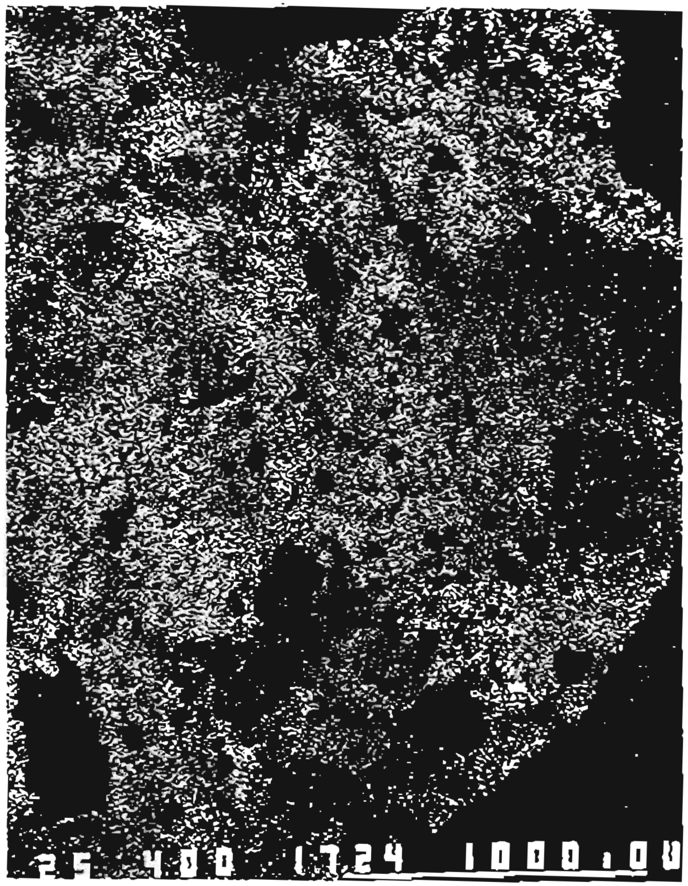


Sample no.	Map (1:50000)	UTM X	UTM Y
109	2016 I	347.40	6752.80

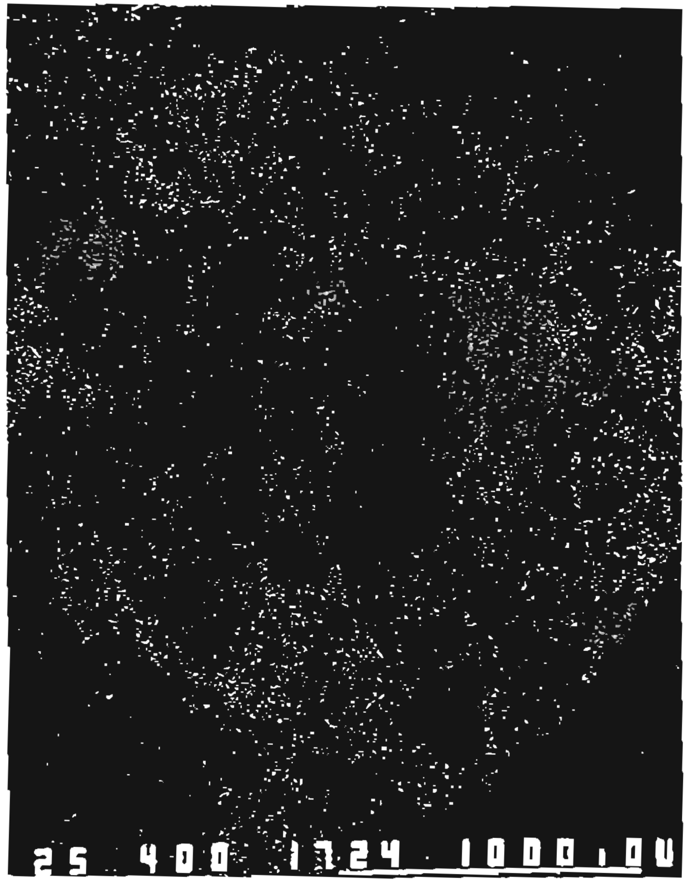
BSI



X-ray image
Mn



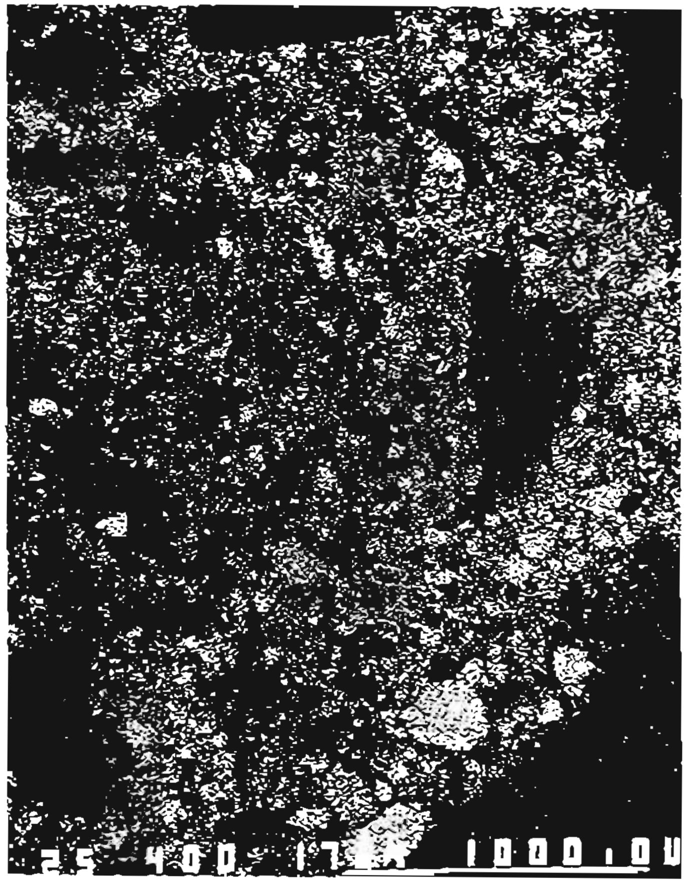
X-ray image
Fe



NGU-report 86.169. FIGURE 2.14

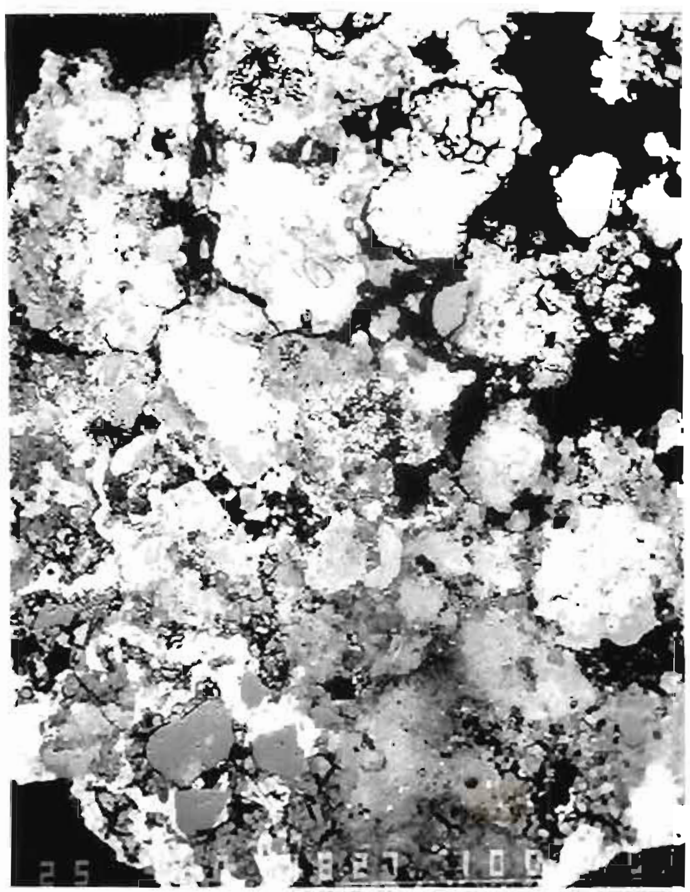
Sample no.
109 continue

X-ray image
Si

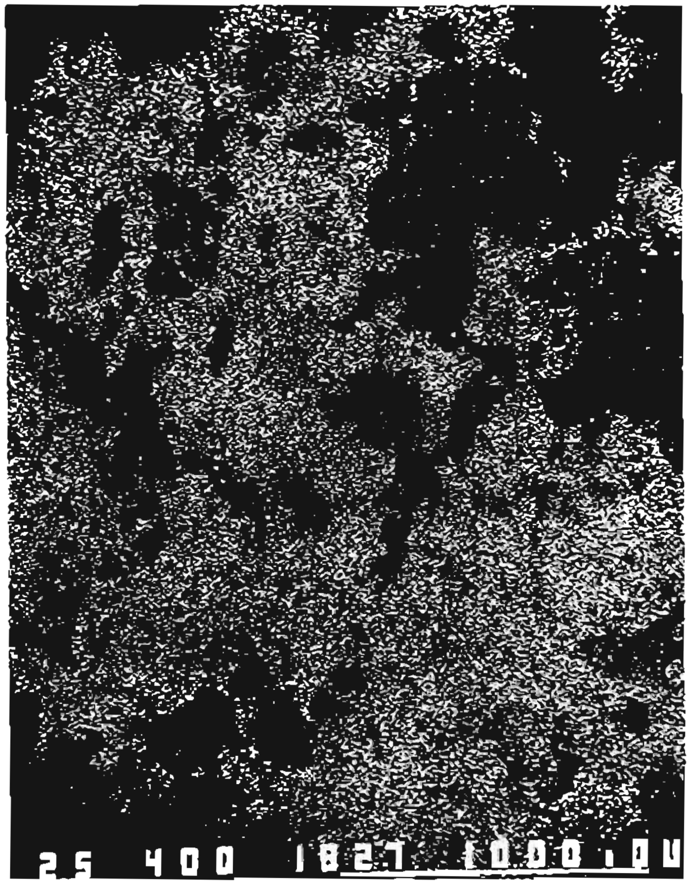


Sample no.	Map (1:50000)	UTM X	UTM Y
110	1619 II	612.10	6896.70

BSI



X-ray image
Mn



X-ray image
Fe

NGU-report 86.169. FIGURE 2.15

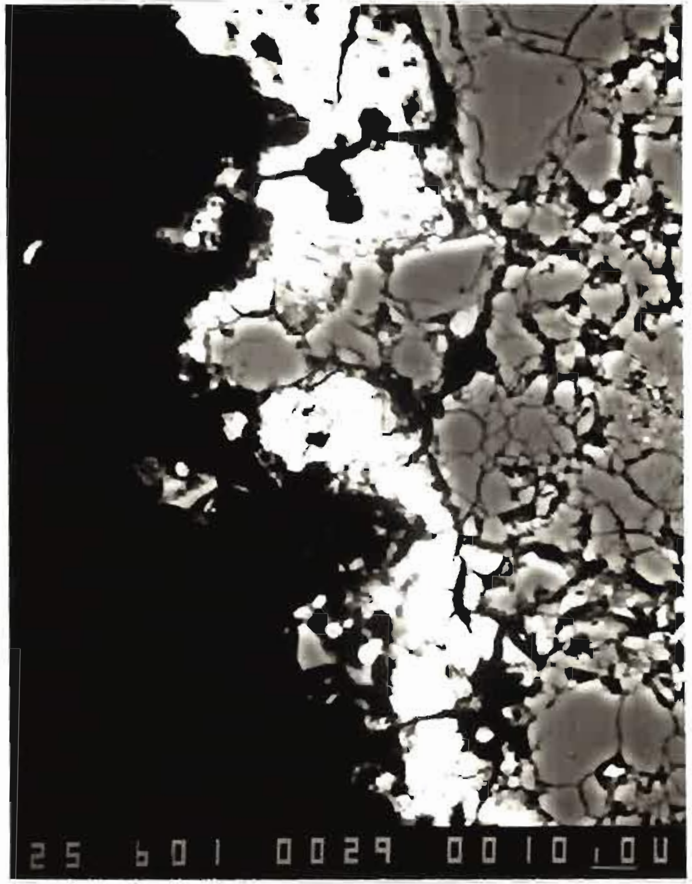
Sample no.
110 continue

X-ray image
Si

Sample no.	Map (1:50000)	UTM X	UTM Y
111B	2018 I	343.10	6864.10

BSI

BSI
Coating

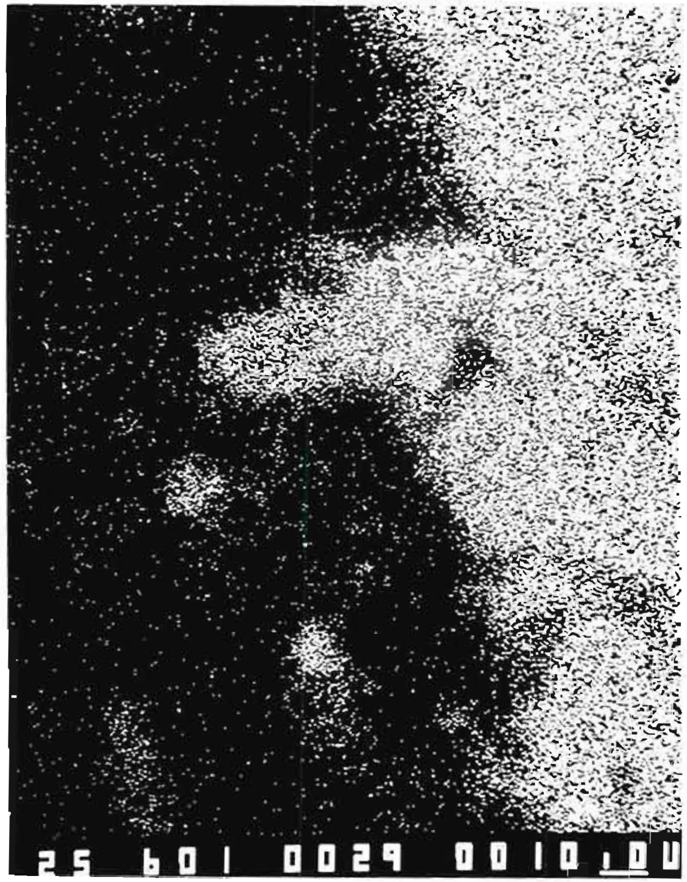


X-ray image
Mn

NGU-report 86.169. FIGURE 2.16

Sample no.
111B continue

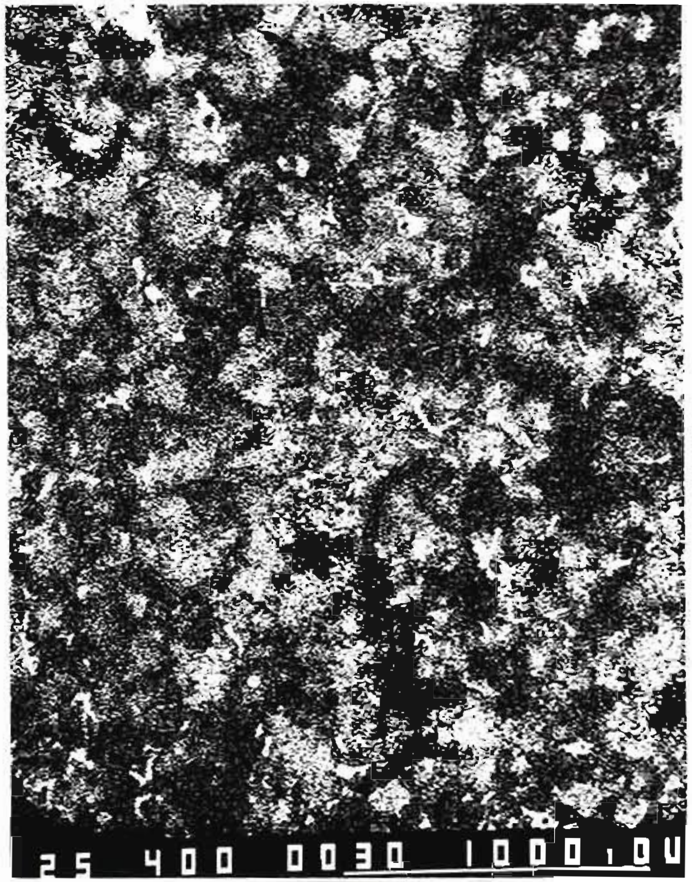
X-ray image
Si



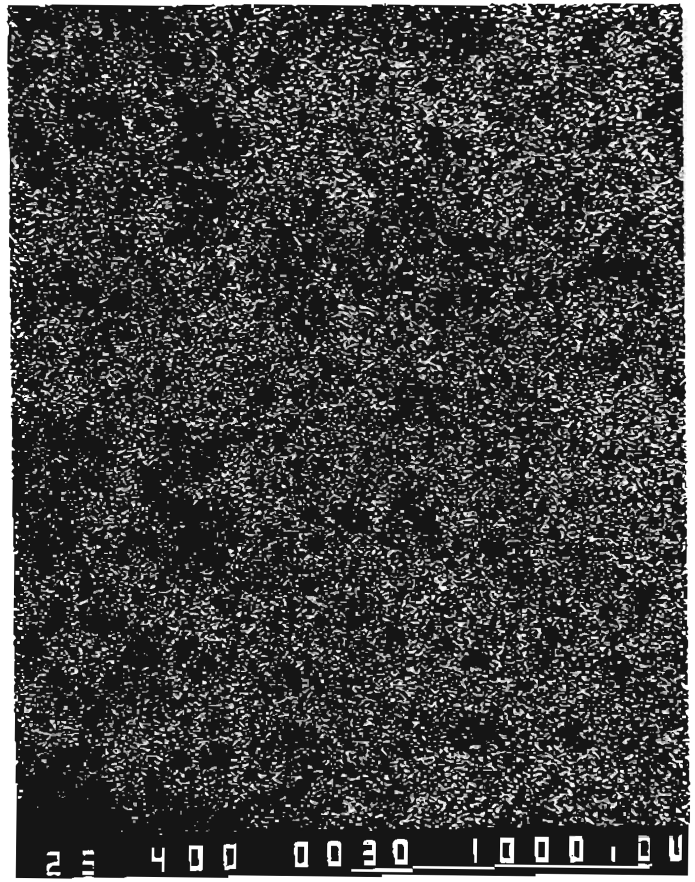
Sample no.	Map (1:50000)	UTM X	UTM Y
112	2015 IV	649.20	6693.70

BSI

X-ray image
Mn

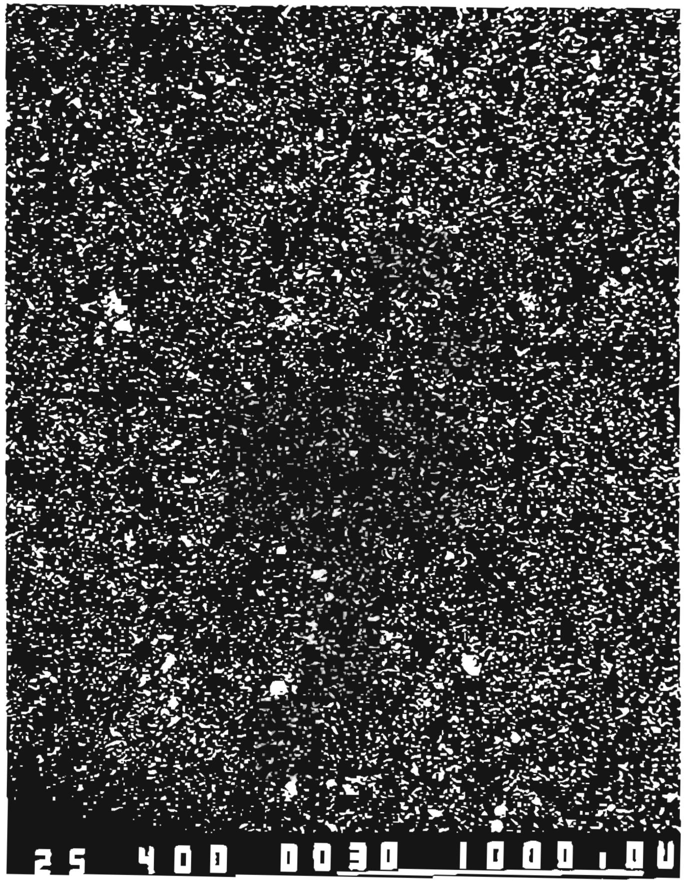


X-ray image
Fe



Sample no.
112 continue

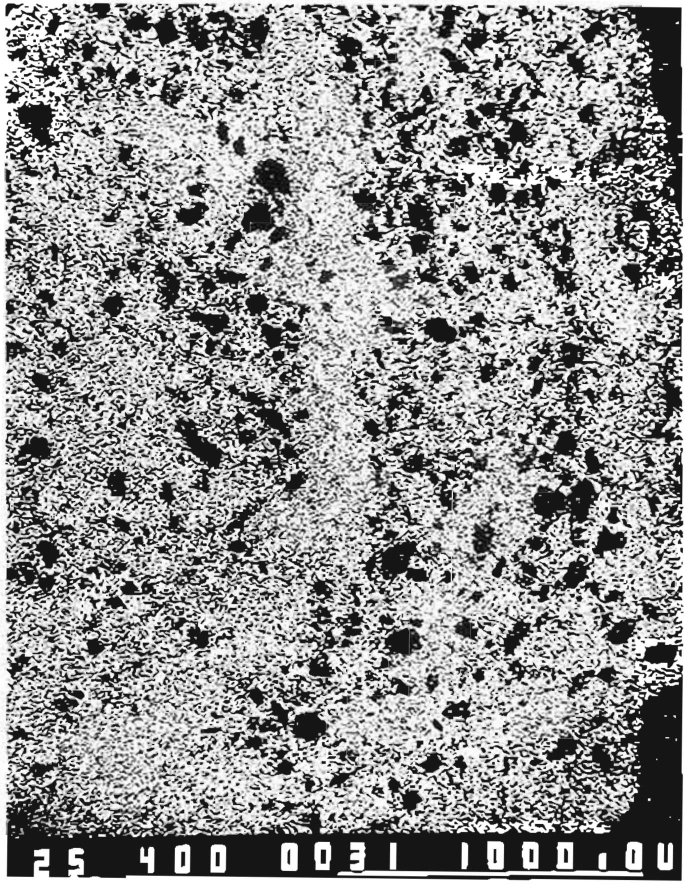
X-ray image
Si



Sample no.	Map (1:50000)	UTM X	UTM Y
113A	2015 IV	649.20	6693.70

BSI
Fe-rich sample

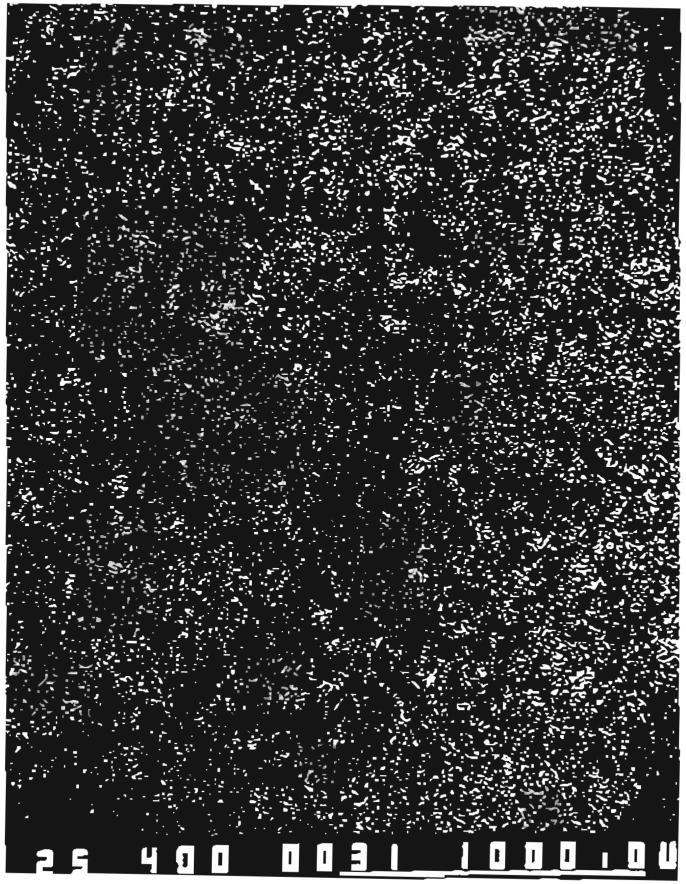
X-ray image
Fe



X-ray image
Si

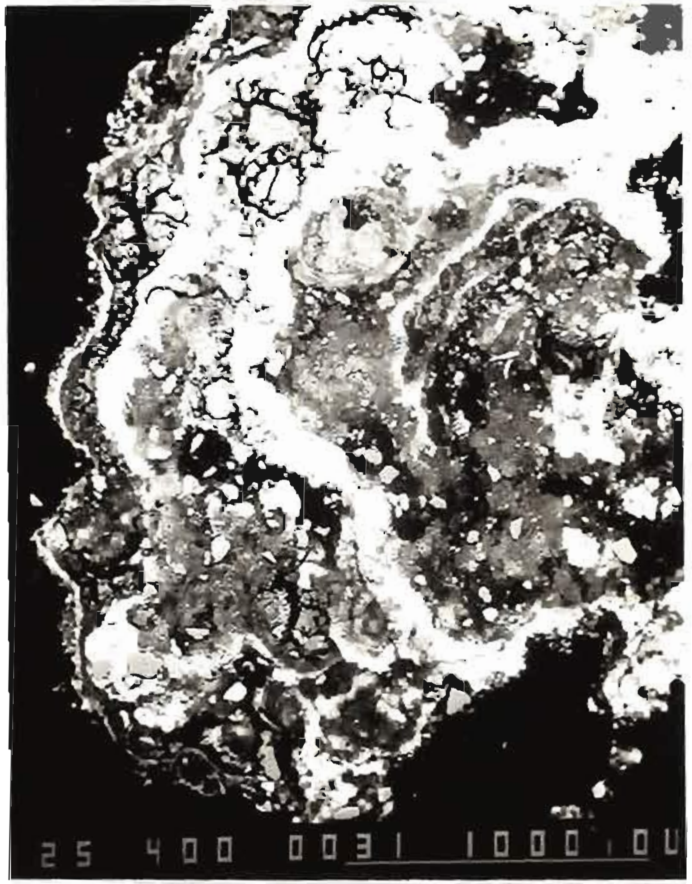
Sample no.
113A continue

X-ray image
Al

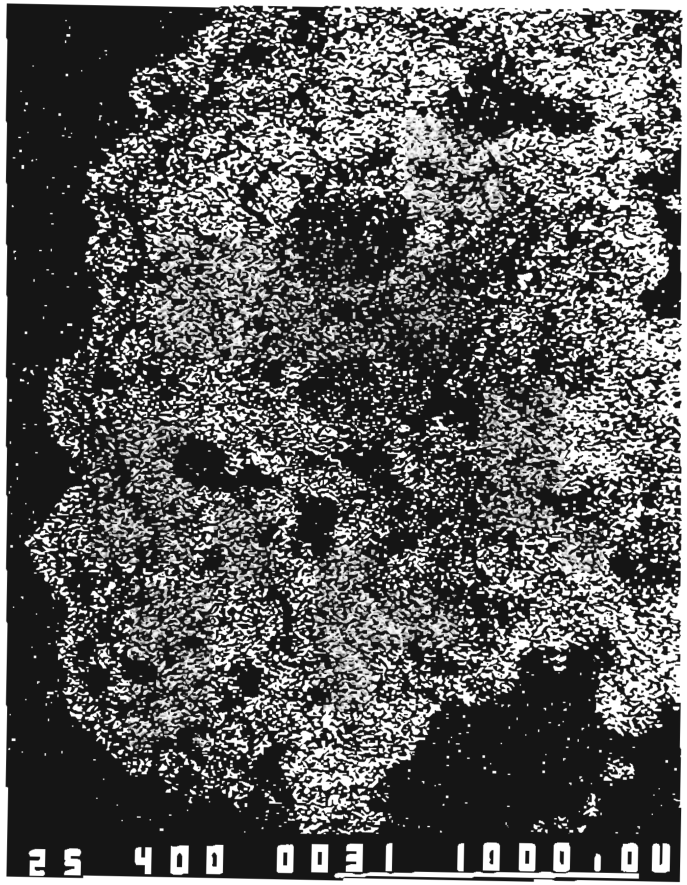


Sample no.
113B

BSI
Mn-rich sample



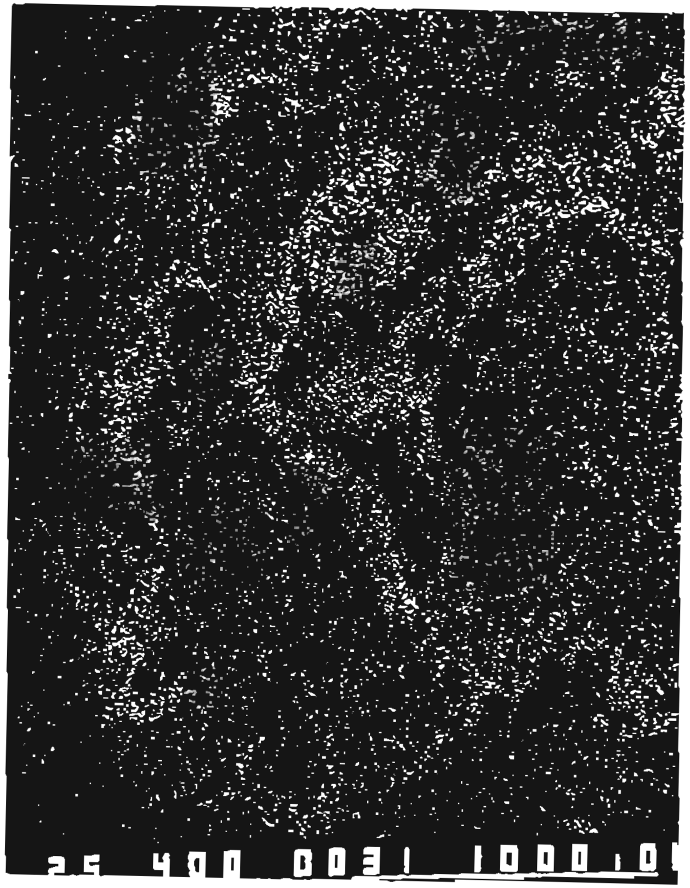
X-ray image
Mn



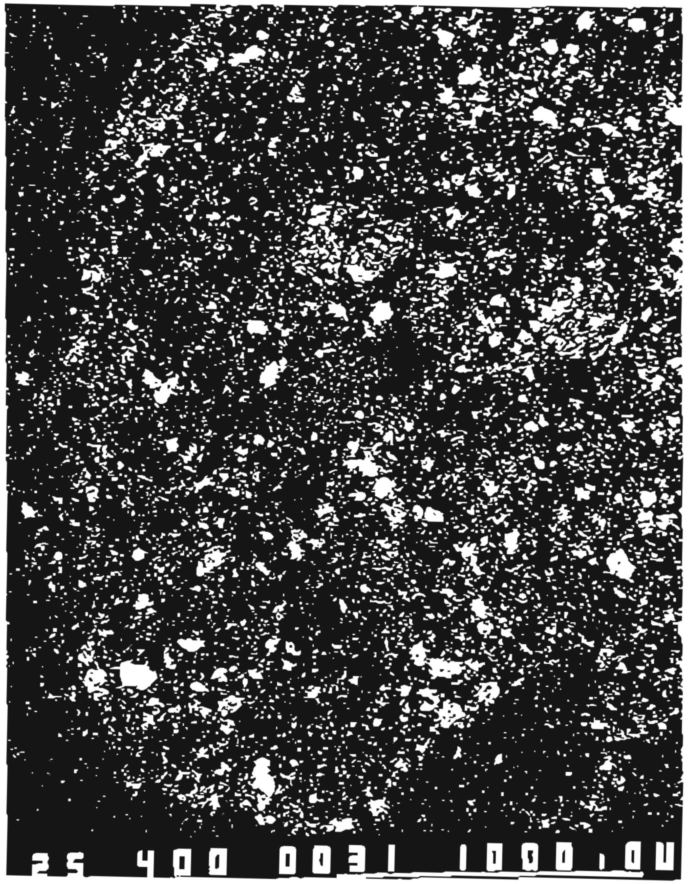
NGU-report 86.169. FIGURE 2.18

Sample no.
113B continue

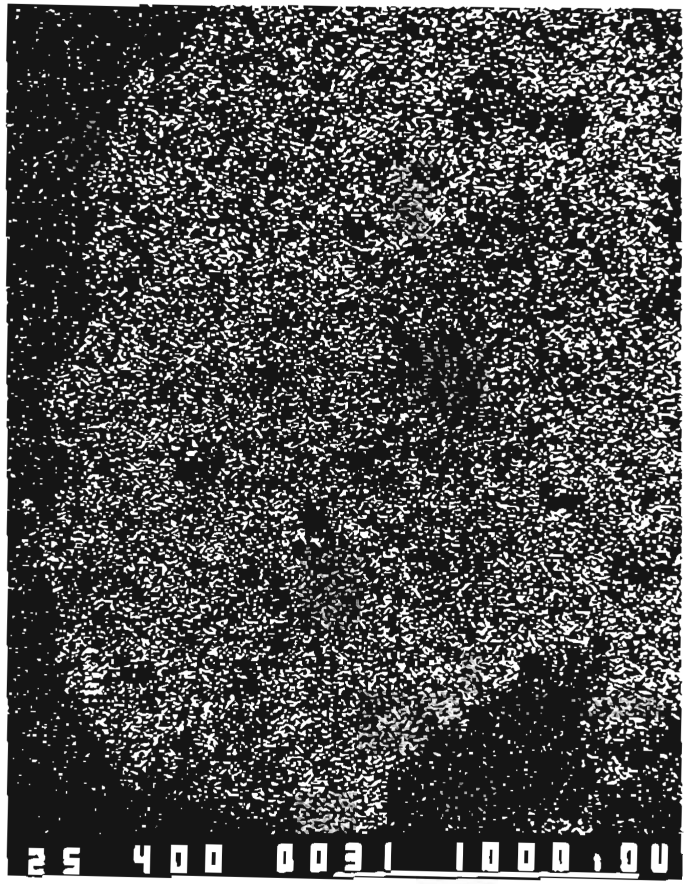
X-ray image
Fe



X-ray image
Si



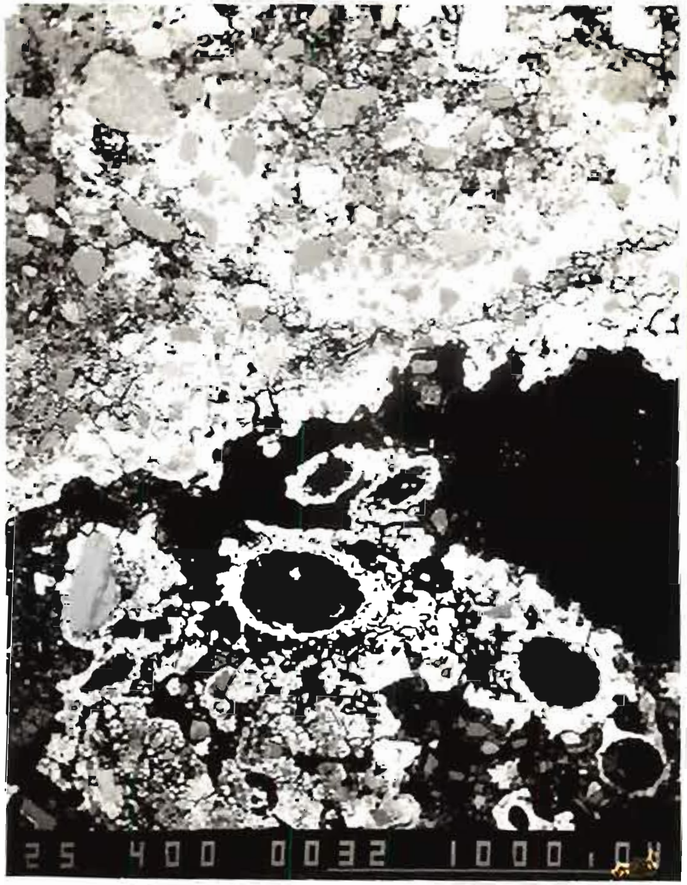
X-ray image
Al



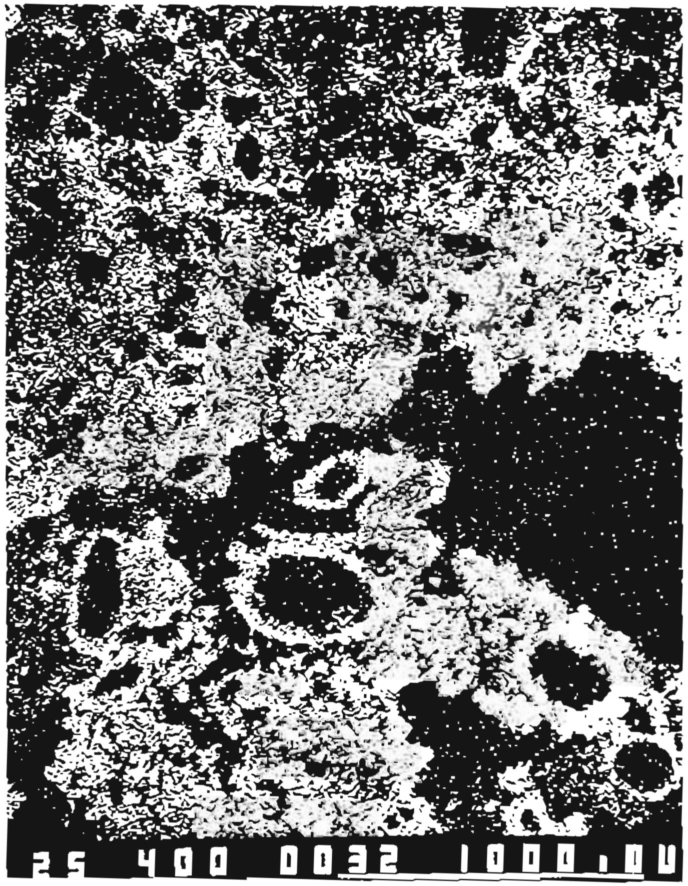
NGU-report 86.169. FIGURE 2.18

Sample no.	Map (1:50000)	UTM X	UTM Y
114	1616 III		

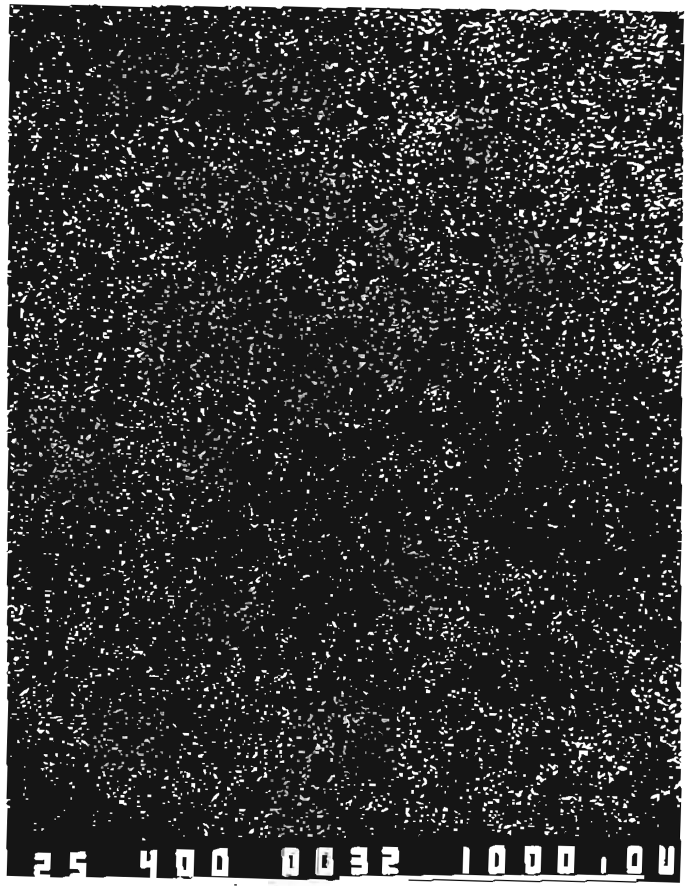
BSI



X-ray image
Mn

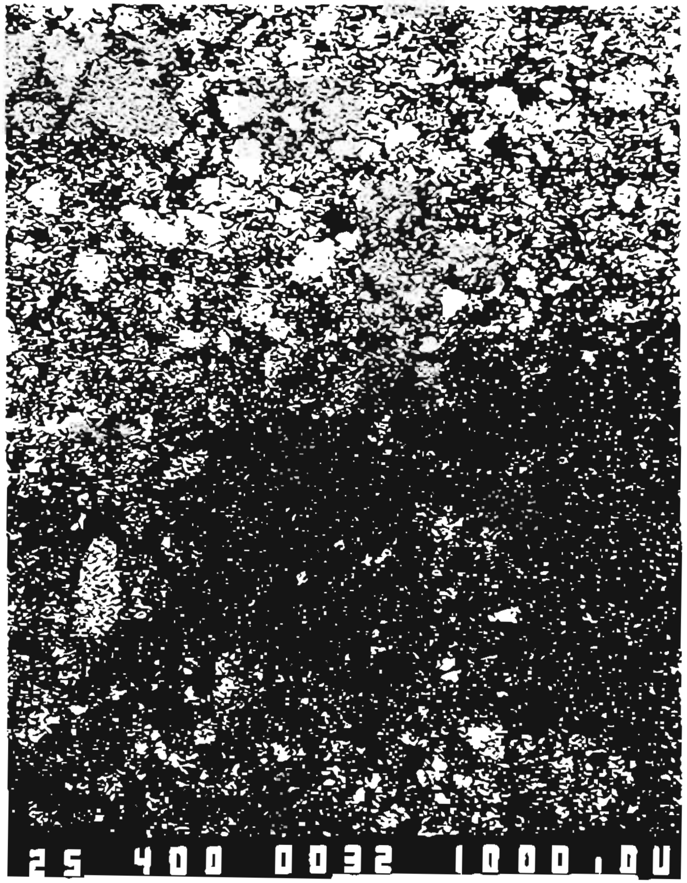


X-ray image
Fe

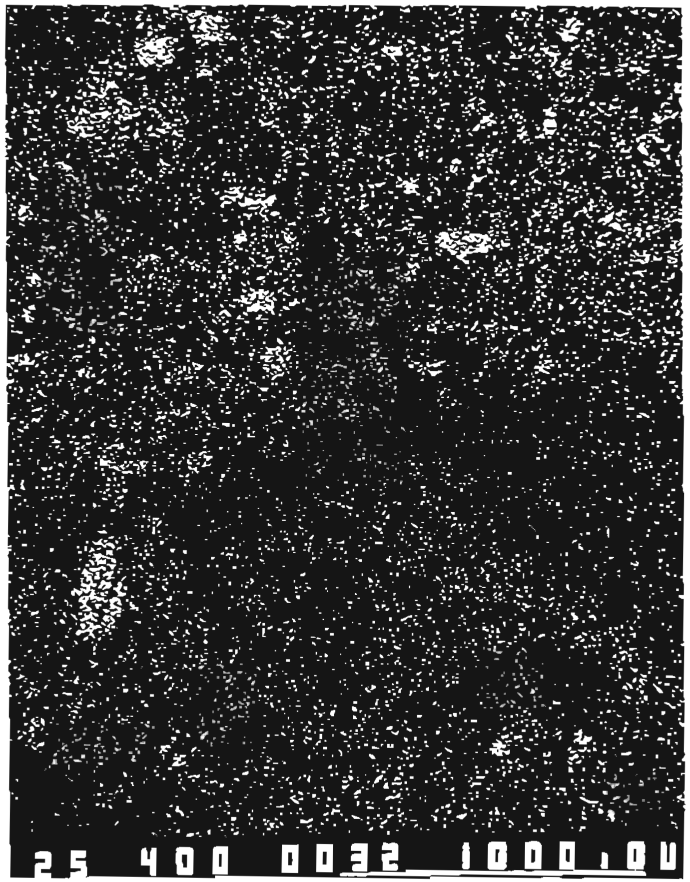


Sample no.
114 continue

X-ray image
Si

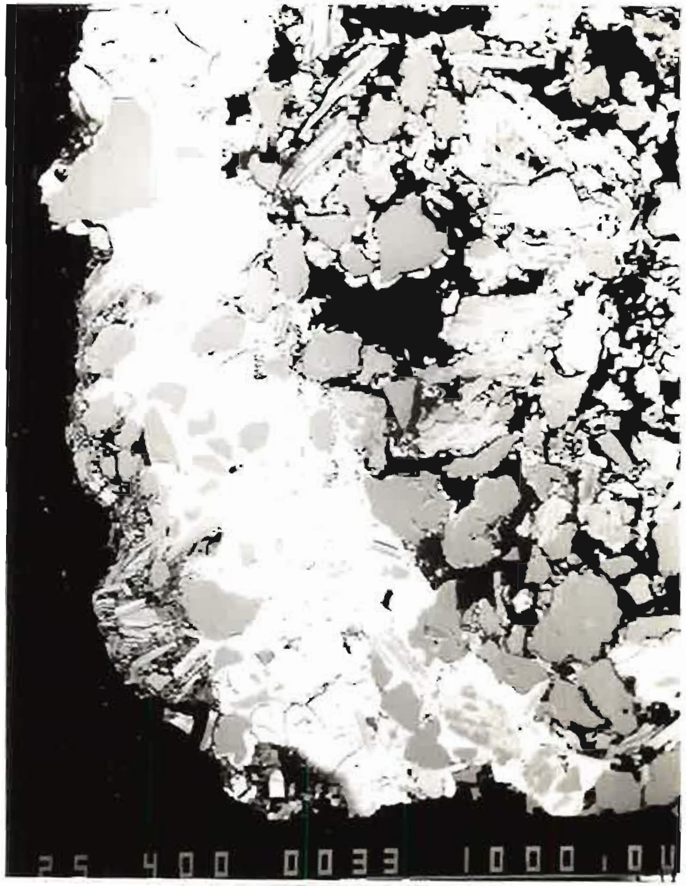


X-ray image
K

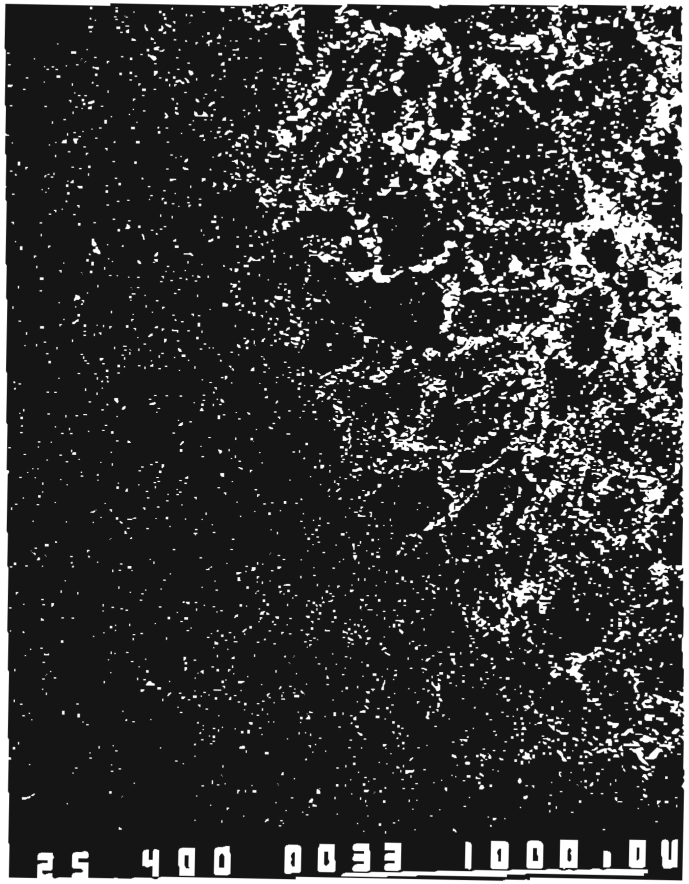


Sample no.	Map (1:50000)	UTM X	UTM Y
115	1619 IV	573.90	6917.80

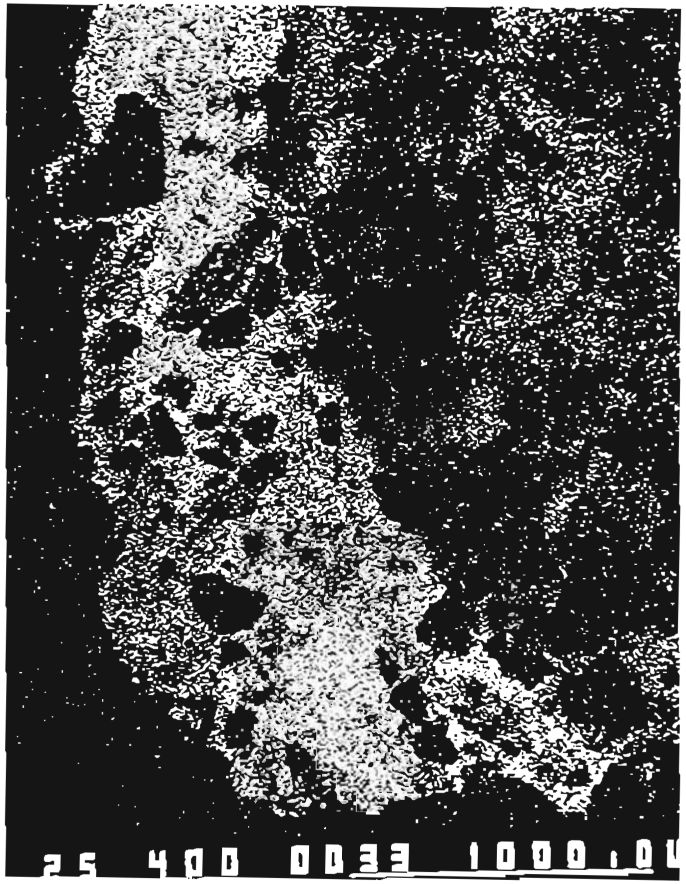
BSI



X-ray image
Mn

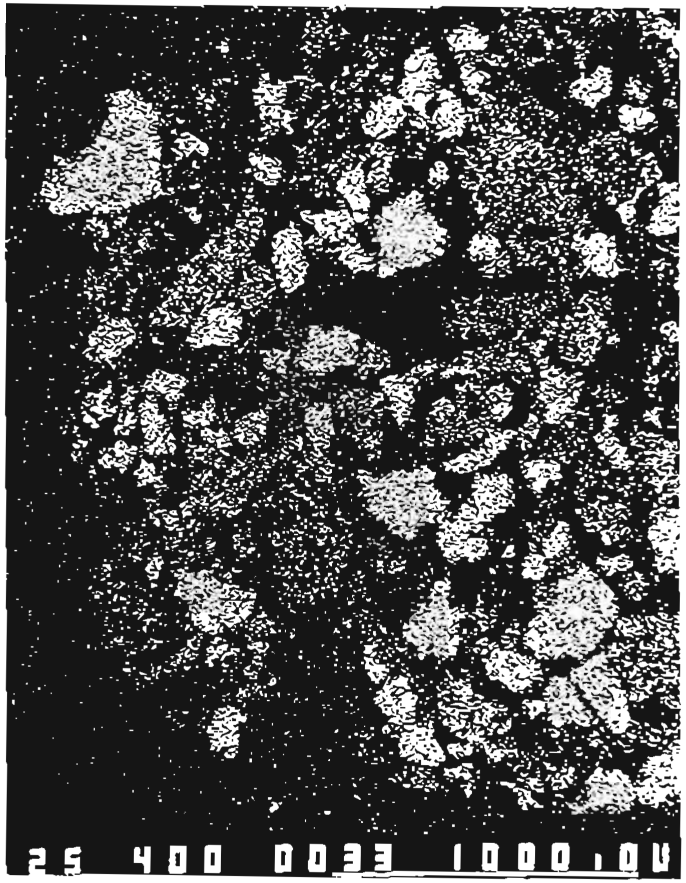


X-ray image
Fe



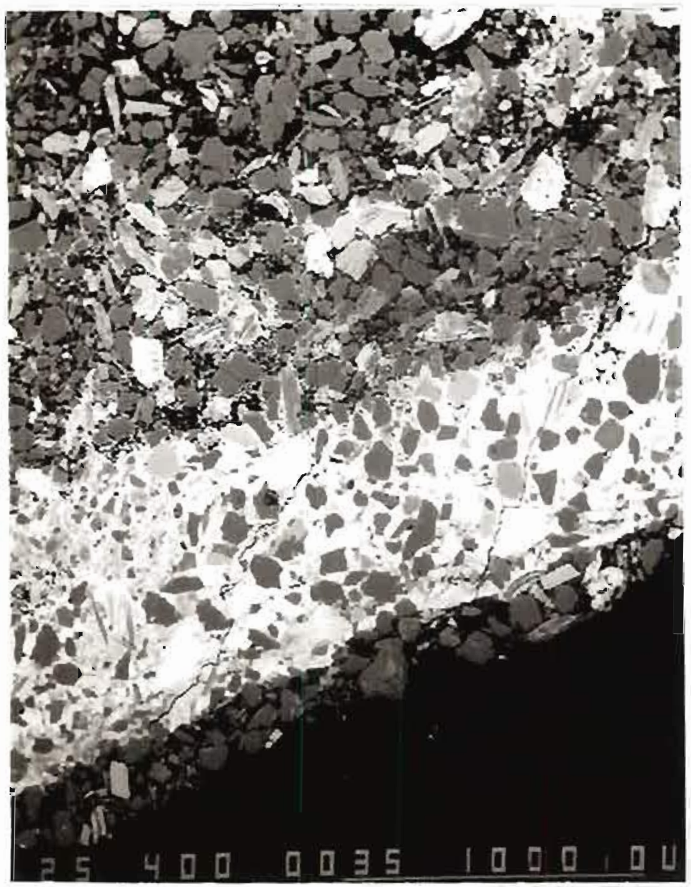
Sample no.
115 continue

X-ray image
Si

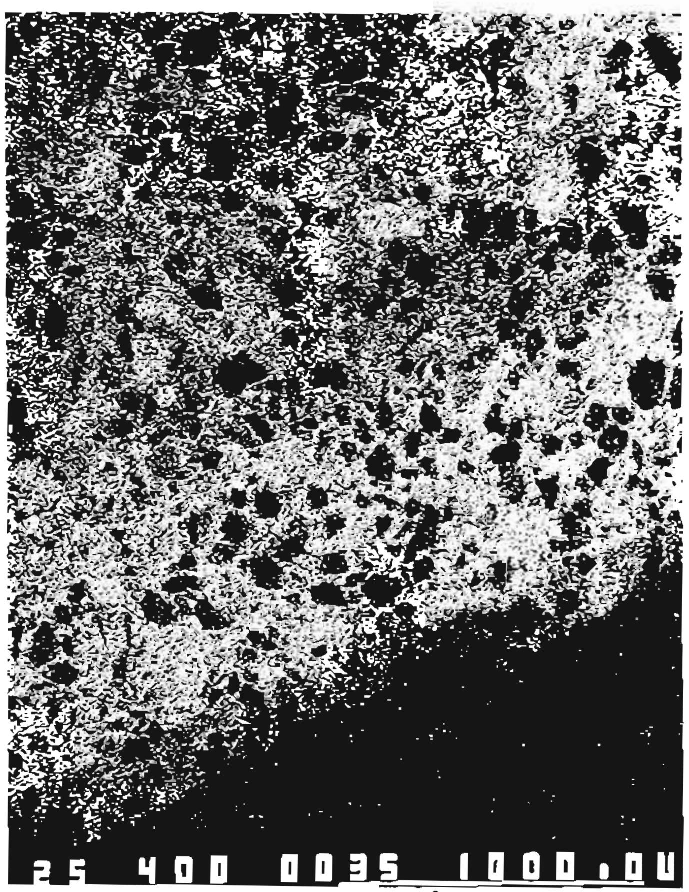


Sample no.	Map (1:50000)	UTM X	UTM Y
116	1519 I	560.50	6905.00

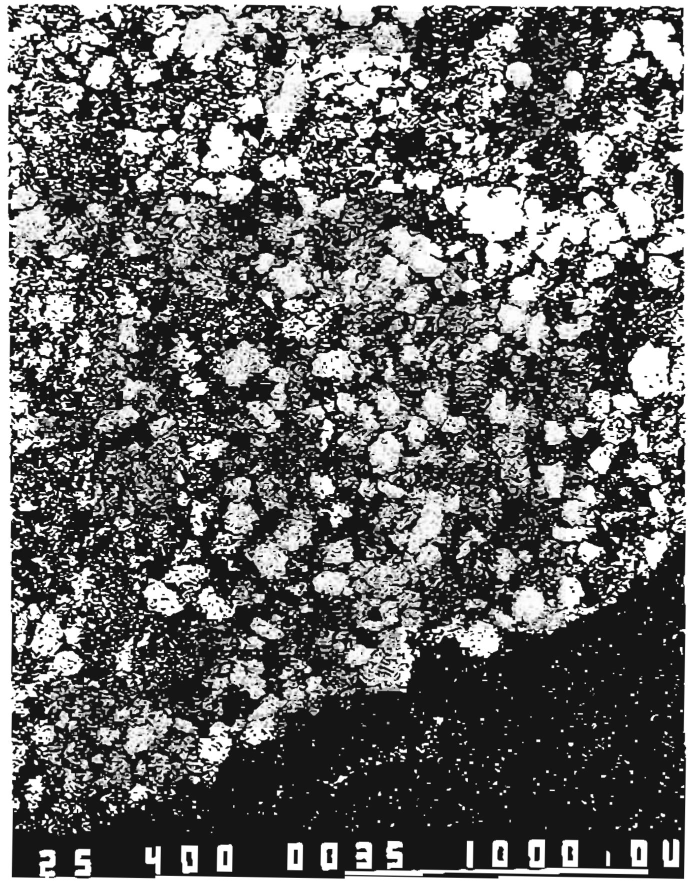
BSI



X-ray image
Fe



X-ray image
Si

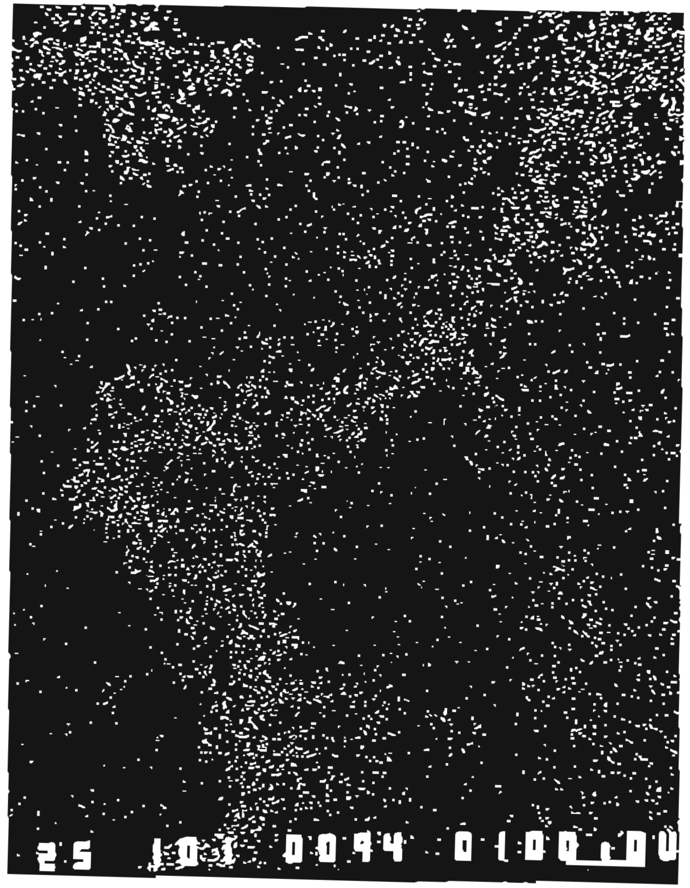


Sample no.	Map (1:50000)	UTM X	UTM Y
117	1815 II	591.20	6677.70

BSI

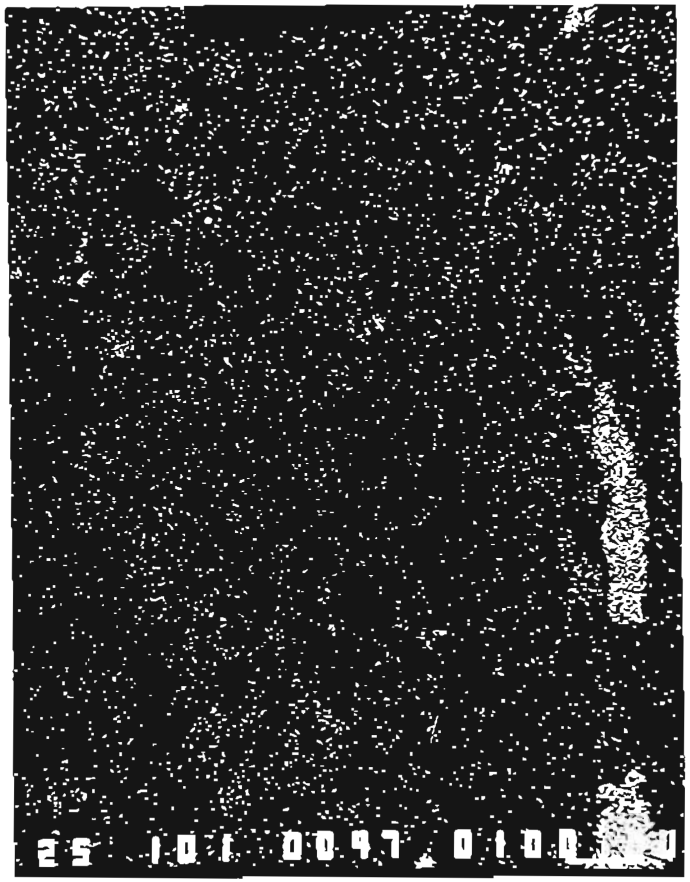
X-ray image
Mn

X-ray image
Fe

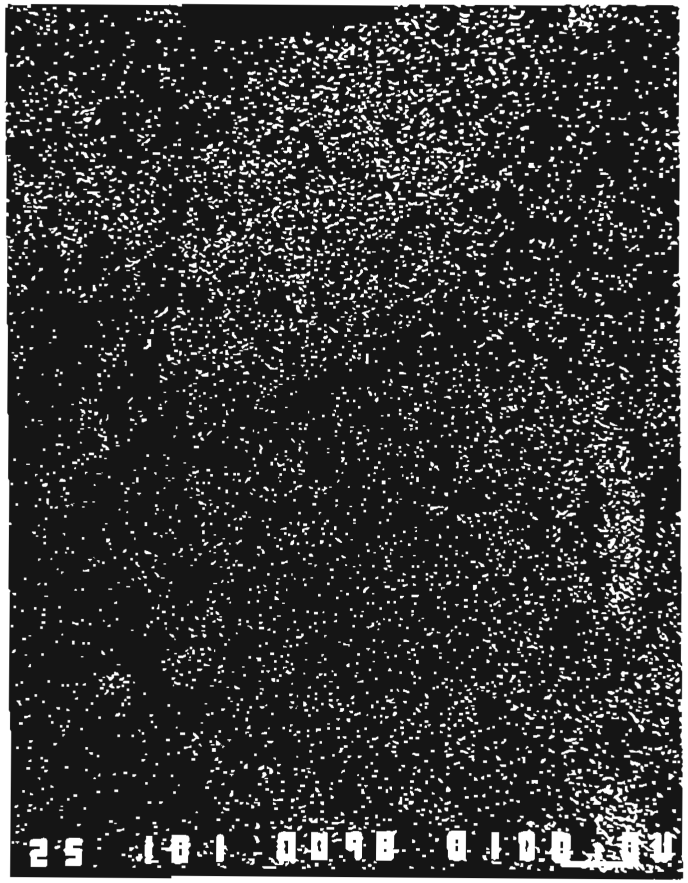


Sample no.
117 continue

X-ray image
Si



X-ray image
Al



X-ray image
Ba

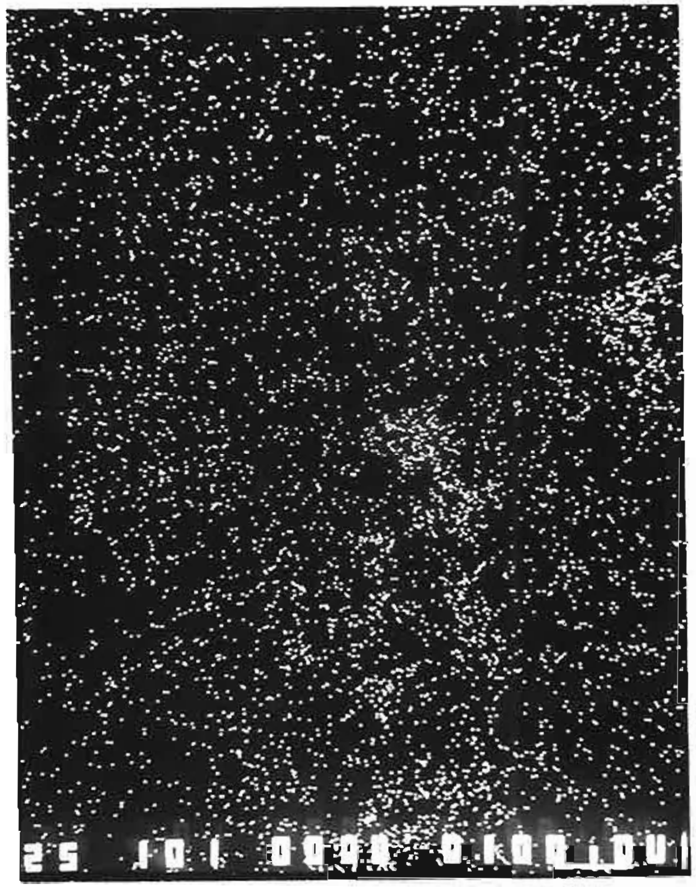


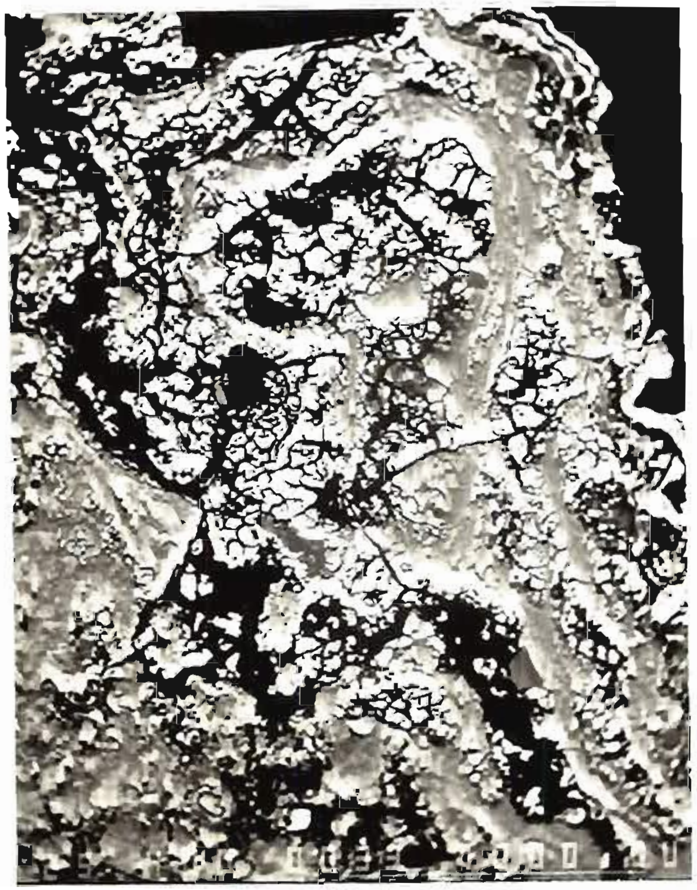
 FIGURE 2.22

Sample no.
117B

BSI
Feldspars and
oxidates

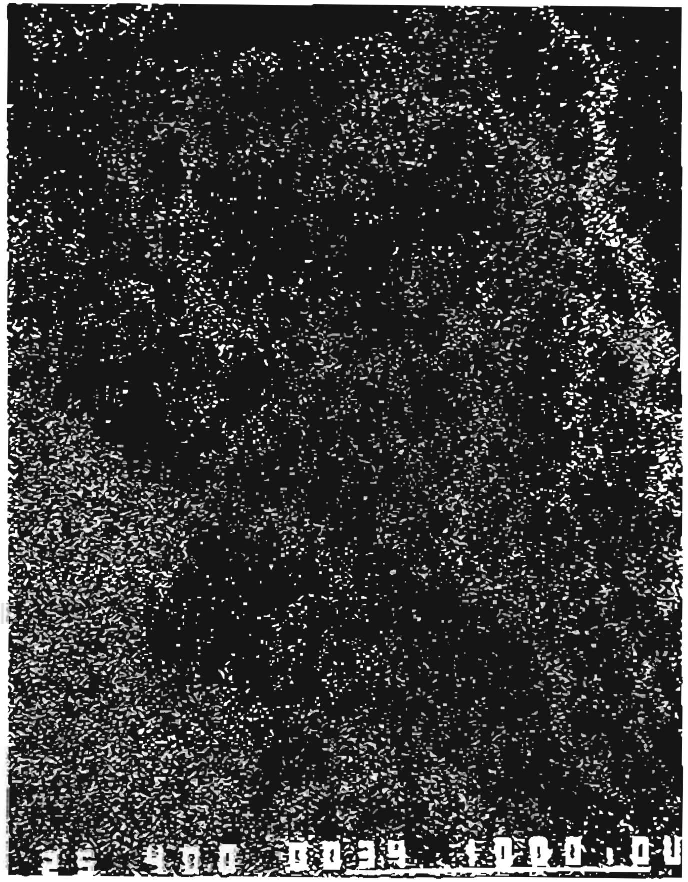
Sample no.	Map (1:50000)	UTM X	UTM Y
118	2017 II	660.50	6781.30

BSI



X-ray image
Mn

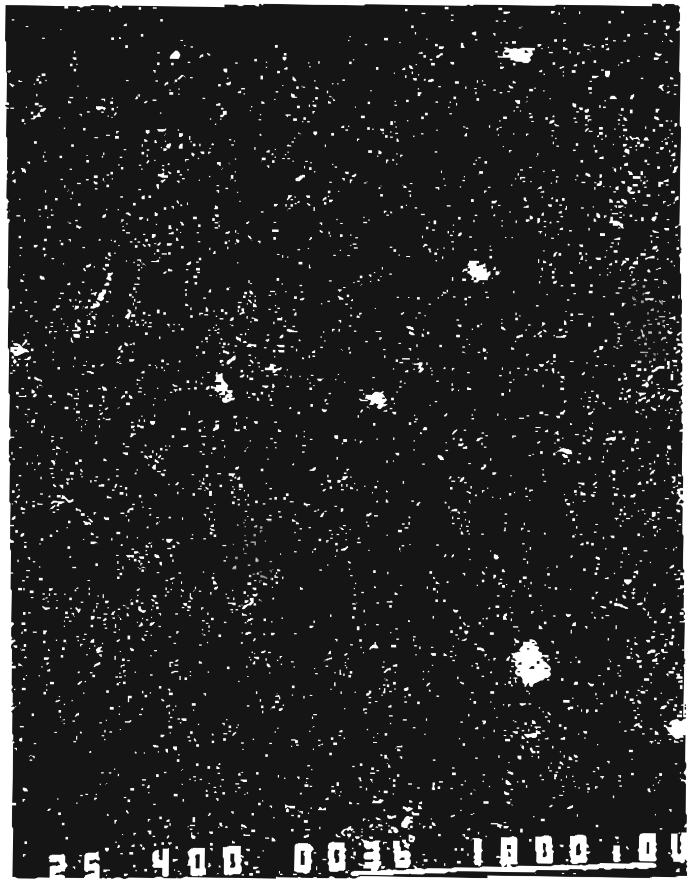
X-ray image
Fe



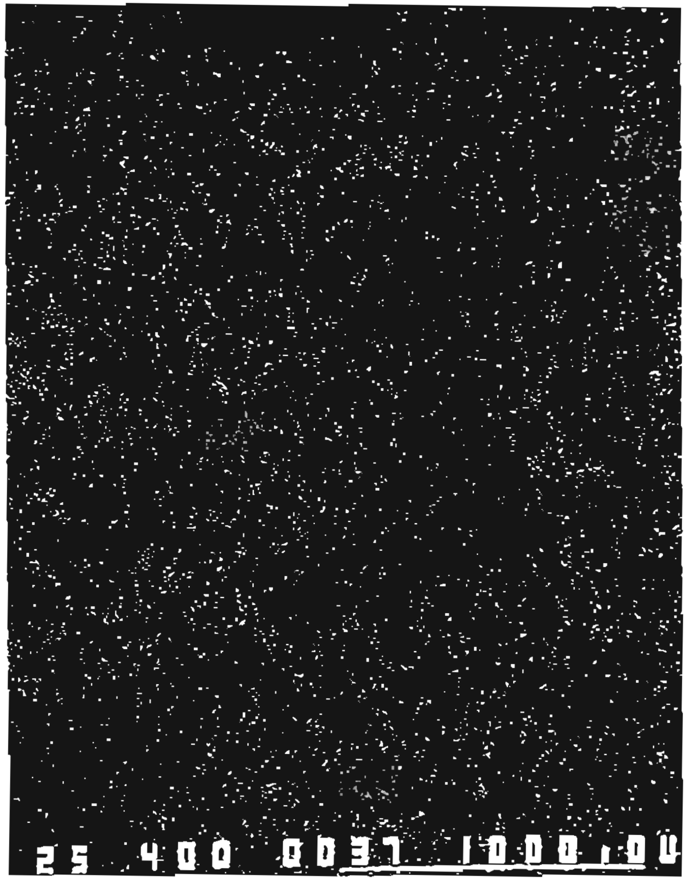
NGU-report 86.169. FIGURE 2.23

Sample no.
118 continue

X-ray image
Si



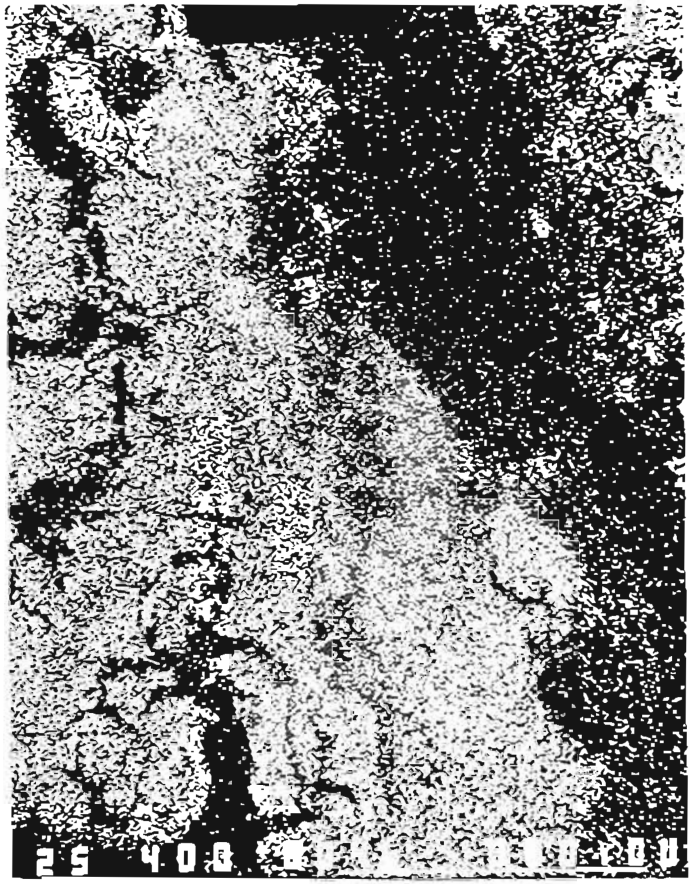
X-ray image
Al



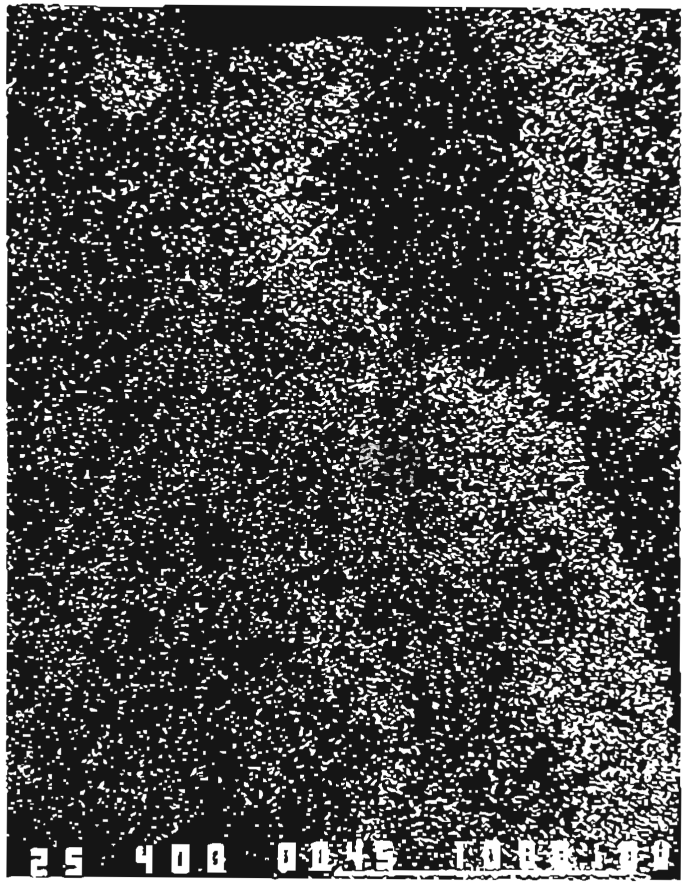
Sample no.	Map (1:50000)	UTM X	UTM Y
119	2017 II	346.00	6784.00

BSI

X-ray image
Mn

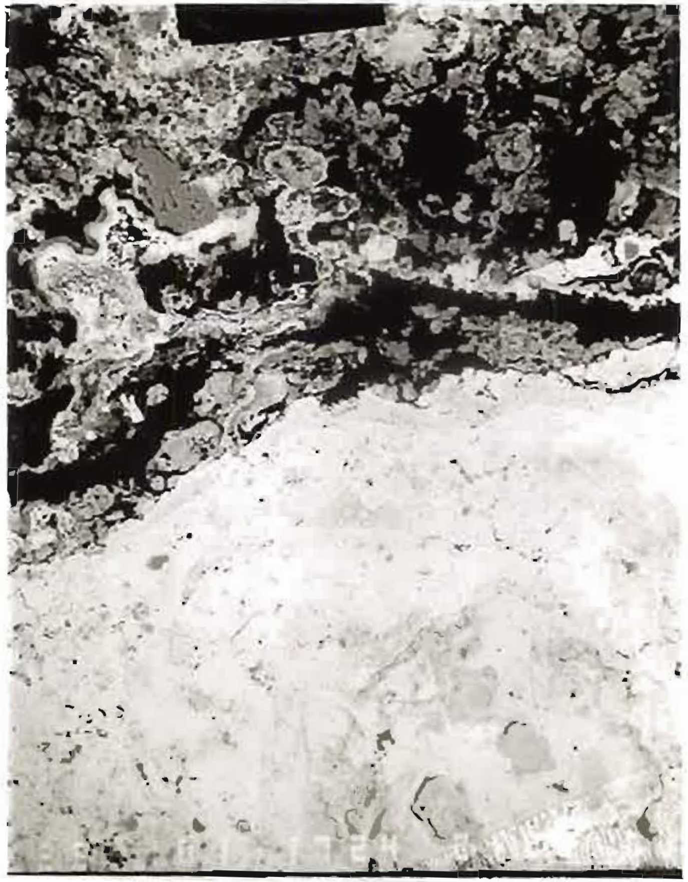


X-ray image
Fe

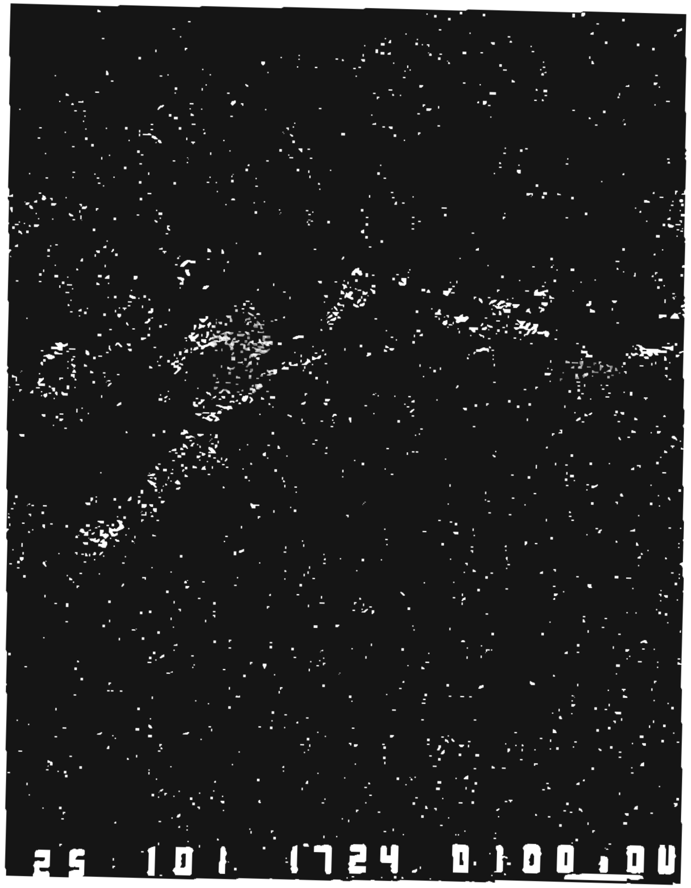


Sample no.	Map (1:50000)	UTM X	UTM Y
120A	2018 II	346.00	6837.80

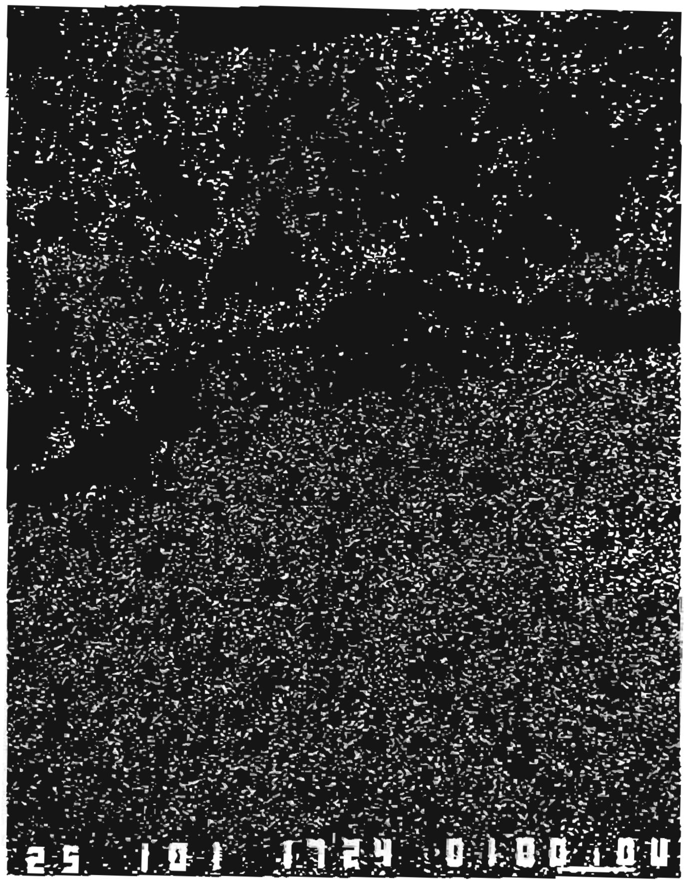
BSI



X-ray image
Mn



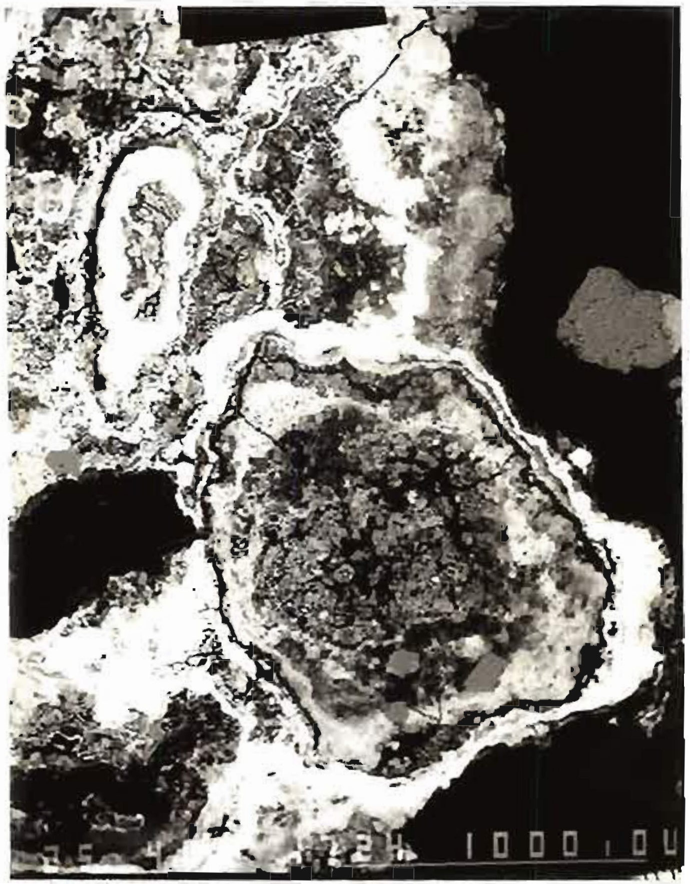
X-ray image
Fe



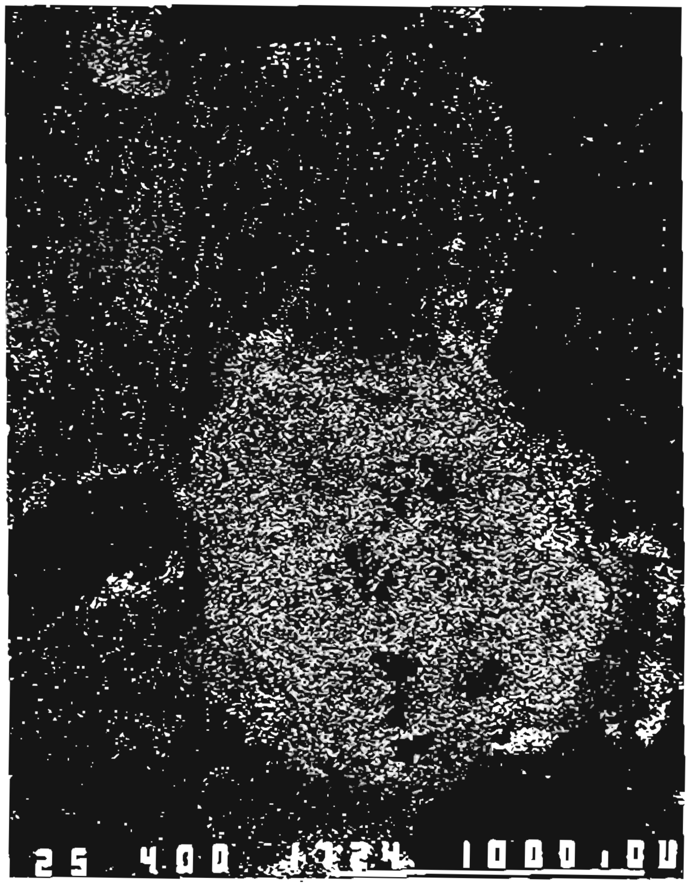
NGU-report 86.169. FIGURE 2.25

Sample no.
120B

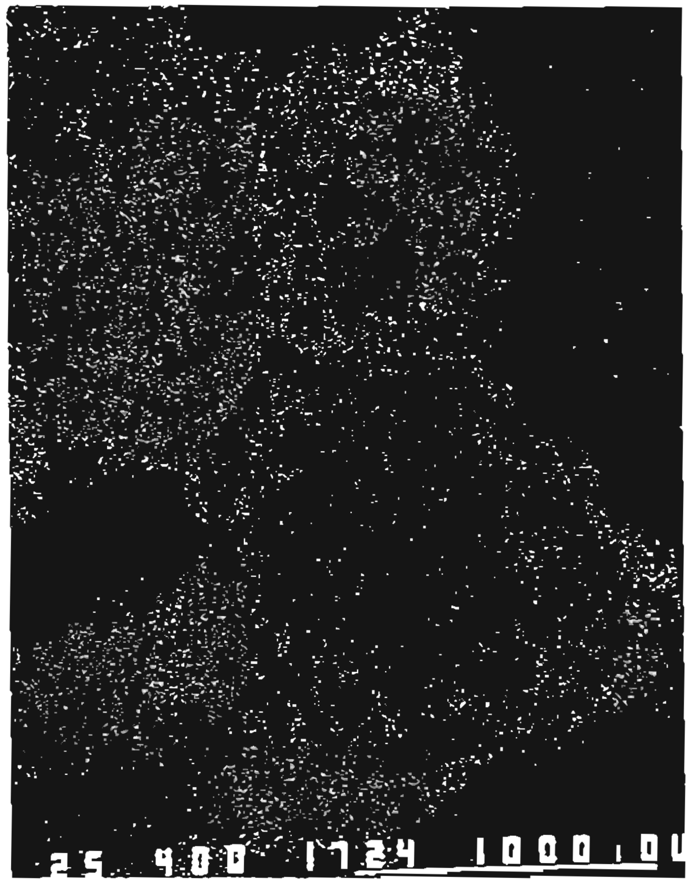
BSI



X-ray image
Mn

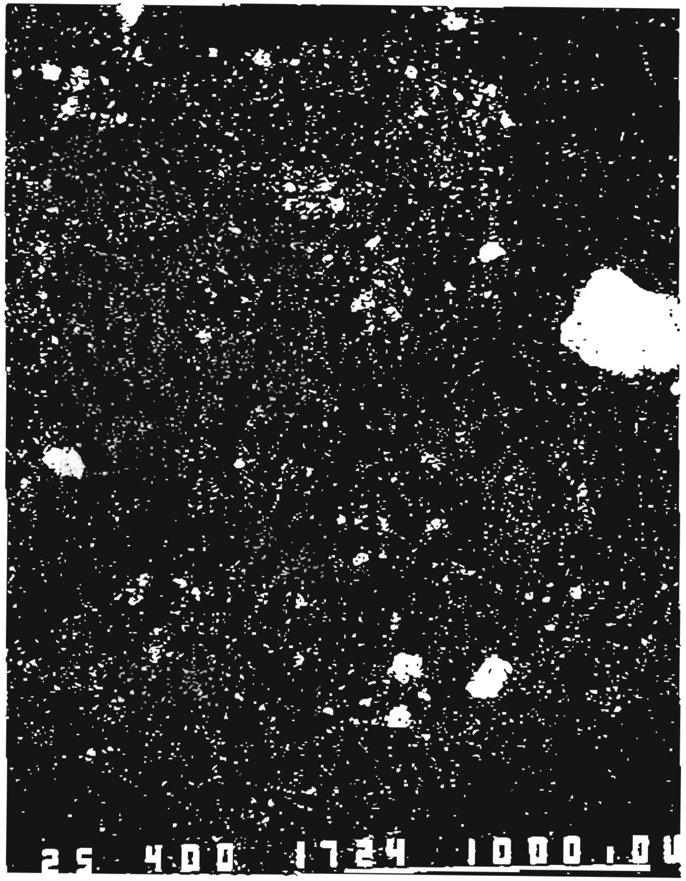


X-ray image
Fe



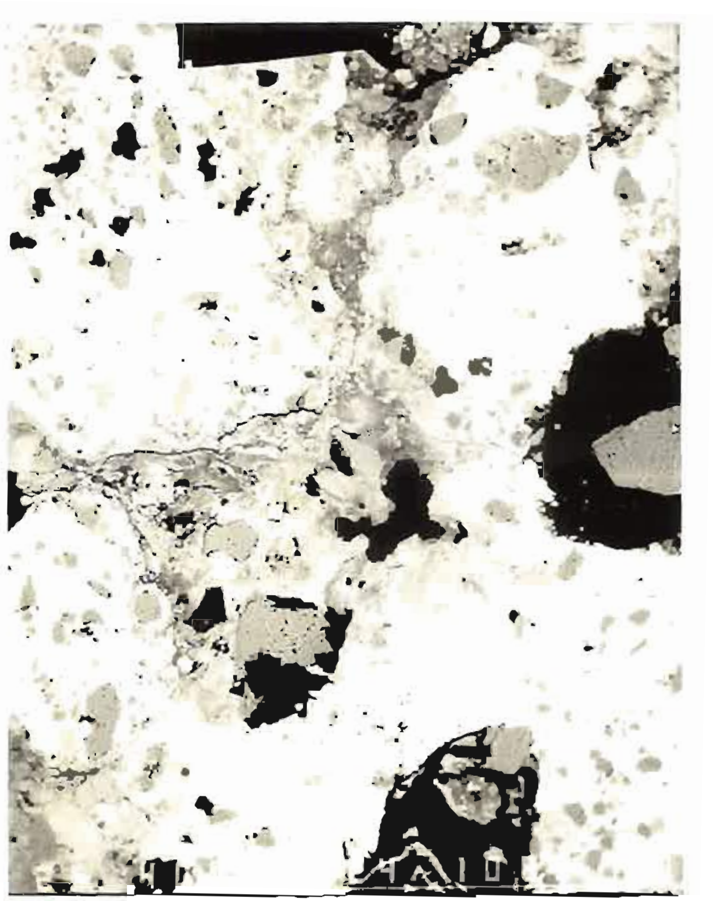
Sample no.
120B continue

X-ray image
Si

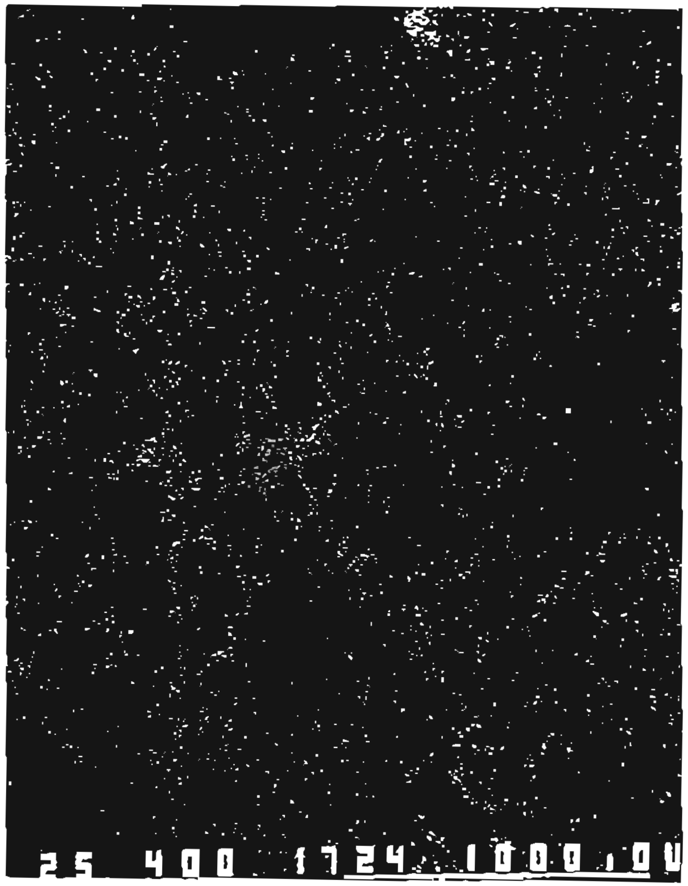


Sample no.	Map (1:50000)	UTM X	UTM Y
121	2018 III		

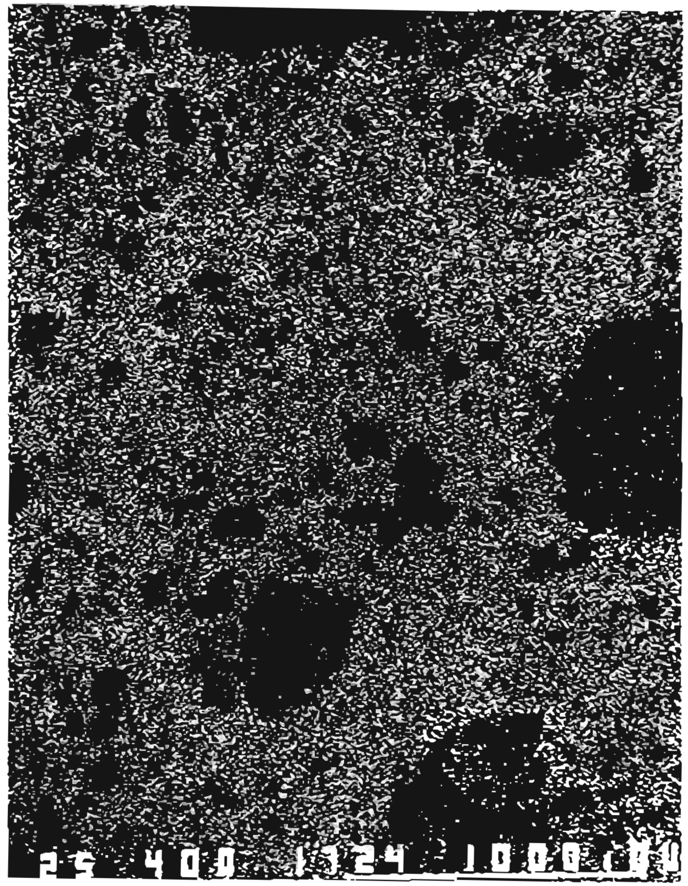
BSI



X-ray image
Mn



X-ray image
Fe



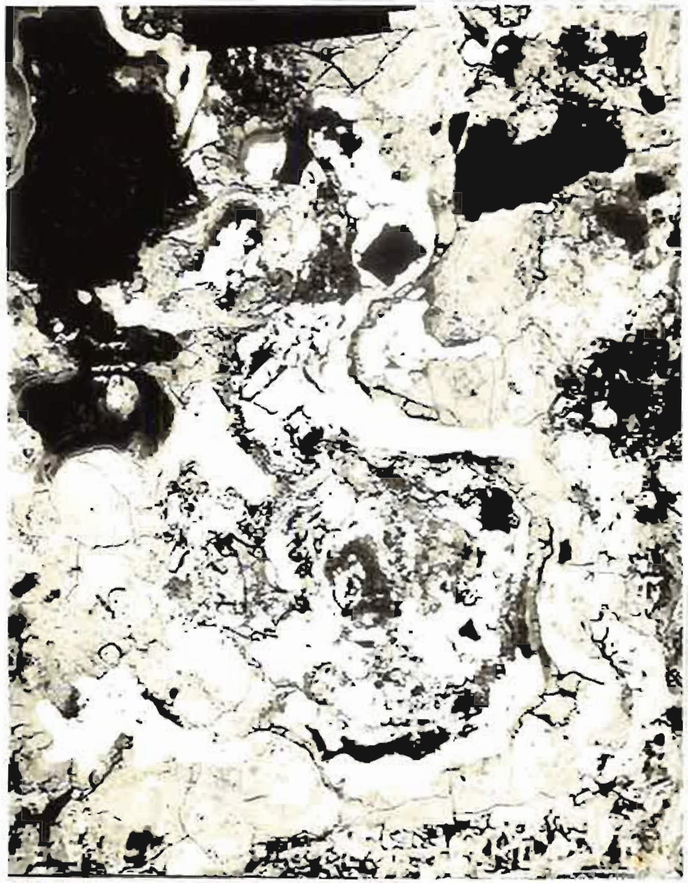
NGU-report 86.169. FIGURE 2.26

Sample no.
121 continue

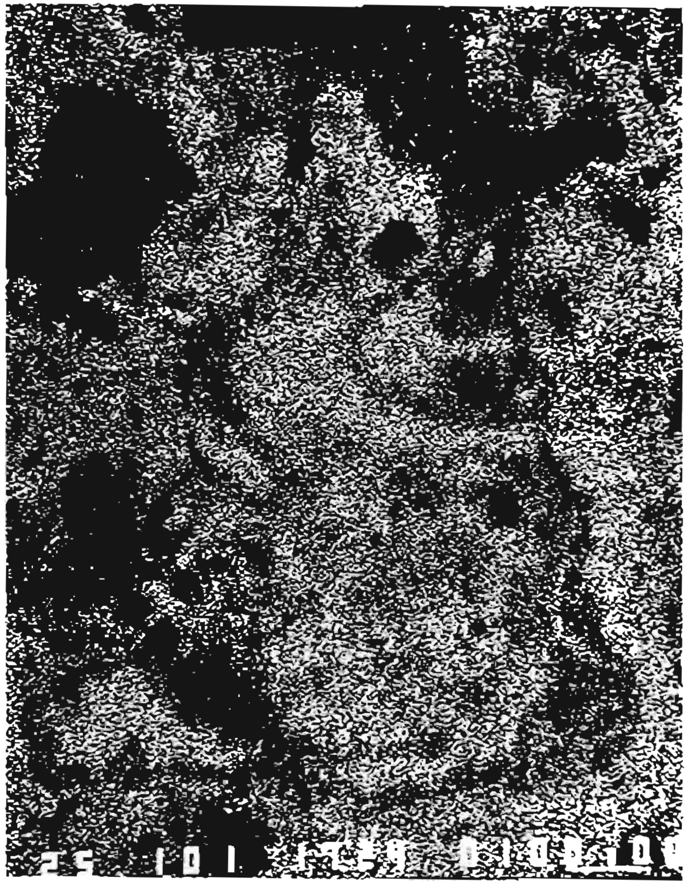
X-ray image
Si

Sample no.	Map (1:50000)	UTM X	UTM Y
122	1917 II	619.90	6781.90

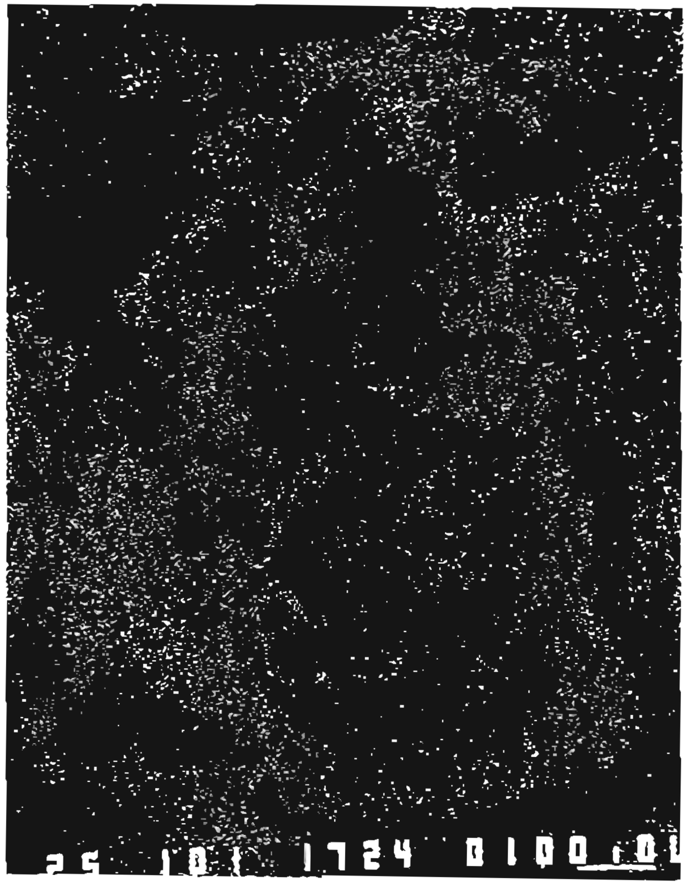
BSI



X-ray image
Mn



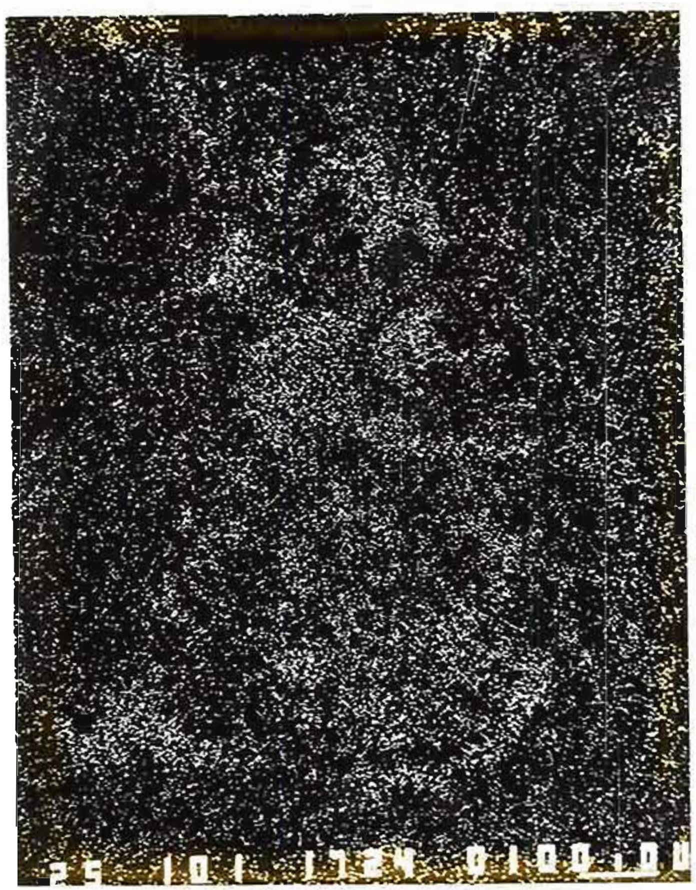
X-ray image
Fe



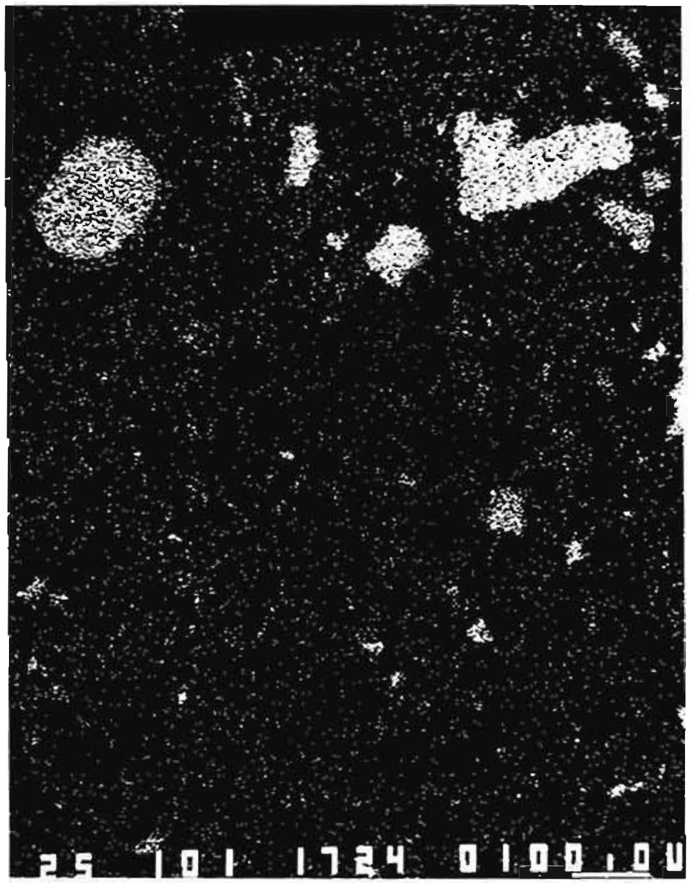
NGU-report 86.169. FIGURE 2.27

Sample no.
122 continue

X-ray image
Ba



X-ray image
Si



X-ray image
Ca

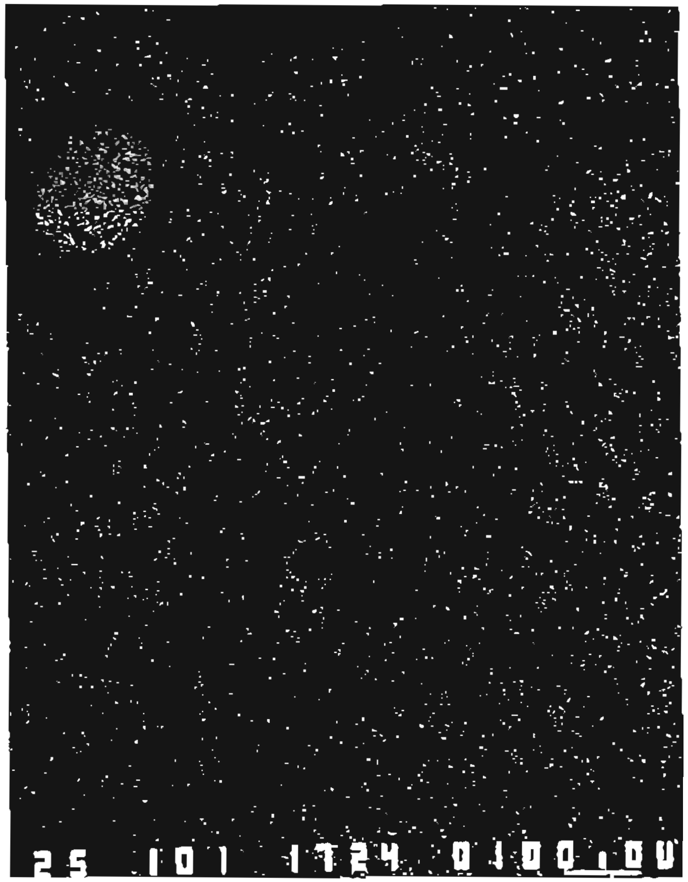


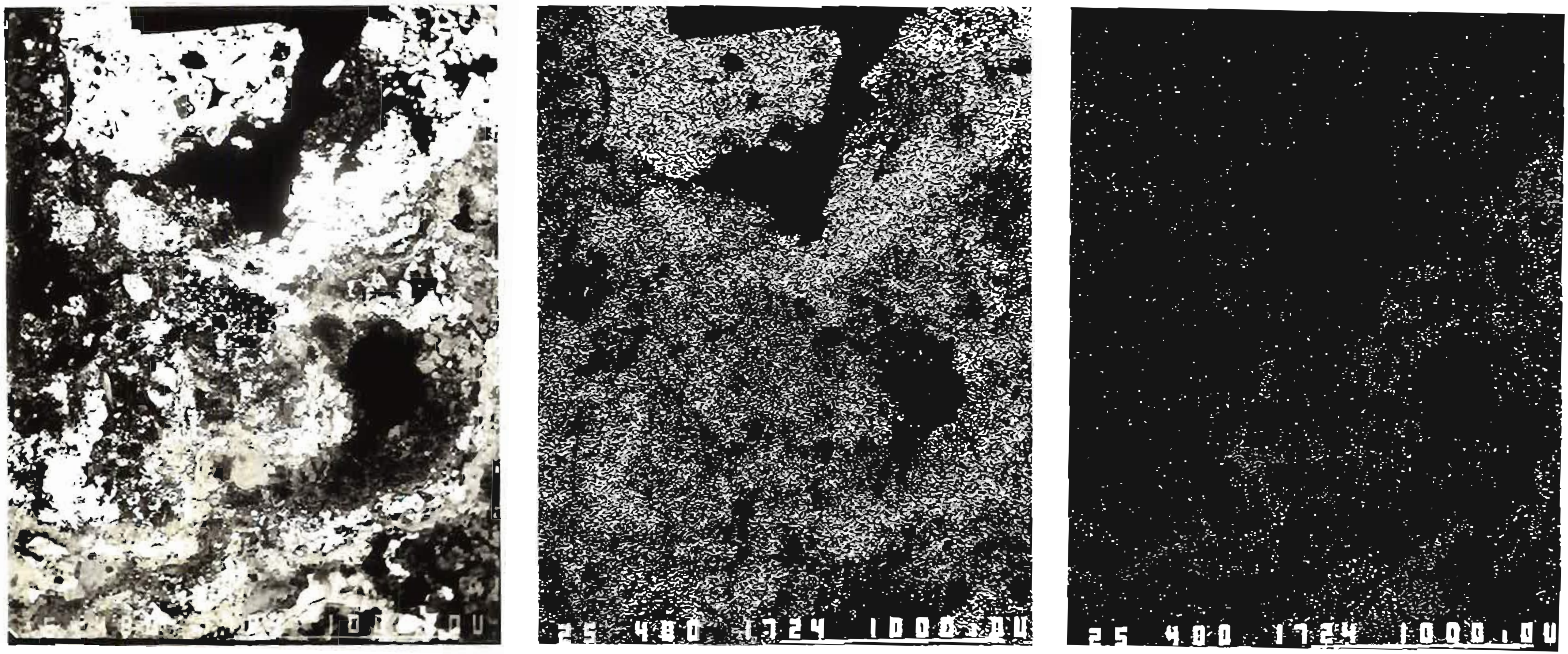
 FIGURE 2.27

Sample no.	Map (1:50000)	UTM X	UTM Y
123	2016 IV	645.90	6761.80

BSI

X-ray image
Mn

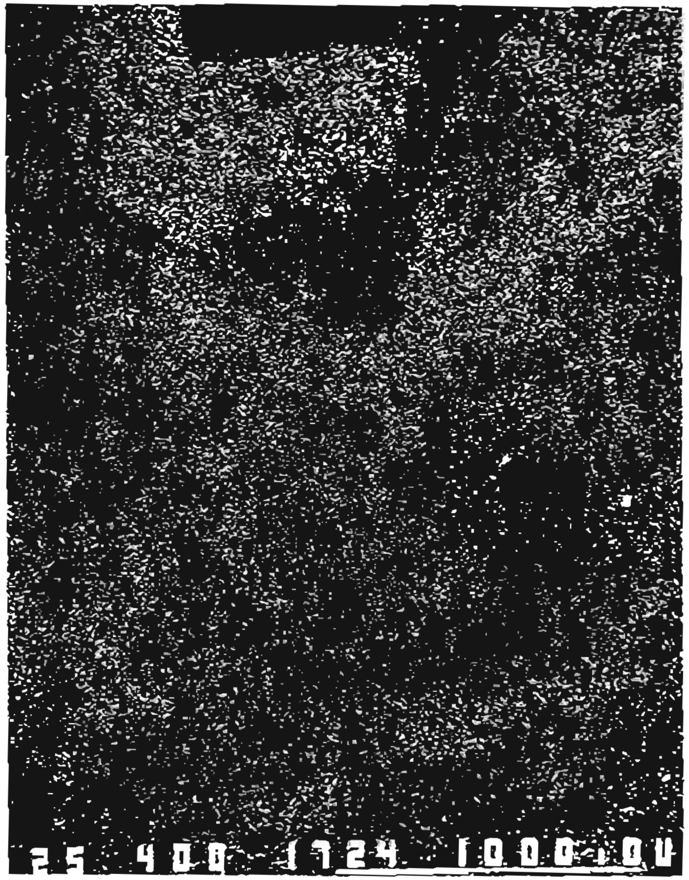
X-ray image
Fe



Sample no.
123 continue

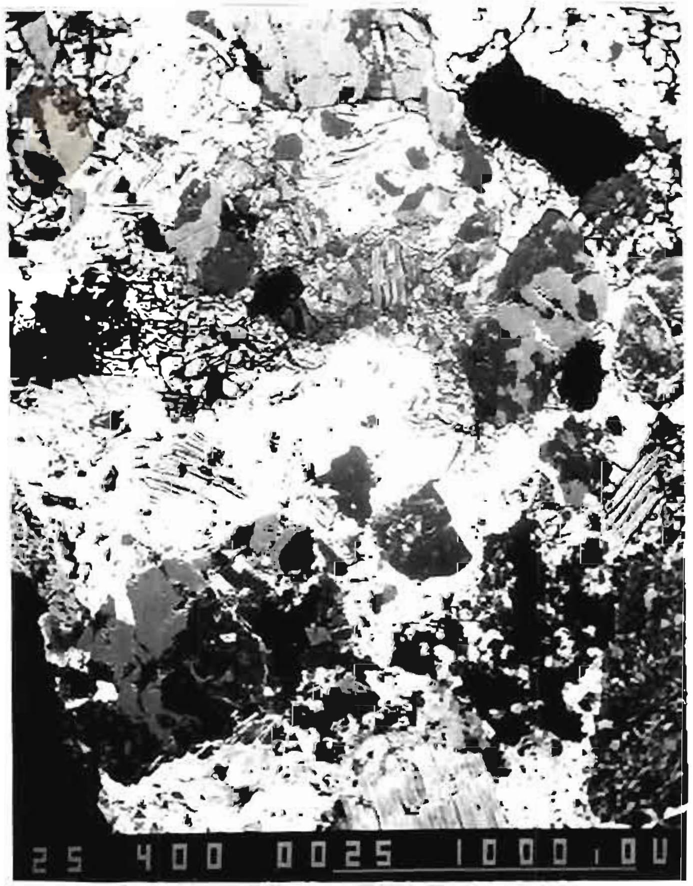
X-ray image
Si

X-ray image
Ba

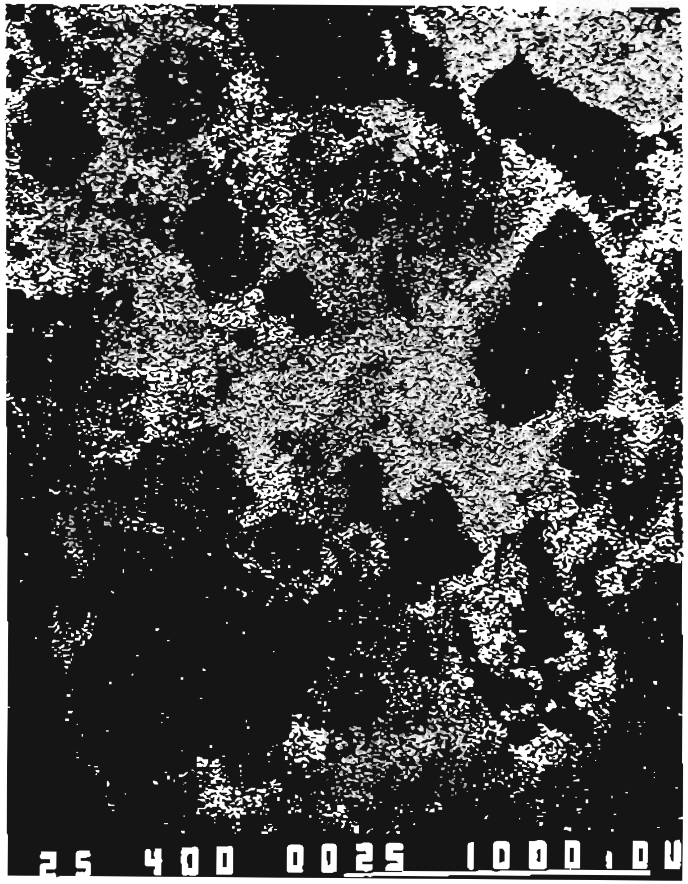


Sample no.	Map (1:50000)	UTM X	UTM Y
124	2117 III	357.30	6784.00

BSI



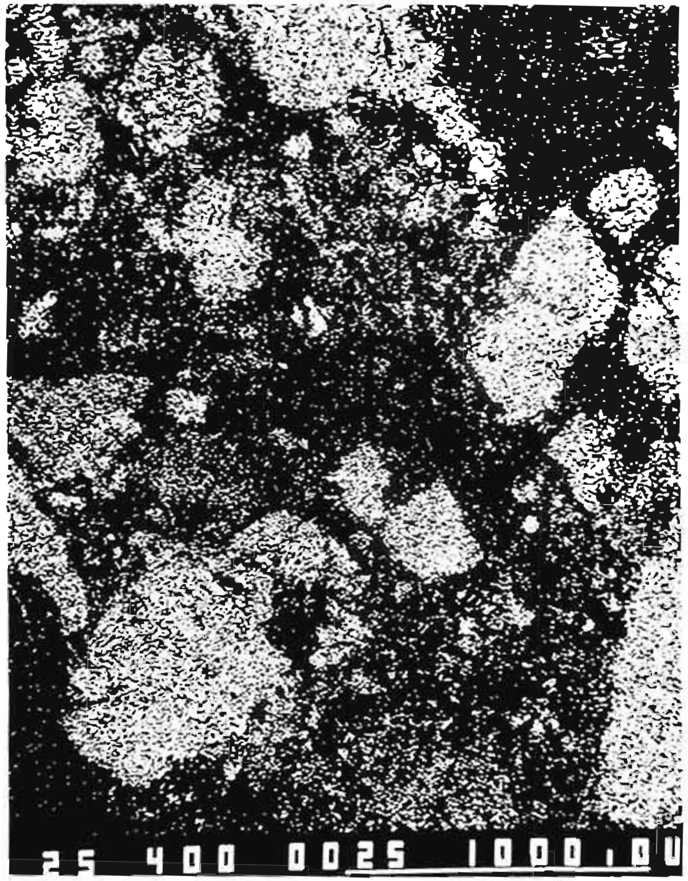
X-ray image
Mn



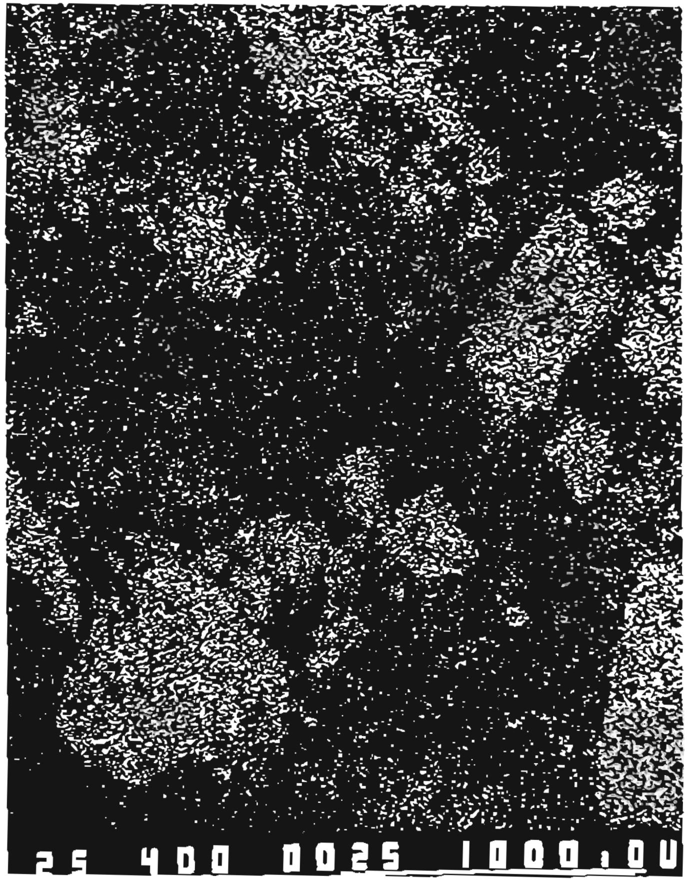
X-ray image
Fe

Sample no.
124 continue

X-ray image
Si

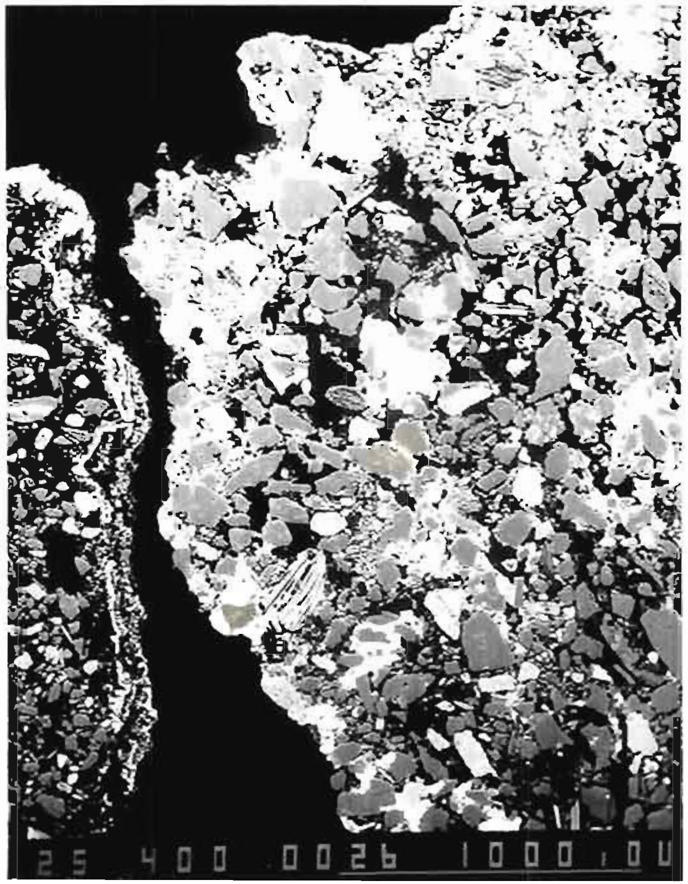


X-ray image
Al



Sample no.	Map (1:50000)	UTM X	UTM Y
125	2017 III	635.50	6779.70

BSI

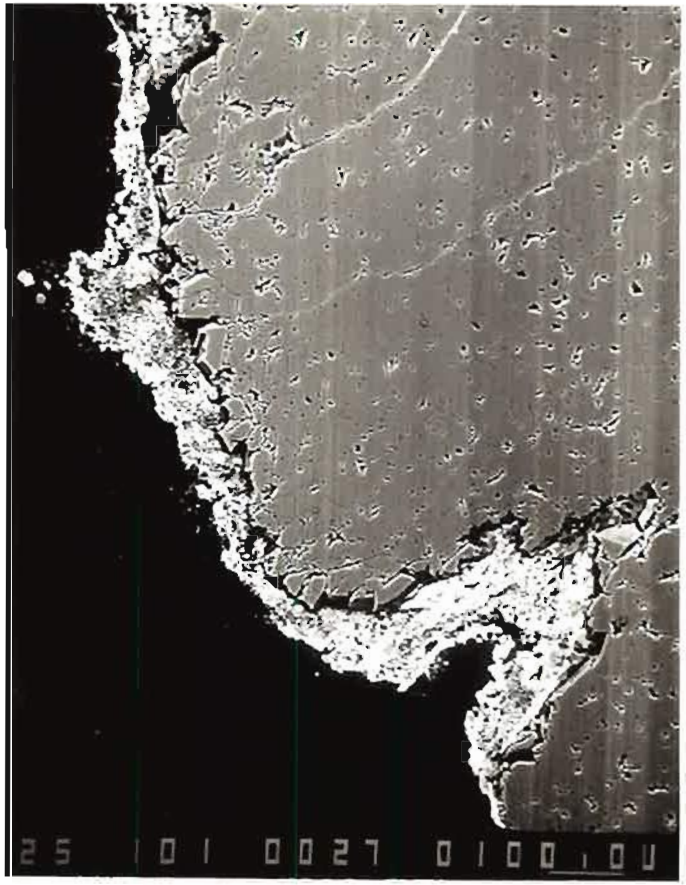


X-ray image
Mn

X-ray image
Si

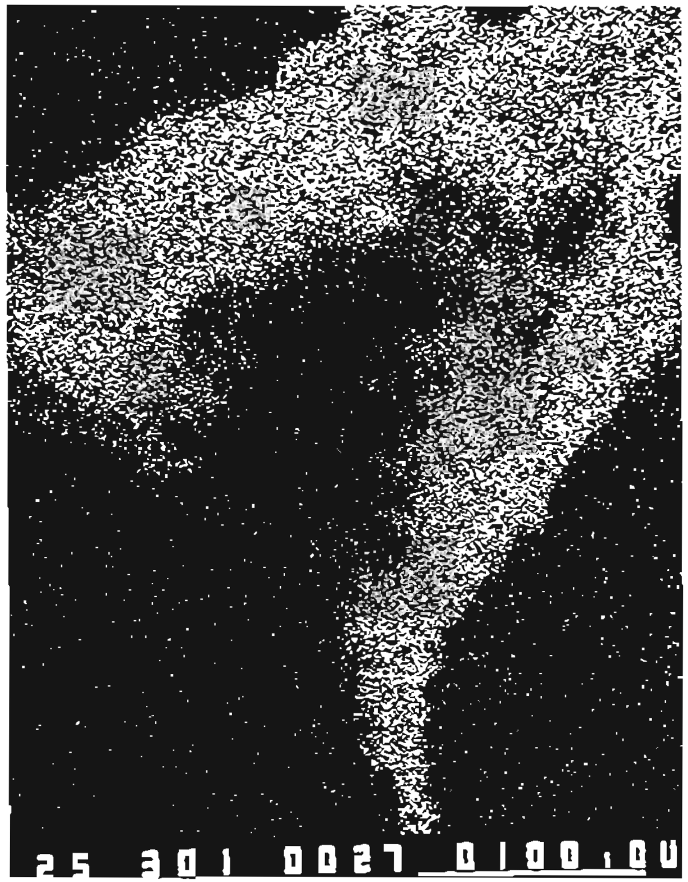
Sample no.	Map (1:50000)	UTM X	UTM Y
126	1917 IV	592.40	6793.90

BSI



BSI
Coating

X-ray image
Mn

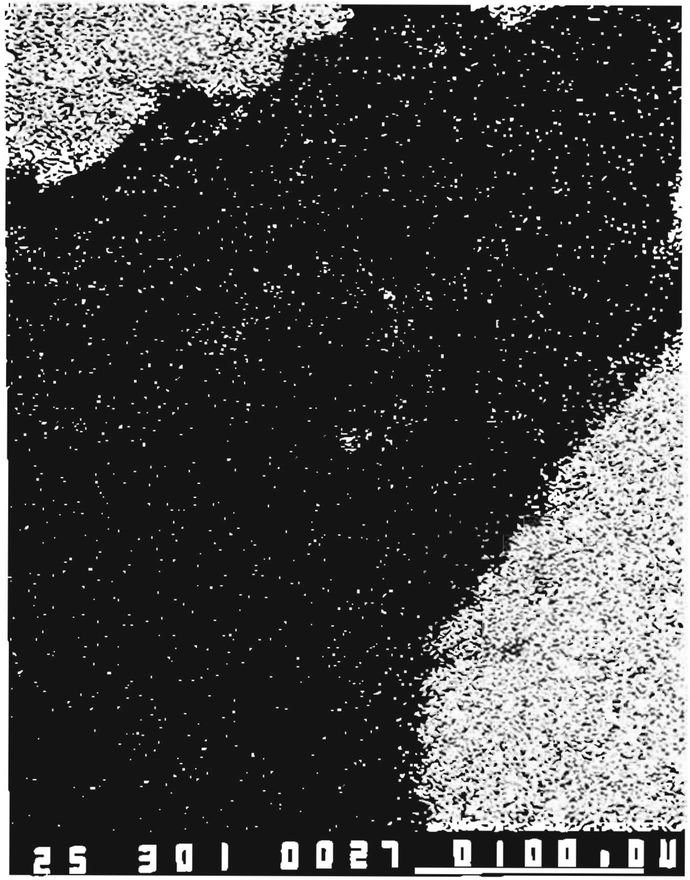


NGU-report 86.169. FIGURE 2.31

Sample no.
126 continue

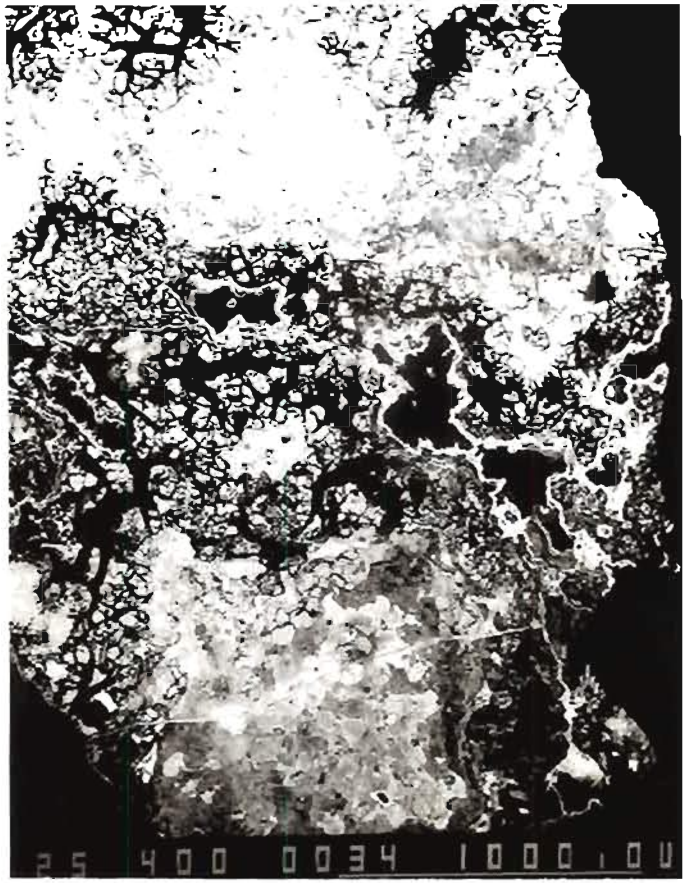
X-ray image
Fe

X-ray image
Si

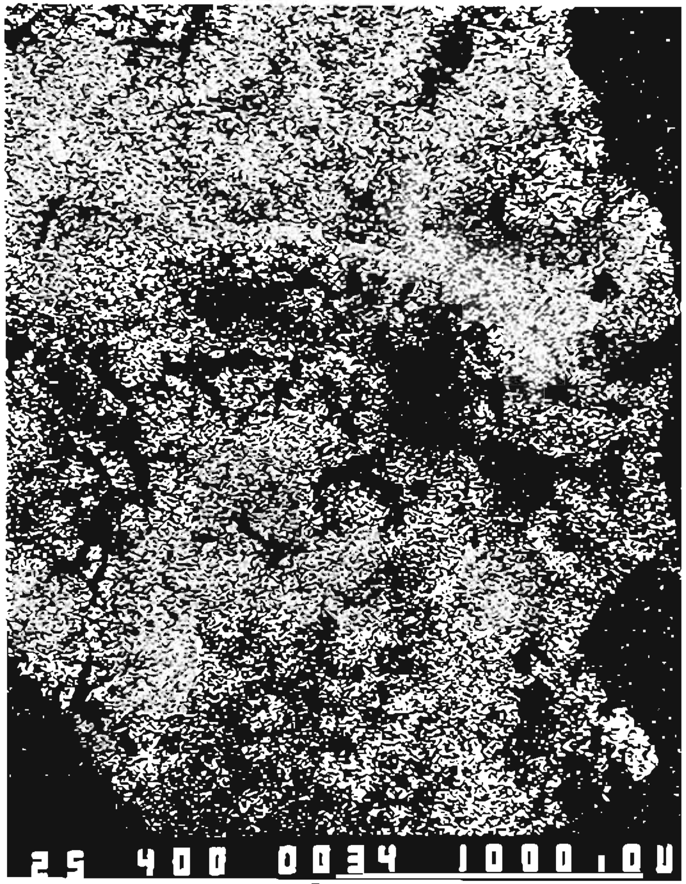


Sample no.	Map (1:50000)	UTM X	UTM Y
127	2017 IV	651.20	6798.50

BSI



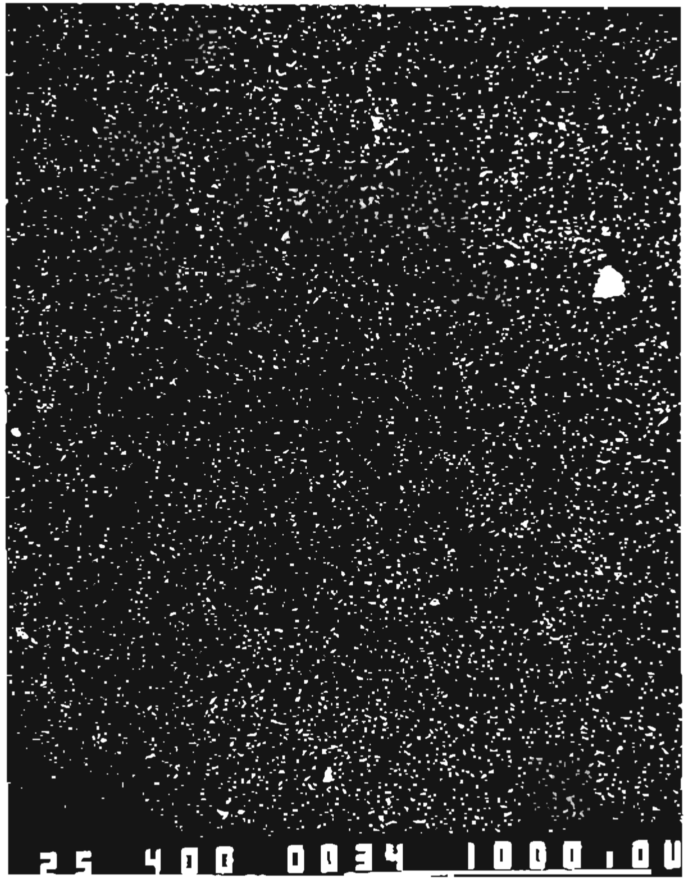
X-ray image
Mn



X-ray image
Fe

Sample no.
127 continue

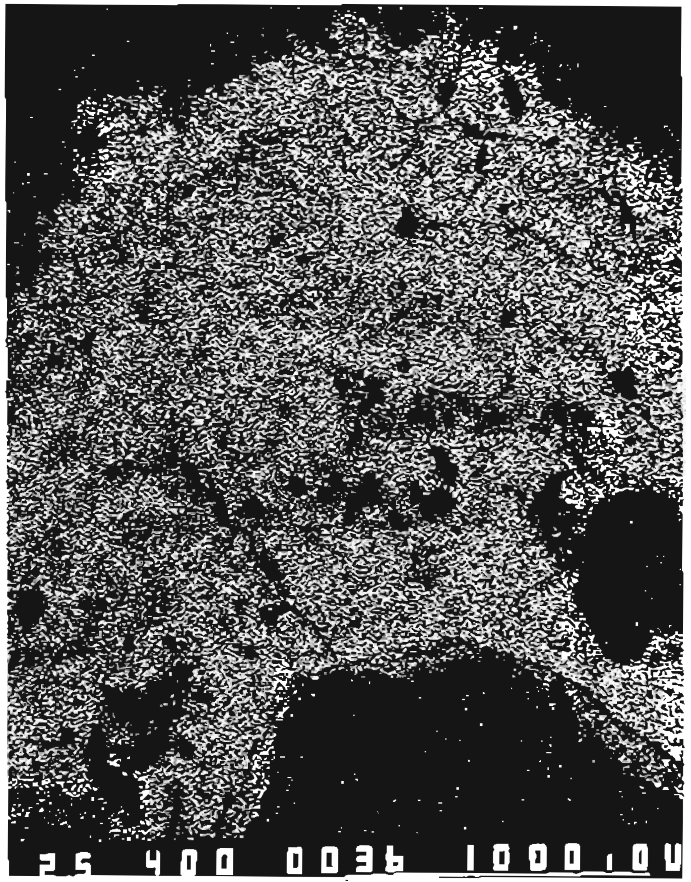
X-ray image
Si



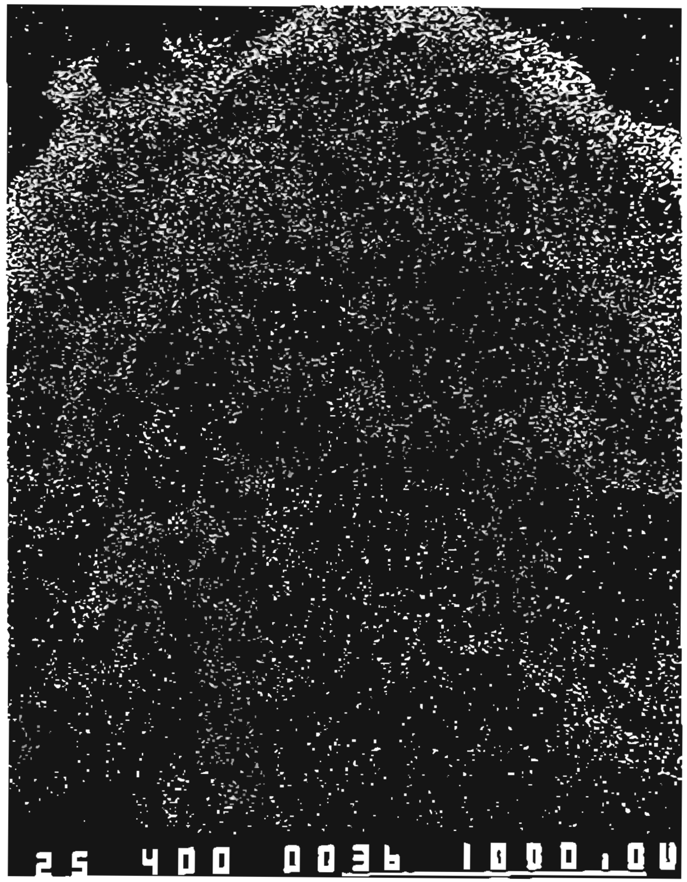
Sample no.	Map (1:50000)	UTM X	UTM Y
128	1915 IV	597.90	6706.70

BSI

X-ray image
Mn



X-ray image
Fe

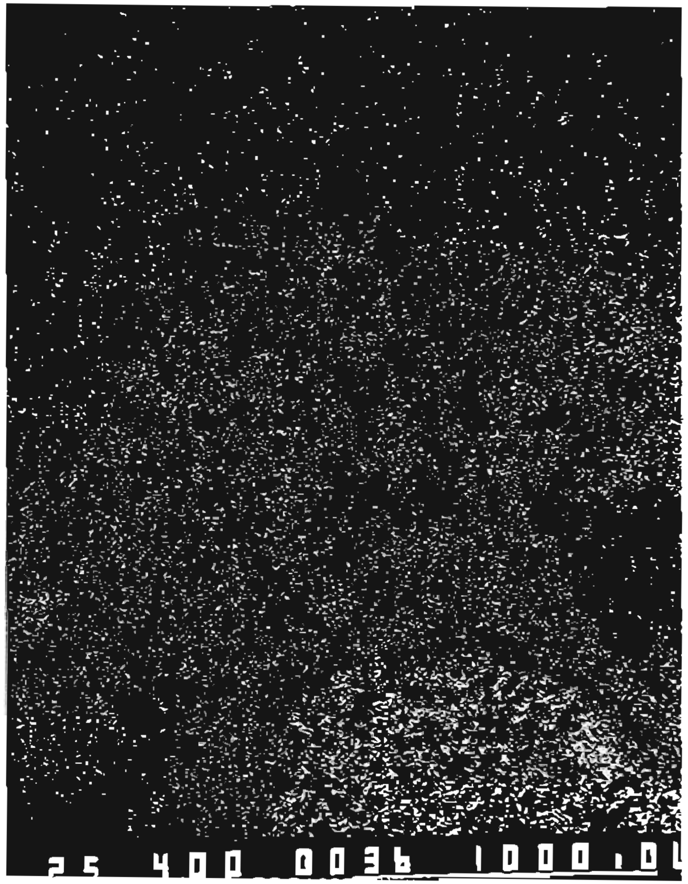


NGU-report 86.169. FIGURE 2.33

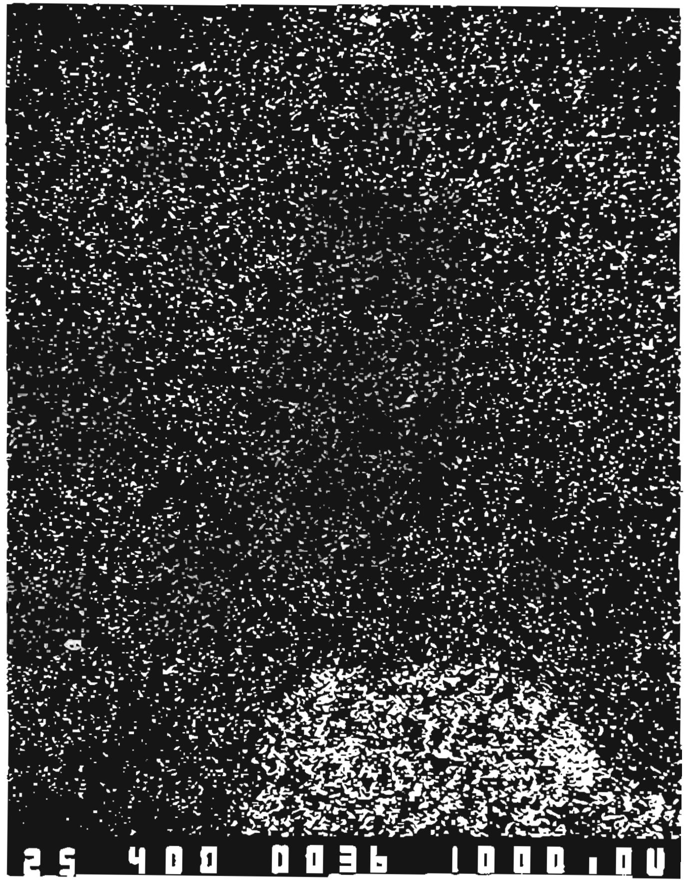
Sample no.
128 continue

X-ray image
Si

X-ray image
Al



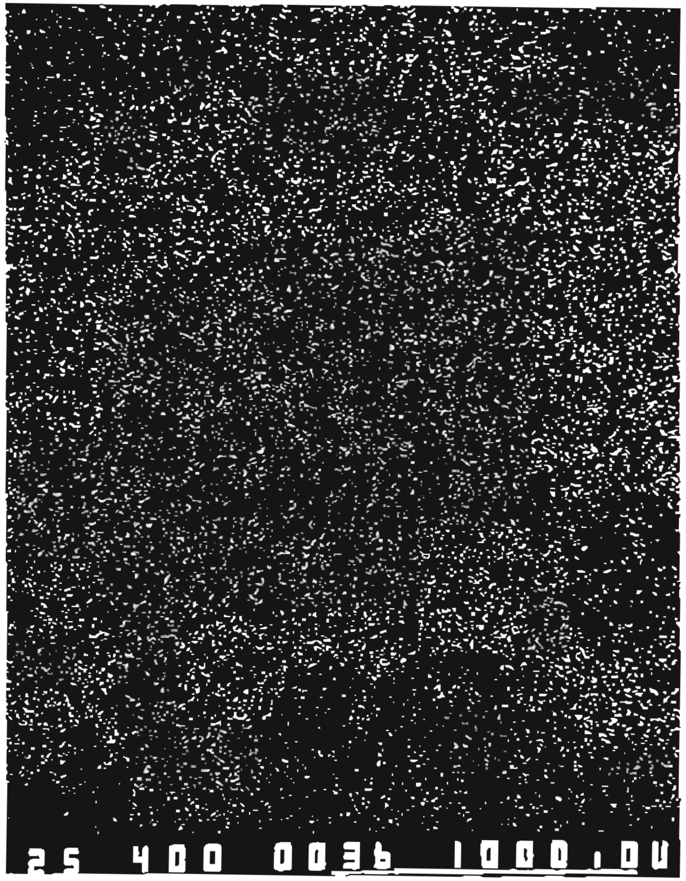
X-ray image
K



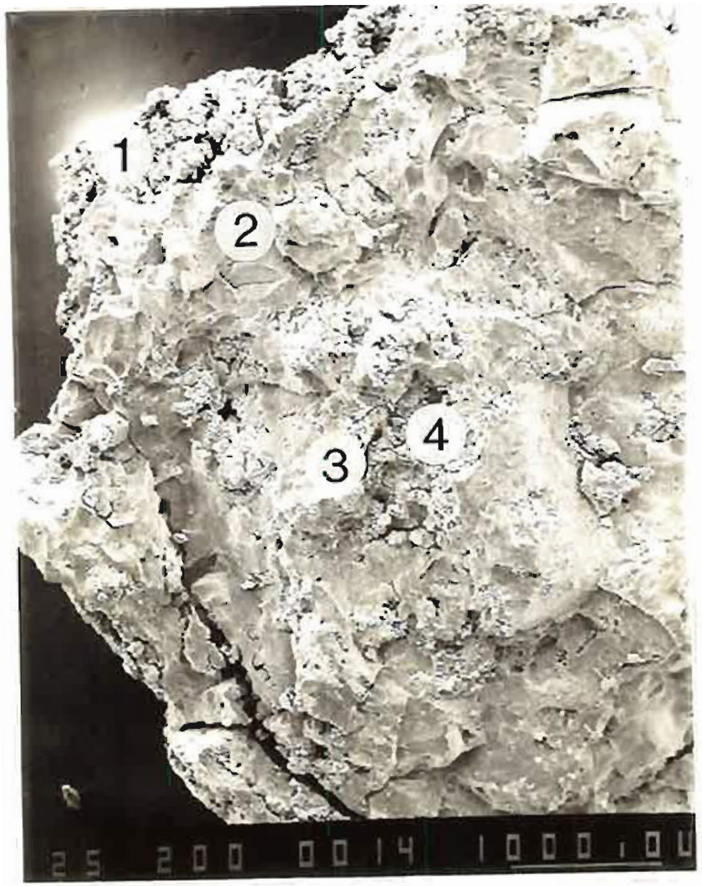
NGU-report 86.169. FIGURE 2.33

Sample no.
128 continue

X-ray image
S



Sample no.	Map (1:50000)	UTM X	UTM Y	Method
14	1915 IV	602.80	6705.40	SEI



Point 1. Outer part , Mn-phase
Point 2. Mn-phase
Point 3. Mn-phase (with minor Al)
Point 4. Core , Mn-Al phase

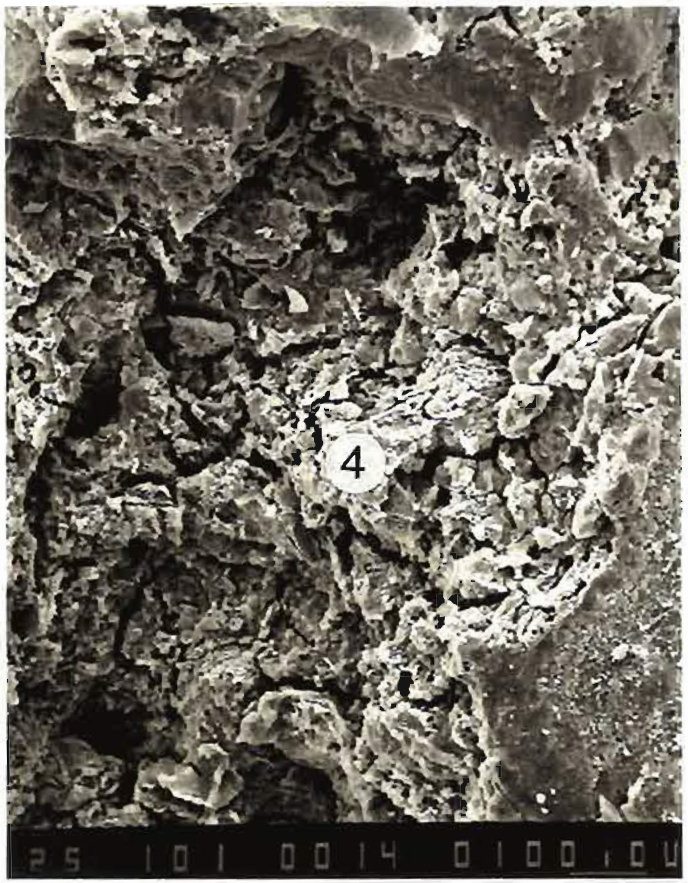
Area 1

Area 2

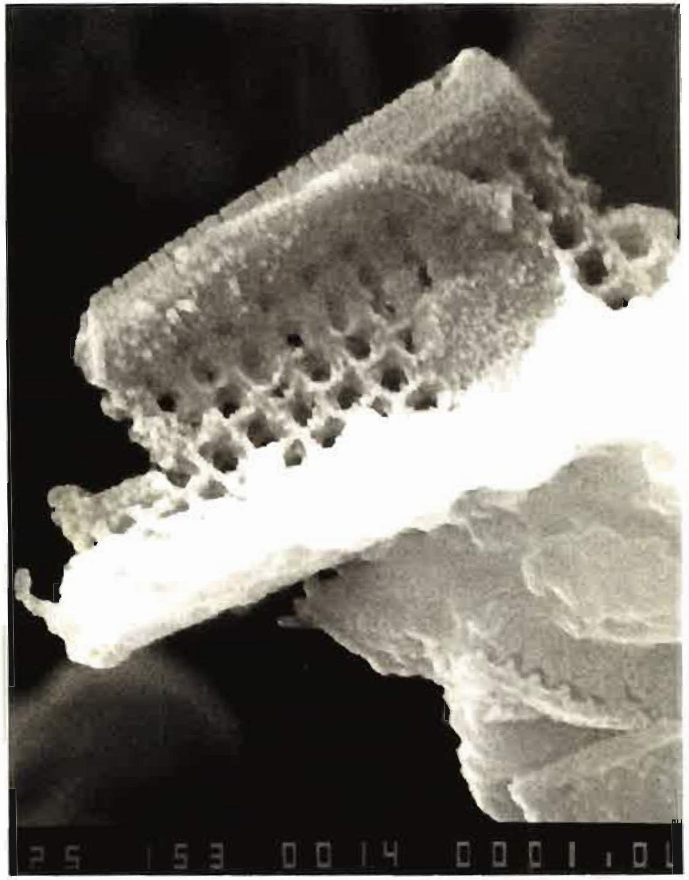
NGU-report 86.169. FIGURE 3.1

Sample no.
14 continue

Area 3



Area 4



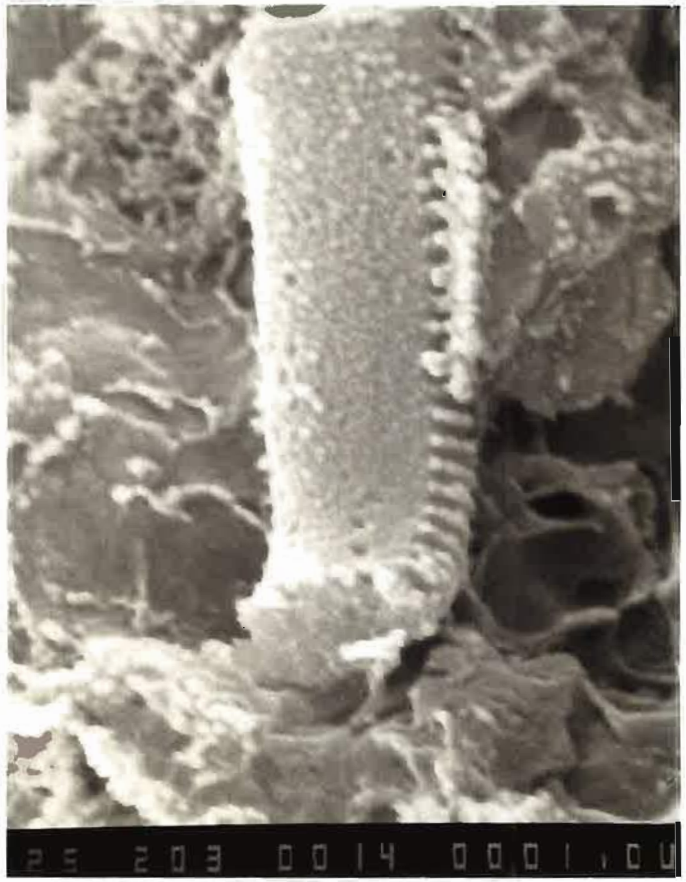
Area 1

NGU-report 86.169. FIGURE 3.1

Sample no.
14 continue

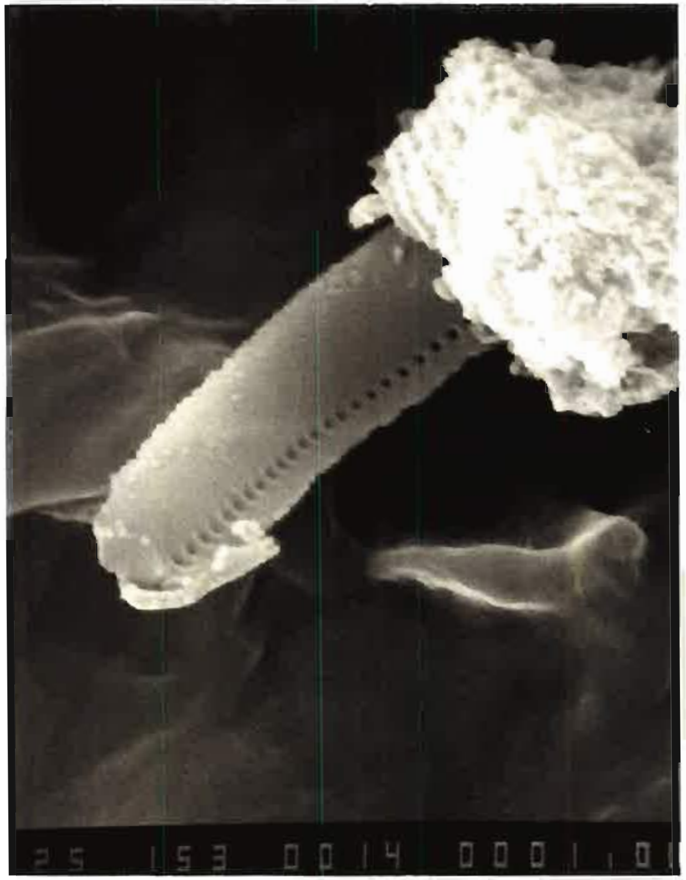
Area 1

Area 1



Area 2

Sample no.
14 continue

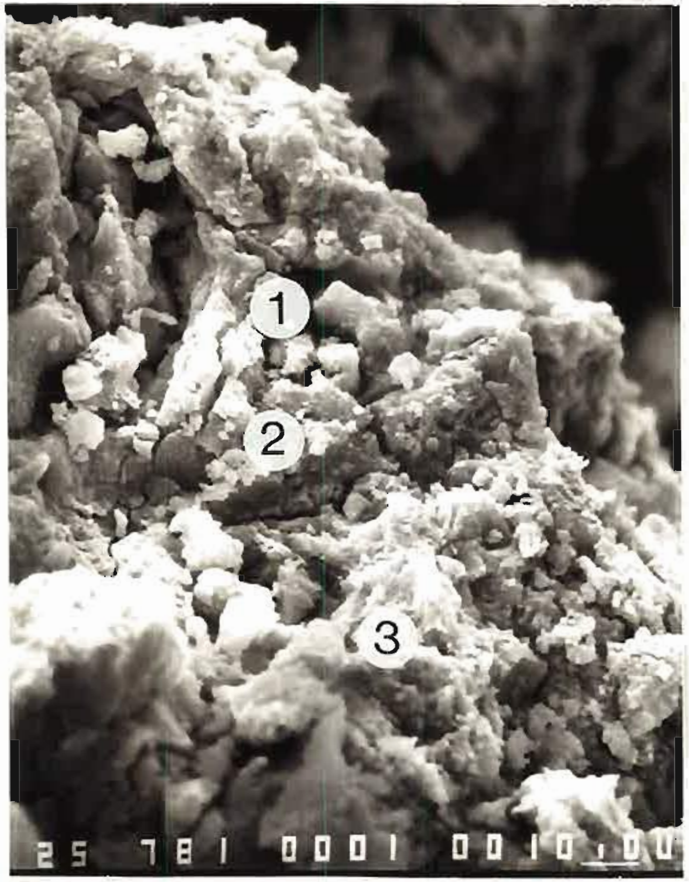


Area 3

Area 4

Area 4

Sample no.	Map (1:50000)	UTM X	UTM Y	Method
96	1814 IV	559.50	6635.90	SEI



Point 1. Fe-Mn phase
Point 2. Fe-phase (with minor Mn)
Point 3. Fe-phase (with minor Mn)

Area 1

Area 2

Sample no.
96 continue

Area 3

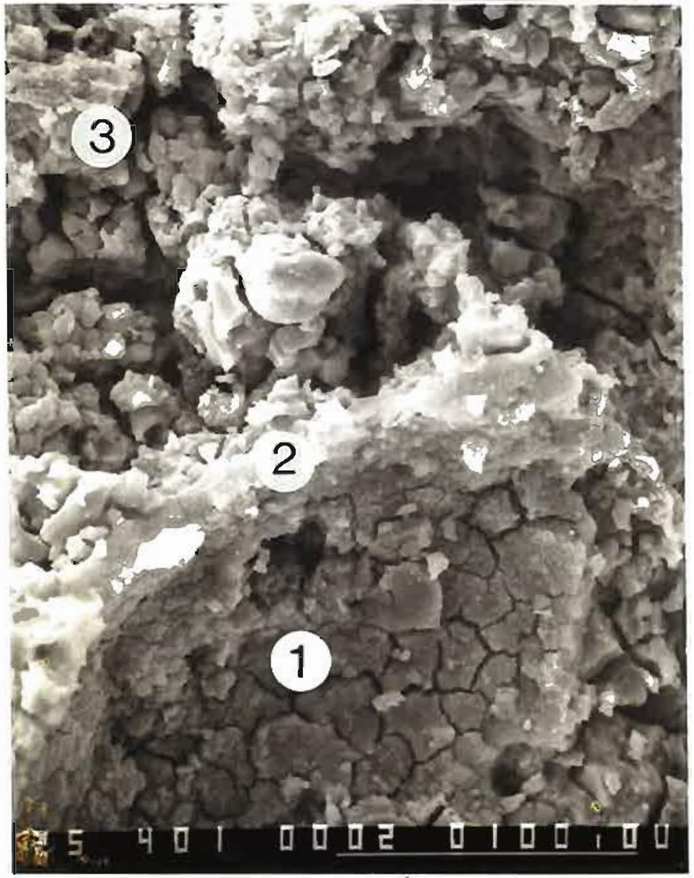
Rough and smooth surface:
Fe-phases (with minor Mn)

Mn-phase

Sample no.
96 continue

Sample no.	Map (1:50000)	UTM X	UTM Y	Method
97	1814 IV	559.50	6635.90	SEI

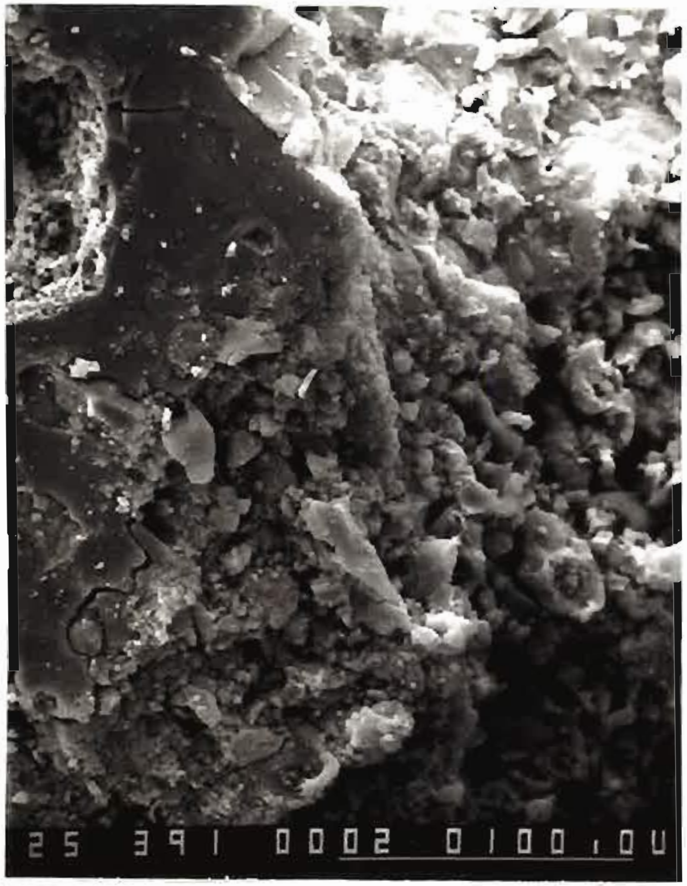
Rough and smooth surface: Fe-phases



Point 1. Fe-phase (with minor Mn)
Point 2. Fe-Mn phase
Point 3. Fe-phase (with minor Mn)

Sample no.
97 continue

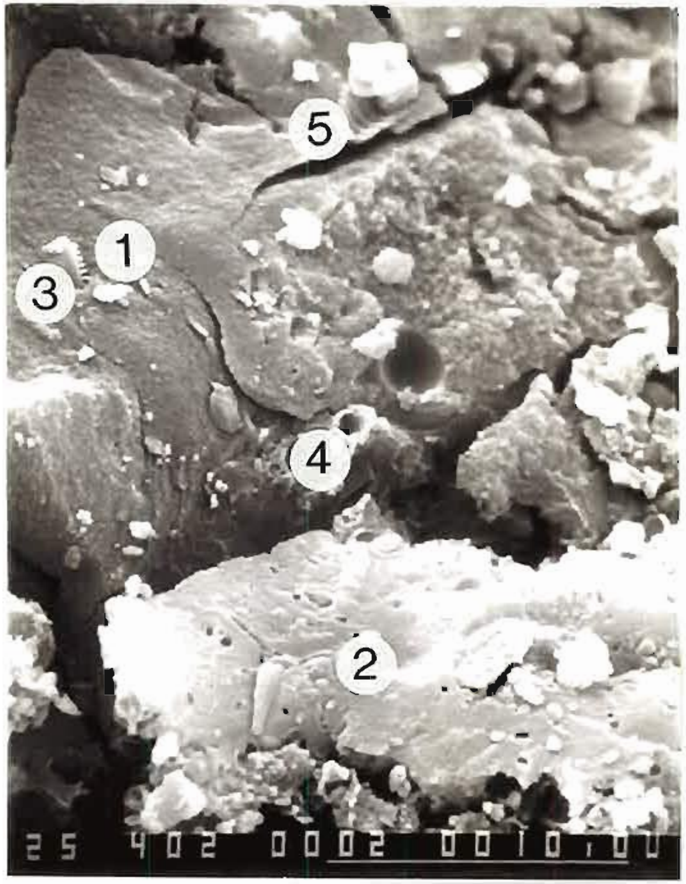
Left: Rough surface: Fe-phase
(with minor Mn)
Right: Smooth surface: Mn-phase



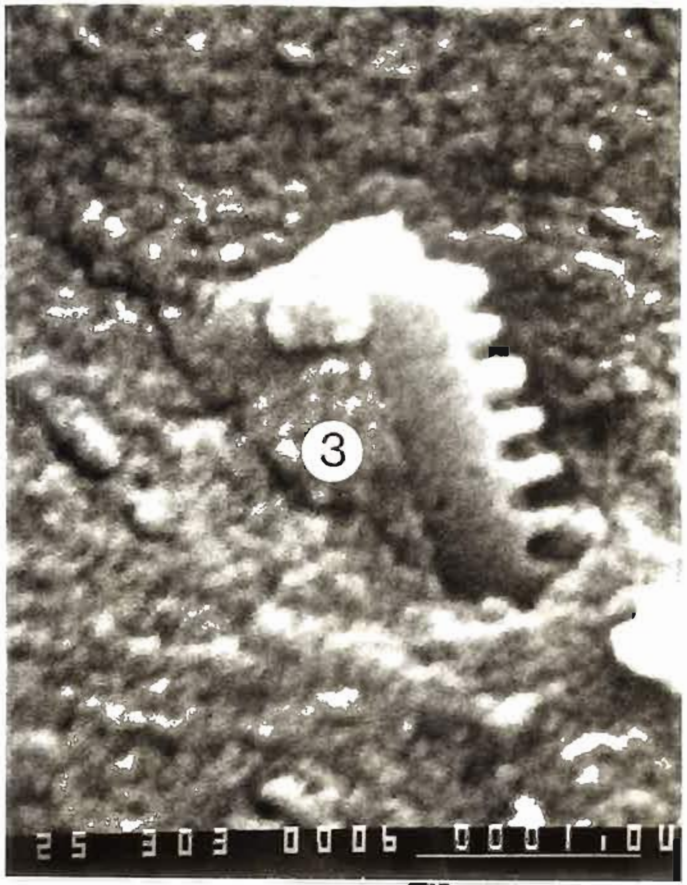
Left: Rough and smooth surface:
Fe-phase
Right: Rough surface: Mn-phase

Mn-phase

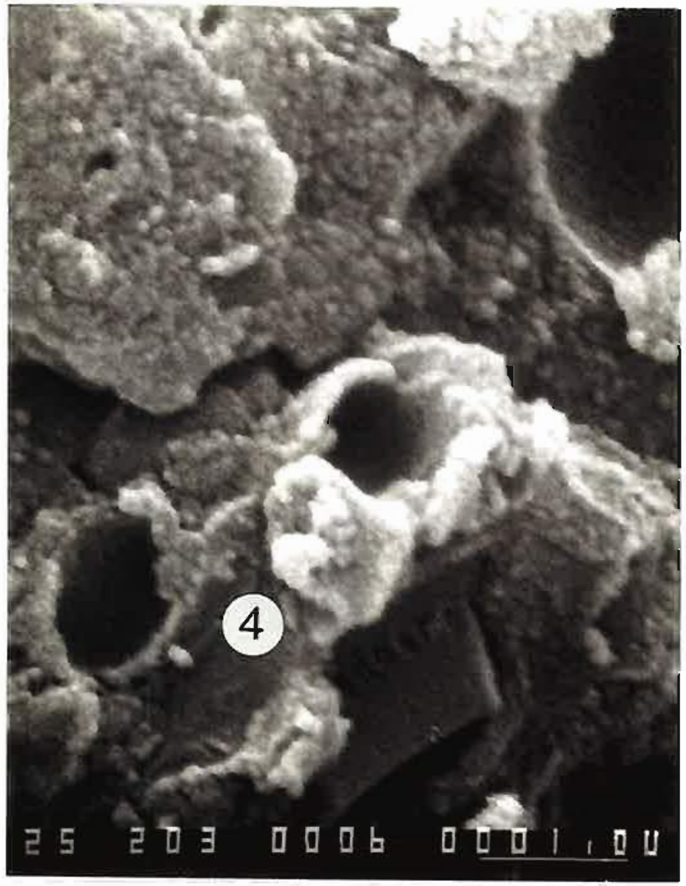
Sample no.	Map (1:50000)	UTM X	UTM Y	Method
100	1716 III	526.60	6731.00	SEI



Point 1. Mn- phase (with minor Fe)
Point 2. Fe-phase (with minor Mn)
Point 3. Mn-phase

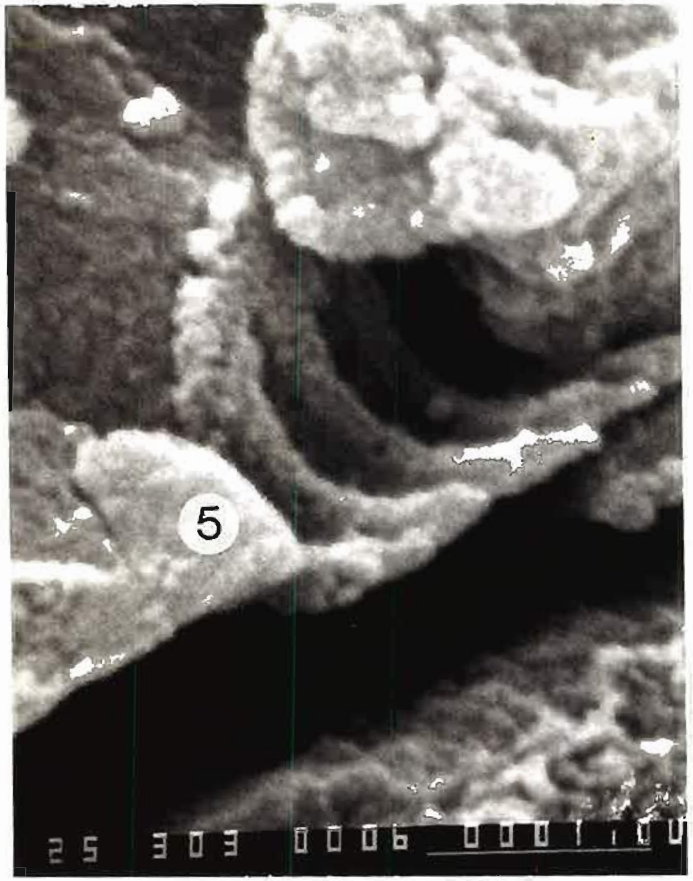


Area 3

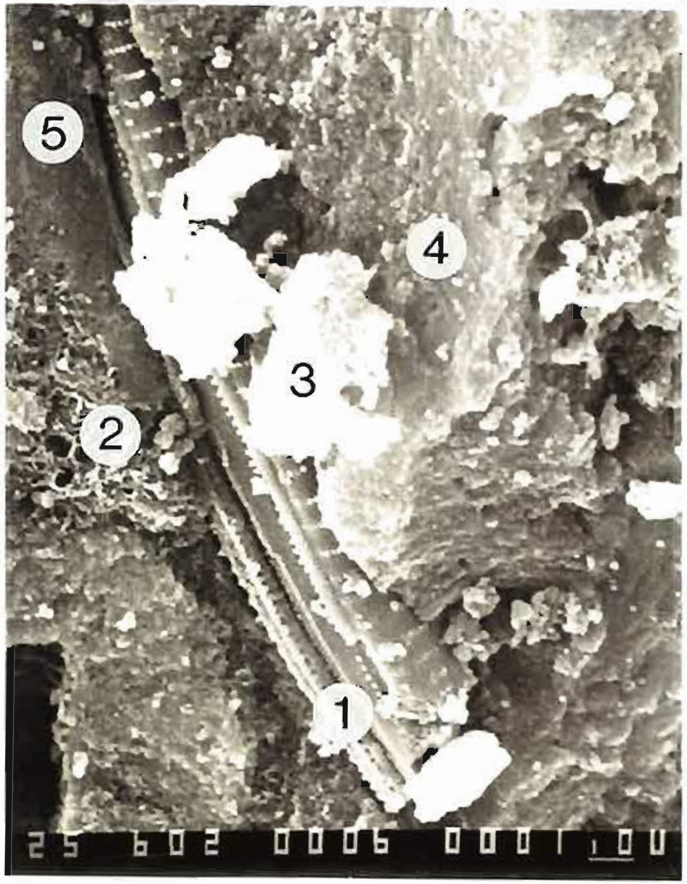


Area 4

Sample no.
100 continue



Area 5

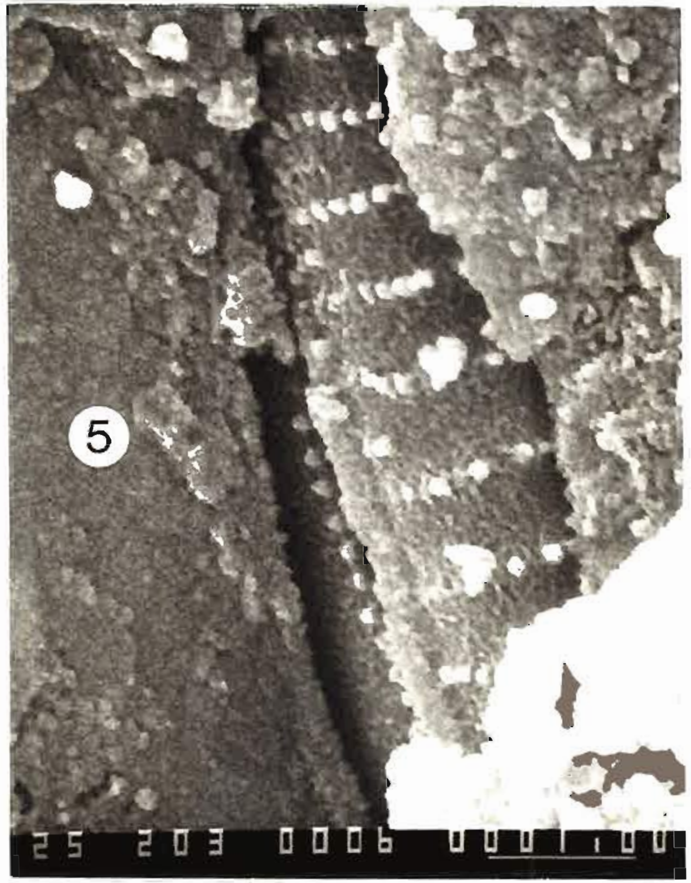


Point 1. Mn-phase (with minor Fe)
Point 2. Fe-Mn phase
Point 3. Fe-Mn phase
Point 4. Fe-phase (with minor Mn)
Point 5. Fe-phase (with minor Mn)

Sample no.
100 continue

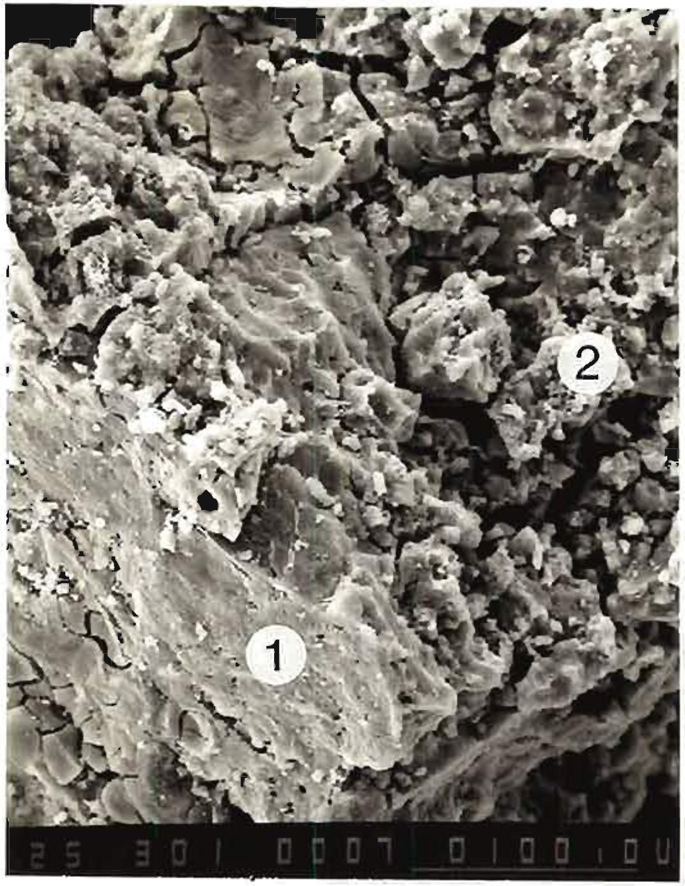
Area 1

Area 2



Area 5

Sample no.	Map (1:50000)	UTM X	UTM Y	Method
101	1815 I	594.60	6694.50	SEI

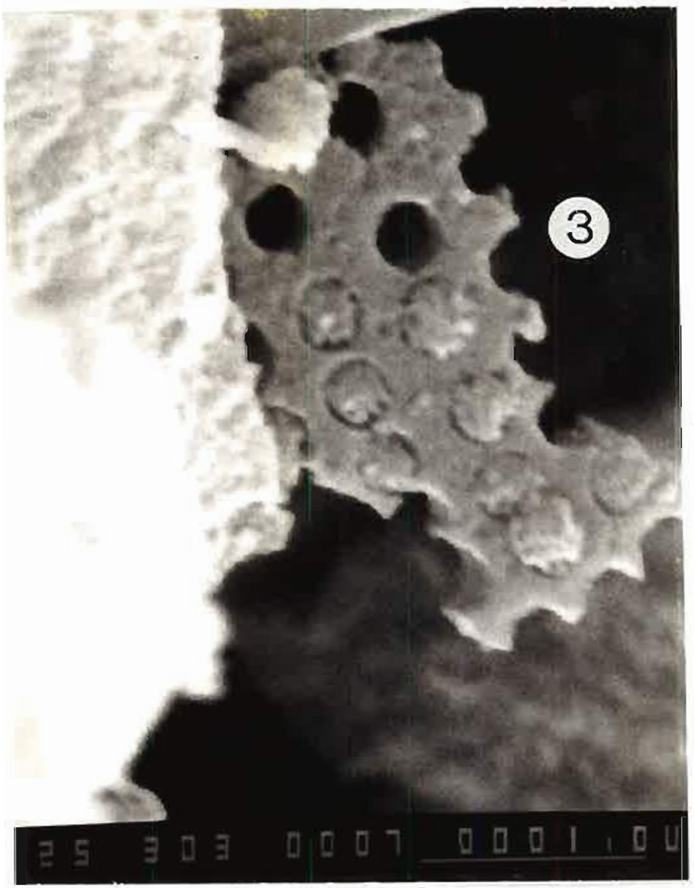


Point 1. Mn-phase
Point 2. Mn-phase

Area 1

Area 2

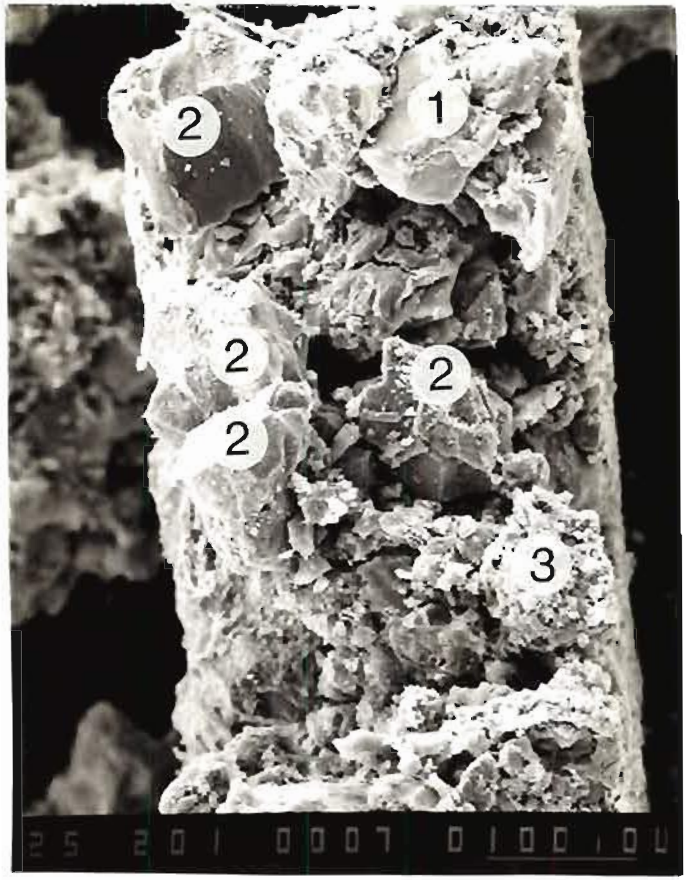
Sample no.
101 continue



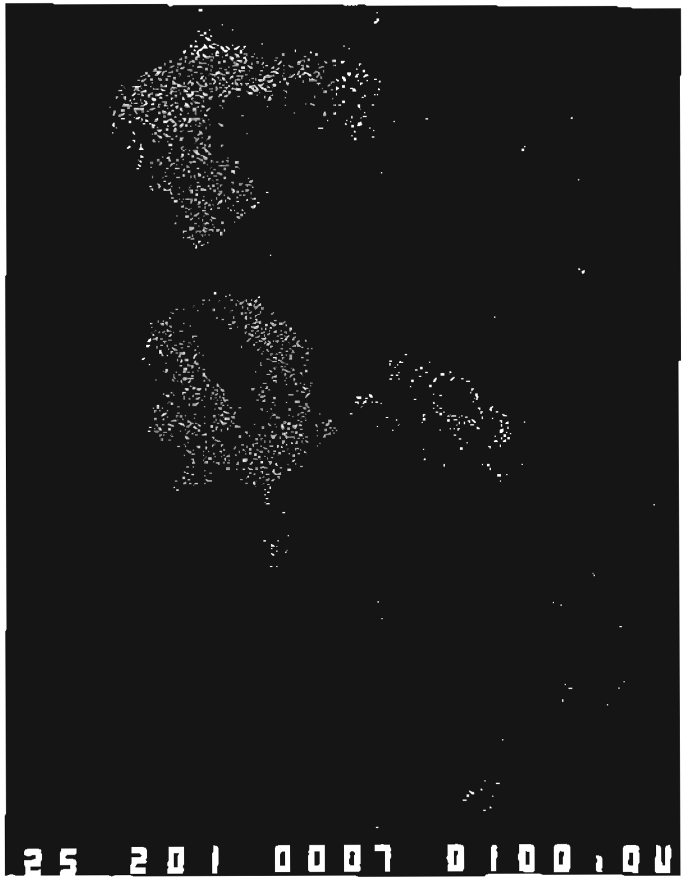
Area 3

Area 4

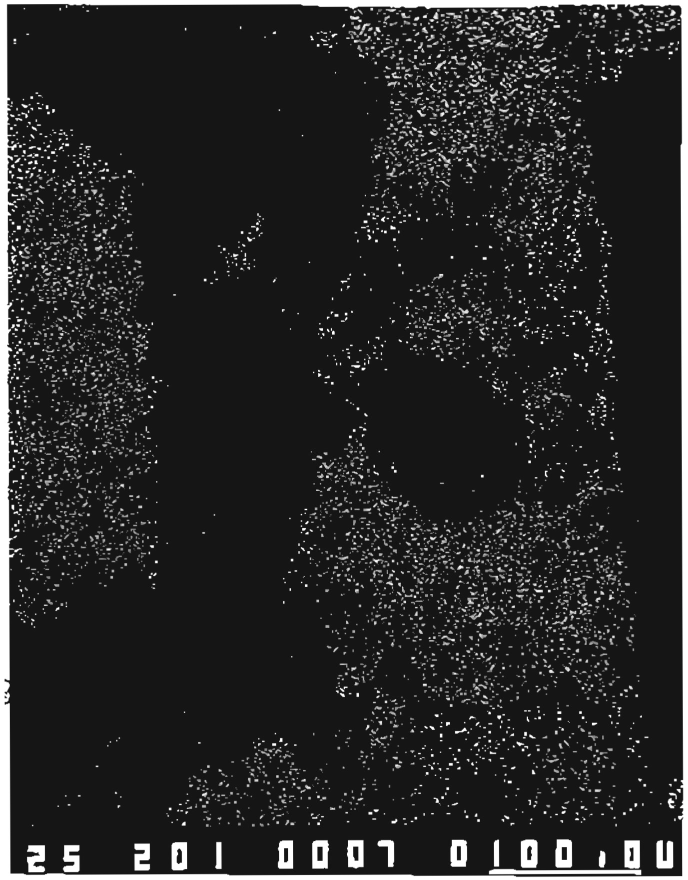
Sample no.
101 continue



1. Mn-phase
2. Si-phase
3. Mn-phase



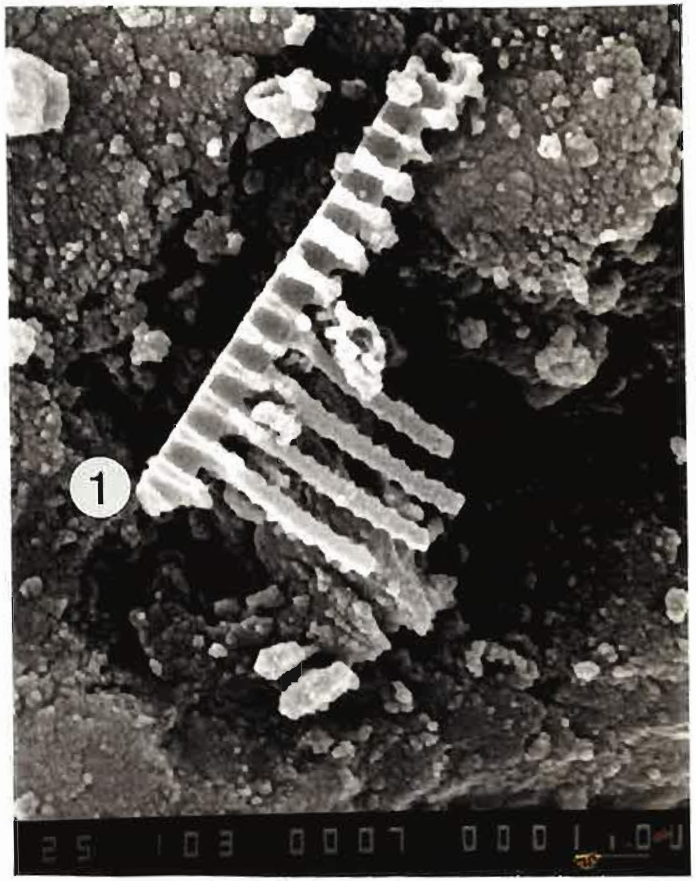
X-ray image
Si



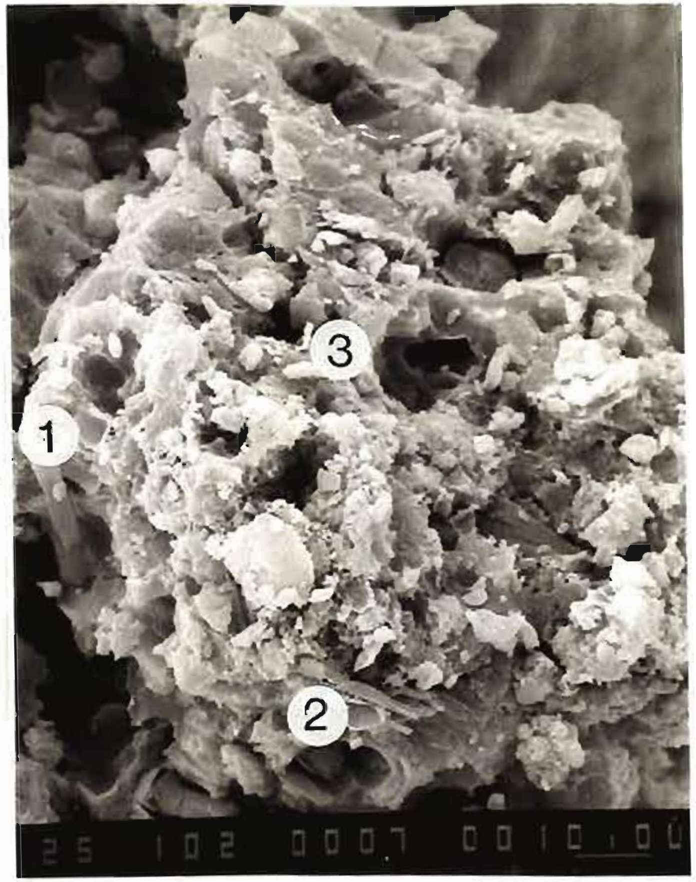
X-ray image
Mn

Sample no.
101 continue

Area 1

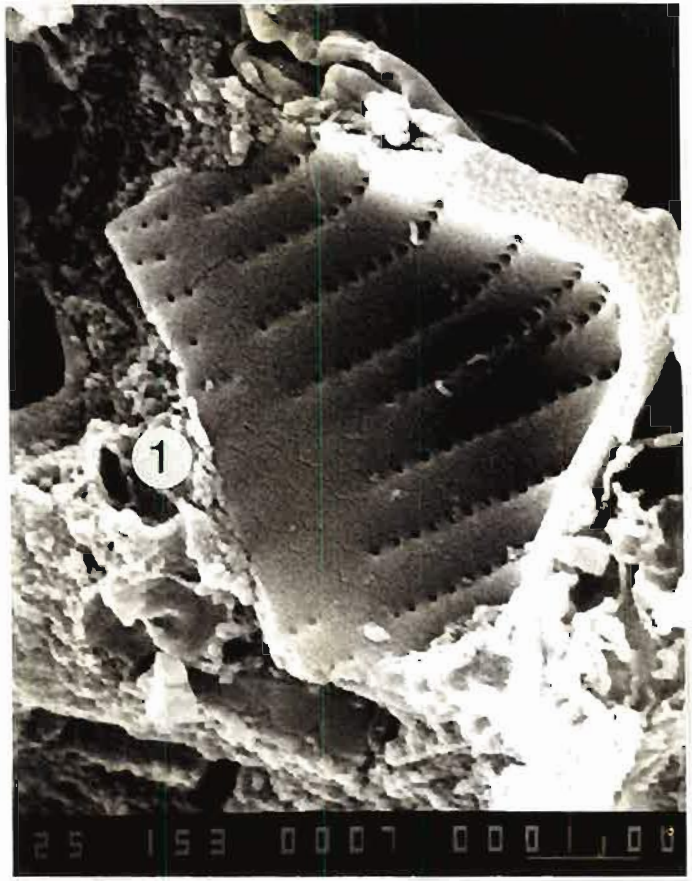


Area 1



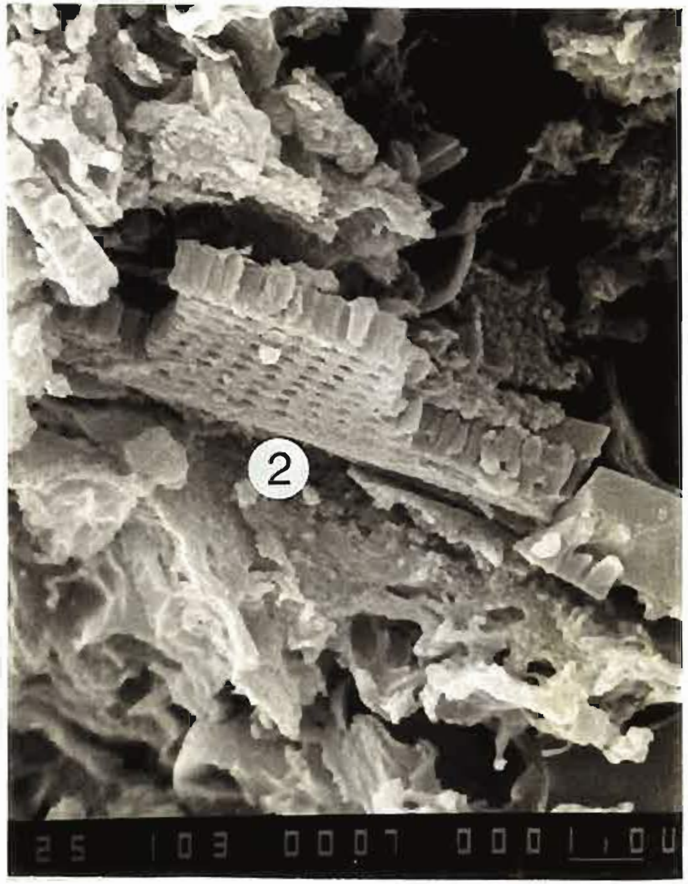
Area 3.

Sample no.
101 continue



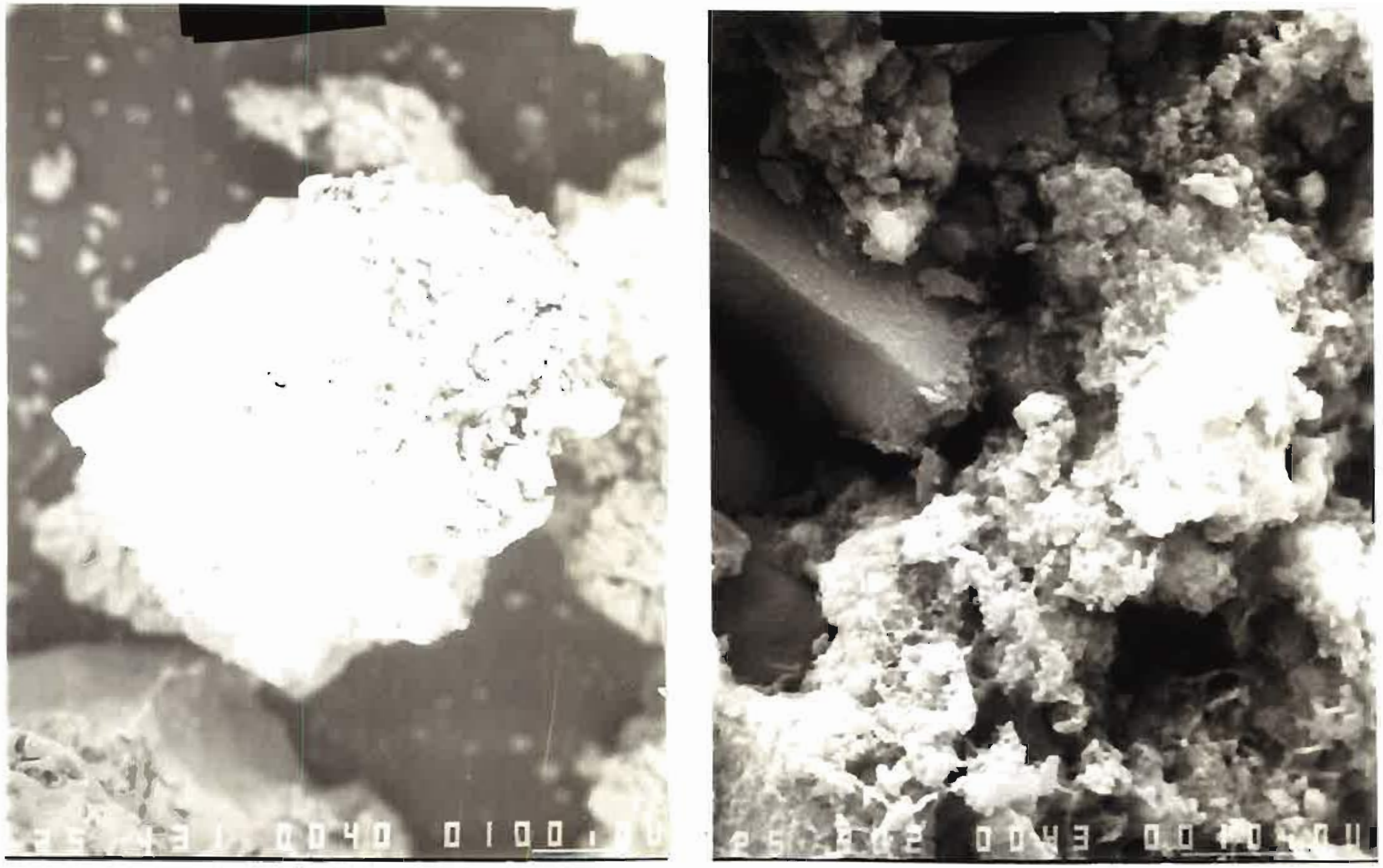
Area 1

Area 2



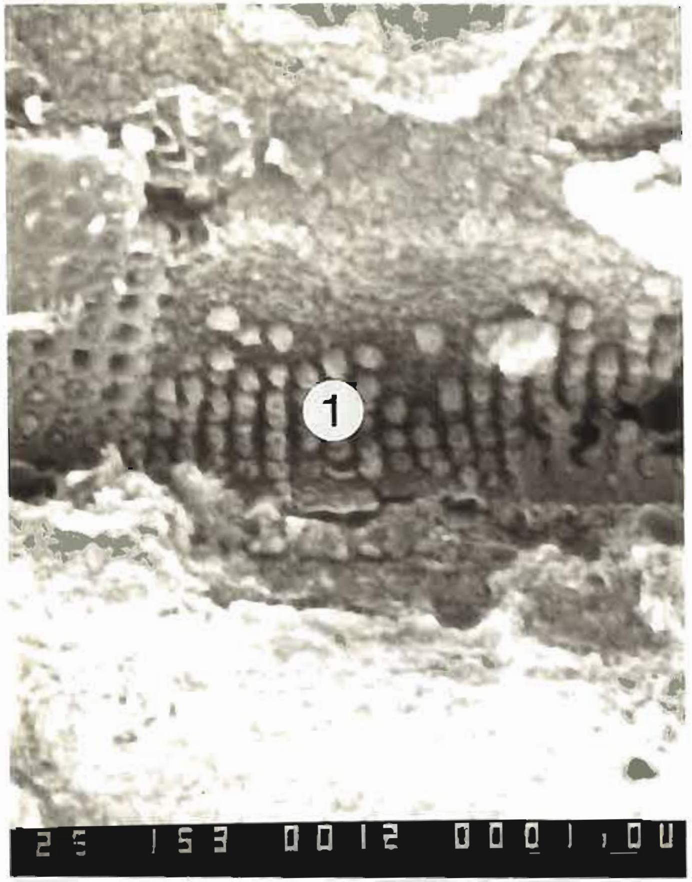
Area 2

Sample no.	Map (1:50000)	UTM X	UTM Y	Method
103	1915 IV	595.80	6695.90	SEI



Sample no.	Map (1:50000)	UTM X	UTM Y	Method
104	2017 II	344.20	6768.00	SEI

Smooth surface: Mn-phase

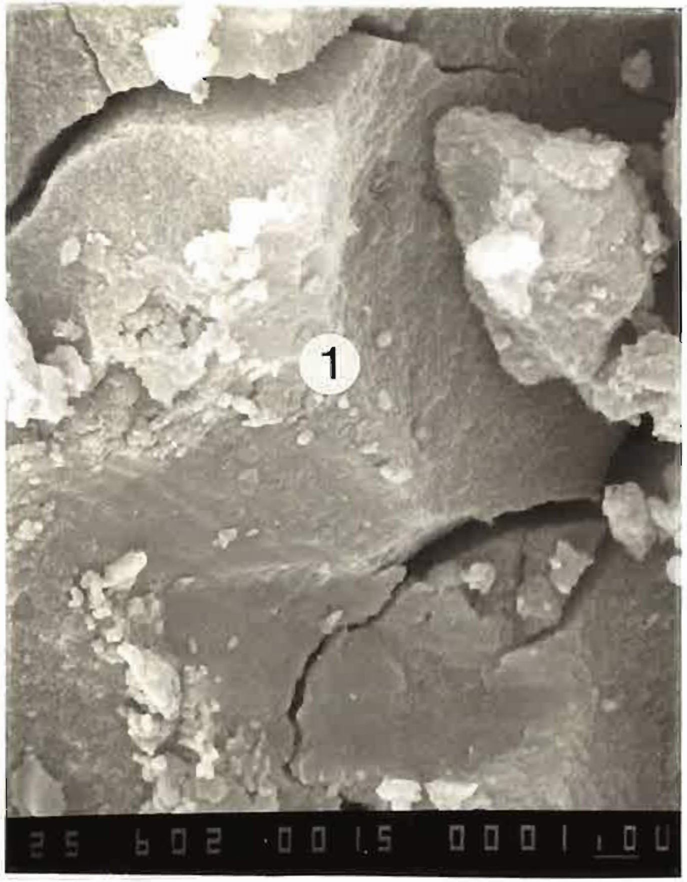


Area 1

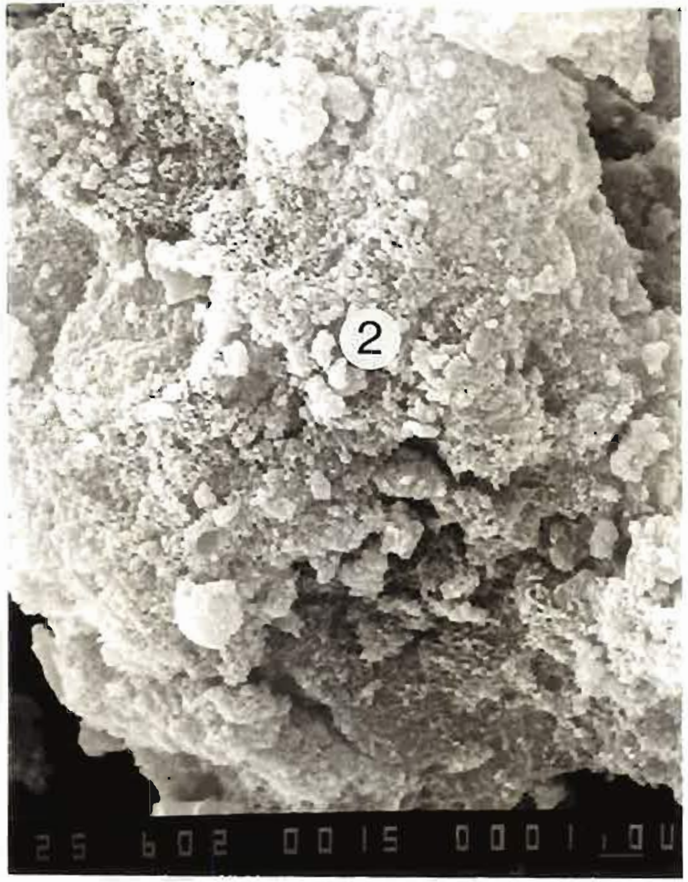
Rough surface: Mn-phase

Sample no.	Map (1:50000)	UTM X	UTM Y	Method
105	2017 III	650.70	6786.50	SEI

Point l. Smooth surface: Mn-phase
Point 2. Rough surface: Fe-Mn phase

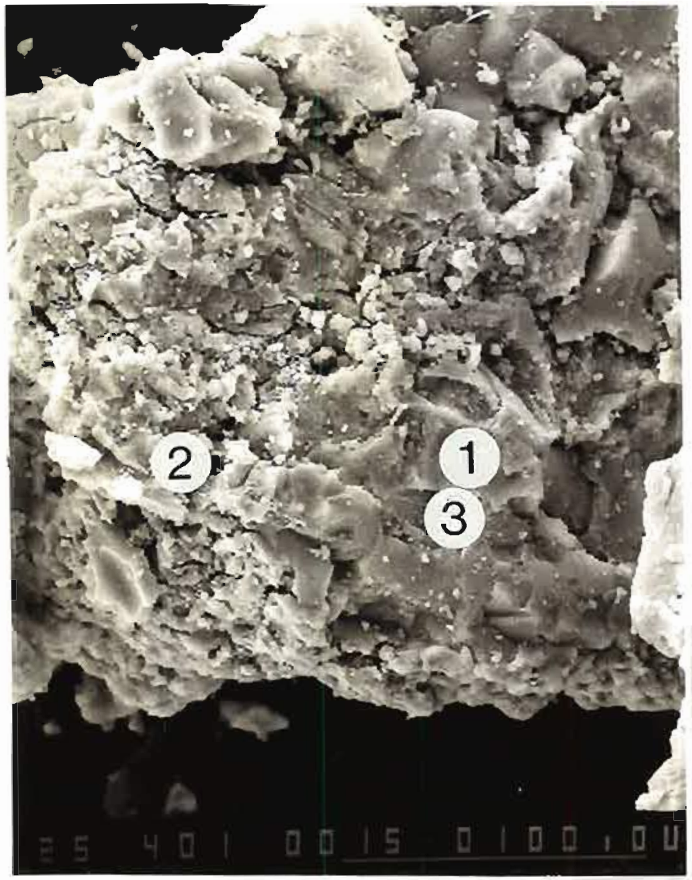


Area 1

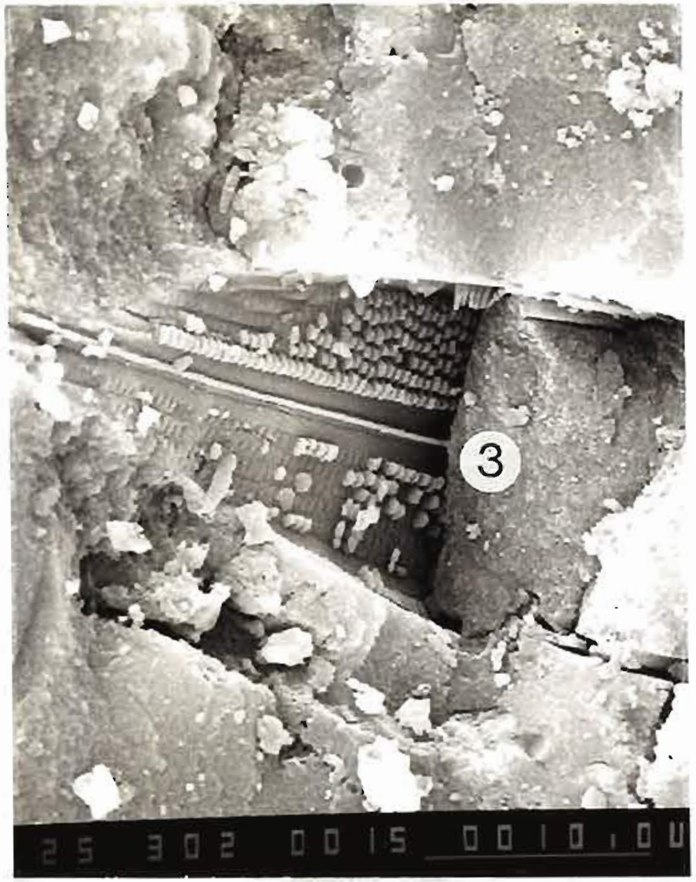


Area 2

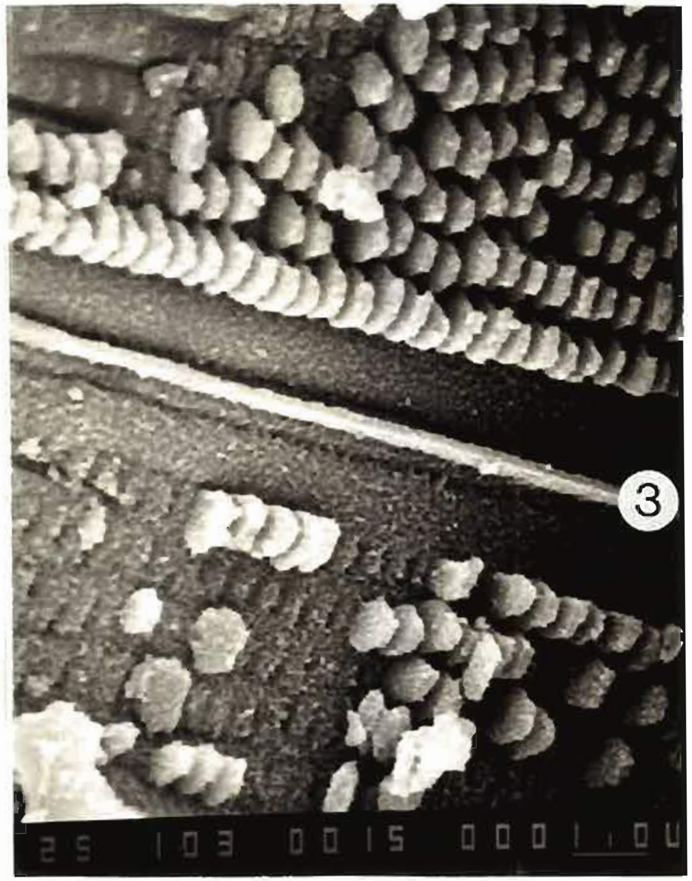
Sample no.
105 continue



Point 1. Smooth surface: Mn-phase (with minor Fe)
Point 2. Rough surface: Fe-phase (with minor Mn)



Area 3

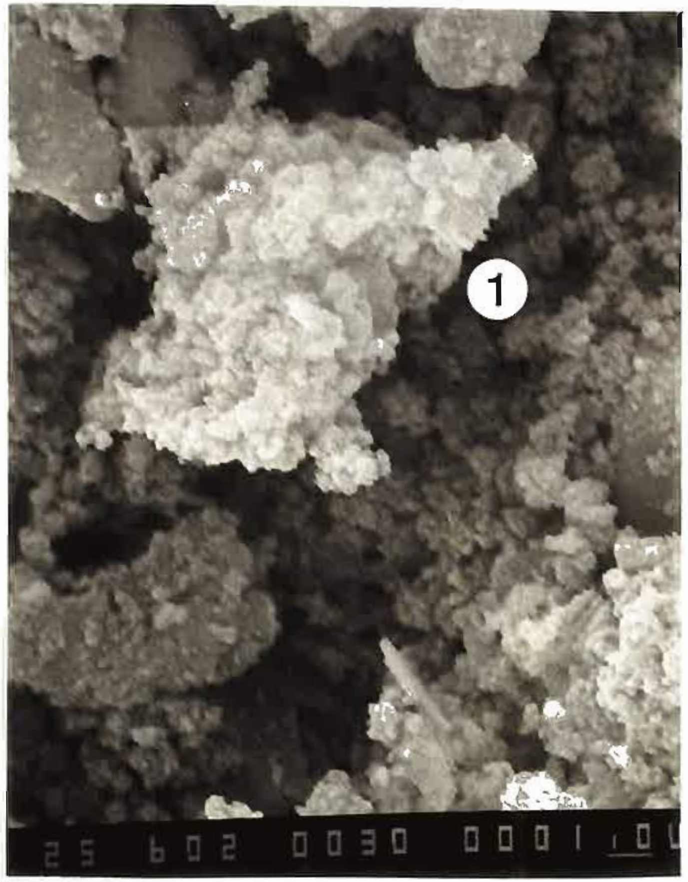


Area 3

Sample no.	Map (1:50000)	UTM X	UTM Y	Method
112	2015 IV	649.20	6693.70	SEI

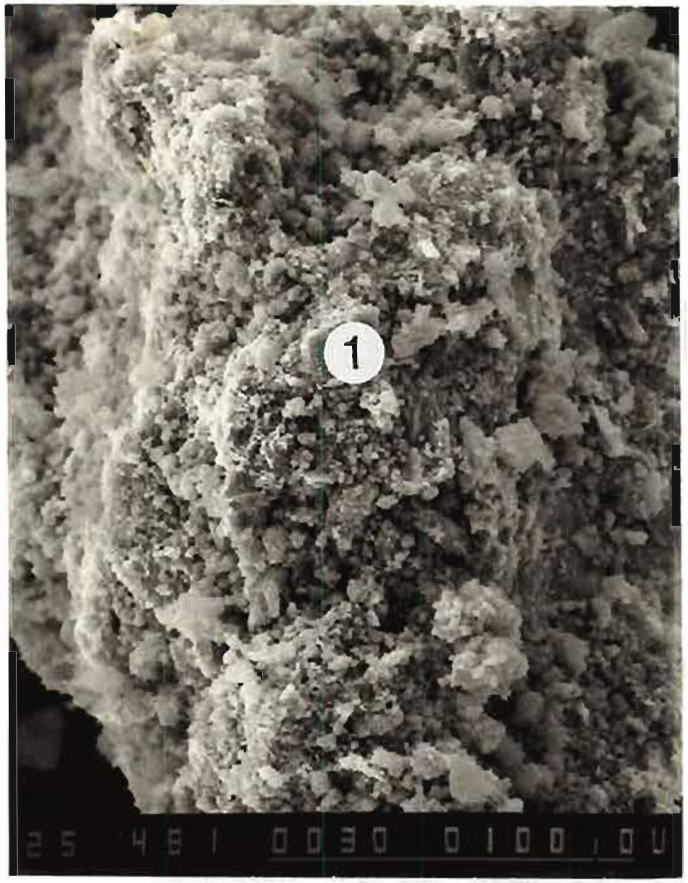
Rough surface: Fe-phase (with minor Mn)

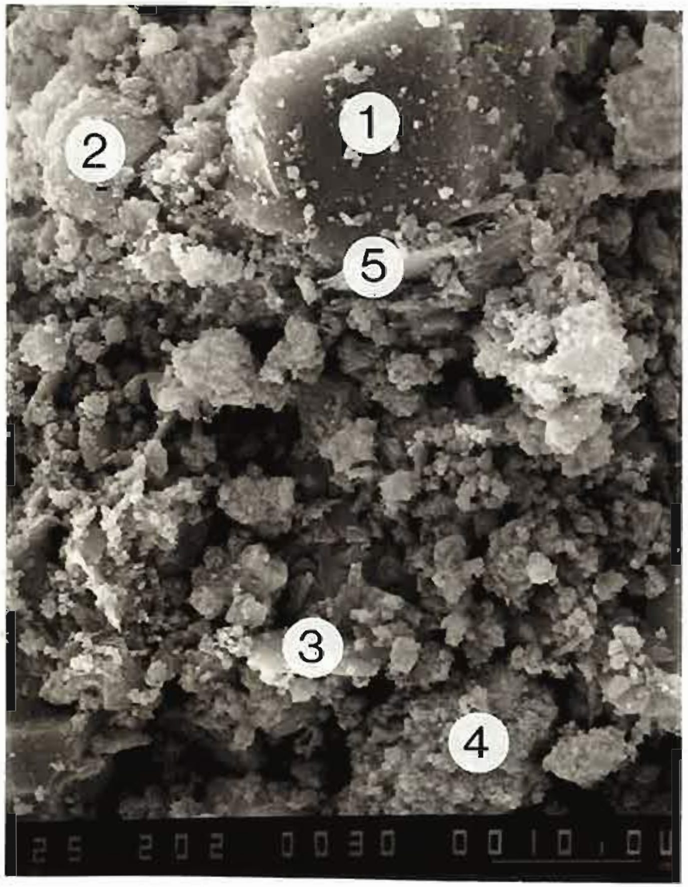
Area 1



Area 1

Sample no.
112 continue

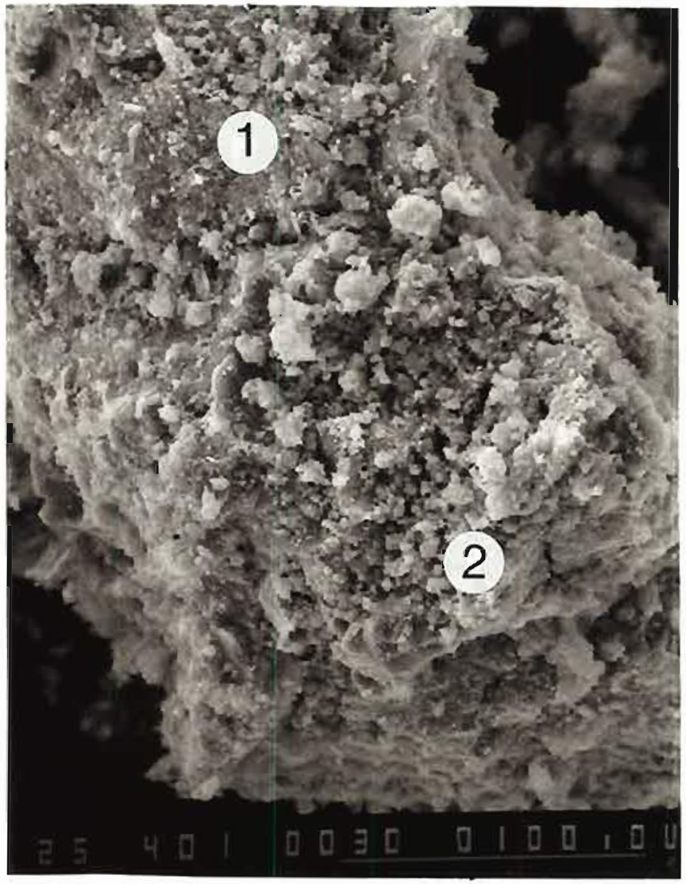




Area 1.
Point 1. Si-phase
Point 2. Fe-phase (with minor Si)
Point 3. Fe-phase (with minor Si)
Point 4. Fe-phase (with minor Mn)
Point 5. Fe-phase (with minor Mn)

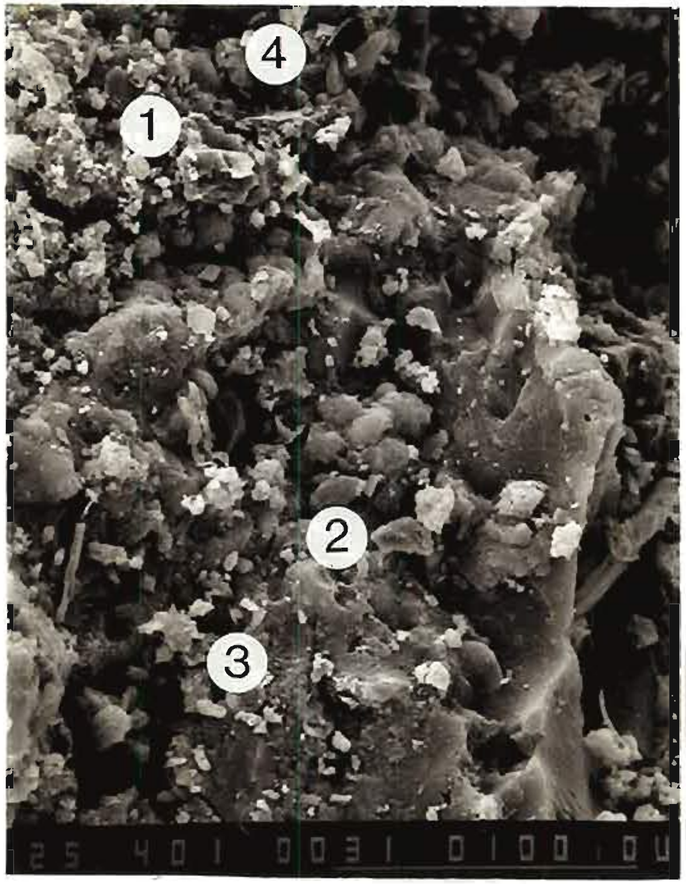
Area 5

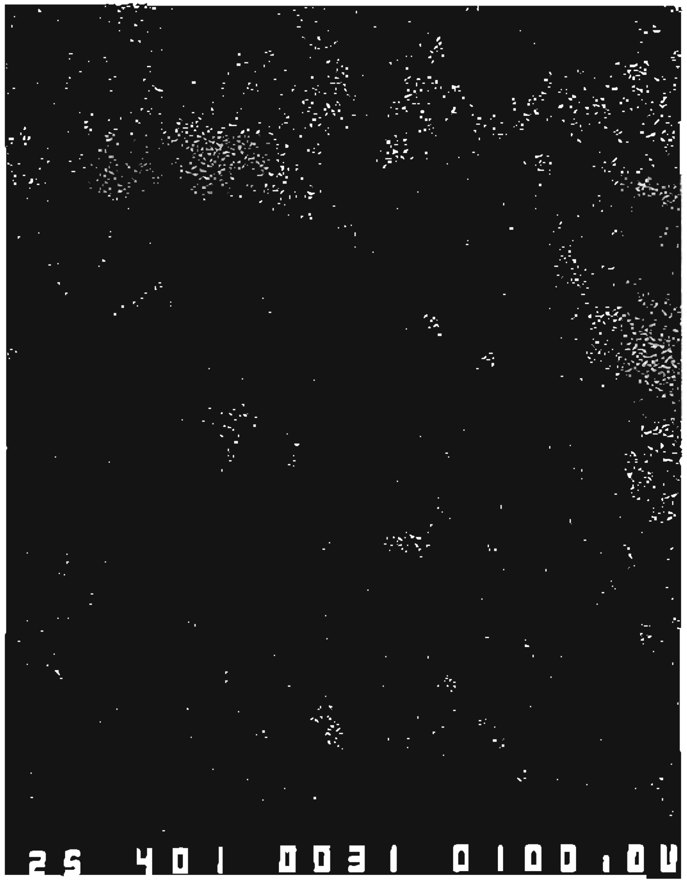
Sample no.
112 continue



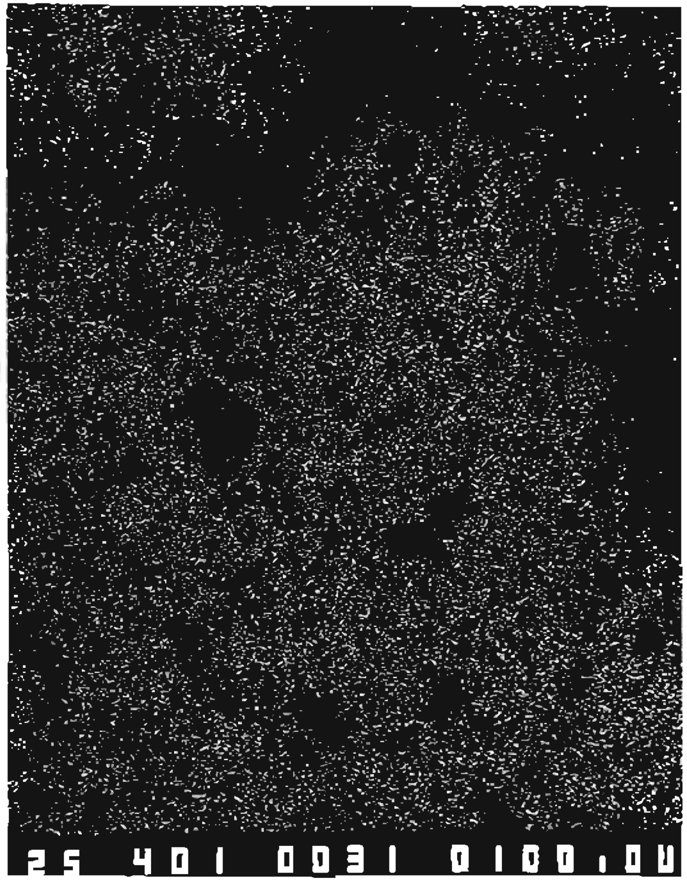
Point 1. Fe-Mn phase
Point 2. Fe-Mn phase

Sample no.	Map (1:50000)	UTM X	UTM Y	Method
113	2015 IV	649.20	6693.70	SEI





X-ray image
Si



X-ray image
Mn

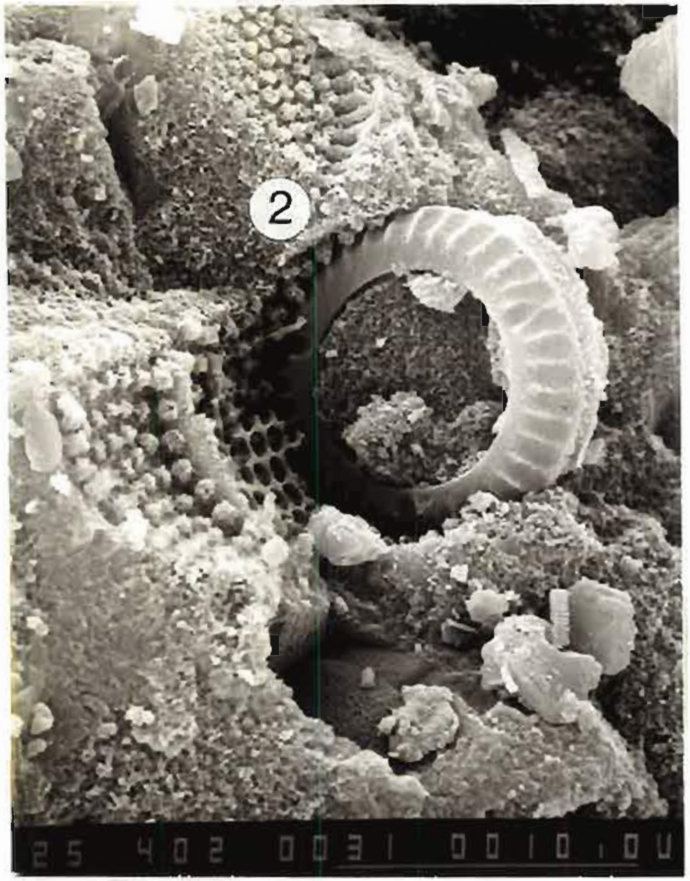
Sample no.
113 continue

Area 1

Area 1

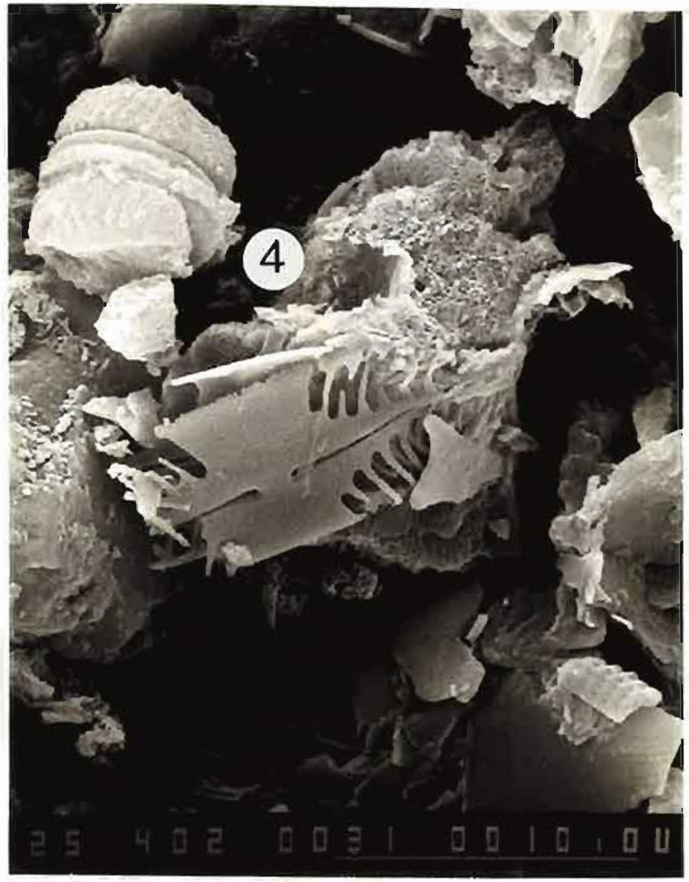
Area 1

Sample no.
113 continue



Area 2

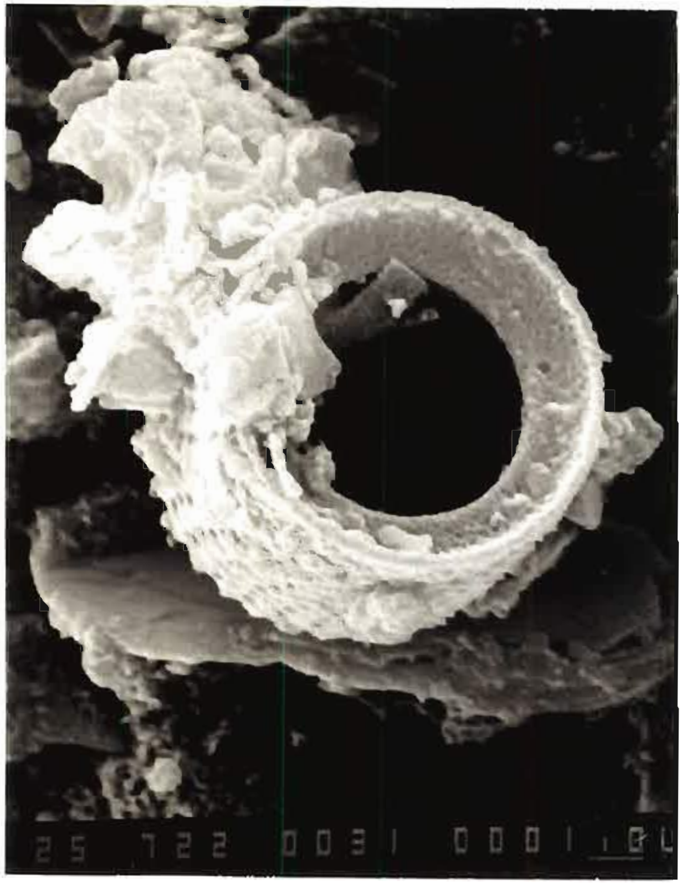
Area 3



Area 4

NGU-report 86.169. FIGURE 3.10

Sample no.
113 continue



NGU-report no. 86.169

OXIDATES AS A GEOCHEMICAL SAMPLING MEDIUM IN GRANITIC TERRAIN.

APPENDIX II.

Project no. 2249.

Norges geologiske undersøkelse

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Oslokontor, Drammensveien 230, Oslo 2 - Tlf. (02) 50 25 00

Rapport nr. 86.169	ISSN 0800-3416	Åpen/Fortrolig til XXXXXXXX

Tittel:
Oxidates as a geochemical sampling medium in granitic terrain.

APPENDIX II.

Forfatter:	Oppdragsgiver:
Siv Kjeldsen	EF
Fylke: Akershus, Oppland, Hedmark	**Kommune:**
Kartbladnavn (M. 1:250 000) Hamar	**Kartbladnr. og -navn (M. 1:50 000)** 1915 IV Hurdal, 2015 IV Odalen
Forekomstens navn og koordinater:	**Sidetall:** **Pris:** **Kartbilag:**

Feltarbeid utført:	Rapportdato:	Prosjektnr.:	Prosjektleder:
1984/1985	February 1987	2249	Rolf Tore Ottesen

Sammendrag:
The main objective for the project is to develope a geochemical method for exploration of ores associated with granitic rocks.

Oxidates were sampled in streambeds and lakes from 114 localities in Southeastern Norway. 65 of these localities are situated in the northern Oslo Graben.
The samples were examined mineralogically and chemically by a variety of methods. Geochemical maps of the element content in oxidates show regional distribution patterns for several elements.

Sampling and analysis of oxidates can be used in exploration for mineralizations such as the Skrukkelia Mo-deposit in the northern Oslo Graben. New anomalies (especially for Zn and W) have been detected.

Appendix I contain description of samples, chemical and mineralogical determinations performed on the samples, backscattered electron image-, X-ray image- and scanning electron image pictures of the oxidate preparates.

Appendix II contain spectral plots, point analysis with the microprobe, X-ray diffractograms, analytical results, correlation coefficient matrix, scatterplots, frequency distributions and information on data storage.

Appendix III contain maps of the element content in oxidates.

Emneord	Metode	Jern
Geokjemi	Geologisk undersøkelse	Mangan
Fagrapport	Noduler	Kjemisk analyse

CONTENT, APPENDIX 2.

FIGURES:

6.6 Sample 101
6.7 Sample 102
6.8 Sample 103
6.9 Sample 104
6.10 Sample 105
6.11 Sample 106
6.12 Sample 107
6.13 Sample 108
6.14 Sample 109
6.15 Sample 110
6.16 Sample 111 B
6.17 Sample 112
6.18 Sample 113
6.19 Sample 114
6.20 Sample 115
6.21 Sample 116
6.22 Sample 117
6.23 Sample 118
6.24 Sample 119
6.25 Sample 120
6.26 Sample 121
6.27 Sample 122
6.28 Sample 123
6.29 Sample 124
6.30 Sample 125
6.31 Sample 126
6.32 Sample 127
6.33 Sample 128
6.34 Sample 129

<u>Analytical results.</u>
(Sample no. 796-814 for the analytical results equals locality no. 96-114)

86.169-7.1 Results from the HCl-soluble ICP-analysis.
7.2 Results from the HNO_3-soluble ICP-analysis.
7.3 Results from the INAA analysis.
7.4 Total content of carbon,chlorine and sulphur. 71 samples have been analyzed by XRF for the sulphur and the chlorine content. 114 samples have been analyzed for the carbon content.
7.4 The content of mercury in 8 samples analyzed by the cold vapor method.
7.5 The content of water in 14 samples.

<u>Correlation coefficient matrix:</u>

86.169-8.1 Correlation coefficients for 32 HCl-soluble constituents in 114 oxidates from Southeastern Norway. Values > 0.32 are significant at $p < 0.001$.
8.2 Correlation coefficients for 32 HCl-soluble constituents in 63 oxidates from Hurdal. Values > 0.41 are significant at $p < 0.001$.
8.3 Correlation coefficients for 29 HNO_3-soluble constituents in 86 oxidates from Southeastern Norway. Values >0.36 are significant at $p < 0.001$.
8.4 Correlation coefficients for 29 constituents (total content) in 90 oxidates from Southeastern Norway.

Values > 0.34 are significant at $p < 0.001$.

8.5 Correlation coefficients for 32 constituents (total content) in 70 oxidates from Southeastern Norway. Values > 0.38 are significant at $p < 0.001$.

<u>Scatterplots, HCl-soluble data, N=114, Southeastern Norway:</u>

86.169-9.1 Al,As,Ba and Be versus Fe and Mn .
9.2 Ca,Cd,Co and Cr versus Fe and Mn .
9.3 Cu,K,La and Li versus Fe and Mn .
9.4 Mg,Mo and Na versus Fe and Mn. Fe versus Mn.
9.5 Ni,P,Pb and Rb versus Fe and Mn.
9.6 Sb,Sc,Si and Sn versus Fe and Mn.
9.7 Sr,Th,Ti and U versus Fe and Mn.
9.8 V,W,Y and Zn versus Fe and Mn.
9.9 Zr versus Fe and Mn.

<u>Scatterplots, HCl-soluble data, N=63, Hurdal:</u>

86.169-10.1 Ba,Cd,Co and Cr versus Fe and Mn.
10.2 La,Li and Mg versus Fe and Mn. Fe versus Mn.
10.3 Mo,Ni,P and Si versus Fe and Mn.
10.4 Sr,Th,U and V versus Fe and Mn.
10.5 W, Y and Zn versus Fe and Mn.

<u>Scatterplots, HNO_3-soluble data, N=86, Southeastern Norway.</u>

86.169-11 Ce versus La. Ce,La,Mo and Zn versus Fe and Mn.

<u>Scatterplots between Fe, Mn and the water content in oxidates. Southeastern Norway N=14, Hurdal N=8.</u>

86.169-12.1 H_2O^- and H_2O^+ versus H_2OTot, H_2O^+ versus H_2O^- and Fe versus Mn.
12.2 Fe and Mn versus H_2OTot and H_2O^-.
12.3 Fe and Mn versus H_2O^+.

<u>Scatterplots between the 3 strongest correlations for the HCl-extract, HNO_3-extract and the total content in oxidates:</u>

86.169-13.1 W versus Zn, U versus Mn and Cd versus Zn.
13.2 La versus Ce, La versus Zn and Cd versus Zn.
13.3 Yb versus Lu, Sm versus Tb and Nd versus Tb.

<u>Frequency distribution, Southeastern Norway:</u>

86.169-14.1 Al,As,Ba,Be,Ca,Cd,Co,Cr,Cu and Fe. HCl-soluble data, N=114.
14.2 K,La,Li,Mg,Mn,Mo,Na,Ni,P and Pb. HCl-soluble data, N=114.
14.3 Rb,Sc,Si,Sr,Th,Ti,U,V,W and Y. HCl-soluble data, N=114.
14.4 The HCl-soluble content of Zn and Zr, and the total content of C,Cl and S in oxidates.

Frequency distribution, Hurdal:

86.169-15.1 Al,As,Ba,Be,Ca,Cd,Co,Cr,Cu and Fe. HCl-soluble data, N=63.

15.2 K,La,Li,Mg,Mn,Mo,Na,Ni,P and Pb. HCl-soluble data, N=63.

15.3 Rb,Sc,Si,Sr,Th,Ti,U,V,W and Y. HCl-soluble data, N=63.

15.4 The HCl-soluble content of Zn and Zr, and the total content of C,Cl and S in oxidates.

Data storage, file information:

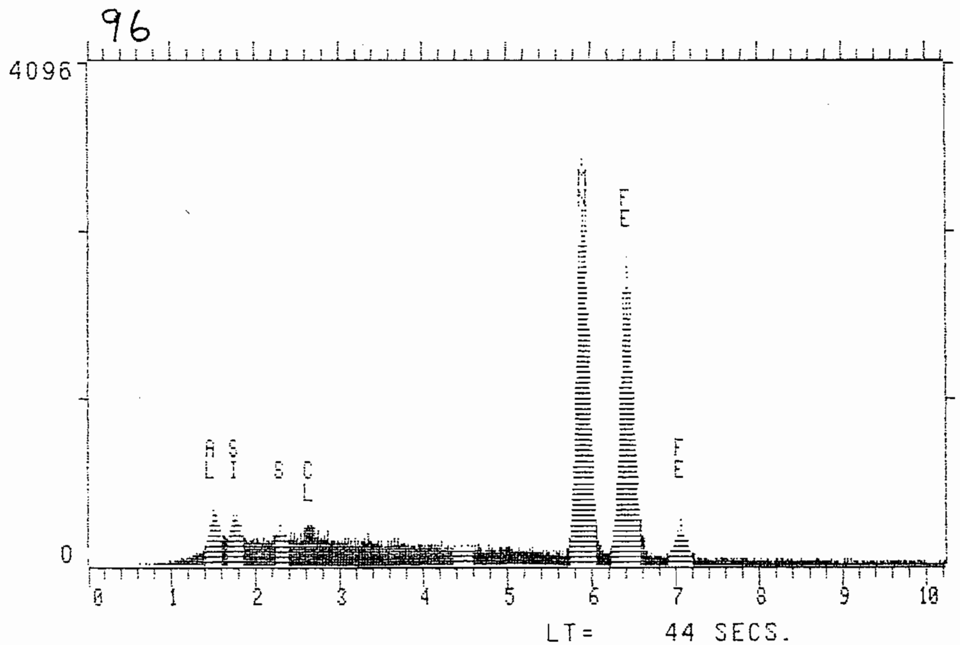
86.169-16.1 HCl-soluble data

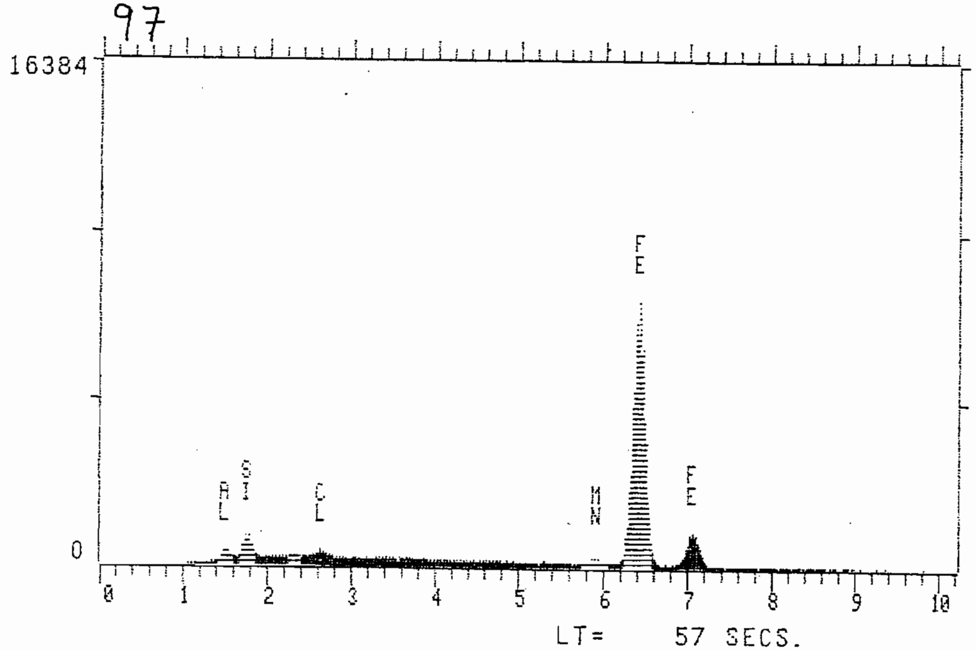
16.2 INAA-data

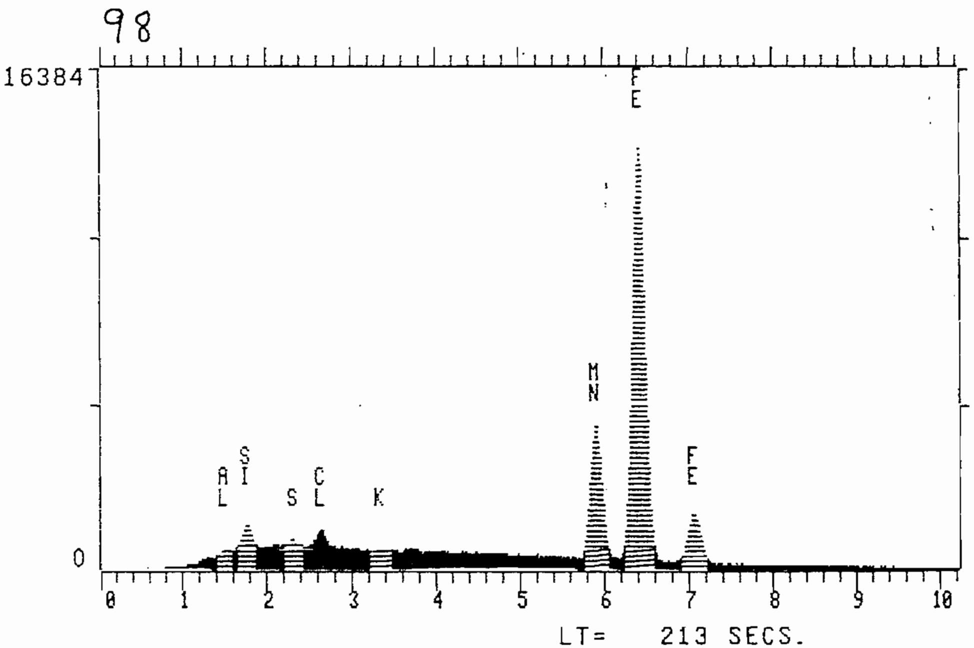
16.3 Carbon-content in 120 oxidates

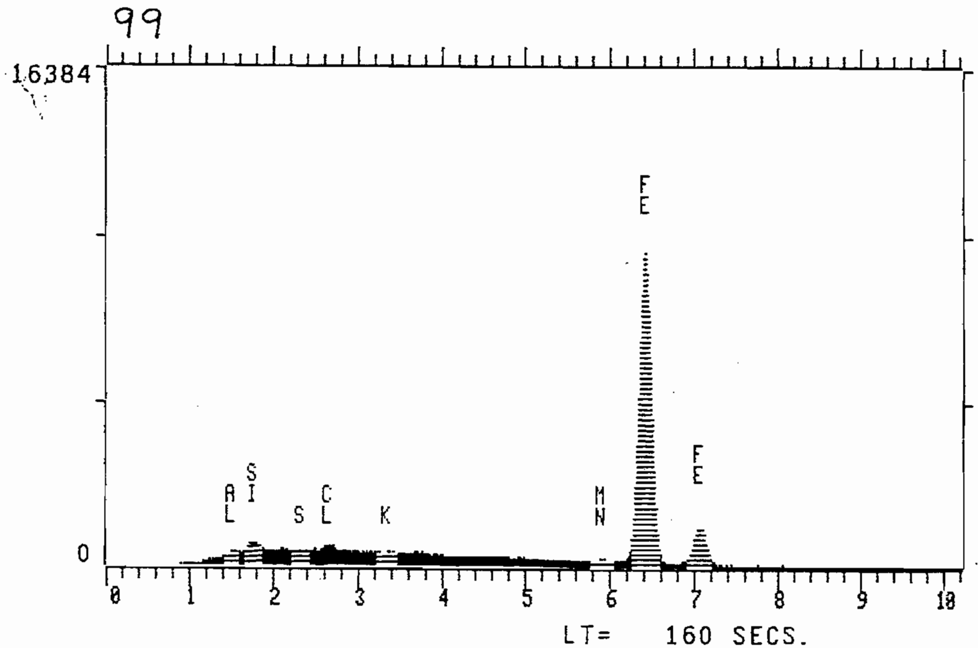
16.4 HNO_3-soluble data

16.5 The chlorine and the sulphur content in 71 oxidates

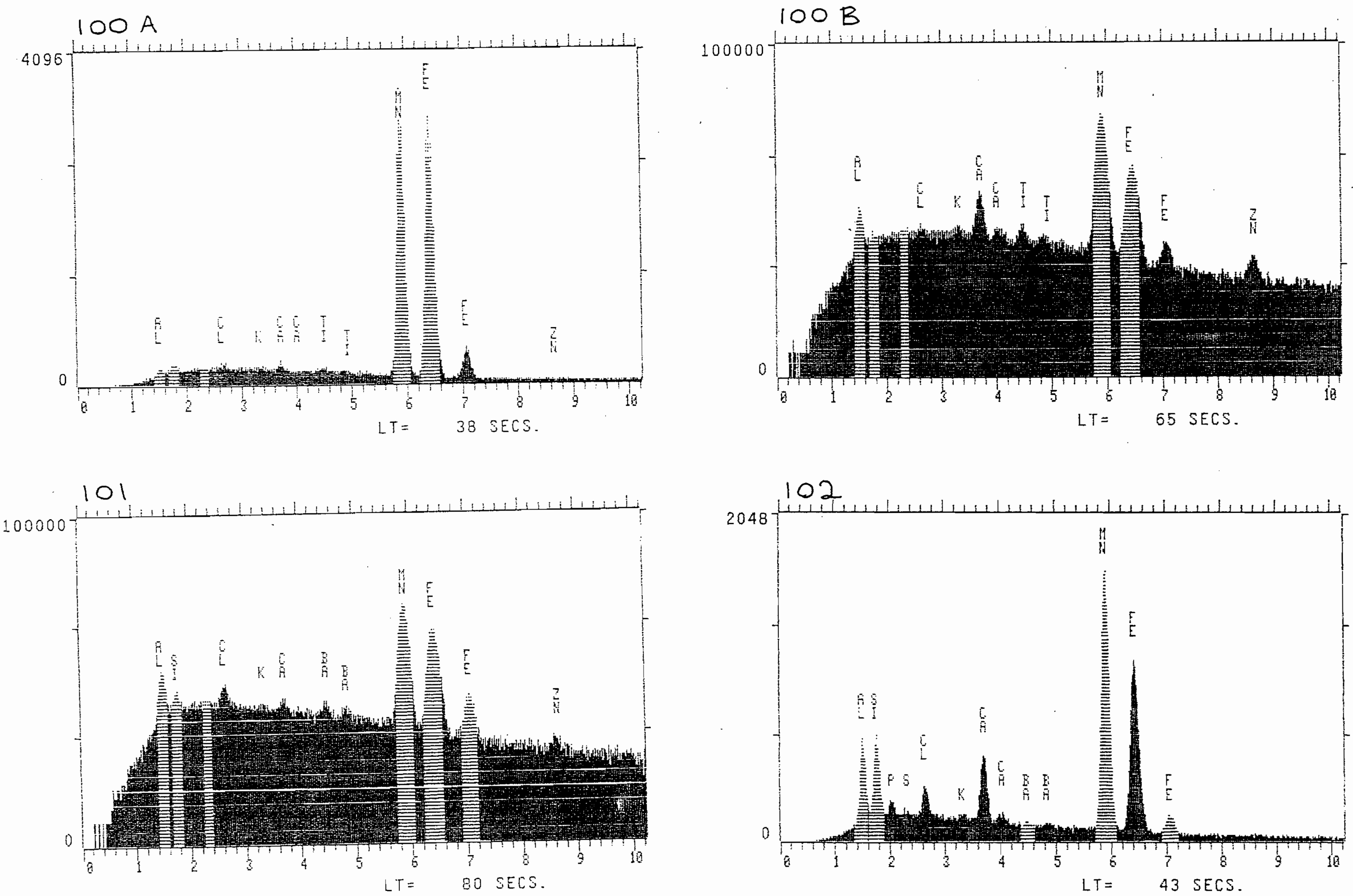




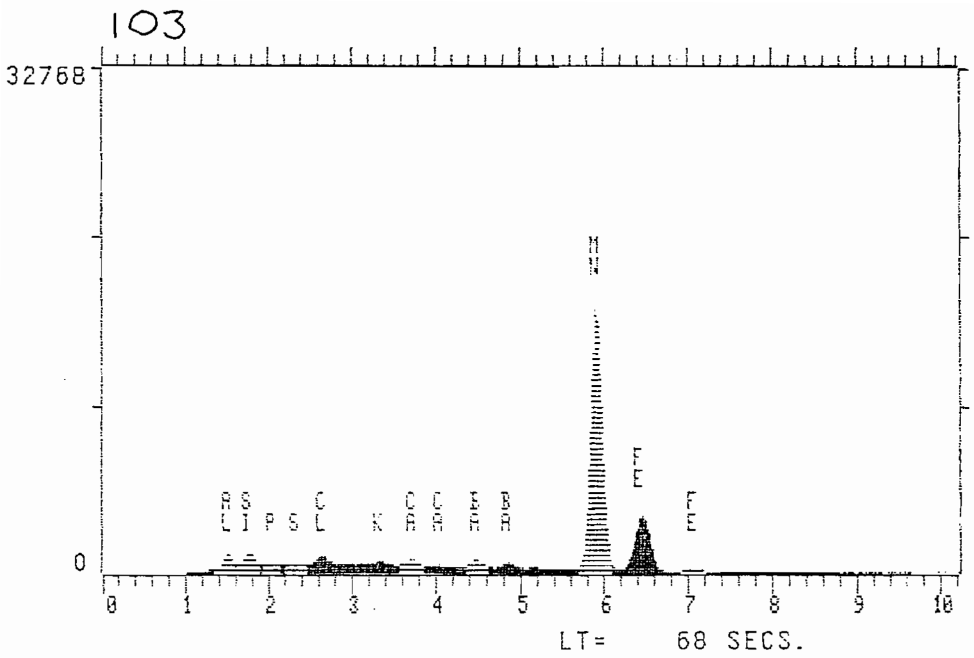


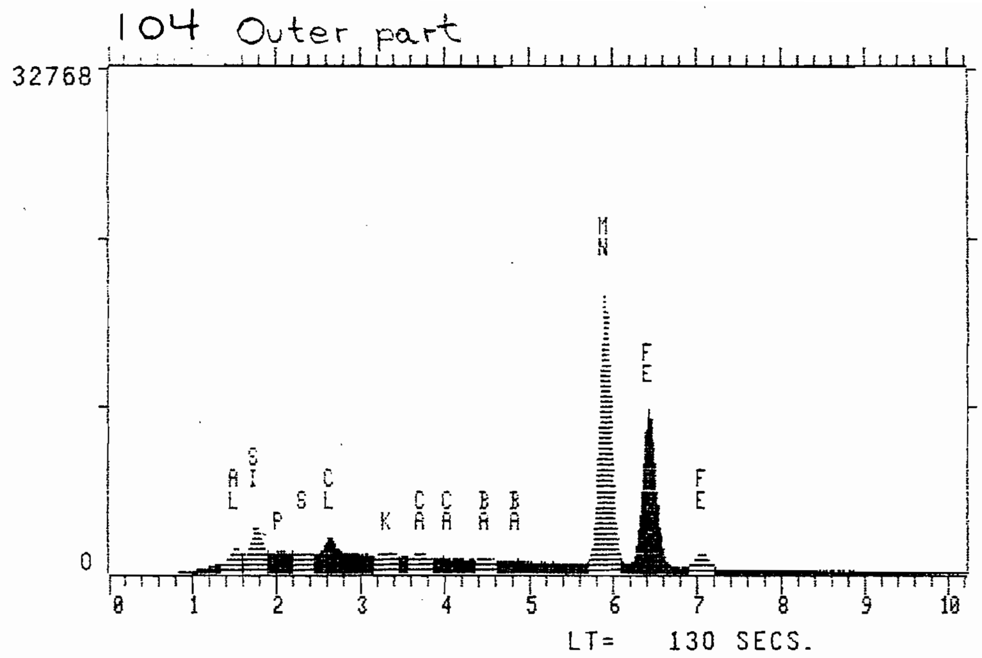


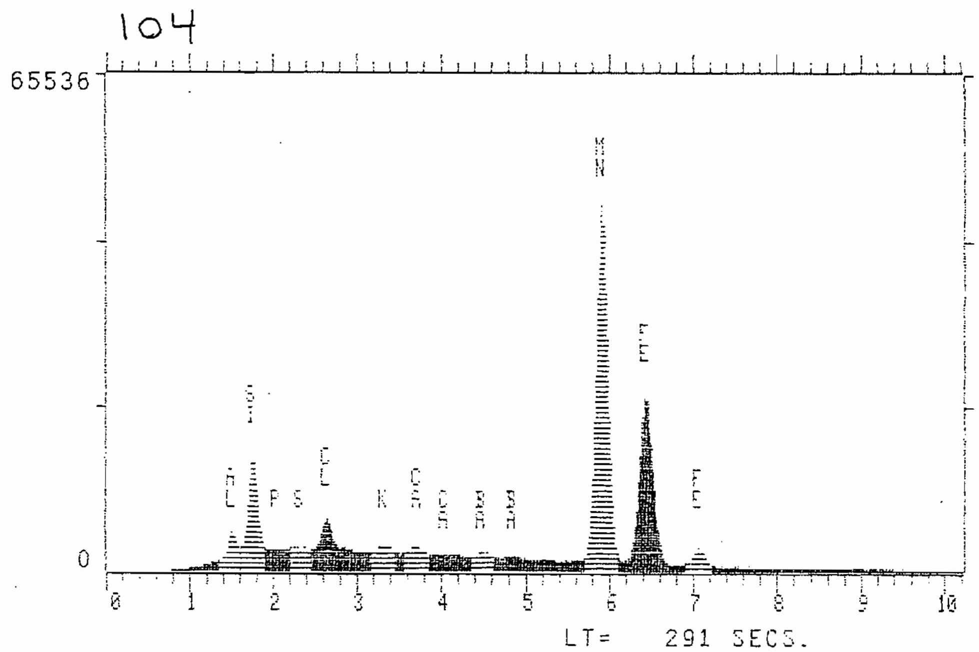
NGU-report 86.169. FIGURE 4.1 - 4.4

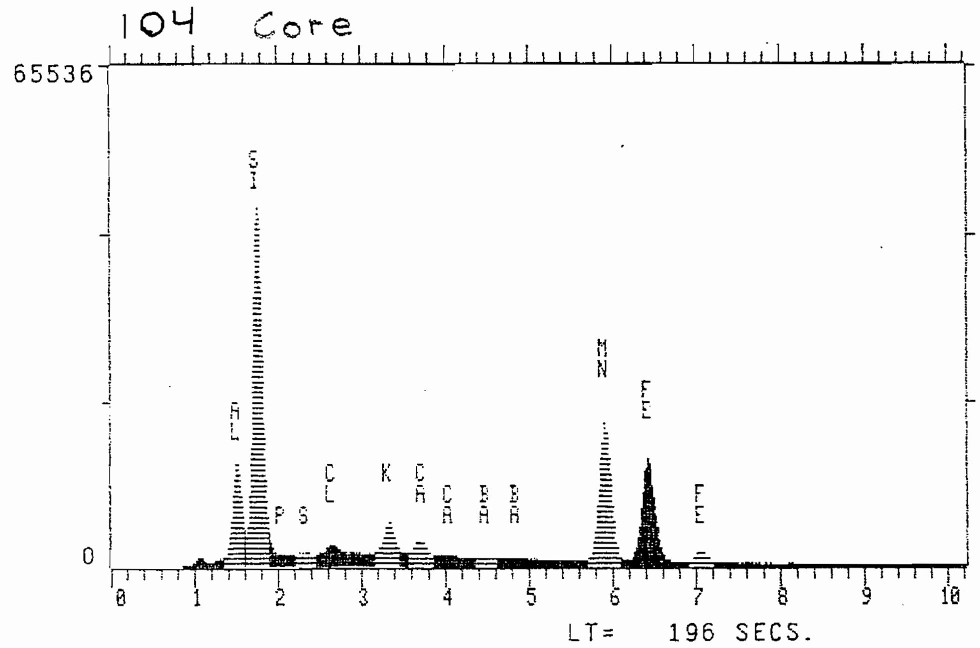


NGU-report 86.169. FIGURE 4.5 - 4.7



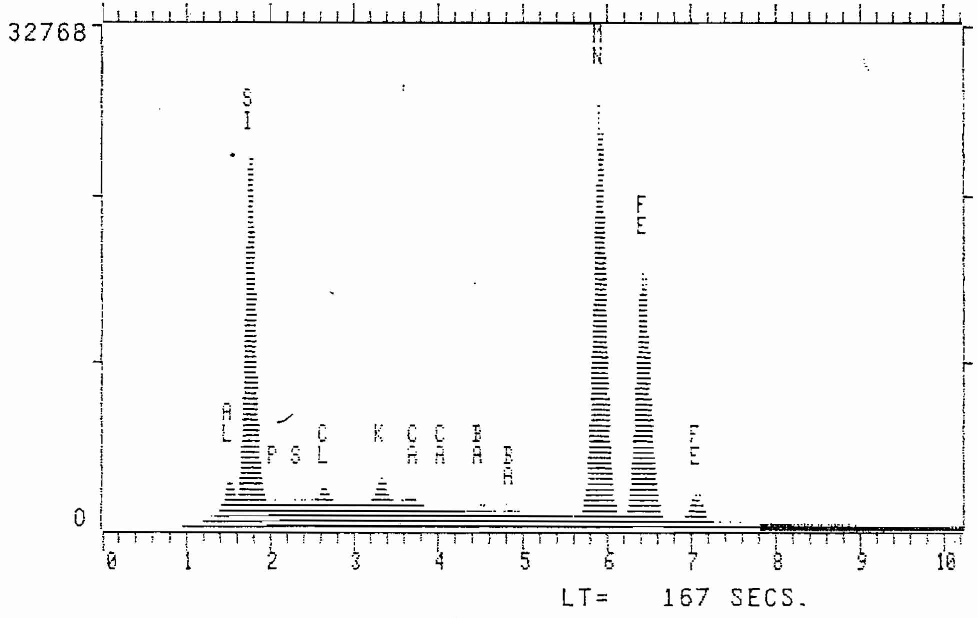




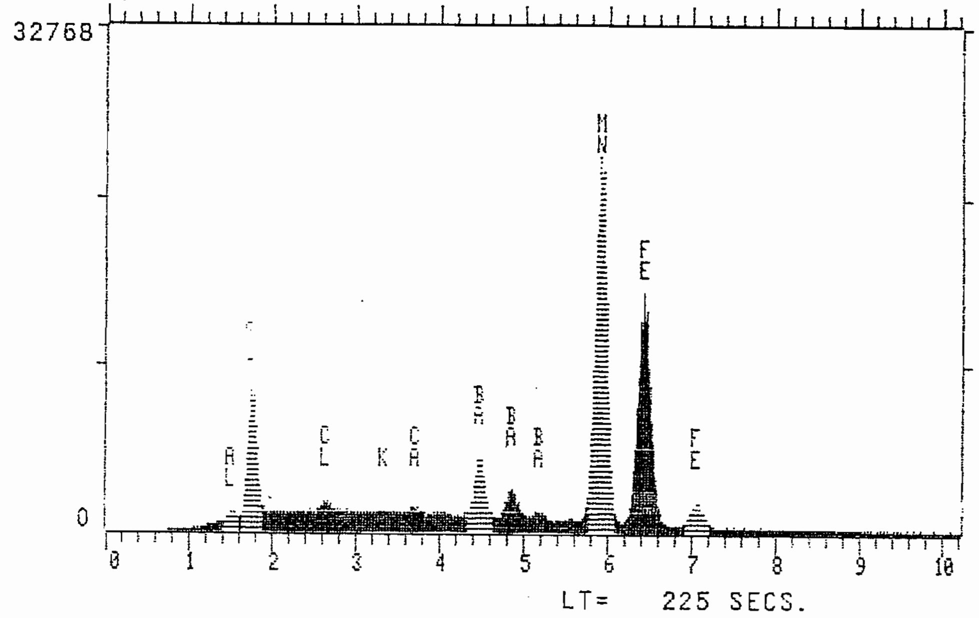


NGU-report 86.169. FIGURE 4.8 - 4.9

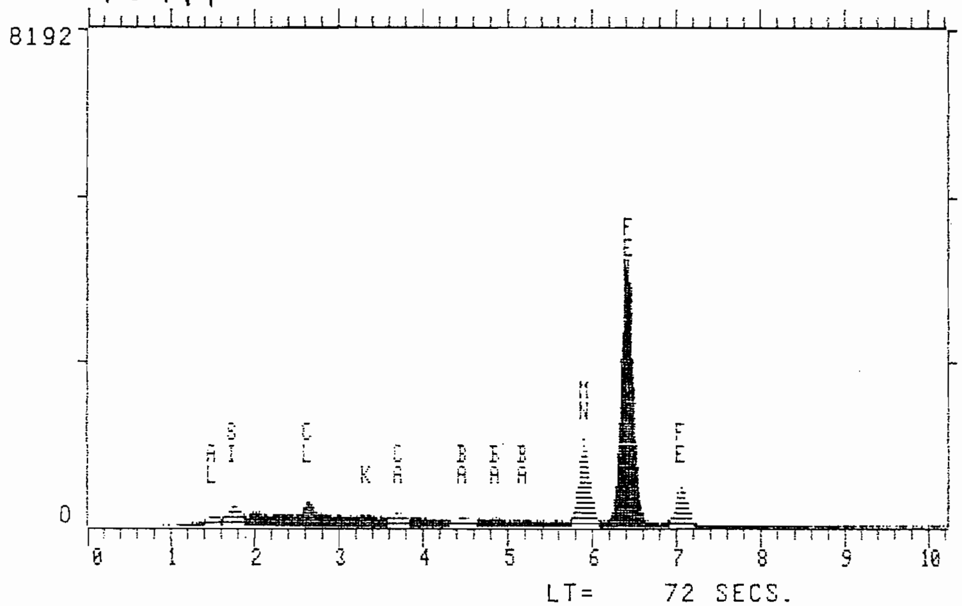
105



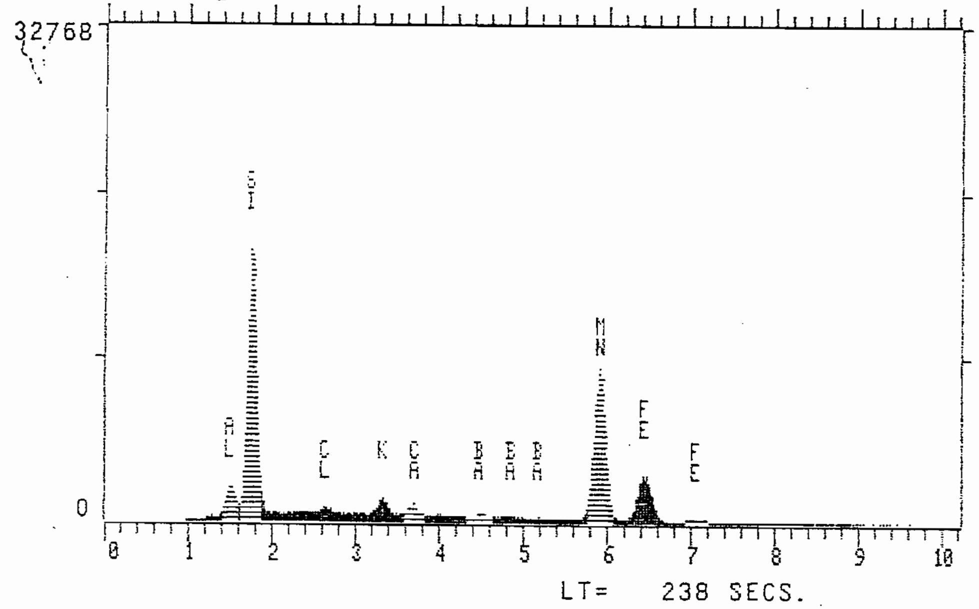
106



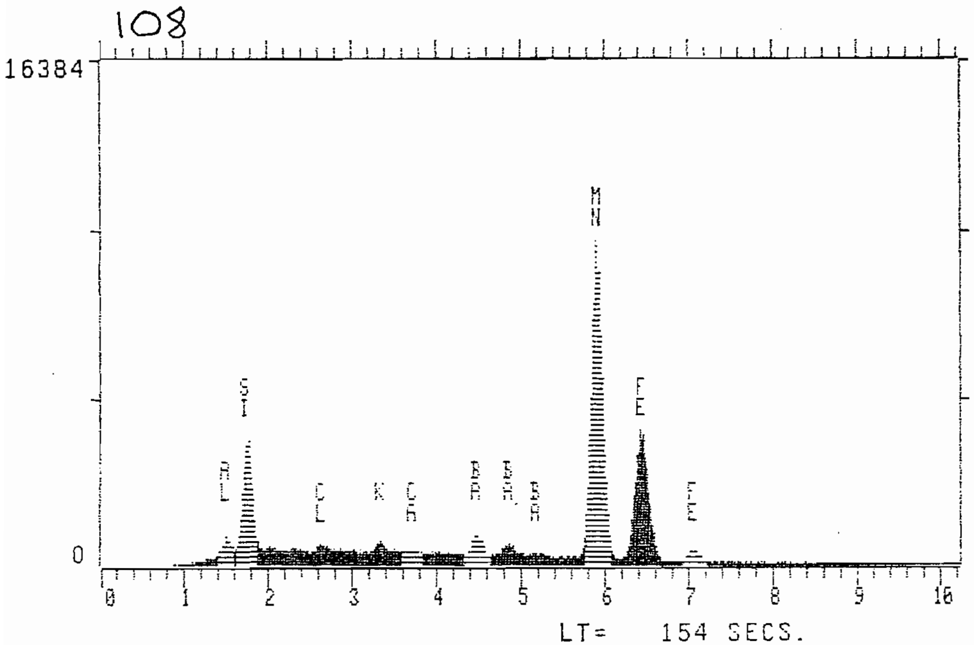
107A

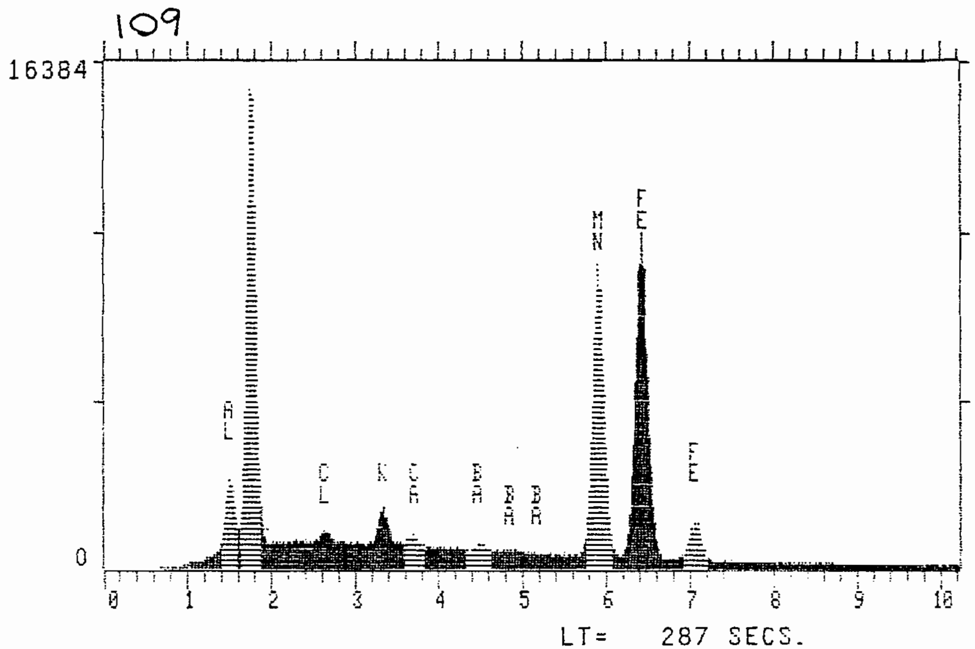


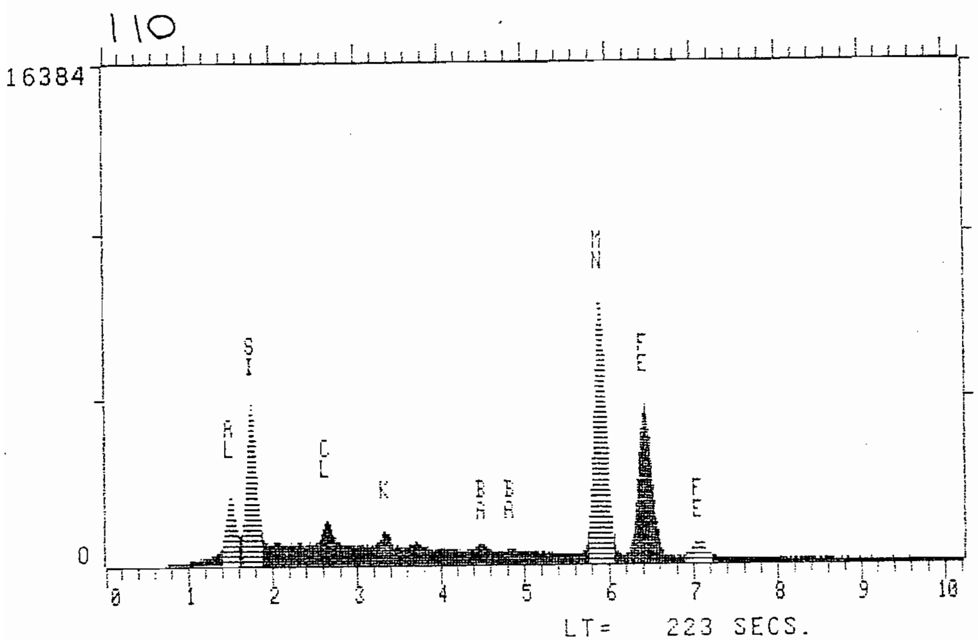
107 B

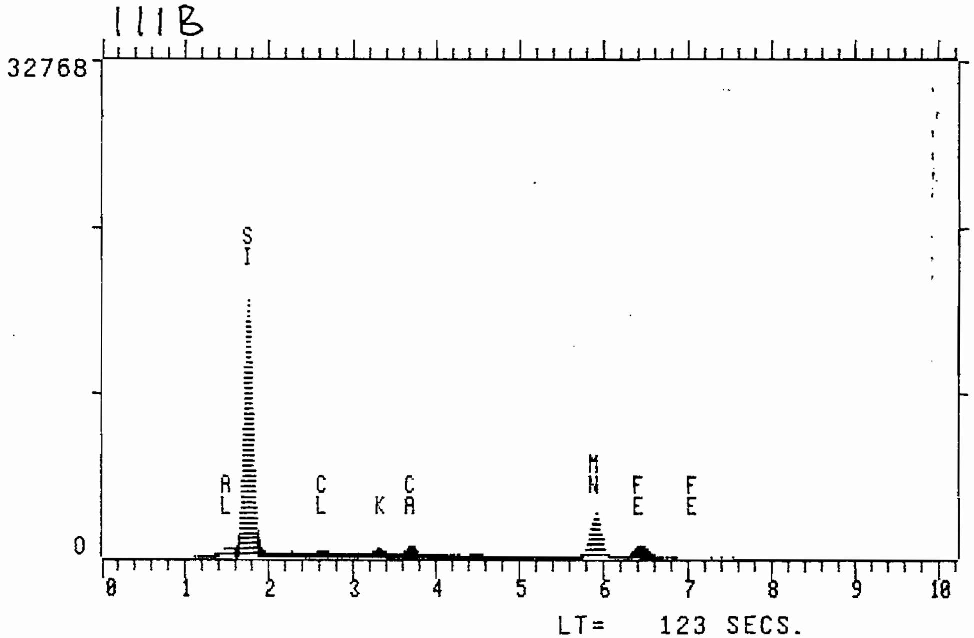


NGU-report 86.169. FIGURE 4.10 - 4.12

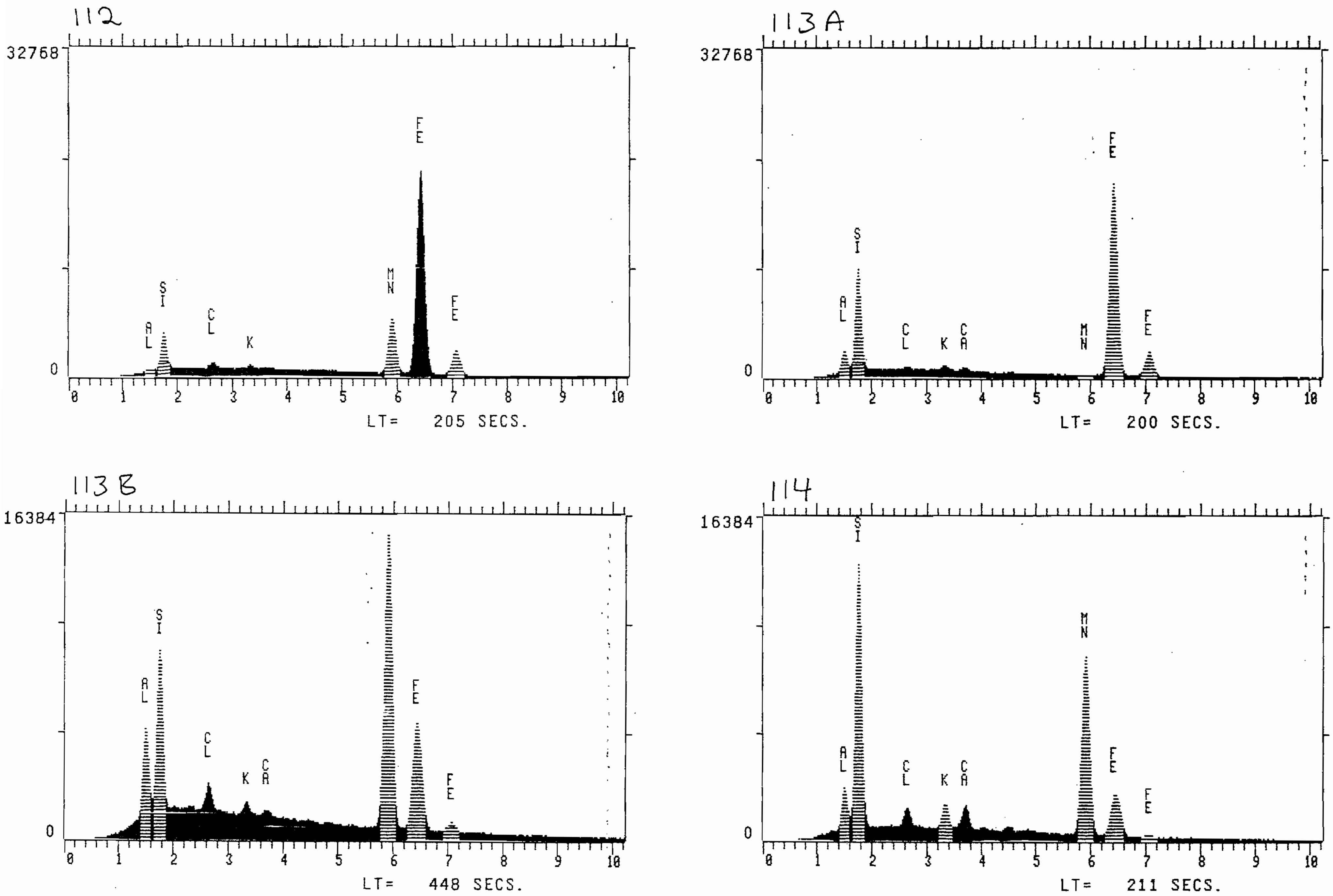




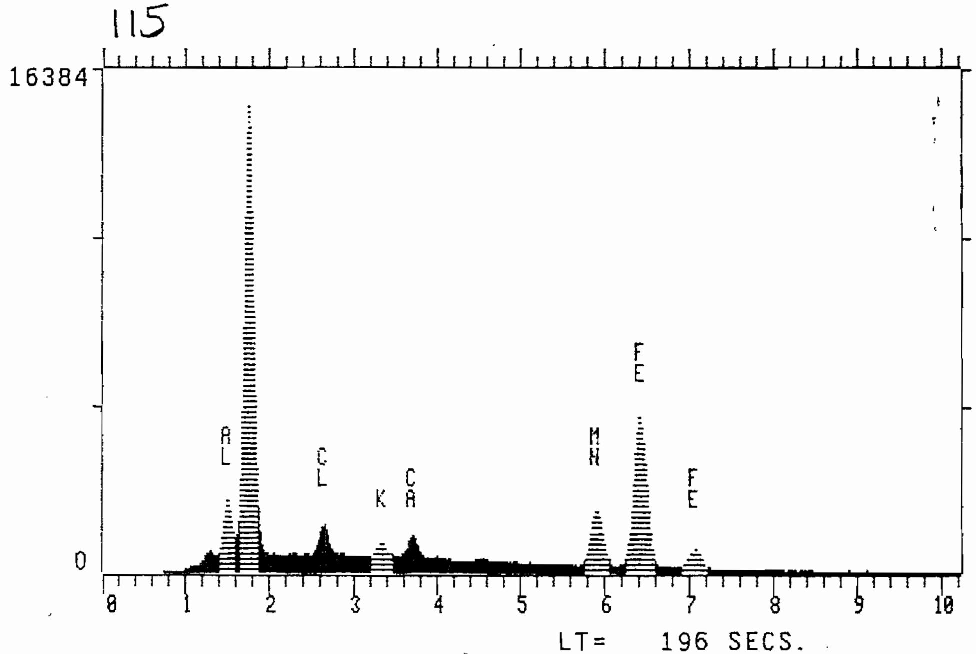


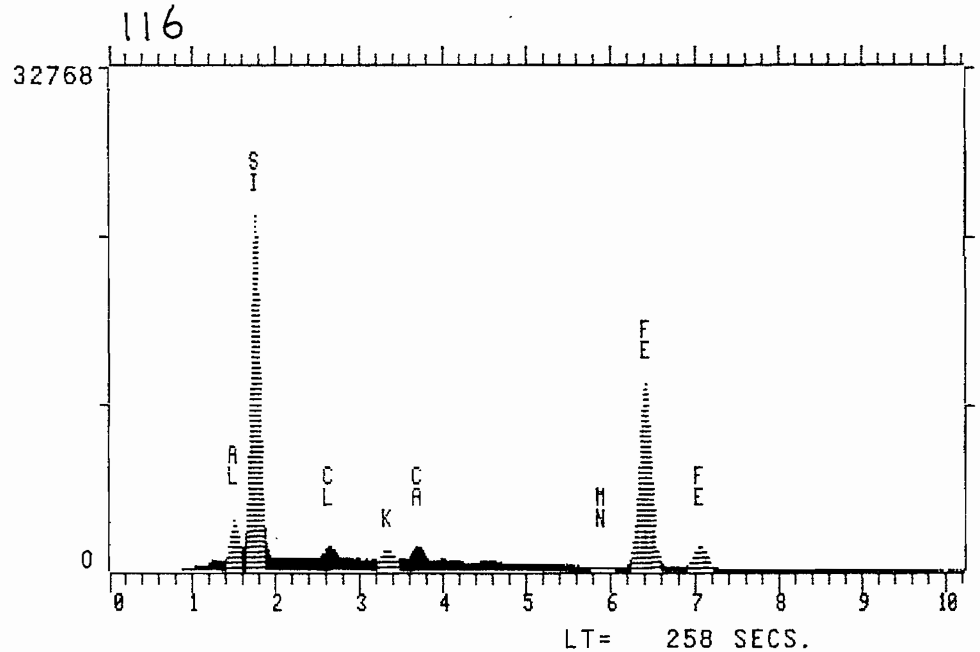


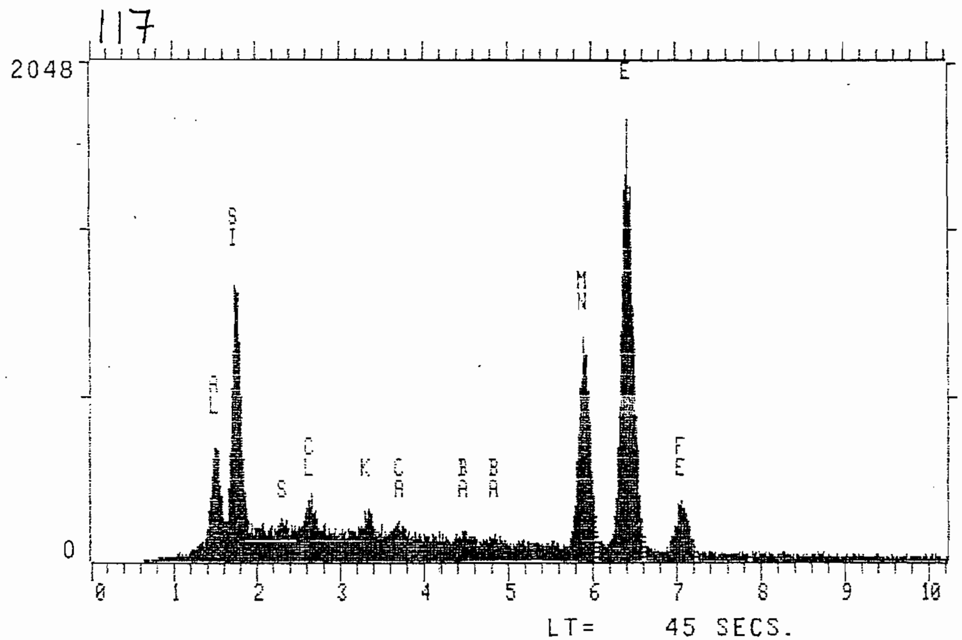
NGU-report 86.169. FIGURE 4.13 - 4.16

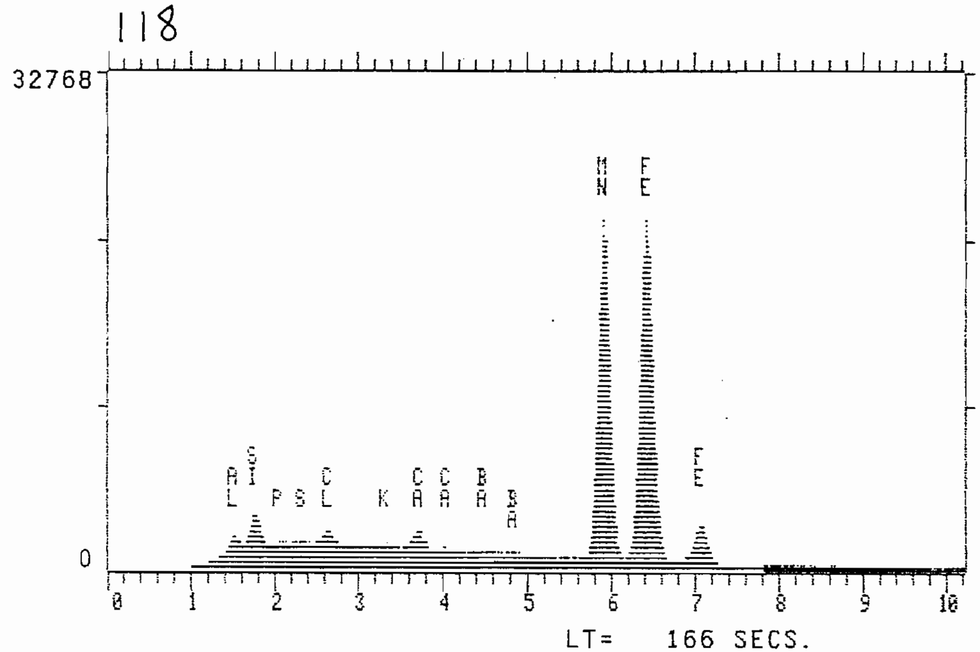


NGU-report 86.169. FIGURE 4.17 - 4.19



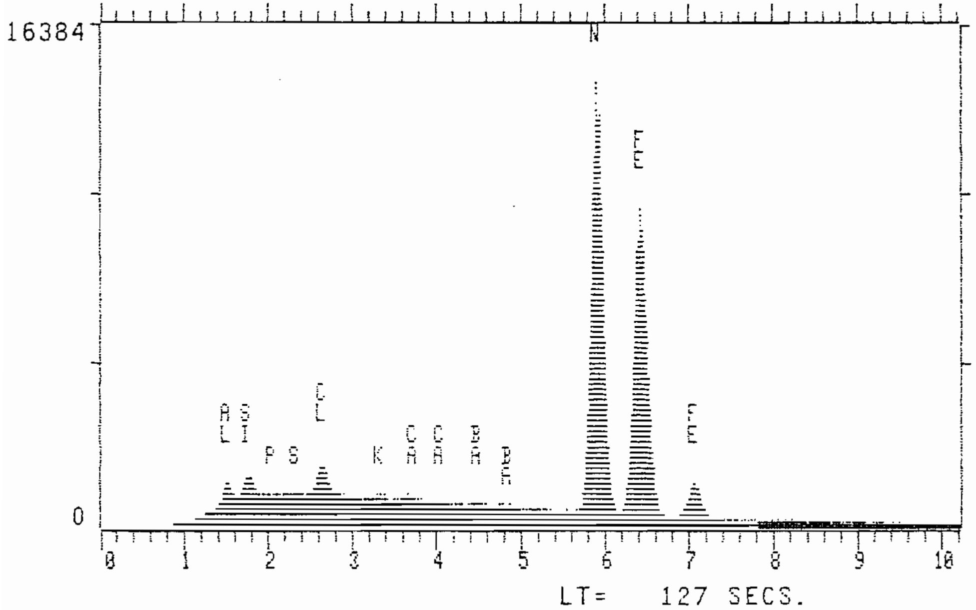




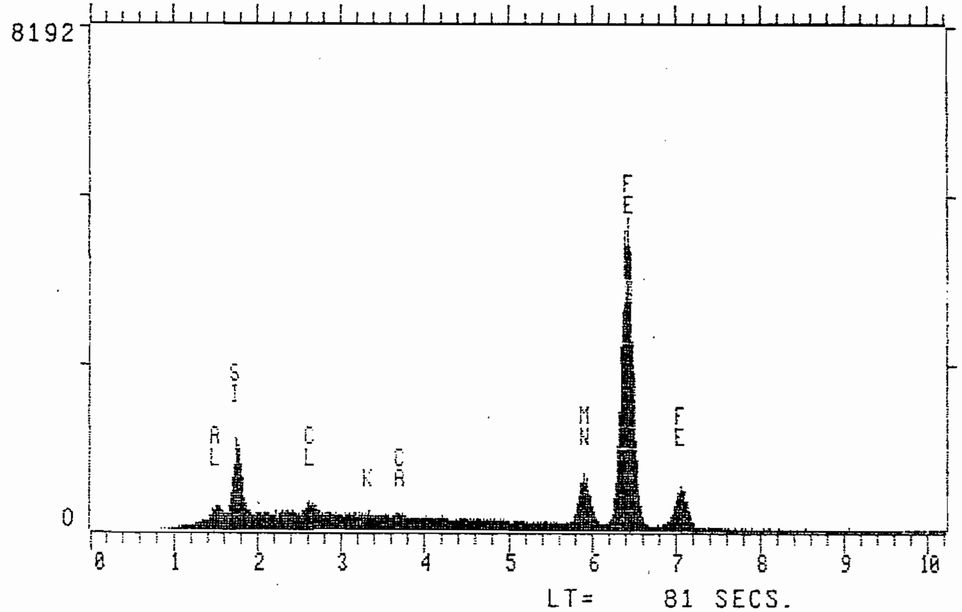


NGU-report 86.169. FIGURE 4.20 - 4.23

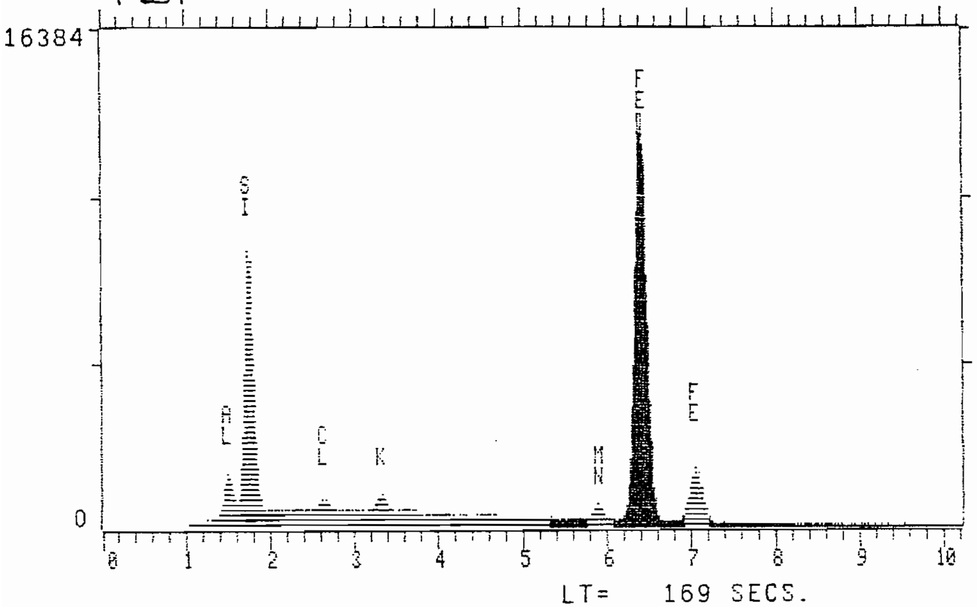
119



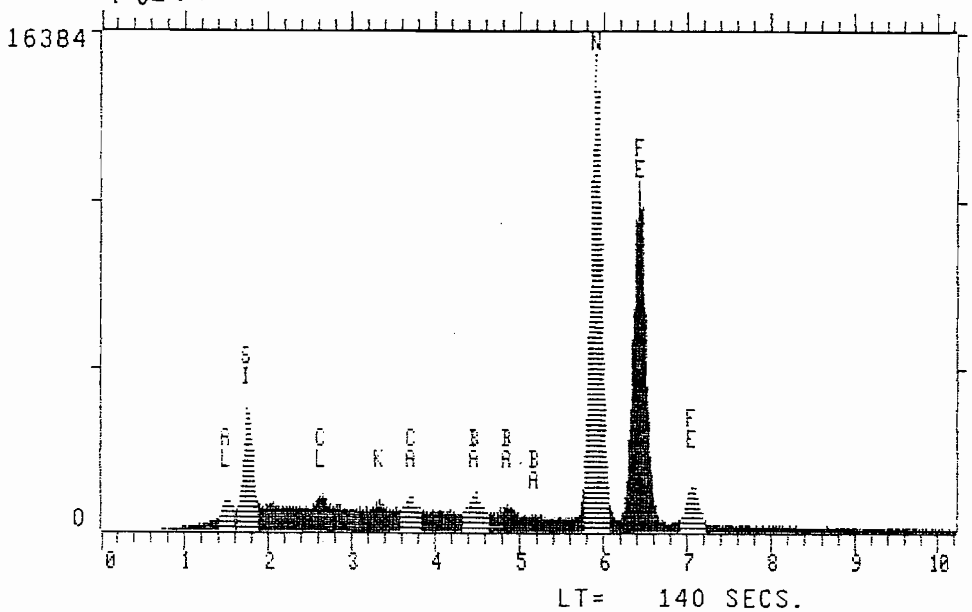
120



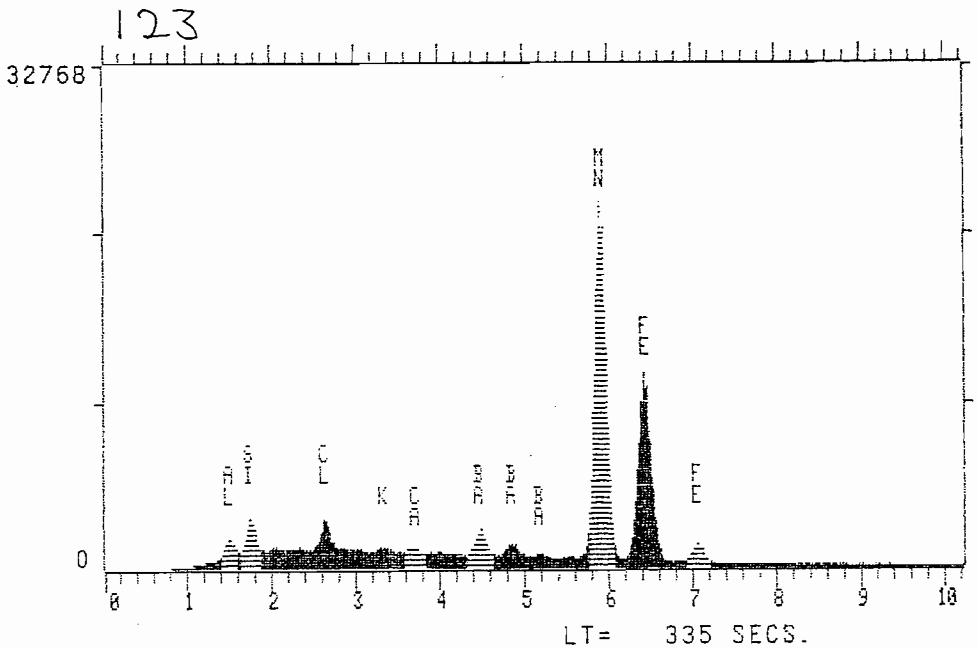
121

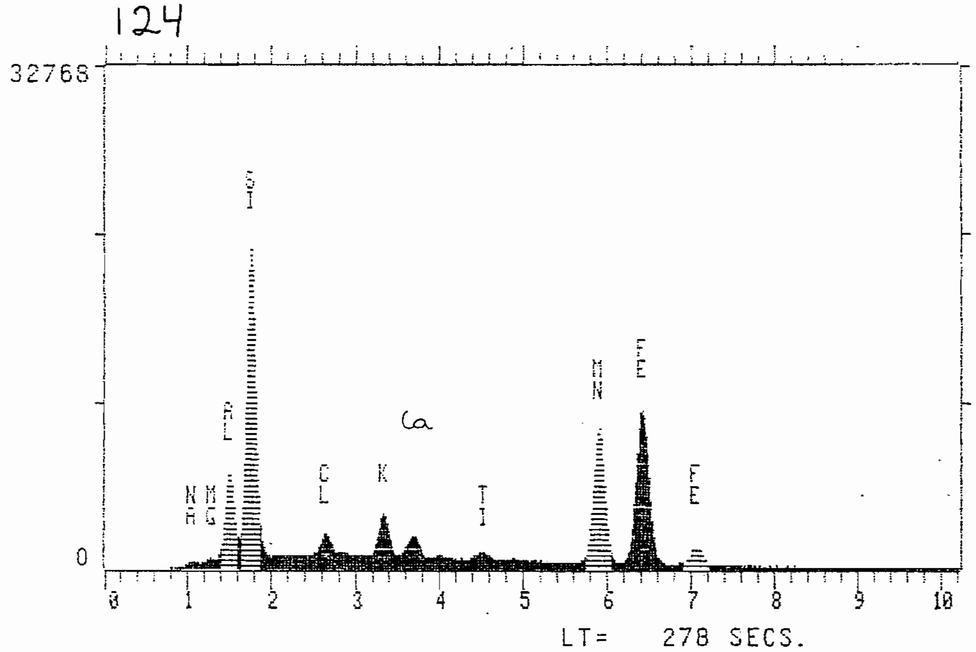


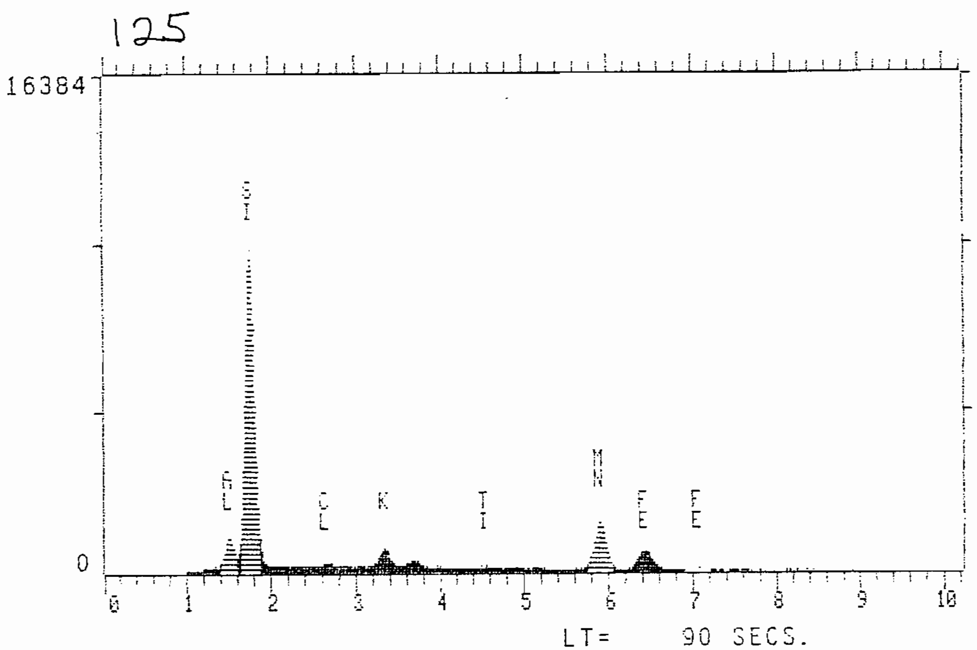
122

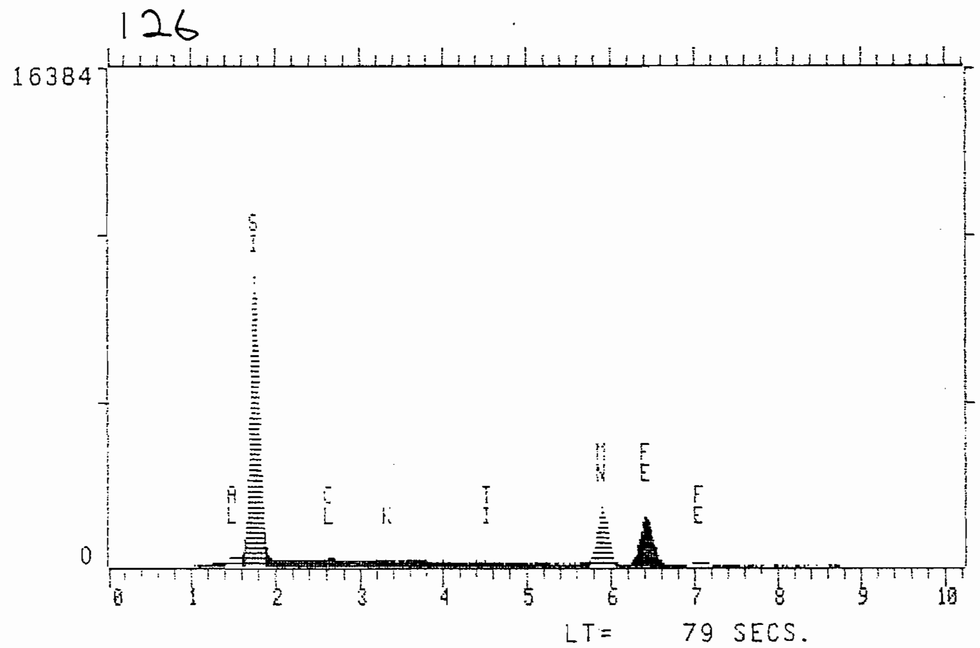


NGU-report 86.169. FIGURE 4.24 - 4.27

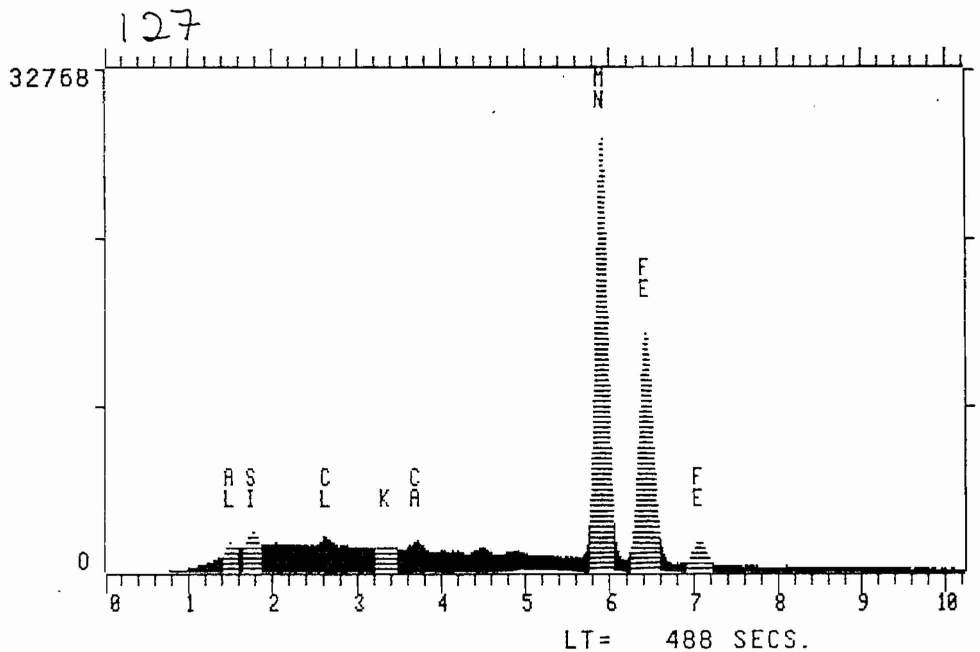


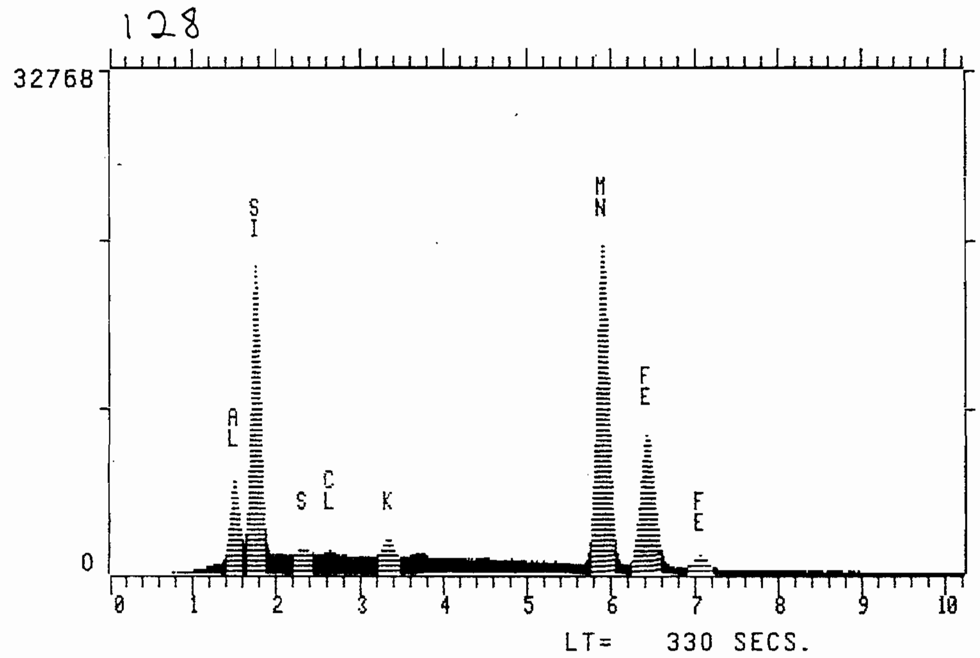






NGU-report 86.169. FIGURE 4.28 - 4.31





NGU-report 86.169. FIGURE 4.32 - 4.33

S.NO	P.NO	COLOUR	MN	FE	ZN	AL	SI	MO	S	BA	O	C+H2O
						WT %						
96	1	Light	55.59	0		3.77	0.14		0.26	0.50	39.58	
	2	Dark	35.74	0	0.06	2.49	0.08	0	0.08	0.51	61.02	
	3	Light	1.88	49.71		0.79	0.99		0.22		46.28	
	4	Light	1.22	53.66	0	1.15	2.13		0.27		41.44	
	5	Dark	8.43	19.97	0	2.57	0.49		0.11		30.57	37.73
	6	Grey	2.51	43.73		1.68	1.24	0.08	0.14		29.95	20.78
97	1	Light	1.00	50.59	0	2.12	1.65		0.16		36.28	7.72
	2	Dark	0.20	45.24		1.59	2.24	0	0.08		31.54	19.09
	3	Light	0.16	54.90	0.11	0.74	1.89	0	0.19	0	38.15	3.78
	4	Dark	0.41	35.35		1.62	0.99	0	0.06	0	27.50	33.95
98	1	Light	0.54	57.58		0.15	1.18		0.16	0	38.26	2.00
	2	Dark	17.46	7.61	0	0.49	0.14		0.10	0.15	26.51	47.47
99	1	Light	0.22	52.12	0.10	1.36	1.24		0.25		43.33	1.44
	2	Dark	1.50	52.99	0	0.74	1.22		0.18	0	36.72	6.71
100	1	Light	60.46	0	0.13		0		0	0.27	37.96	1.20
	2	Dark	34.06	5.06	0.14	0.25	0.05			2.12	32.30	26.06
	3	Light	52.76	0	0.12		0			4.53	35.02	7.48
	4	Dark	18.01	3.96	0.17	0.81				0.74	29.66	46.54
101	1	Light	0.42	55.55	0.10	0.65	0.90		0.07	0	41.34	0.99
	2	Light	0.43	54.29	0.20	0.64	1.21		0.07	0	39.46	3.58
	3	Grey	33.70	2.48	0.27	5.41			0.07	0.38	36.54	21.15
	4	Grey	33.17	4.72	0.22	5.62	0.21	0.08?	0.08	0.34	38.35	17.18
	5	Dark	21.46	2.13	0.16	2.86	0.10		0.02	0.30	30.57	42.32
	6	Dark	17.70	1.94	0.19	2.81	0.08	0.07?	0.03	0.20	27.07	49.98
102	1	Light	0.75	49.98		0.63	0.92		0.10	0	43.72	3.80
	2	Dark	17.00	20.29	0.18	1.32	0.15		0.03	0.38	22.45	38.10
	3	Dark	20.79	0	0.25	0.53	0		0.03	0.97	25.88	51.50
103	1	Light	49.20	0	0.36	0.99	0			6.14	38.65	4.54
	2	Dark	29.38	0	0.20	0.76	0			2.56	31.96	35.10
	3	Dark	19.51	0	0.20	0.44	0	0	0.03	1.43	26.39	51.99
	4	Light	46.97	0	0.37	1.45	0		0.10	3.44	35.47	12.08
104	0	Light	0.68	50.13	0	0.20	1.04			0	37.18	10.78
	1		1.12	44.85	0	0.13		0.08?	0.03		41.34	12.44
	2		23.71	9.58		0.43	0.03		0.14	0.24	40.80	25.09
	3		32.66	10.65		1.47	0		0.06	0.64	38.94	15.52
	4		36.32	8.29	0.06?	1.14		0.10	0.05	0.25	35.01	18.72
	5		0.68	53.11		0.64	0.80				33.10	11.47
	6		10.31	9.68	0	0.51			0.02	0.12	27.26	52.01
	7		22.79	14.04	0	1.18	0.12			0.34	34.07	27.34
	8		30.01	11.75		1.59	0.08	0	0.06	0.35	35.06	21.02
	9		38.90	9.86		1.37	0	0	0.09	0.88	34.19	14.60
	10		7.54	42.00		0.89	0.76				32.11	16.50
	11		18.80	24.20		1.81	0.54			0.69	38.30	15.57

S.NO	P.NO	COLOUR	WT %									
			MN	FE	ZN	AL	SI	MO	S	BA	O	C+H2O
105	1	Dark	30.33	8.66	0.05	0.38			0.06	0.33	33.43	26.72
	2	Dark	25.78	10.57		0.33				0.27	35.48	27.52
	3	Light	44.46	0.22	0.13	0.21	0.10	0	0.03	0.98	37.00	16.91
	4	Light	40.27	12.27	0.07	0.70			0.02	0.86	34.34	11.29
106	1	Light	47.72	0	0.06	0.13		0.09	0	0.91	38.58	2.87
	2	Light	47.01	0	0.15	0.13	0.10		0	0.37	38.65	3.67
	3	Grey	0.33	57.91	0	0	2.75			0.11	34.33	4.58
	4	Grey	0.46	57.15	0	0.14	2.09	0		0.06	35.85	4.18
107	1	Light	0.25	55.09			1.83		0.03	0	37.24	5.57
	2	Light	50.54	0	0.06	0.78	0	0	0.07	2.21	35.70	10.60
	3	Dark		48.90		0.39	0.97		0.05	0	29.20	20.46
	4	Dark	0.06	39.09		0.50	0.31		0.05		32.42	27.57
108	1	Light	49.53	0	0	0.61	0	0		1.37	37.03	1 38
	2	Grey	20.69	32.22	0.05	0.69	0.83		0.06	1.24	37.18	6.95
	3	Grey	38.83	10.54		1.85		0	0.10	1.75	37.89	8.86
	4	Light	50.16	0	0	0.32	0		0	1.43	37.05	1.11
109	1	Light	21.64	29.88	0.08	1.50	0.69		0.11	1.36	36.08	8.55
	2	Light	6.45	47.78	0.05	2.07	1.52	0	0.14	0.04	37.66	4.37
	3	Light	21.71	29.22		2.07	0.54		0.14	0.32	34.52	11.32
	4	Dark	10.76	13.42	0	1.59	0.22	0		0.04	29.03	44.84
110	1	Grey	27.84	5.03	0.32	9.40	0.51		0.16	0.43	39.42	16.47
	2	Light	46.07	2.38	0.48	0.70	0		0.04	2.23	35.50	12.48
	3	Light	28.18	4.35	0.27	5.02	0.11	0	0.08	0.55	41.21	20.17
	4	Light	45.23		0.47	1.27	0		0	1.68	38.63	12.67
	5	Dark	13.98	8.24	0.17	7.14	1.0		0.05	0.16	34.18	35.11
	6	Dark	11.64	12.46	0.30	7.05	0.72		0.05	0.17	38.38	29.19
112	1	Light	0.56	53.28		0.20	4.09			0	36.85	4.90
	2	Light	55.64	0			0.12?	0	0	3.03	35.58	5.44
	3	Dark	17.44	27.57	0	0.12	1.43		0	0.90	28.31	24.30
	4	Dark	7.72	16.06	0	0.31	0.75			0.07	26.23	48.77
	5	Light	0.65	53.94		0.35	4.56			0	35.15	5.38
113A	1	Light	2.49	51.75	0	2.74	1.75			0.03	33.45	7.79
	2	Light	33.91	0.41	0.24	7.95	0.53		0.11	0.32	35.82	20.65
	3	Dark	24.10		0.12	3.54	0.11	0		0.23	13.65	58.25
	4	Dark	8.67	3.61		3.31	0.91		0.06	0.04	28.72	54.63
113B	1	Light	0.54	56.05		2.11	1.45		0.04	0	35.62	4.21
	2	Light	0.54	53.93		4.24	0.89		0.03		33.93	6.32
114	1	Light	52.04	0	0	0.38	0	0	0.09	1.25	35.53	10.78
	2	Light	48.02	0		0.28	0		0.02	1.34	38.99	11.37
	3	Grey	32.94	2.16		0.64			0.02	0.49	39.28	24.37

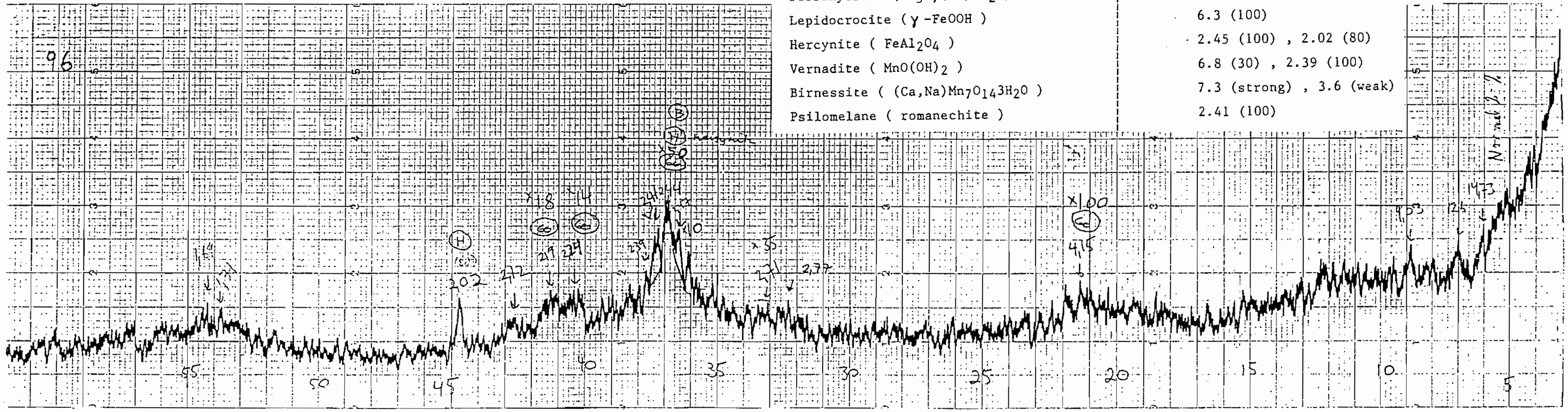
NGU-report 86.169. FIGURE 5.2

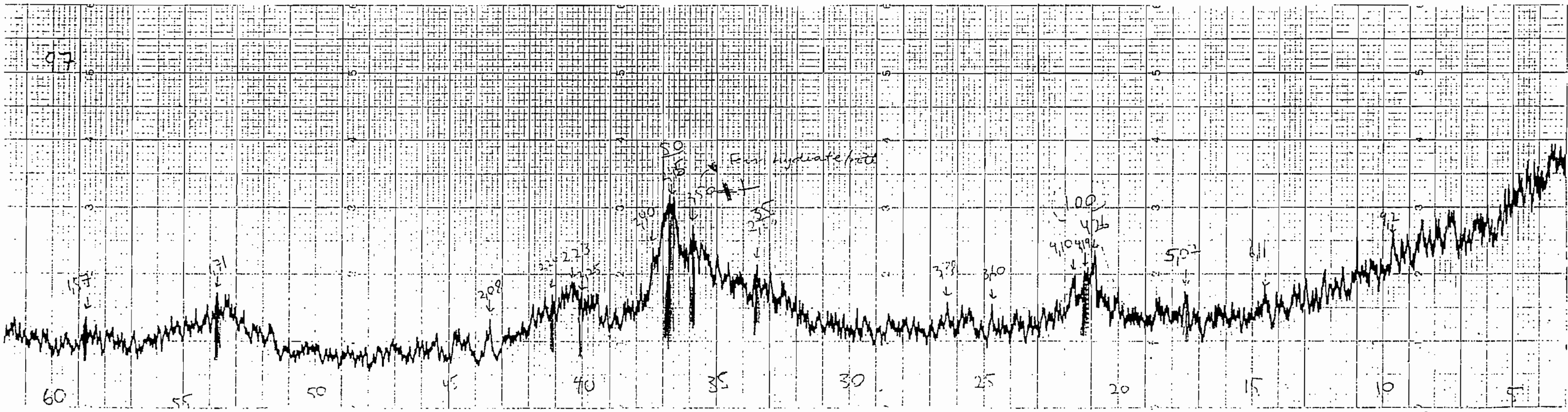
S.NO.	P.NO.	COLOUR	MN	FE	ZN	AL	SI	MO	S	BA	O	C+H2O
			WT %									
115	1	Light		56.90	0	0.26	1.41		0.07	0	33.67	7.60
	2	Light	0.29	56.48	0	0.32	1.51		0.10		35.77	5.56
	3	Light	17.73	38.89		0.58	1.05		0.03	0.33	33.13	8.29
	4	Light	0.65	52.72		0.73	2.78		0.09		37.26	5.60
116	1	Light	0.05	51.43		0.45	1.60		0.10		34.97	11.26
	2	Light		58.99		0.62	1.32	0	0.12	0	31.65	7.35
	3	Dark		50.93	0	0.73	1.34		0.06	0	27.92	19.04
117	1	Light	6.65	41.13	0.08	3.42	0.72			0.23	35.55	12.23
	2	Dark	18.86	1.43	0.35	6.12	0.21	0.16	0.02	0.28	40.39	32.21
118	1	Light	40.99	4.16	0.55	1.18		0	0.09	1.64	30.46	20.83
	2	Dark	19.53	17.69		0.85	0.26	0		0.47	25.21	35.93
	3	Light	32.97	5.50	0.05	1.50	0.09?	0	0.11	0.68	32.76	26.43
119	1	Light	25.58	24.58		1.16	0.10	0		0.68	31.96	15.83
	2	Dark	19.70	14.78		1.10		0		0.62	29.30	34.33
	3	Darke	22.23	3.63		0.62		0	0	0.82	22.47	50.27
	4	Light	49.10	0		0.93	0	0		5.55	36.01	8.29
	5	Light	28.86	22.71		1.52	0.13	0	0.09	0.66	32.32	13.65
120	1	Light	1.05	55.28		0.97	0.93	0	0.04	0	30.59	10.80
	2	Light	1.03	56.64		0.94	0.98	0	0.03		29.46	10.84
	3	Dark	0.89	50.55	0	1.36	0.79	0	0.03	0	28.99	17.29
	4	Dark	0.66	41.91		1.19	0.31	0.06?	0.02		22.08	33.69
	5	Dark	0.76	30.80	0	0.91	0.35	0	0.03	0	26.46	40.67
121	1	Light	0.54	52.49		1.58	0.84	0	0.07	0	34.98	9.43
	2	Light	0.37	49.80	0	1.33	0.46	0.07?	0.05	0	29.47	18.52
	3	Dark	2.26	21.87		1.67	0.25			0	22.14	51.73
	4	Dark	1.68	26.25	0	1.72	0.20	0	0.02		22.51	47.55
122	1	Light	34.83	9.10	0.07	1.74	0.09	0	0.05	0.81	39.47	13.92
	2	Light	32.84	12.94		1.83	0.18	0	0.03	0.87	38.33	13.01
	3	Dark	15.17	25.62		3.91	0.92		0.02	0.16	30.95	23.30
	4	Dark	16.61	15.51		3.82	0.52			0.13	35.56	27.71
123	1	Light	50.37	0	0.11	1.02	0	0		7.84	37.25	3.47
	2	Light	48.46	0	0.05	1.08	0			8.56	37.35	4.56
	3	Dark	36.62	1.24	0.09	5.18	0.24	0	0.10	0.74	36.84	18.89
	4	Dark	39.93	3.68	0.08	7.17	0.33	0	0.18	0.30	35.11	13.29
124	1	Light	1.44	53.27	0	0.24	0.47	0	0.03	0.03	36.23	8.37
	2	Light	1.18	54.41	0	0.24	0.36	0		0	35.88	7.99
	3	Dark	13.96	23.34	0	0.92	0.25			0.15	32.34	29.11
	4	Dark	11.76	29.51		0.71	0.64	0.07	0.03	0.09	25.95	31.29

NGU-report 86.169. FIGURE 5.3

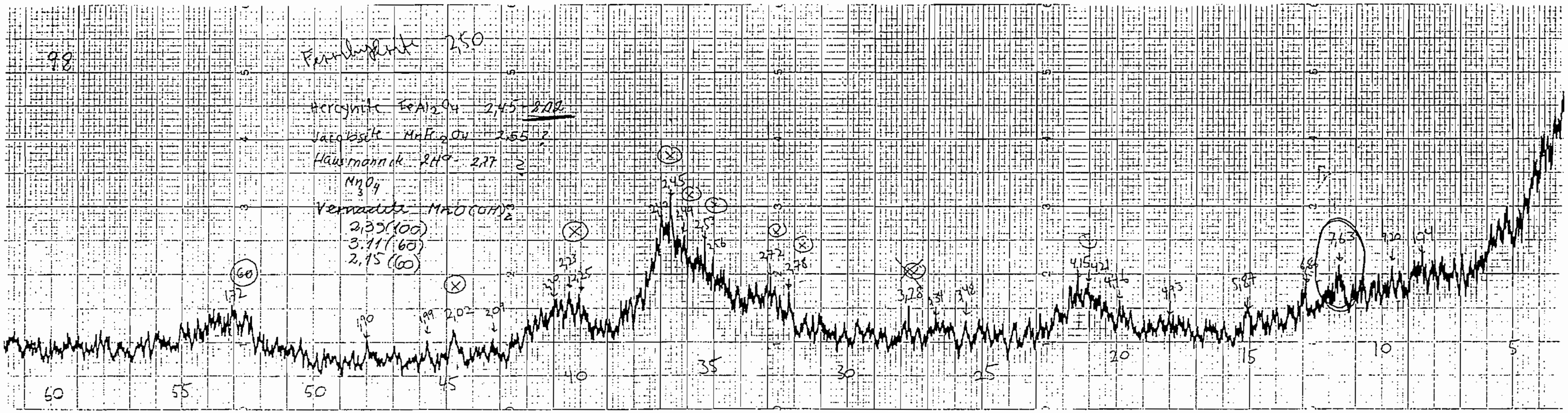
S.NO	P.NO	COLOUR	WT %									
			MN	FE	ZN	AL	SI	MO	S	BA	O	C+H2O
125	1	Light	40.03	0	0.14	1.54		0	0.06	1.92	37.34	18.89
	2	Light	38.65	0	0.11	1.68	0		0.07	1.64	36.60	21.13
	3	Light	37.37	0.11	0.09	1.95	0.07		0.06	1.34	34.75	24.12
126	1	Light	0.33	55.35	0.06	1.59	0.84	0	0.05	0	35.06	6.77
	2	Light	0.36	53.75	0.05?	2.12	0.85	0	0.05		36.38	6.50
	3	Dark	23.66	4.46	0.41	1.39	1.47	0	0.05	0.88	26.50	41.09
127	1	Light	50.93	0	0.05?	0.19	0	0	0	6.08	36.48	6.21
	2	Light	44.40	5.32	0.05?	0.48	0.13	0	0.06	2.49	35.84	11.17
	3	Light	0.80	58.09	0	0.36	0.85				33.36	6.44
	4	Dark	20.44	21.63		0.65	0.47		0	0.44	27.09	29.28
	5	Dark	19.30	22.70		0.75	0.43	0	0	0.41	26.89	29.47
128	1	Light	27.77	23.69	0.05?	1.83	0.19	0.58	0.15	0.36	34.60	10.72
	2	Light	0.49	55.97	0	0.52	0.18	0.49	0.03	0	34.57	7.83
	3	Dark	25.63	12.87		1.03		0.22	0.05	0.27	31.69	28.25
	4	Dark	23.73	24.74	0	1.19	0.19	0.28	0.06	0.16	31.42	18.26

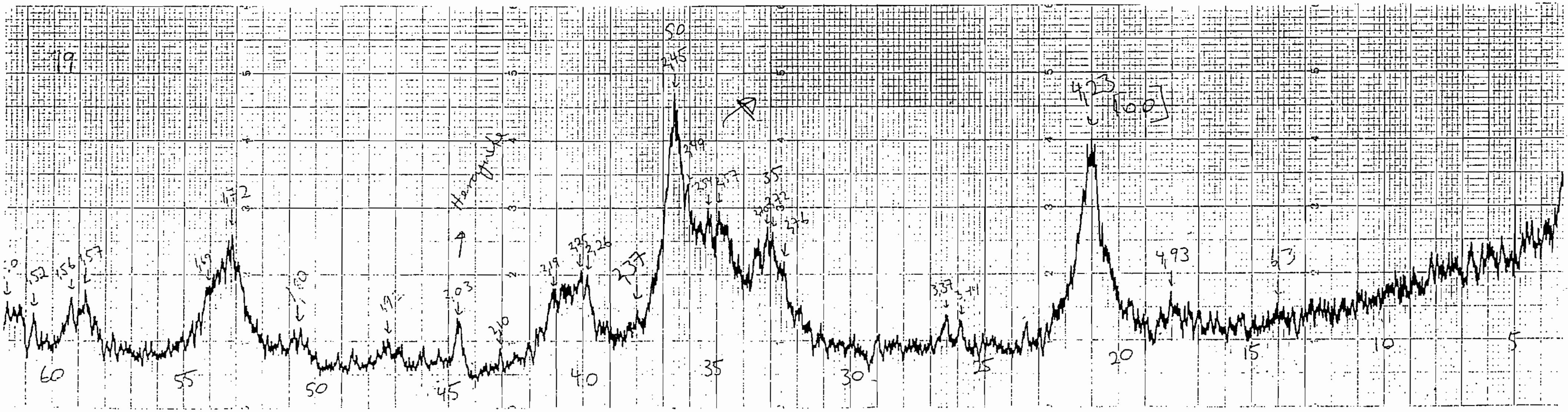
Mineral	d-spacings (intensity)
Goethite (α-FeOOH)	4.2 (100) , 2.45 (50)
Ferrihydrite ($Fe_5O_7(OH)4H_2O$)	2.5 (100)
Lepidocrocite (γ -FeOOH)	6.3 (100)
Hercynite ($FeAl_2O_4$)	2.45 (100) , 2.02 (80)
Vernadite ($MnO(OH)_2$)	6.8 (30) , 2.39 (100)
Birnessite ($(Ca,Na)Mn_7O_{14}3H_2O$)	7.3 (strong) , 3.6 (weak)
Psilomelane (romanechite)	2.41 (100)



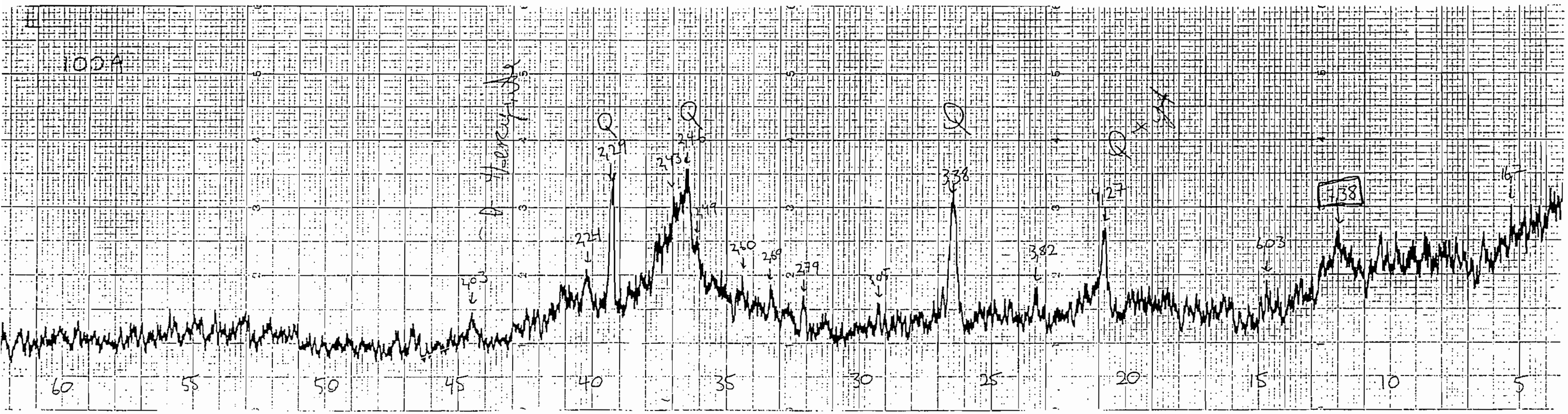


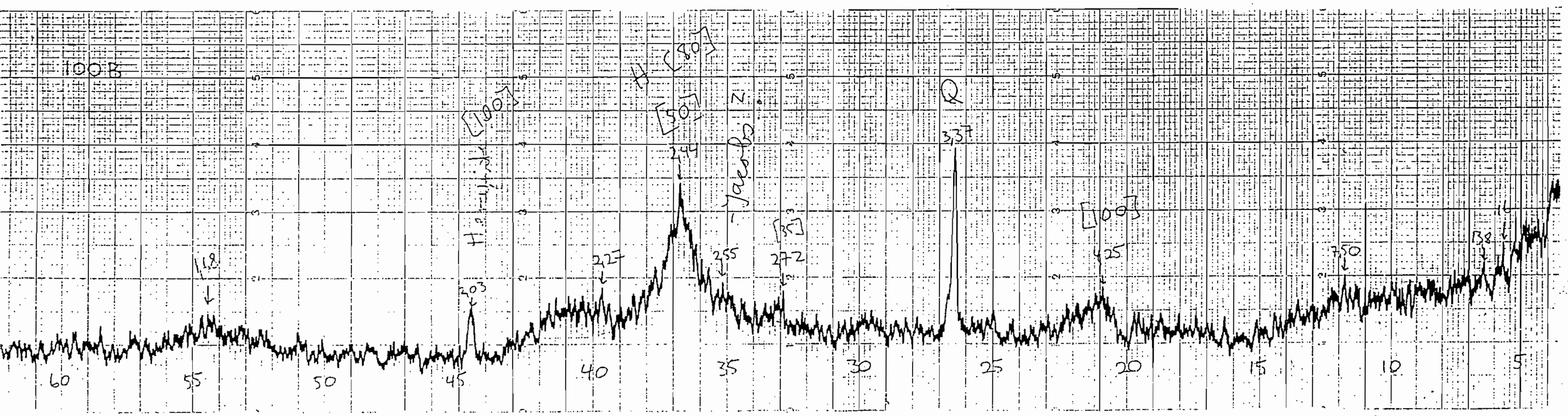
NGU-report 86.169. FIGURE 6.1 - 6.2



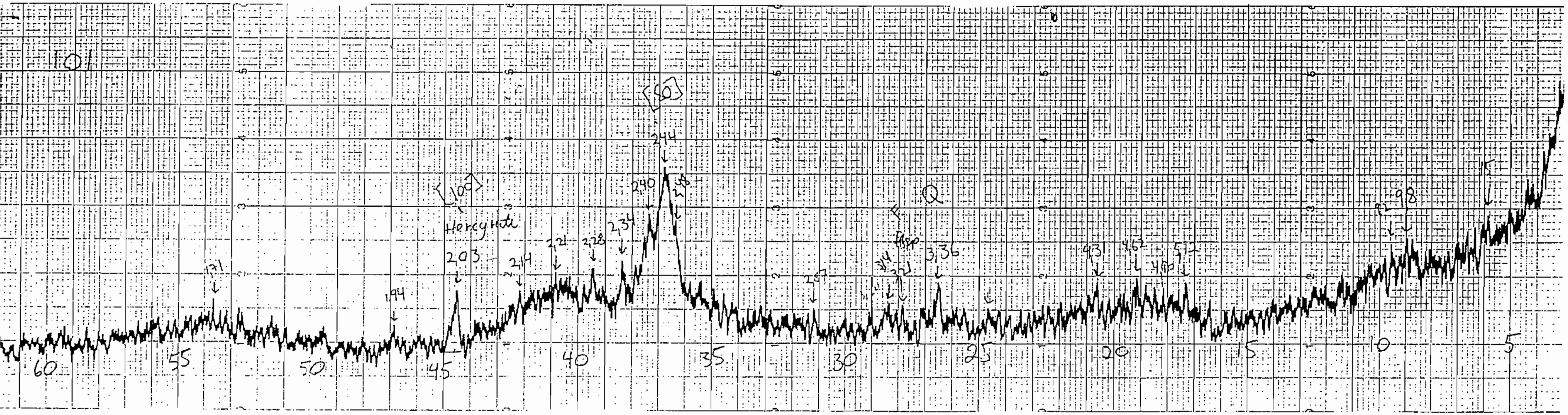


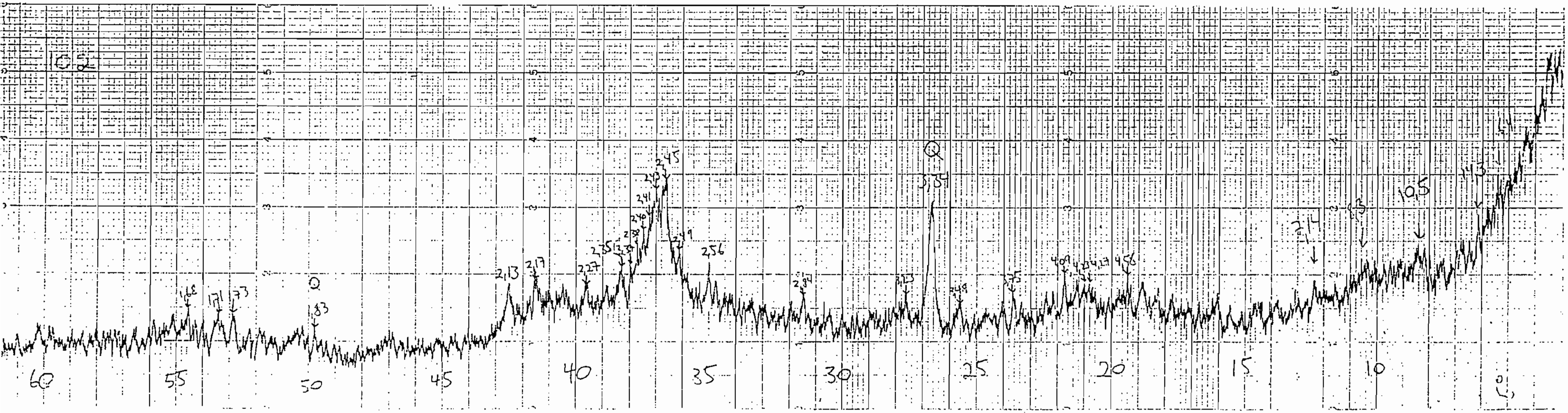
NGU-report 86.169. FIGURE 6.3 - 6.4



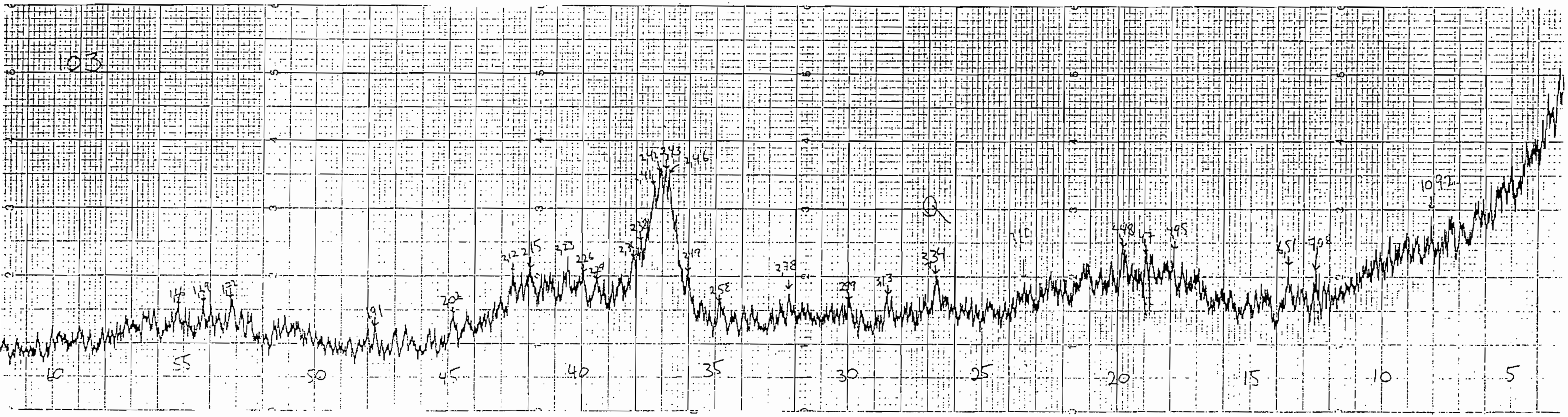


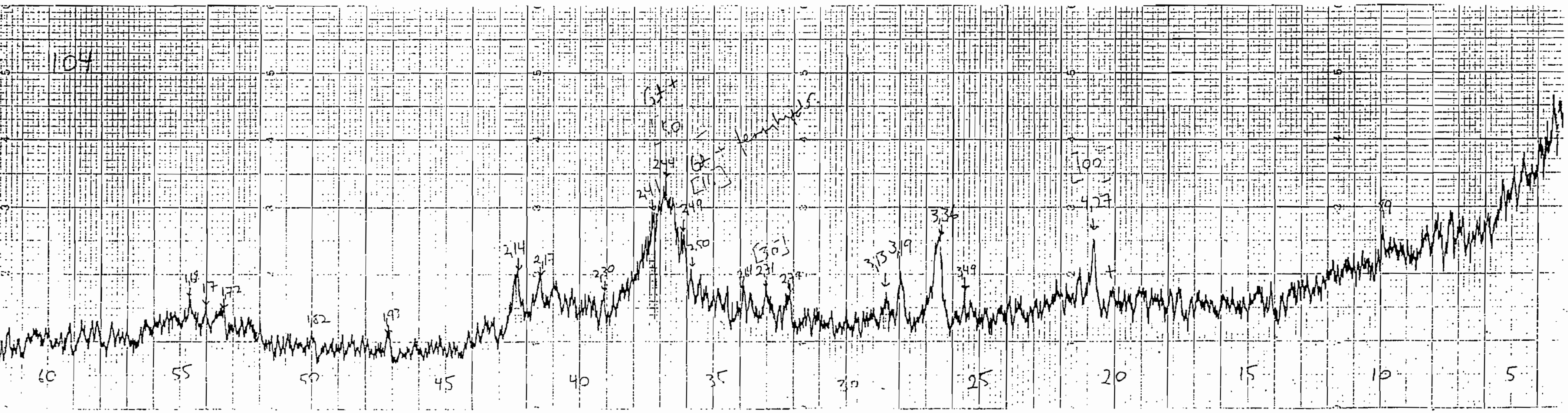
NGU-report 86.169. FIGURE 6.5



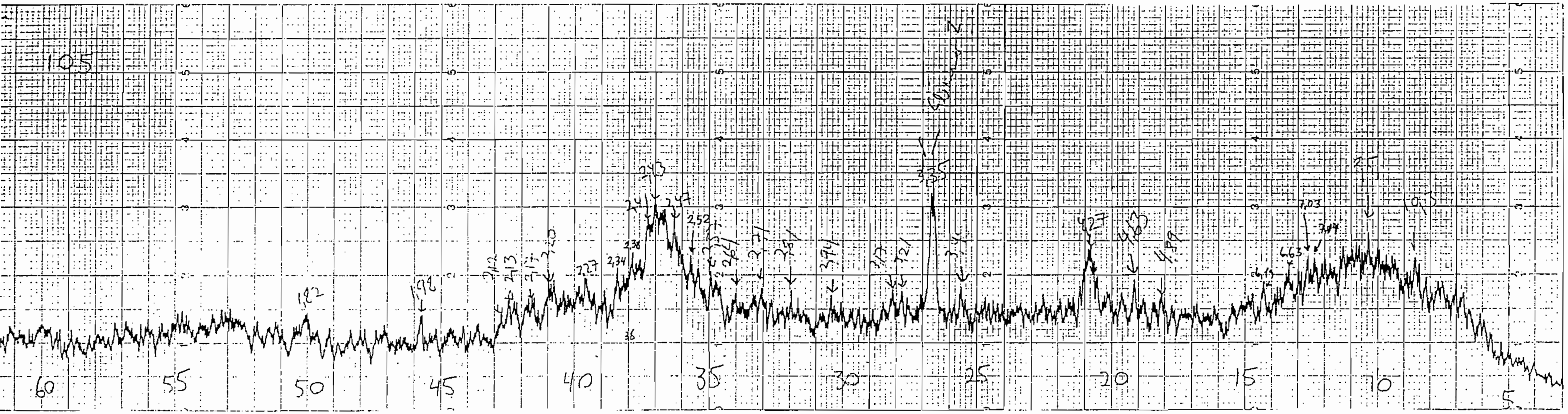


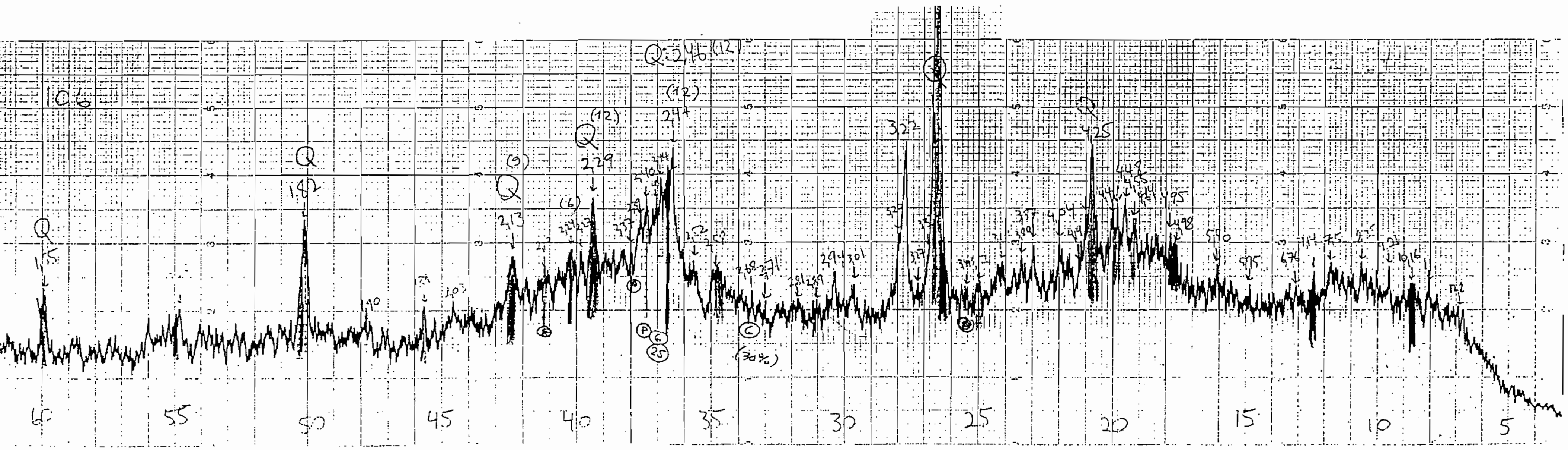
NGU-report 86.169. FIGURE 6.6 - 6.7



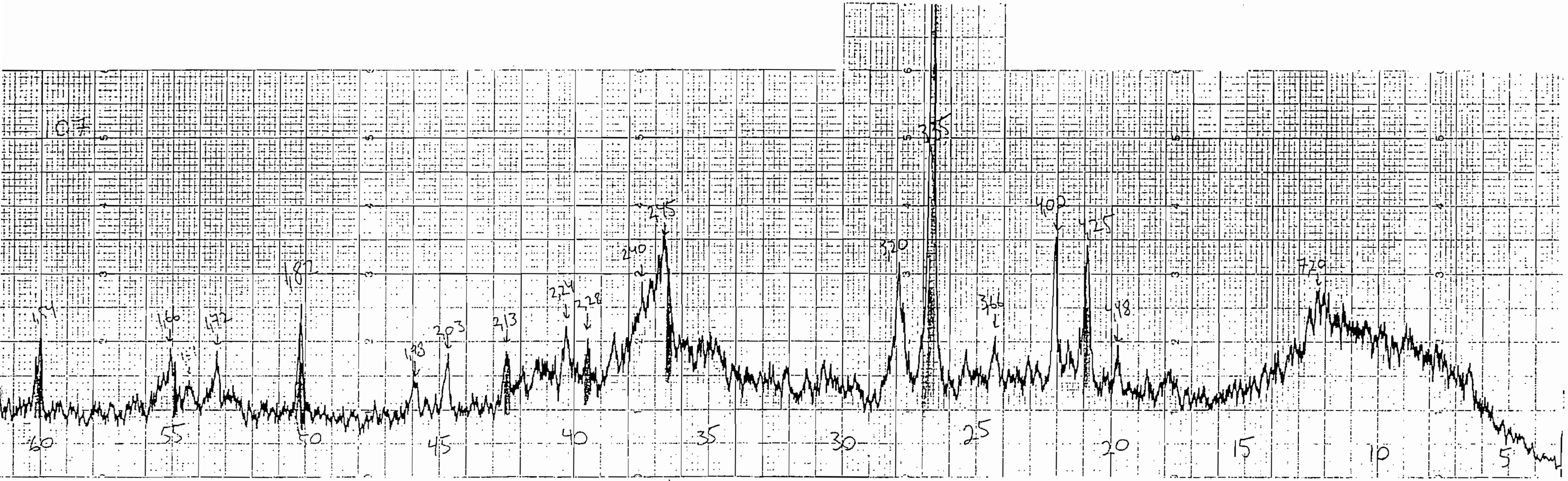


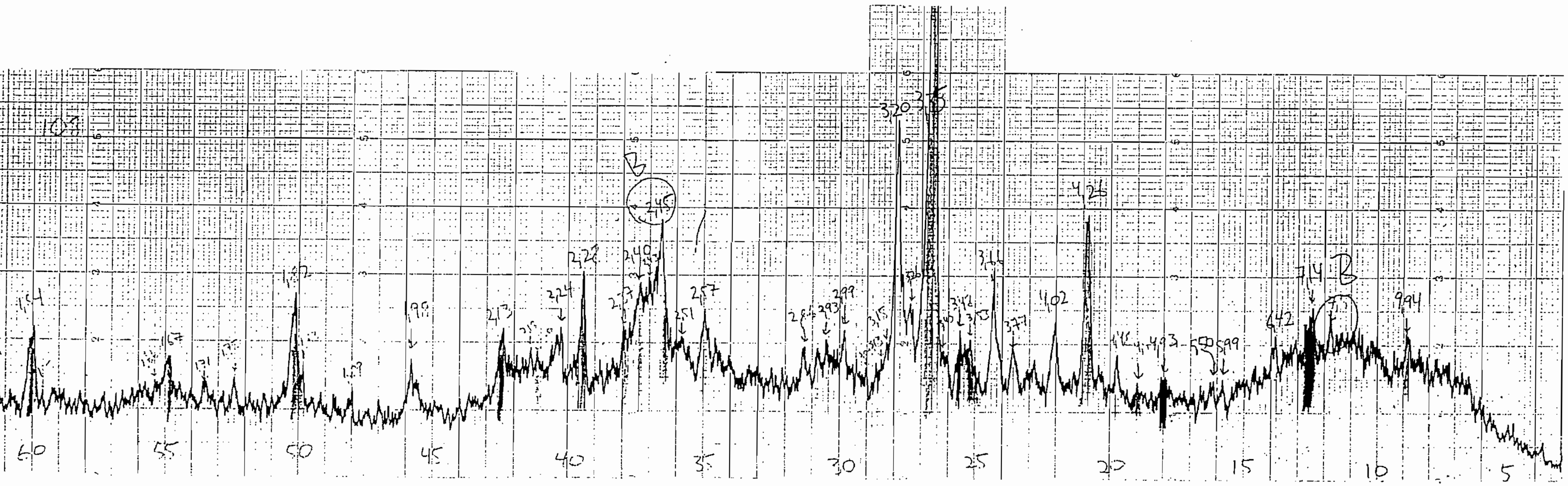
NGU-report 86.169. FIGURE 6.8 - 6.9



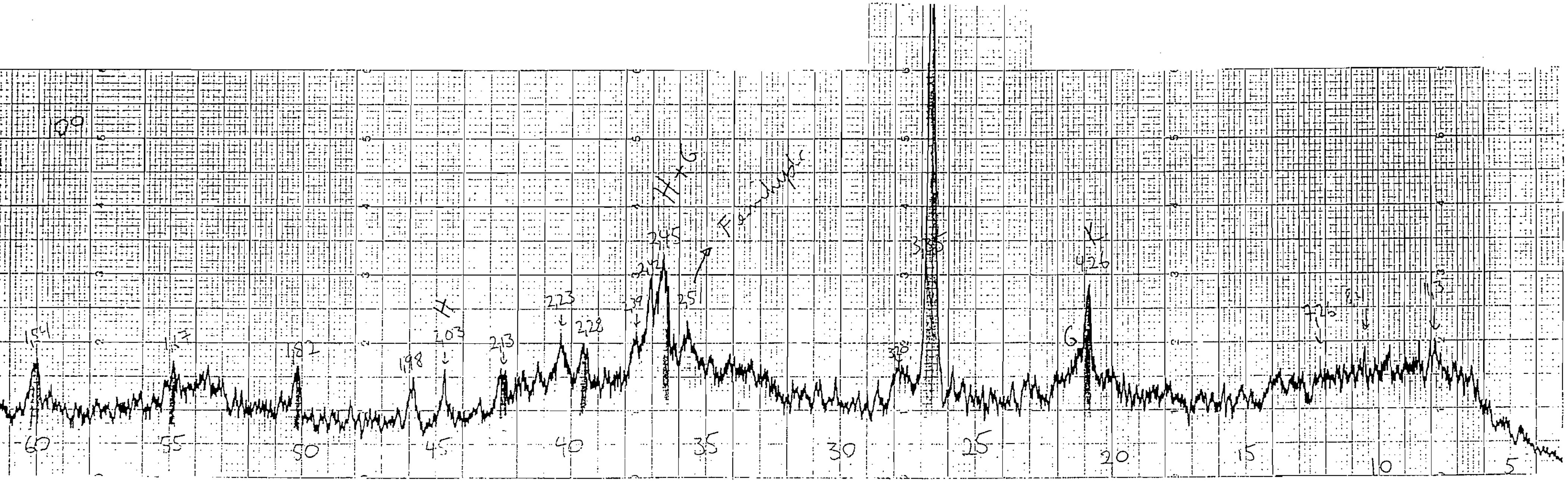


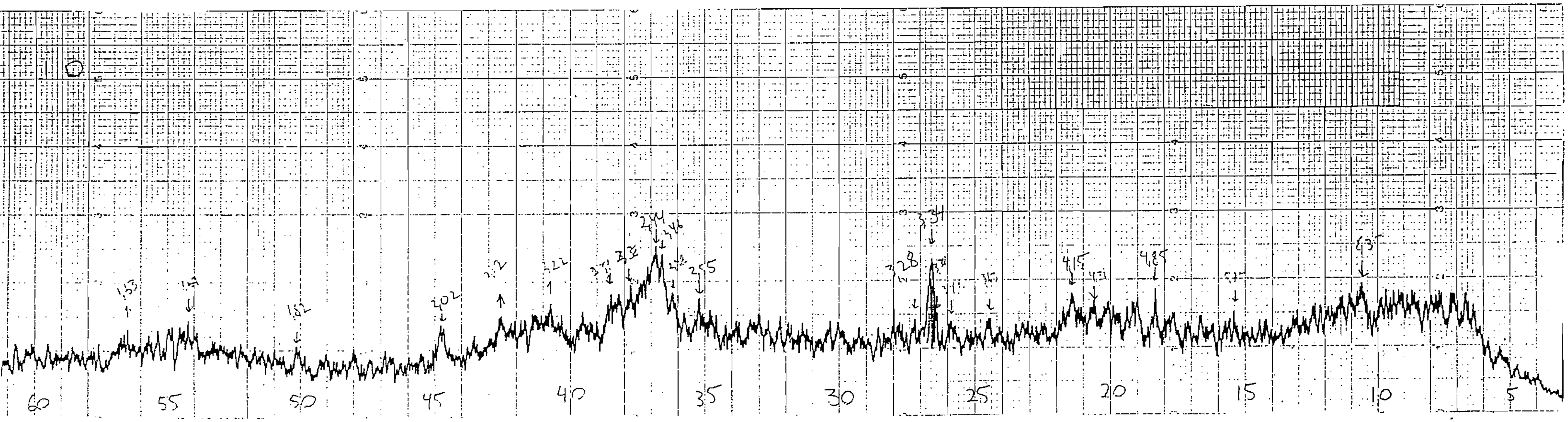
NGU-report 86.169. FIGURE 6.10 - 6.11



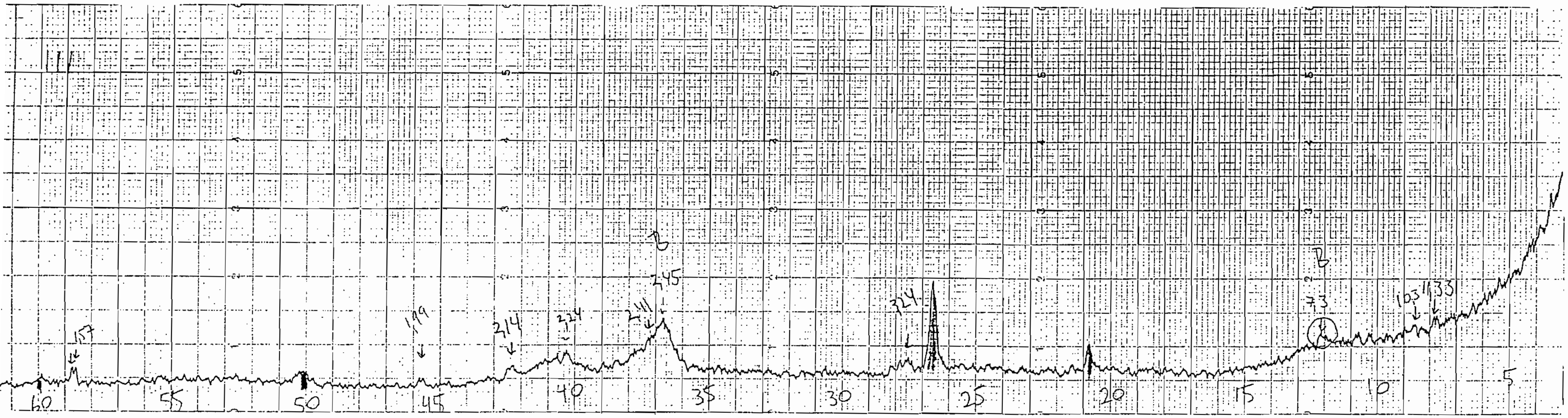


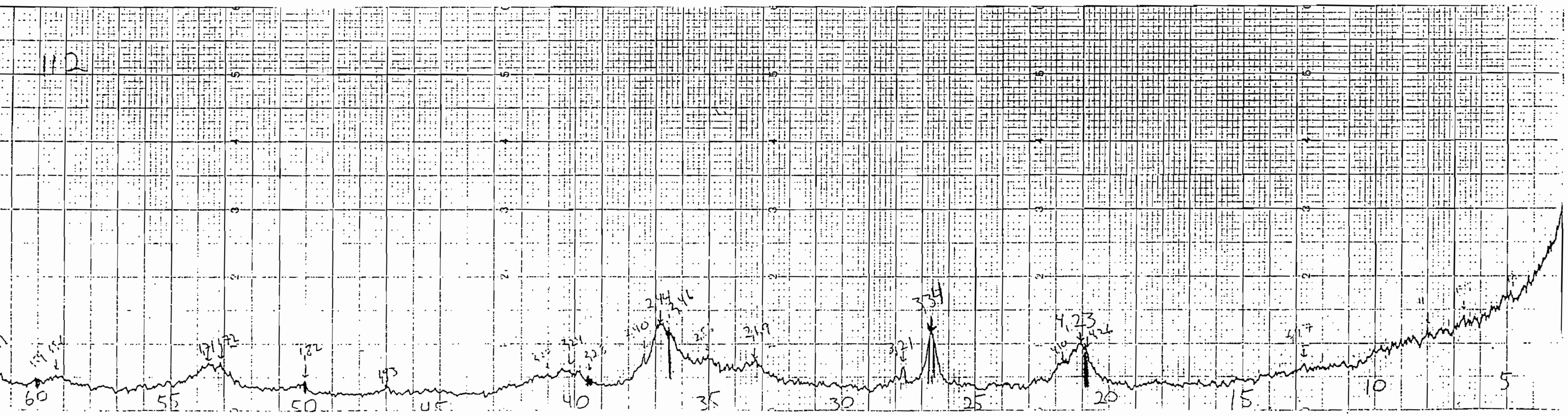
NGU-report 86.169. FIGURE 6.12 - 6.13



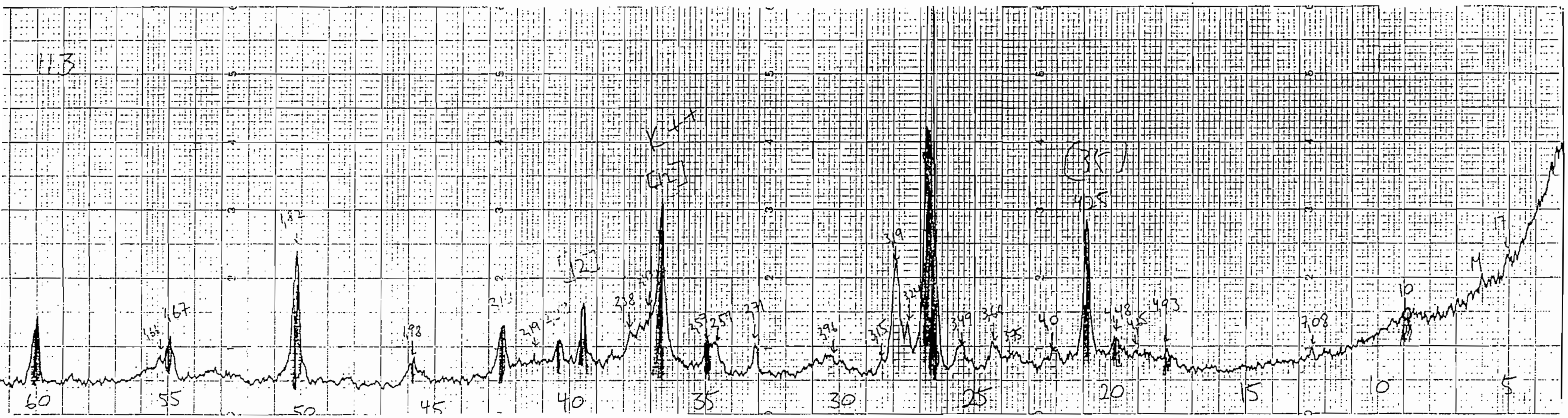


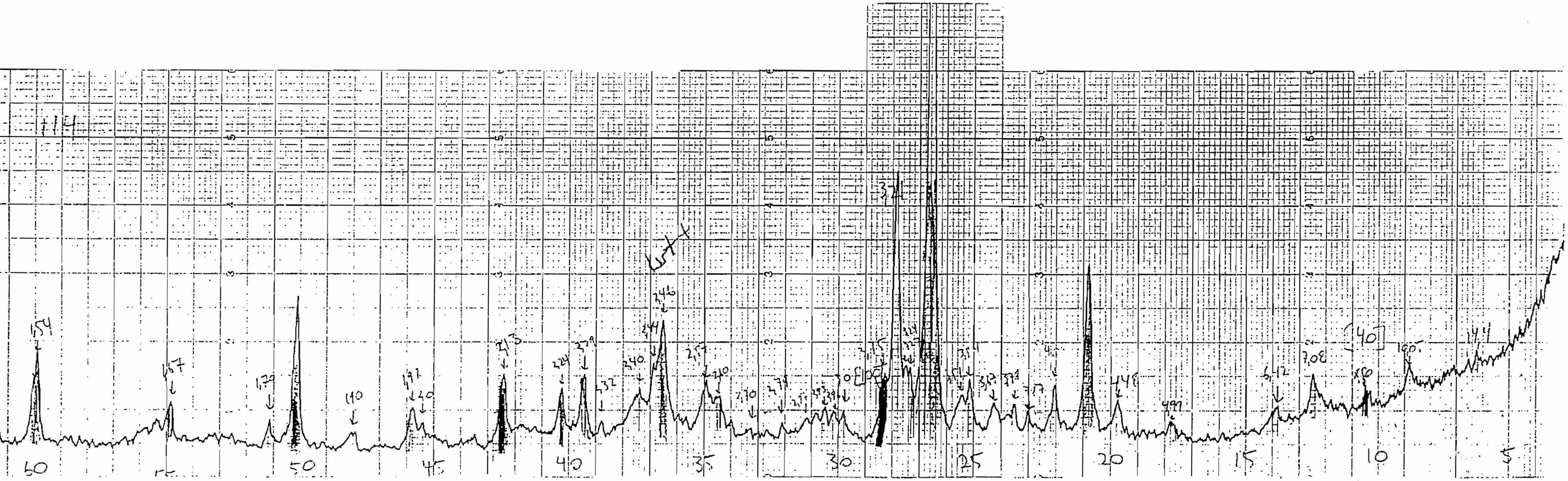
NGU-report 86.169. FIGURE 6.14 - 6.15



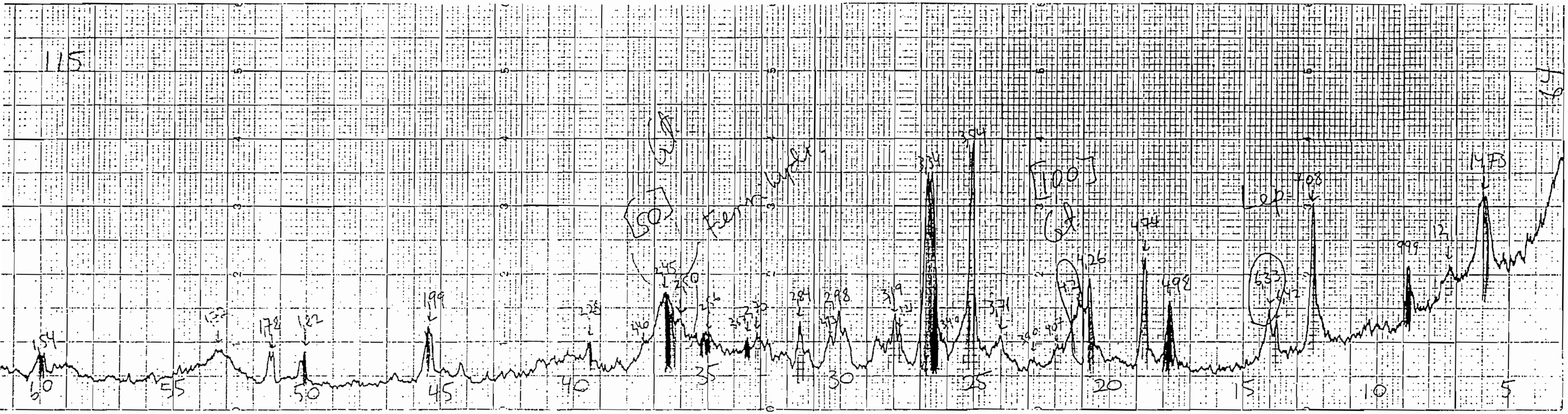


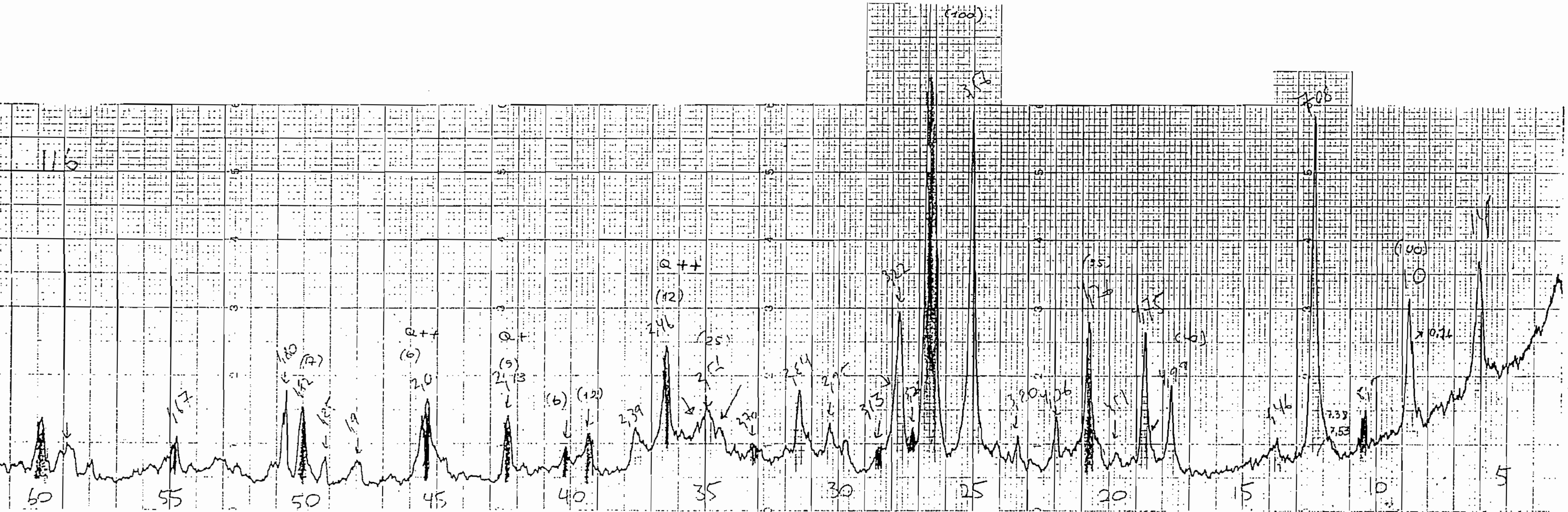
NGU-report 86.169. FIGURE 6.16 - 6.17



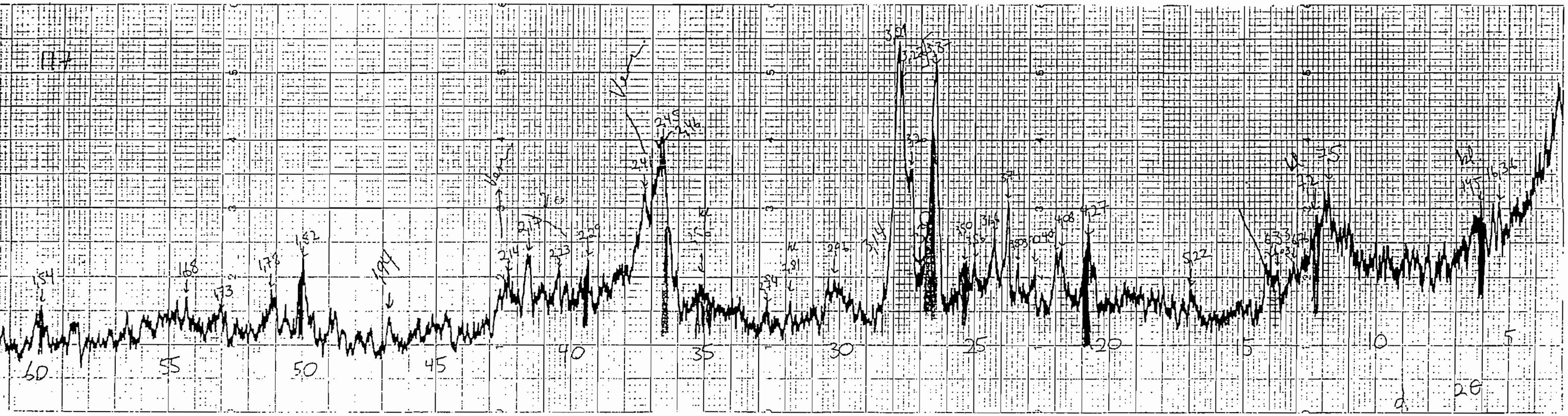


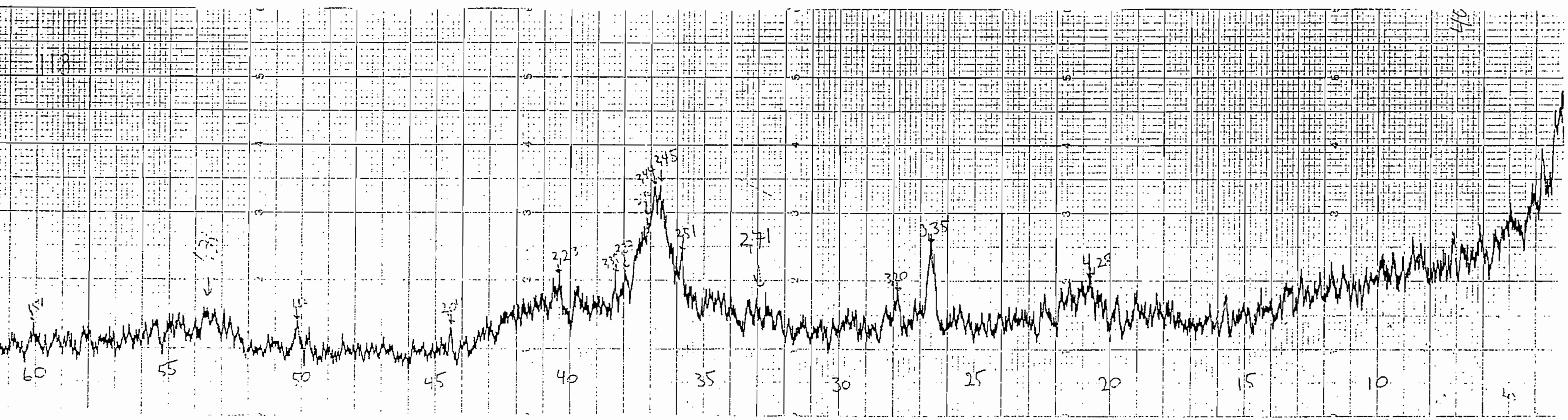
NGU-report 86.169. FIGURE 6.18 - 6.19



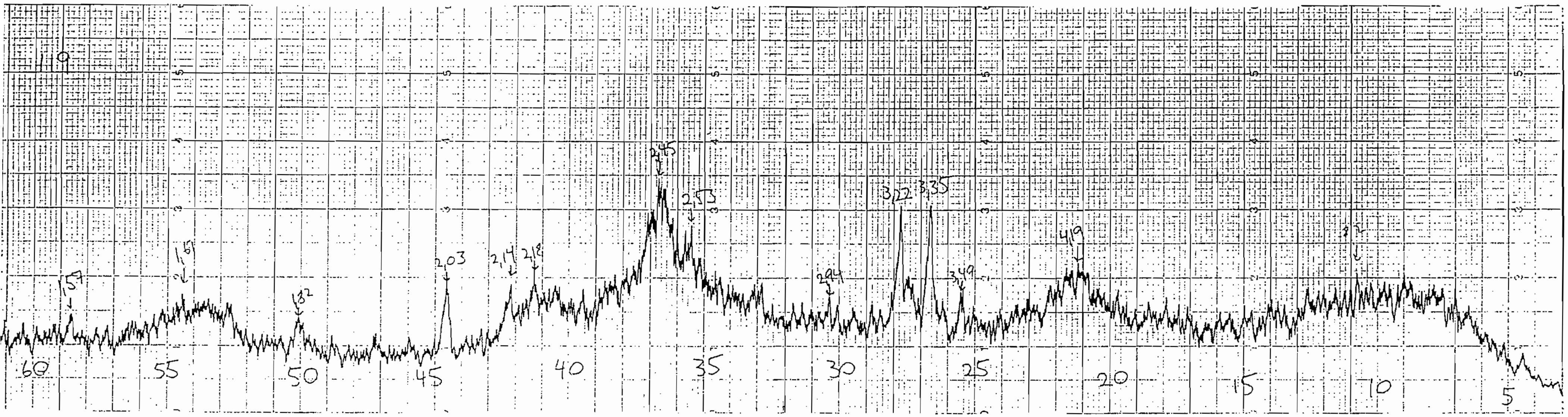


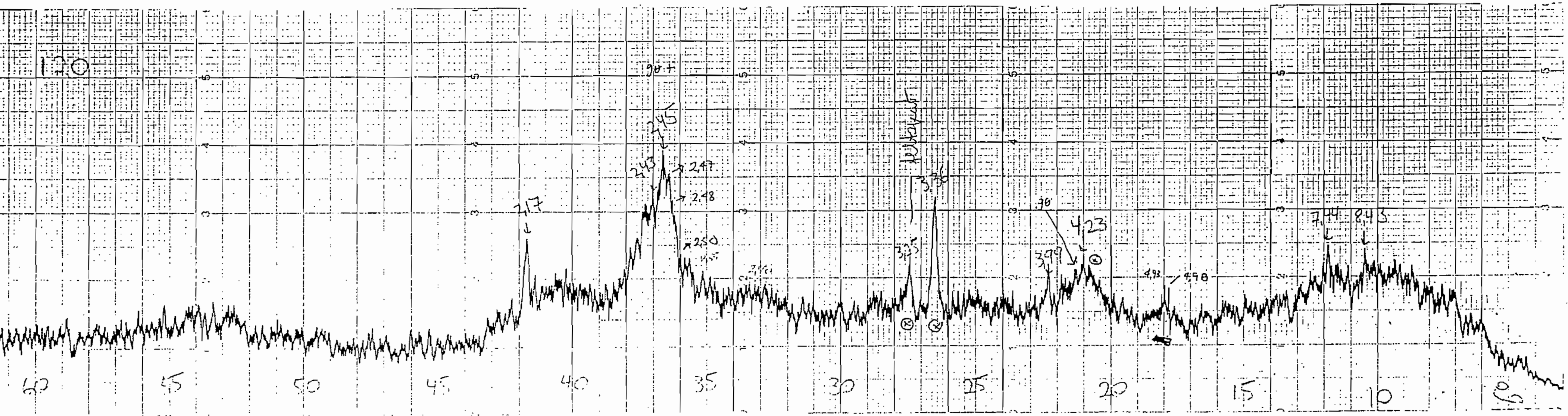
NGU-report 86.169. FIGURE 6.20 - 6.21



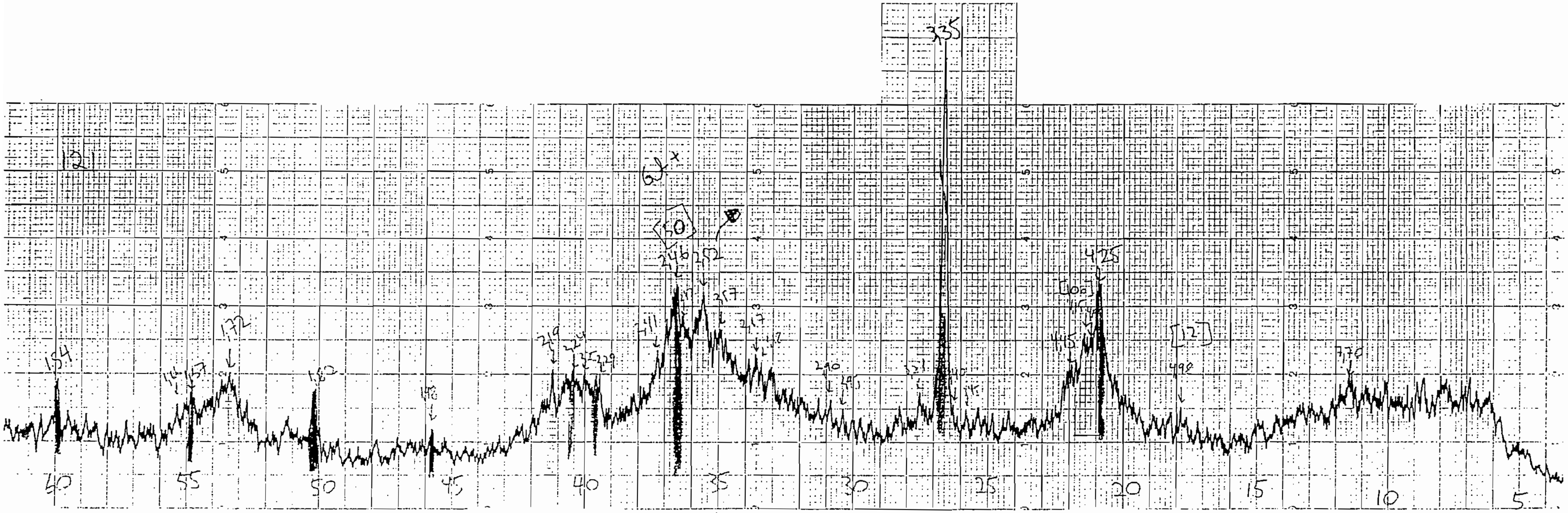


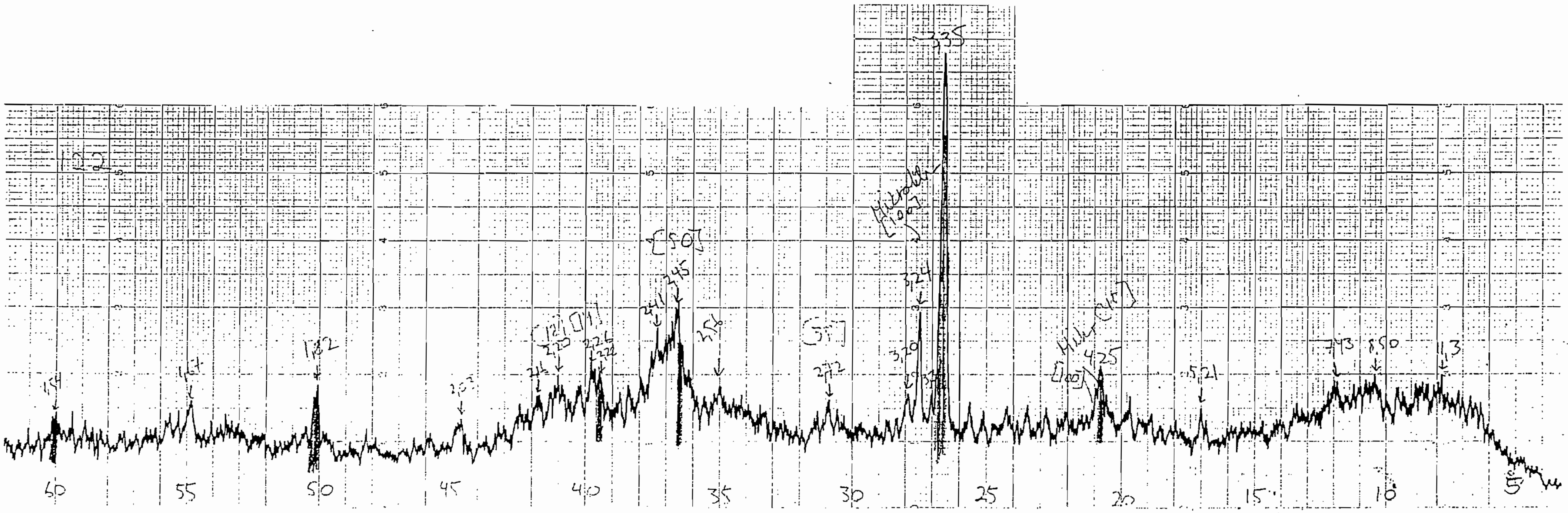
NGU-report 86.169. FIGURE 6.22 - 6.23



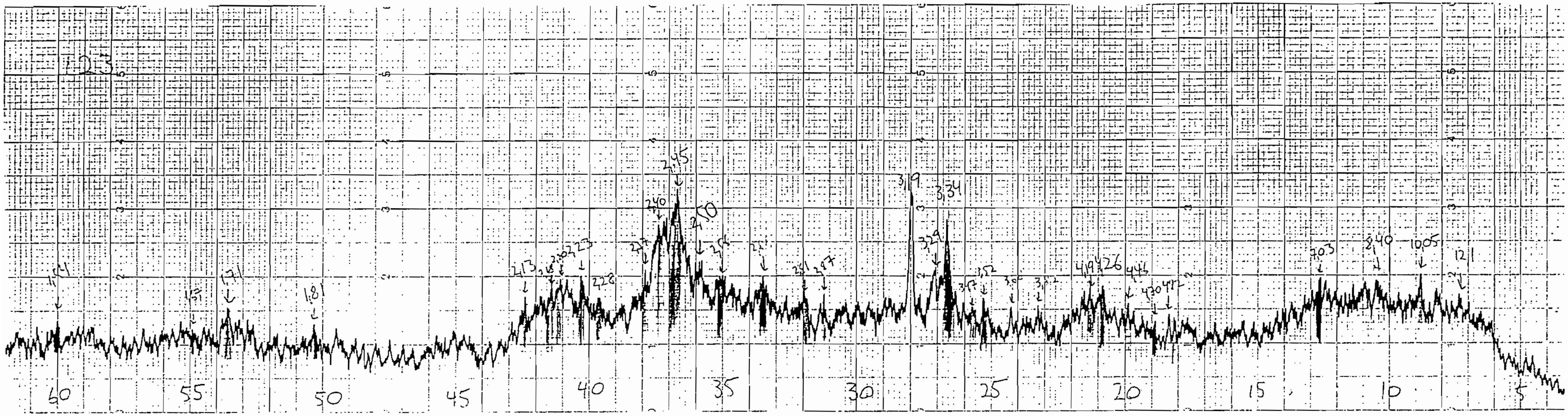


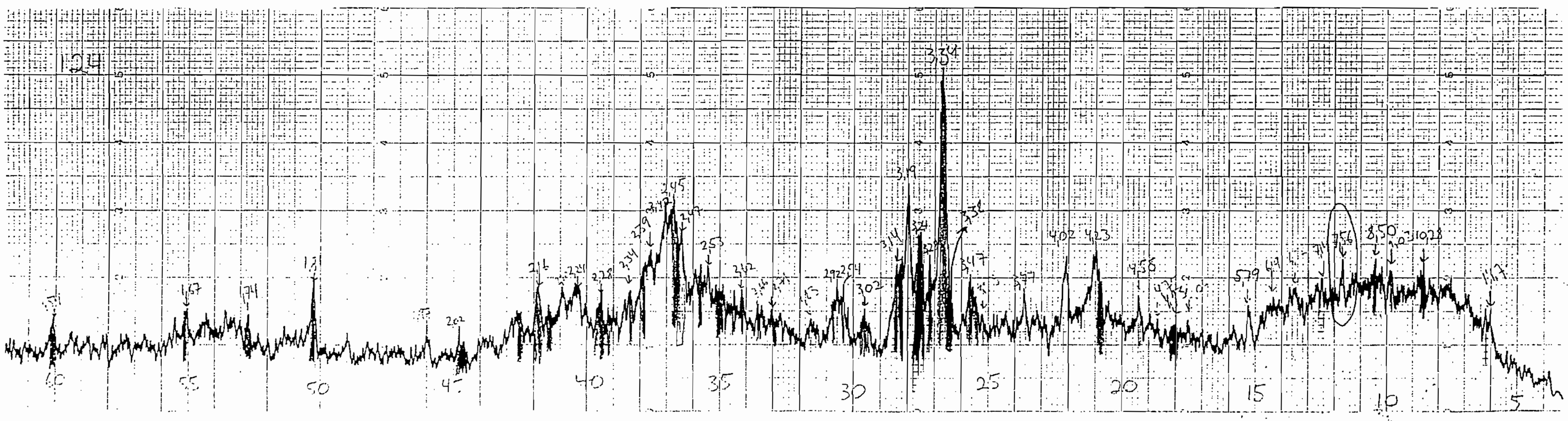
NGU-report 86.169. FIGURE 6.24 - 6.25



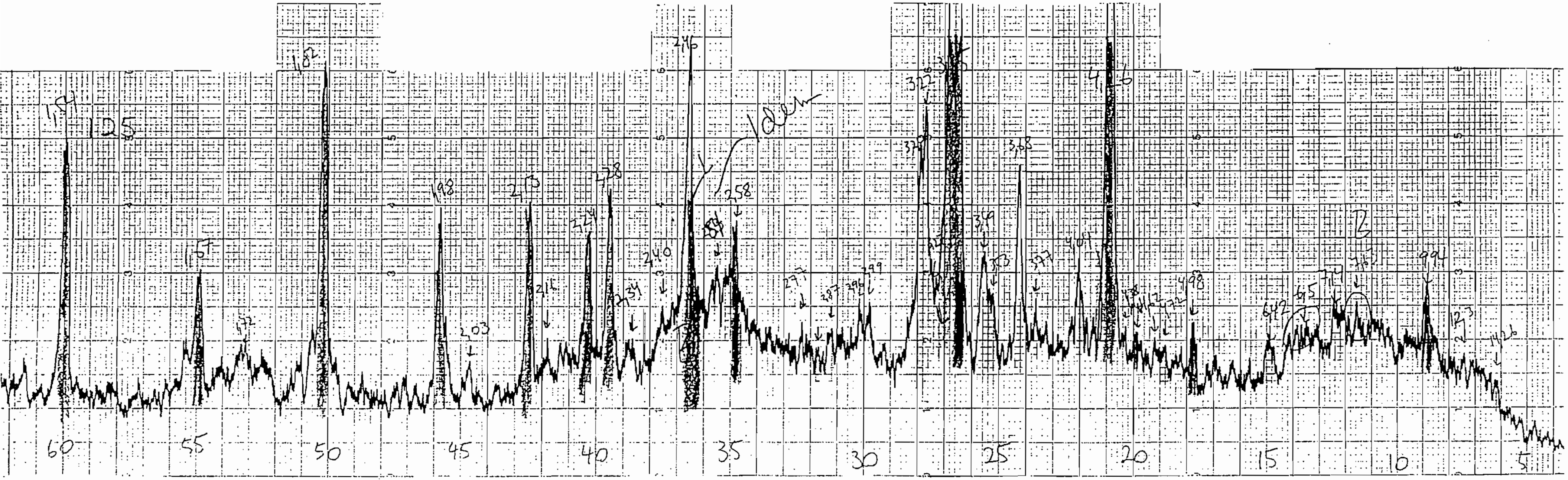


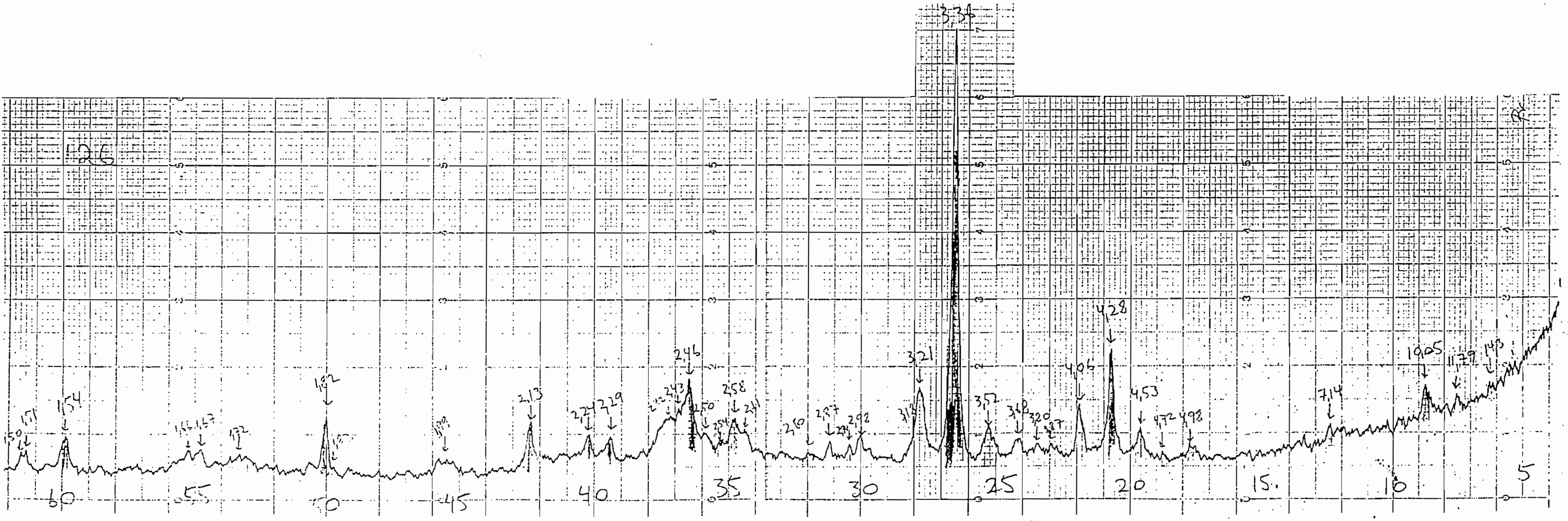
NGU-report 86.169. FIGURE 6.26 - 6.27



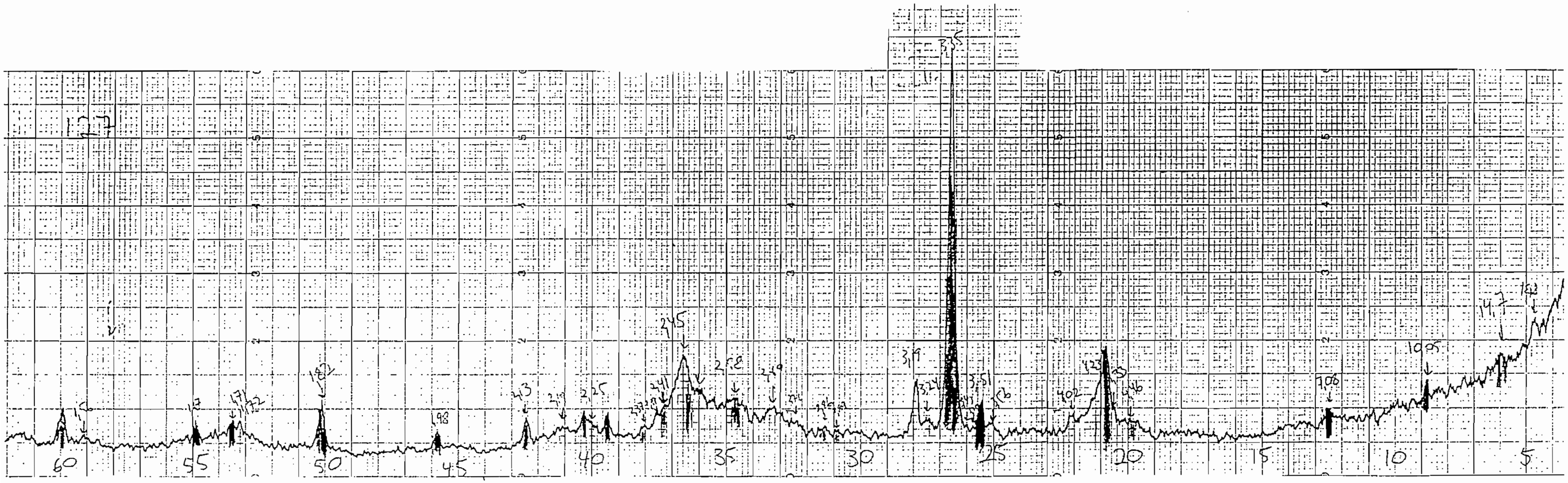


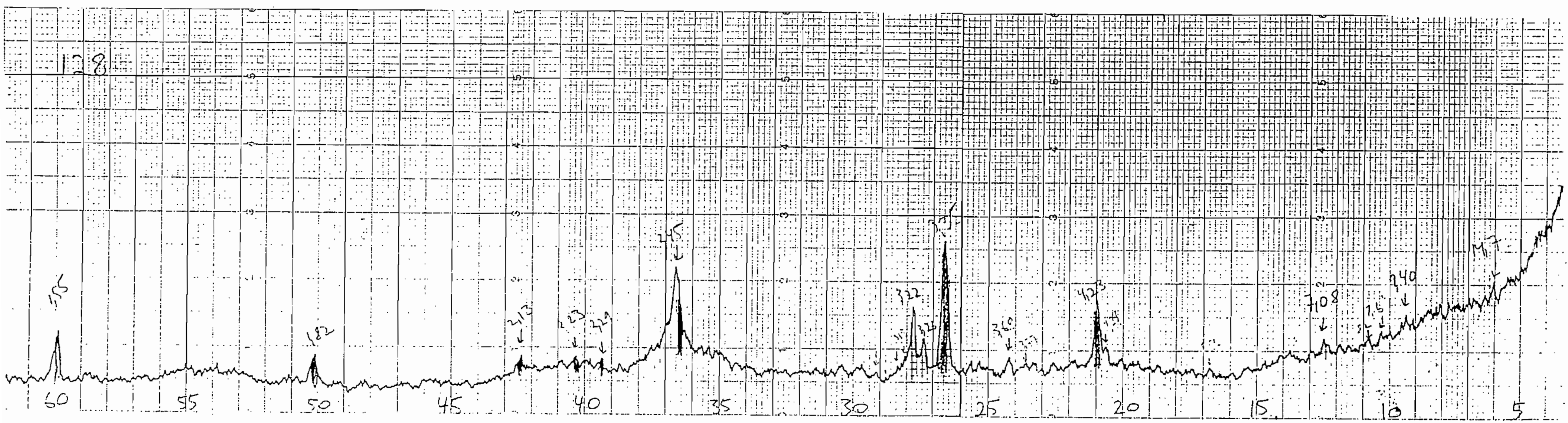
NGU-report 86.169. FIGURE 6.28 - 6.29



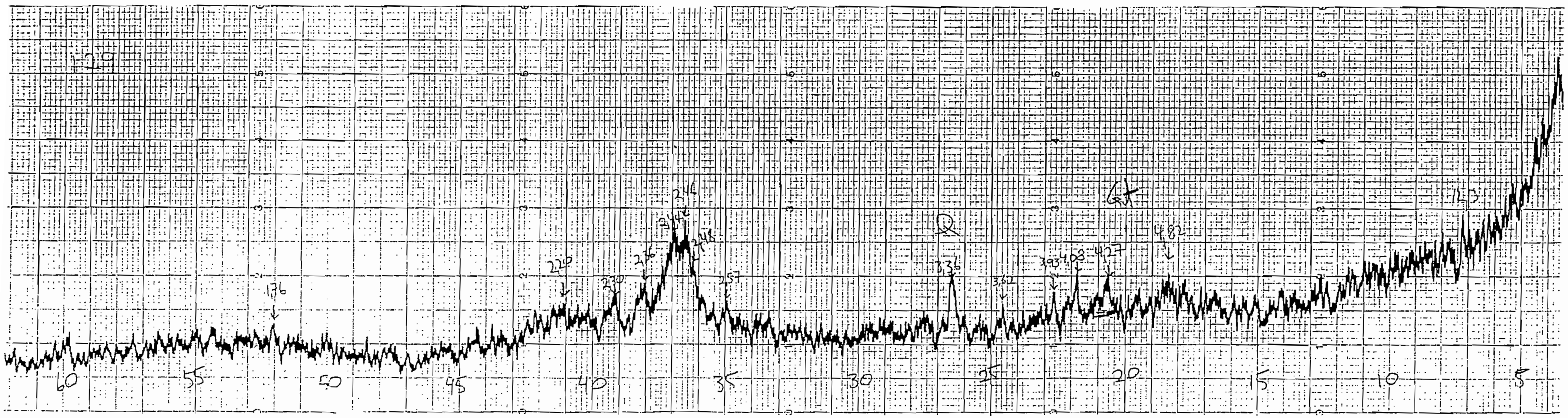


NGU-report 86.169. FIGURE 6.30 - 6.31





NGU-report 86.169. FIGURE 6.32 - 6.33



NGU-report 86.169. FIGURE 6.34

Side 1-A

PRNR	UTM X km	UTM Y km	Si %	Al %	Fe %	Mn %	Ti %	Mg %	Ca %	Na %	K %	P %	Ba ppm	Be ppm	Co ppm	Cr ppm	Cu ppm
701	594.60	6694.50	.19	2.00	14.30	13.10	.02	.07	.15	.004	.04	.50	3240.	6.	150.	24.	7.
702	601.39	6707.47	.10	1.80	9.70	20.00	.01	.05	.16	.002	.02	.69	3730.	6.	270.	28.	3.
703	601.36	6707.44	.11	1.60	10.70	8.40	.01	.06	.08	.010	.03	.35	1300.	6.	130.	19.	3.
704	601.39	6707.36	.16	2.20	11.70	18.20	.01	.10	.15	.001	.02	.64	3480.	8.	220.	28.	3.
705	601.43	6707.32	.11	1.40	6.90	10.00	.01	.04	.16	.008	.03	.37	2270.	6.	110.	15.	1.
706	601.44	6707.20	.06	1.60	4.80	6.80	.02	.07	.13	.012	.05	.27	1220.	6.	72.	12.	3.
707	601.46	6707.06	.18	3.70	7.30	17.40	.01	.06	.28	.005	.02	.61	4470.	16.	140.	28.	12.
708	601.50	6706.98	.35	3.70	14.60	12.90	.01	.06	.21	.001	.01	.49	3420.	18.	130.	24.	9.
709	601.48	6706.84	.25	3.30	8.70	12.70	.02	.09	.26	.004	.03	.49	3870.	17.	110.	23.	12.
710	601.56	6706.62	.28	3.90	8.40	16.10	.01	.08	.25	.002	.03	.57	5610.	20.	110.	26.	14.
711	601.50	6706.40	.35	3.60	11.00	12.50	.01	.13	.31	.002	.02	.47	3560.	19.	100.	26.	10.
712	601.91	6705.76	.25	1.40	12.50	22.00	.00	.03	.22	.003	.06	.74	7950.	5.	100.	31.	4.
713	602.67	6705.46	.09	2.70	6.40	11.60	.03	.28	.14	.003	.05	.43	2500.	6.	77.	30.	20.
714	602.79	6705.34	.11	5.50	4.40	20.10	.01	.04	.17	< .001	.01	.71	3330.	15.	120.	31.	27.
715	602.84	6705.26	.05	3.50	2.70	10.10	.04	.19	.17	.010	.05	.41	2470.	11.	46.	18.	14.
716	602.81	6704.49	.35	2.40	10.60	16.40	.03	.15	.51	.004	.05	.59	4850.	7.	62.	26.	11.
717	602.83	6704.44	.06	2.80	3.50	8.60	.06	.35	.35	.007	.07	.41	2310.	8.	39.	17.	8.
718	603.11	6703.95	.07	2.60	4.70	7.10	.03	.24	.19	.007	.04	.31	1290.	8.	45.	17.	12.
719	603.22	6703.51	.09	3.20	5.50	9.20	.03	.16	.18	.008	.03	.36	1890.	11.	61.	19.	14.
720	603.20	6702.30	.13	4.00	6.00	11.00	.04	.18	.20	.004	.03	.44	2060.	19.	75.	22.	14.
721	608.98	6705.05	.17	1.10	11.90	6.40	.01	.06	.05	.003	.01	.26	1530.	9.	65.	15.	1.
722	608.86	6705.14	.30	1.50	35.70	1.90	.00	.02	.03	< .001	< .00	.11	320.	10.	58.	8.	4.
723	608.73	6705.17	.09	1.70	9.20	11.60	.02	.22	.06	.002	.03	.44	1030.	5.	130.	29.	4.
724	608.60	6705.13	.09	1.20	8.00	10.50	.05	.13	.07	.004	.02	.40	1730.	4.	100.	21.	1.
725	608.50	6705.10	.05	1.50	8.10	4.70	.13	.68	.22	.007	.04	.22	700.	3.	66.	130.	6.
727	607.60	6706.70	.19	3.30	10.20	13.30	.02	.09	.09	.004	.03	.52	2250.	9.	250.	28.	8.
728	614.00	6707.30	.06	1.60	4.40	3.90	.04	.69	.19	.011	.42	.18	1090.	4.	37.	9.	8.
729	613.90	6705.50	.06	1.10	4.90	2.20	.05	.35	.36	.003	.11	.24	730.	3.	32.	24.	10.
730	599.33	6708.36	.09	2.90	6.50	17.30	.07	.24	.25	.025	.05	.64	4590.	3.	320.	38.	39.
731	597.84	6707.26	.06	1.60	7.90	4.30	.15	1.10	.29	.012	.32	.22	580.	2.	540.	35.	3.
732	599.68	6706.68	.13	2.90	6.60	9.30	.03	.25	.31	.005	.05	.37	2080.	4.	260.	28.	12.
733	597.03	6705.20	.21	1.70	13.70	16.50	.02	.12	.21	.002	.03	.59	4790.	4.	580.	32.	6.
734	596.21	6703.77	.14	2.60	9.80	7.20	.05	.37	.18	.003	.06	.30	1160.	4.	420.	31.	15.
735	607.50	6703.10	.09	3.50	7.30	15.10	.03	.10	.08	.002	.02	.58	1740.	3.	270.	25.	4.
736	609.50	6700.60	.21	2.40	11.60	11.80	.01	.04	.12	.005	.02	.47	3640.	7.	130.	22.	6.
737	629.20	6693.40	.16	2.50	15.30	12.40	.04	.30	.11	.001	.04	.52	2520.	4.	1170.	46.	180.
738	603.23	6686.61	.05	1.20	2.80	6.20	.01	.06	.03	.011	.03	.23	360.	2.	38.	12.	1.
739	600.08	6686.24	.19	3.70	9.10	14.10	.02	.06	.12	.001	.01	.56	1660.	8.	190.	26.	5.
740	597.40	6688.30	.05	1.20	3.30	4.40	.06	.42	.43	.013	.15	.20	910.	2.	41.	14.	10.
741	612.23	6686.92	.12	1.50	9.00	18.50	.02	.07	.11	.004	.03	.65	4620.	4.	220.	32.	4.
742	613.10	6685.90	.13	2.50	10.70	10.00	.02	.12	.21	.004	.04	.42	3110.	6.	170.	27.	22.
743	605.79	6683.00	.39	2.80	19.40	8.00	.01	.06	.06	< .001	.00	.33	820.	36.	140.	18.	3.
744	606.20	6684.60	.06	1.70	5.60	4.70	.06	.41	.36	.016	.07	.32	550.	9.	41.	14.	7.
745	605.61	6685.82	.09	.89	12.10	4.40	.02	.03	.01	.005	.01	.17	500.	3.	83.	13.	2.
746	604.70	6687.60	.05	.93	4.10	1.80	.09	.42	.30	.019	.13	.16	120.	2.	20.	21.	9.
747	603.13	6689.20	.20	1.90	15.90	7.90	.02	.07	.03	< .001	.01	.32	1460.	4.	250.	19.	3.
748	602.82	6692.50	.13	1.00	14.90	13.60	.02	.09	.08	.001	.02	.51	2160.	2.	280.	25.	6.
749	605.66	6691.01	.08	1.60	7.30	18.00	.02	.03	.02	.001	.02	.62	1150.	4.	64.	29.	3.
750	608.32	6695.69	.05	.74	4.70	2.90	.02	.02	.02	.006	.01	.12	260.	5.	26.	6.	3.
751	606.50	6693.90	.05	1.50	4.00	2.60	.06	.24	.12	.011	.04	.12	200.	3.	56.	13.	6.
752	602.36	6697.35	.23	2.10	8.60	19.10	.01	.07	.12	< .001	.01	.59	2700.	5.	240.	35.	9.
753	601.98	6696.17	.17	2.80	8.90	17.60	.01	.08	.04	< .001	.00	.55	1590.	7.	160.	33.	4.
754	602.49	6695.50	.08	2.50	7.80	18.10	.01	.06	.08	< .001	.01	.00	1770.	5.	170.	30.	4.
755	602.80	6695.40	.06	1.40	4.80	5.50	.03	.07	.07	.008	.01	.20	540.	3.	67.	11.	3.

NGU-report 86.169. FIGURE 7.1

Side 1-B

PRNR	UTM X km	UTM Y km	La ppm	Li ppm	Mo ppm	Ni ppm	Pb ppm	Rb ppm	Sc ppm	Sr ppm	V ppm	Zn ppm	Zr ppm	Y ppm	Ag ppm	W ppm	Sn ppm
701	594.60	6694.50	150.	18.	110.	190.	12.	33.	3.	26.	37.	1900.	7.	19.	< 1.	37.	< 3.
702	601.39	6707.47	150.	8.	140.	190.	98.	< 29.	< 1.	34.	44.	2660.	5.	33.	< 5.	54.	< 2.
703	601.36	6707.44	74.	5.	150.	73.	45.	70.	1.	13.	41.	930.	7.	21.	< 1.	24.	< 2.
704	601.39	6707.36	110.	14.	180.	140.	18.	51.	2.	41.	40.	1730.	6.	28.	< 5.	35.	< 2.
705	601.43	6707.32	120.	14.	370.	110.	15.	< 30.	< 1.	46.	23.	2140.	4.	30.	< 1.	43.	< 2.
706	601.44	6707.20	93.	14.	240.	89.	15.	< 30.	3.	25.	23.	1820.	5.	28.	< 1.	36.	< 2.
707	601.46	6707.06	260.	38.	760.	200.	13.	< 29.	6.	94.	32.	5270.	7.	74.	< 5.	99.	< 2.
708	601.50	6706.98	240.	25.	940.	170.	14.	33.	4.	60.	43.	3930.	9.	81.	< 1.	75.	< 2.
709	601.48	6706.84	290.	29.	820.	190.	< 5.	< 30.	7.	66.	34.	4100.	8.	89.	< 1.	79.	< 2.
710	601.56	6706.62	290.	47.	830.	190.	< 5.	< 30.	6.	79.	29.	5080.	8.	97.	< 5.	95.	< 2.
711	601.50	6706.40	270.	32.	840.	180.	< 5.	63.	5.	84.	34.	4240.	8.	95.	< 1.	80.	< 2.
712	601.91	6705.76	120.	10.	100.	190.	18.	< 30.	< 1.	120.	30.	2230.	5.	35.	< 5.	44.	< 2.
713	602.67	6705.46	120.	18.	76.	140.	19.	< 30.	5.	25.	38.	1120.	5.	41.	< 1.	21.	< 2.
714	602.79	6705.34	170.	50.	350.	390.	22.	< 30.	9.	35.	30.	5960.	6.	64.	< 5.	110.	< 2.
715	602.84	6705.26	110.	33.	300.	200.	23.	< 30.	4.	30.	23.	4070.	5.	42.	< 1.	82.	< 2.
716	602.81	6704.49	120.	29.	380.	200.	< 6.	39.	2.	280.	29.	3680.	5.	39.	< 5.	69.	< 3.
717	602.83	6704.44	95.	33.	260.	160.	21.	< 28.	3.	110.	30.	3510.	4.	31.	< 1.	68.	< 2.
718	603.11	6703.95	73.	23.	200.	130.	14.	< 30.	4.	27.	28.	2440.	5.	27.	< 1.	48.	< 2.
719	603.22	6703.51	96.	29.	240.	170.	33.	< 30.	6.	33.	32.	3280.	6.	35.	< 1.	62.	< 2.
720	603.20	6702.30	110.	37.	350.	190.	29.	< 30.	6.	35.	34.	4620.	7.	46.	< 1.	88.	< 2.
721	608.98	6705.05	28.	1.	270.	45.	17.	< 30.	< 1.	9.	26.	240.	5.	8.	< 1.	10.	< 2.
722	608.86	6705.14	16.	< 1.	88.	16.	42.	< 31.	< 1.	5.	56.	330.	12.	8.	< 1.	8.	< 3.
723	608.73	6705.17	32.	8.	37.	98.	52.	< 30.	< 1.	10.	39.	410.	5.	8	< 1.	11.	< 2.
724	608.60	6705.13	33.	3.	36.	83.	22.	< 30.	< 1.	13.	29.	470.	4.	7.	< 1.	12.	< 2.
725	608.50	6705.10	28.	6.	28.	65.	11.	< 31.	2.	28.	63.	340.	4.	7.	< 1.	10.	< 3.
727	607.60	6706.70	45.	10.	71.	150.	20.	< 30.	3.	17.	37.	1380.	6.	10.	< 1.	27.	< 2.
728	614.00	6707.30	44.	36.	64.	110.	40.	45.	3.	27.	25.	870.	13.	13.	< 1.	19.	< 2.
729	613.90	6705.50	65.	4.	22.	55.	11.	< 31.	6.	40.	56.	590.	5.	11.	< 1.	14.	< 3.
730	599.33	6708.36	140.	12.	65.	170.	< 5.	< 30.	9.	39.	63.	580.	4.	21.	< 5.	12.	< 2.
731	597.84	6707.26	12.	9.	620.	42.	60.	< 30.	7.	29.	85.	130.	5.	10.	< 1.	11.	< 2.
732	599.68	6706.68	77.	28.	150.	140.	9.	< 30.	5.	39.	41.	1390.	5.	20.	< 1.	29.	< 2.
733	597.03	6705.20	49.	5.	920.	100.	10.	< 30.	2.	45.	43.	590.	6.	12.	< 5.	21.	< 2.
734	596.21	6703.77	19.	16.	24.	100.	18.	< 30.	3.	22.	55.	580.	5.	8.	< 1.	17.	< 2.
735	607.50	6703.10	70.	18.	280.	110.	81.	< 30.	4.	16.	47.	1260.	5.	10.	< 5.	25.	< 2.
736	609.50	6700.60	140.	15.	210.	150.	33.	< 31.	3.	46.	46.	2140.	6.	24.	< 1.	44.	< 2.
737	629.20	6693.40	24.	12.	8.	130.	39.	< 30.	1.	16.	87.	460.	7.	7.	< 1.	9.	< 2.
738	603.23	6686.61	57.	3.	9.	46.	36.	< 30.	2.	4.	13.	400.	2.	11.	< 1.	11.	< 2.
739	600.08	6686.24	100.	16.	85.	150.	53.	< 31.	5.	22.	39.	1680.	6.	19.	< 1.	34.	< 2.
740	597.40	6688.30	94.	10.	82.	50.	5.	< 30.	4.	19.	28.	590.	3.	11.	< 1.	14.	< 2.
741	612.23	6686.92	73.	11.	180.	130.	11.	< 30.	2.	57.	39.	1400.	5.	32.	< 5.	29.	< 2.
742	613.10	6685.90	88.	14.	220.	210.	20.	< 30.	2.	29.	77.	1780.	7.	22.	< 1.	36.	< 2.
743	605.79	6683.00	140.	4.	47.	70.	30.	< 30.	1.	14.	43.	890.	9.	63.	< 1.	21.	< 2.
744	606.20	6684.60	75.	15.	45.	42.	900.	33.	4.	52.	36.	1000.	14.	65.	< 1.	23.	< 2.
745	605.61	6685.82	23.	< 1.	28.	26.	73.	< 30.	< 1.	3.	29.	110.	7.	15.	< 1.	7.	< 2.
746	604.70	6687.60	56.	8.	10.	33.	35.	< 30.	3.	15.	24.	160.	8.	16.	< 1.	7.	< 2.
747	603.13	6689.20	51.	4.	86.	69.	37.	< 30.	1.	7.	42.	340.	6.	14.	< 1.	10.	< 2.
748	602.82	6692.50	36.	< 1.	90.	100.	39.	51.	< 1.	10.	41.	290.	6.	8.	< 1.	8.	< 2.
749	605.66	6691.01	40.	5.	86.	110.	160.	< 30.	2.	6.	26.	360.	5.	20.	< 5.	10.	< 2.
750	608.32	6695.69	26.	2.	30.	18.	49.	39.	< 1.	2.	20.	150.	7.	15.	< 1.	7.	< 2.
751	606.50	6693.90	28.	7.	38.	23.	39.	32.	3.	6.	22.	190.	4.	10.	< 1.	7.	< 2.
752	602.36	6697.35	470.	5.	55.	130.	< 5.	< 30.	4.	22.	27.	760.	4.	59.	< 5.	19.	< 2.
753	601.98	6696.17	140.	10.	120.	110.	25.	38.	3.	7.	31.	1590.	5.	17.	< 5.	32.	< 2.
754	602.49	6695.50	120.	8.	78.	150.	43.	< 30.	2.	12.	34.	1540.	4.	14.	< 5.	31.	< 2.
755	602.80	6695.40	60.	2.	48.	48.	62.	32.	2.	7.	24.	520.	4.	13.	< 1.	15.	< 2.

Side 1-C

PRNR	UTM X km	UIM Y UTM Y	Sb ppm	As ppm	U ppm	Th ppm	Cd ppm
701	594.60	6694.50	< 8.	39.	370.	45.	32.
702	601.39	6707.47	< 7.	43.	590.	32.	30.
703	601.36	6707.44	< 7.	29.	360.	42.	11.
704	601.39	6707.36	< 7.	25.	540.	38.	24.
705	601.43	6707.32	< 7.	21.	340.	23.	20.
706	601.44	6707.20	< 7.	16.	210.	29.	18.
707	601.46	6707.06	< 7.	28.	540.	46.	45.
708	601.50	6706.98	< 7.	33.	470.	36.	34.
709	601.48	6706.84	< 7.	24.	450.	46.	36.
710	601.56	6706.62	< 7.	27.	540.	43.	37.
711	601.50	6706.40	< 7.	25.	460.	34.	34.
712	601.91	6705.76	< 7.	20.	650.	23.	20.
713	602.67	6705.46	< 7.	37.	330.	22.	13.
714	602.79	6705.34	< 7.	54.	560.	44.	47.
715	602.84	6705.26	< 7.	40.	330.	29.	39.
716	602.81	6704.49	< 8.	20.	490.	23.	35.
717	602.83	6704.44	< 7.	31.	290.	20.	30.
718	603.11	6703.95	< 7.	23.	240.	16.	22.
719	603.22	6703.51	< 7.	32.	300.	28.	32.
720	603.20	6702.30	< 7.	35.	380.	33.	39.
721	608.98	6705.05	< 7.	14.	220.	10.	5.
722	608.86	6705.14	< 8.	31.	< 21.	< 6.	13.
723	608.73	6705.17	< 7.	24.	360.	14.	13.
724	608.60	6705.13	< 7.	16.	310.	18.	12.
725	608.50	6705.10	< 8.	11.	150.	5.	6.
727	607.60	6706.70	< 7.	20.	420.	27.	24.
728	614.00	6707.30	< 7.	13.	100.	29.	9.
729	613.90	6705.50	< 8.	9.	59.	12.	7.
730	599.33	6708.36	< 7.	15.	520.	37.	18.
731	597.84	6707.26	< 7.	18.	120.	9.	3.
732	599.68	6706.68	< 7.	28.	280.	22.	19.
733	597.03	6705.20	< 7.	19.	490.	24.	16.
734	596.21	6703.77	< 7.	30.	230.	10.	12.
735	607.50	6703.10	< 7.	21.	430.	34.	23.
736	609.50	6700.60	< 7.	39.	340.	35.	32.
737	629.20	6693.40	< 7.	36.	370.	19.	13.
738	603.23	6686.61	< 7.	9.	200.	23.	9.
739	600.08	6686.24	< 7.	26.	410.	48.	27.
740	597.40	6688.30	< 7.	11.	130.	26.	8.
741	612.23	6686.92	< 7.	13.	590.	22.	14.
742	613.10	6685.90	< 7.	28.	290.	21.	39.
743	605.79	6683.00	< 7.	37.	230.	14.	17.
744	606.20	6684.60	< 7.	11.	150.	41.	14.
745	605.61	6685.82	< 7.	13.	120.	17.	3.
746	604.70	6687.60	< 7.	20.	49.	11.	2.
747	603.13	6689.20	< 7.	26.	240.	17.	11.
748	602.82	6692.50	< 7.	27.	420.	19.	12.
749	605.66	6691.01	< 7.	14.	550.	49.	9.
750	608.32	6695.69	< 7.	9.	83.	21.	2.
751	606.50	6693.90	< 7.	21.	58.	16.	2.
752	602.36	6697.35	7.	13.	450.	45.	16.
753	601.98	6696.17	9.	19.	400.	51.	27.
754	602.49	6695.50	< 7.	26.	450.	45.	35.
755	602.80	6695.40	7.	12.	110.	24.	11.

Side 2-A

PRNR	UTM X km	UTM Y km	Si %	Al %	Fe %	Mn %	Ti %	Mg %	Ca %	Na %	K %	P %	Ba ppm	Be ppm	Co ppm	Cr ppm	Cu ppm
756	595.78	6698.91	.10	1.80	9.40	19.30	.02	.41	.26	< .001	.06	.60	8910.	4.	160.	49.	5.
757	595.67	6695.97	.12	1.90	8.10	15.60	.01	.07	.09	< .001	.02	.50	4130.	5.	140.	27.	5.
758	595.80	6693.70	.18	3.00	10.60	11.50	.02	.05	.07	< .001	.00	.42	1760.	7.	100.	26.	8.
759	601.90	6689.47	.38	2.00	19.20	11.20	.01	.05	.23	< .001	< .00	.38	1820.	6.	140.	24.	3.
760	601.47	6689.64	.14	1.70	11.60	21.40	.01	.03	.04	< .001	.00	.64	2180.	4.	170.	37.	< 1.
761	598.16	6690.43	.18	1.60	10.80	17.50	.01	.17	.29	< .001	.02	.56	4920.	3.	120.	38.	5.
762	600.27	6696.18	.07	3.70	5.40	13.40	.03	.13	.05	< .001	.01	.48	1120.	5.	180.	31.	5.
763	608.63	6698.28	.33	1.90	37.10	3.10	.00	.02	.02	< .001	< .00	.13	730.	8.	230.	11.	3.
764	603.50	6699.50	.19	2.70	9.10	9.20	.03	.12	.25	< .001	.02	.34	2070.	5.	270.	26.	6.
765	605.70	6699.10	.10	1.80	9.50	9.70	.07	.30	.20	.001	.04	.34	2480.	5.	200.	26.	5.
766	608.58	6699.85	.12	3.30	8.10	10.90	.05	.32	.31	< .001	.03	.40	3020.	8.	170.	28.	20.
767	356.30	6807.10	.28	.80	16.20	9.20	.04	.16	.26	< .001	.03	.36	2070.	2.	120.	21.	5.
768	355.80	6806.50	.07	1.40	12.10	.57	.12	.44	.44	.008	.10	.17	83.	7.	57.	13.	10.
769	358.30	6801.60	.31	1.40	18.10	5.70	.04	.10	.22	< .001	.02	.23	1630.	18.	100.	17.	4.
770	356.30	6801.20	.29	.88	23.00	3.20	.05	.12	.35	.005	.03	.17	1130.	3.	72.	13.	9.
771			.16	4.10	28.80	.04	.03	.03	.22	< .001	< .00	.17	29.	33.	< 1.	23.	4.
772	*		.50	1.70	29.60	5.70	.02	.02	.03	< .001	< .00	.27	900.	8.	310.	25.	< 1.
773			.34	1.80	24.60	5.00	.01	.03	.15	< .001	< .00	.23	890.	19.	270.	16.	3.
774			.31	.71	25.00	4.70	.01	.02	.02	< .001	< .00	.18	930.	4.	210.	13.	< 1.
775	650.50	6690.20	.14	2.10	9.60	8.60	.03	.13	.10	< .001	.04	.33	1300.	3.	210.	24.	27.
776	650.50	6690.20	.33	1.60	19.50	6.00	.02	.05	.08	< .001	.01	.39	2740.	4.	140.	24.	17.
777	*		.68	.42	16.00	15.90	.01	.06	.23	.006	.13	.52	15760.	2.	140.	29.	3.
778			.62	.77	18.40	19.40	.01	.07	.40	< .001	.07	.62	13480.	2.	150.	34.	5.
780	459.90	6632.50	.19	1.80	15.00	7.70	.07	.25	.17	< .001	.01	.28	2060.	3.	210.	28.	7.
781	409.40	6606.50	.27	1.10	23.60	2.30	.05	.12	.11	< .001	< .00	.12	710.	3.	41.	22.	27.
782	399.70	6461.00	.05	1.00	4.10	1.50	.03	.09	.16	< .001	.05	.08	310.	1.	93.	9.	7.
783	511.80	6686.50	.06	.97	10.50	.16	.11	.23	.23	.003	.04	.07	65.	1.	12.	15.	11.
784	650.50	6690.20	.16	2.40	5.20	11.10	.05	.22	.13	< .001	.07	.45	2640.	2.	170.	29.	38.
785	650.50	6690.20	.18	2.50	5.50	12.20	.03	.18	.12	< .001	.05	.49	2770.	2.	220.	29.	33.
786	650.50	6690.20	.24	2.40	25.00	2.30	.01	.07	.08	< .001	.00	.21	740.	6.	91.	22.	19.
787	649.90	6688.70	.30	.66	20.70	2.70	.01	.07	.05	< .001	.01	.22	2100.	2.	65.	18.	35.
788	649.90	6680.70	.32	1.10	18.40	2.50	.02	.06	.05	< .001	.00	.17	2330.	3.	130.	10.	8.
789	649.90	6680.70	.23	3.00	29.70	.84	.01	.04	.09	< .001	< .00	.24	230.	8.	44.	26.	23.
790	649.90	6680.70	.15	1.50	16.80	1.90	.03	.10	.06	< .001	.02	.16	680.	3.	68.	19.	17.
791	648.90	6691.40	.35	3.30	16.70	11.30	.02	.07	.09	< .001	.01	.50	2100.	5.	250.	30.	44.
792	648.90	6691.40	.24	1.50	29.30	2.30	.02	.09	.05	< .001	.02	1.10	920.	8.	51.	25.	29.
793	645.80	6694.70	.28	1.60	25.20	1.40	.01	.06	.07	< .001	< .00	.17	1110.	5.	59.	18.	14.
794	647.40	6694.90	.23	3.90	12.80	15.70	.03	.11	.12	< .001	.03	.71	2120.	5.	300.	37.	56.
795	647.40	6694.90	.22	1.60	25.70	2.60	.03	.11	.06	< .001	.03	.95	490.	6.	48.	25.	30.
796	559.50	6635.90	.37	1.80	12.80	21.00	.00	.02	.04	< .001	.01	.62	1360.	3.	74.	34.	8.
797	559.50	6635.90	.44	1.40	30.60	3.50	.00	.01	.01	< .001	< .00	.13	250.	5.	41.	9.	7.
798	559.55	6635.69	.60	.95	25.40	12.20	.01	.02	.01	< .001	.02	.39	1300.	4.	69.	23.	2.
799	559.55	6635.69	.33	.58	41.80	.35	.00	.02	.00	< .001	< .00	.04	32.	5.	< 1.	2.	2.
800	526.60	6731.00	.26	1.10	14.60	11.00	.01	.13	.17	< .001	.04	.38	4920.	3.	130.	22.	10.
801	594.60	6694.50	.24	4.10	12.60	26.10	.01	.04	.19	< .001	.01	.79	5750.	9.	180.	44.	11.
802	601.60	6706.50	.31	3.10	11.50	19.40	.01	.09	.22	< .001	.02	.59	6930.	14.	130.	34.	12.
803	595.80	6695.90	.17	4.70	9.90	25.40	.02	.10	.15	< .001	.02	.80	7100.	11.	270.	50.	19.
804	344.20	6768.00	.16	1.20	18.10	26.10	.01	.03	.06	< .001	.02	.79	8630.	2.	930.	42.	1.
805	650.70	6786.50	.30	.94	18.40	23.70	.00	.04	.31	< .001	.04	.68	6210.	3.	380.	35.	< 1.
806	631.50	6914.20	.41	7.40	5.00	22.00	.02	.17	.59	< .001	.01	.71	9780.	7.	320.	36.	82.
807	595.80	6793.80	.35	.80	17.30	.02	.22	.09	.53	.001	.06	.61	6510.	2.	170.	28.	19.
808	621.50	6863.00	.23	.78	12.00	11.70	.02	.03	.04	< .001	.01	.63	17550.	4.	110.	26.	2.
809	347.40	6752.80	.31	1.80	18.00	9.50	.03	.15	.09	< .001	.01	.34	3110.	6.	210.	21.	14.
810	612.10	6896.70	.48	4.60	18.20	14.00	.01	.03	.14	< .001	< .00	.49	5900.	31.	350.	27.	100.

* Sweden

Side 2-B

PRNR	UTM X km	UTM Y km	La ppm	Li ppm	Mo ppm	Ni ppm	Pb ppm	Rb ppm	Sc ppm	Sr ppm	V ppm	Zn ppm	Zr ppm	Y ppm	Ag ppm	W ppm	Sn ppm
756	595.78	6698.91	130.	28.	88.	230.	16.	< 30.	1.	59.	34.	2070.	4.	21.	< 5.	39.	< 2.
757	595.67	6695.97	120.	10.	80.	180.	< 5.	< 30.	2.	25.	19.	1760.	4.	21.	< 5.	33	< 2.
758	595.80	6693.70	120.	24.	130.	190.	15.	< 30.	4.	10.	31.	1930.	7.	20.	< 1.	37.	< 2.
759	601.90	6689.47	120.	< 1.	350.	81.	11.	< 30.	< 1.	36.	34.	970.	8.	32.	< 1.	21.	3.
760	601.47	6689.64	83.	< 1.	59.	120.	10.	< 30.	< 1.	11.	24.	740.	5.	19.	< 5.	18.	< 2.
761	598.16	6690.43	190.	13.	150.	170.	12.	< 30.	2.	53.	32.	2310.	6.	23.	< 5.	43.	< 2.
762	600.27	6696.18	63.	17.	270.	130.	14.	< 30.	5.	6.	30.	940.	6.	10.	< 1	20.	2.
763	608.63	6698.28	9.	< 1.	2.	14.	48.	< 31.	< 1.	6.	54.	170.	15.	18.	< 1.	6.	< 3.
764	603.50	6699.50	62.	15.	230.	100.	53.	< 30.	3.	39.	40.	1170.	5.	13.	< 1.	23.	< 2.
765	605.70	6699.10	46.	10.	110.	75.	47.	< 30.	2.	28.	43.	800.	4.	12.	< 1.	17.	< 2.
766	608.58	6699.85	170.	29.	190.	160.	20.	51.	9.	44.	49.	2020.	7.	41.	< 1.	40.	< 2.
767	356.30	6807.10	14.	< 1.	< 1.	52.	15.	38.	< 1.	75.	62.	220.	6.	5.	< 1.	6.	< 2.
768	355.80	6806.50	13.	2.	< 1.	14.	22.	< 30.	2.	50.	140.	53.	6.	8.	< 1.	< 2.	< 2.
769	358.30	6801.60	38.	< 1.	29.	34.	43.	< 30.	< 1.	40	61.	540.	8.	17.	< 1.	11.	< 2.
770	356.30	6801.20	29.	< 1.	< 1.	18.	12.	65.	< 1.	50.	64.	170.	12.	13.	< 1.	6.	< 2.
771			28.	3.	75.	4.	9.	44.	< 1.	18.	500.	120.	14.	26.	< 1.	< 2	< 2.
772			10.	< 1.	< 1.	29.	6.	< 30.	< 1.	4.	110.	30.	15.	12.	< 1.	< 2	< 2.
773	*		38.	< 1.	< 1.	34.	< 5.	< 30.	< 1.	16.	120.	230.	12.	30.	< 1.	5.	< 2.
774			8.	< 1.	< 1.	23.	< 5.	< 30.	< 1.	8.	41.	24.	9.	9.	< 1.	2.	< 2.
775	650.50	6690.20	55.	12.	< 1.	150.	22.	< 30.	3.	19.	56.	450.	7.	21.	< 1.	9.	< 2.
776	650.50	6690.20	61.	5.	< 1.	65.	21.	< 30.	1.	13.	67.	260.	10.	29.	< 1.	6.	< 2.
777	*		67.	< 1.	53.	110.	< 5.	< 30.	< 1.	120.	27.	600.	6.	18.	< 5.	14.	< 2.
778			120.	< 1.	5.	120.	< 5.	< 30.	< 1.	92.	33.	770.	7.	30.	< 5.	16.	< 2.
780	459.90	6632.50	44.	4.	2.	55.	< 5.	< 30.	2.	20.	36.	270.	5.	19.	< 1.	8.	< 2.
781	409.40	6606.50	22.	1.	4.	29.	< 5.	64.	< 1.	5.	77.	150.	8.	20.	< 1.	5.	< 2.
782	399.70	6461.00	47.	3.	41.	18.	310.	100.	2.	24.	22.	310.	4.	12.	< 1.	13.	4.
783	511.80	6686.50	30.	< 1.	< 1.	11.	7.	< 30.	3.	7.	43.	55.	4.	18.	< 1.	5.	2.
784	650.50	6690.20	66.	18.	< 1.	160.	19.	< 30.	6.	31.	31.	440.	5.	23.	< 1.	10.	< 2.
785	650.50	6690.20	68.	64.	< 1.	160.	9.	< 30.	5.	31.	33.	500.	4.	24.	< 1.	10.	< 2.
786	650.50	6690.20	33.	< 1.	< 1.	29.	25.	< 30.	< 1.	9.	84.	320.	12.	24.	< 1.	7.	< 2.
787	649.90	6688.70	26.	< 1.	1.	28.	6.	< 30.	< 1.	12.	28.	81.	7.	12.	< 1.	5.	< 2.
788	649.90	6680.70	29.	< 1.	< 1.	22.	7.	< 30.	< 1.	9.	39.	200.	7.	18.	< 1.	4.	< 2.
789	649.90	6680.70	41.	< 1.	2.	22.	35.	< 30.	< 1.	7.	110.	340.	15.	32.	< 1.	7.	< 2.
790	649.90	6680.70	25.	< 1.	< 1.	27.	21.	< 30.	< 1.	8.	64.	220.	8.	17.	< 1.	6.	< 2.
791	648.90	6691.40	86.	28.	< 1.	190.	25.	< 30.	4.	17.	72.	670.	10.	39.	< 1.	12.	3.
792	648.90	6691.40	80.	< 1.	10.	48.	11.	51.	< 1.	7.	73.	320.	13.	56.	< 1.	7.	8.
793	645.80	6694.70	48.	< 1.	9.	25.	17.	< 30.	< 1.	9.	66.	290.	10.	25.	< 1.	8.	< 2.
794	647.40	6694.90	95.	35.	3.	260.	21.	32.	7.	21.	67.	870.	10.	41.	< 5.	17.	< 2.
795	647.40	6694.90	77.	< 1.	5.	37.	14.	< 30.	< 1.	7.	72.	250.	13.	55.	< 1.	3.	< 2.
796	559.50	6635.90	66.	< 1.	< 1.	98.	< 5.	< 30.	< 1.	5.	16.	450.	7.	14.	< 5.	12.	< 2.
797	559.50	6635.90	25.	< 1.	< 1.	14.	50.	< 30.	< 1.	< 1.	26.	120.	14.	16.	< 1.	6.	< 2.
798	559.55	6635.69	31.	< 1.	49.	73.	70.	< 30.	< 1.	8.	28.	280.	11.	12.	< 1.	7.	< 2.
799	559.55	6635.69	24.	< 1.	160.	< 2.	23.	< 30.	< 1.	< 1.	38.	160.	16.	21.	< 1.	6.	< 2.
800	526.60	6731.00	45.	10.	4.	160.	6.	< 30.	< 1.	79.	23.	960.	6.	21.	< 1.	20.	< 2.
801	594.60	6694.50	290.	36.	240.	380.	10.	< 30.	10.	34.	35.	3860.	9.	32.	< 5.	69.	< 2.
802	601.60	6706.50	260.	25.	760.	190.	< 5.	< 30.	3.	72.	27.	3620.	7.	85.	< 5.	67.	< 2.
803	595.80	6695.90	200.	36.	180.	370.	< 5.	< 30.	8.	30.	27.	2740.	7.	39.	< 5.	48.	< 2.
804	344.20	6768.00	40.	< 1.	< 1.	140.	8.	32.	< 1.	15.	71.	240.	7.	10.	< 5.	6.	< 2.
805	650.70	6786.50	24.	10.	< 1.	200.	37.	< 30.	< 1.	39.	42.	1100.	7.	11.	< 5.	21.	< 2.
806	631.50	6914.20	170.	85.	24.	870.	21.	< 30.	6.	110.	49.	5790.	13.	79.	< 5.	100.	< 2.
807	595.80	6793.80	120.	2.	< 1.	420.	< 5.	< 30.	< 1.	200.	23.	590.	8.	39.	< 1.	12.	< 2.
808	621.50	6863.00	15.	< 1.	< 1.	79.	27.	< 30.	< 1.	21.	130.	32.	5.	6.	< 1.	< 2.	< 2.
809	347.40	6752.80	83.	11.	< 1.	93.	9.	< 30.	4.	10.	54.	410.	9.	39.	< 1.	11.	< 2.
810	612.10	6896.70	100.	19.	4.	150.	96.	38.	6.	22.	58.	2450.	19.	74.	< 1.	45.	< 2.

* Sweden

NGU-report 86.169. FIGURE 7.1

Side 2-C

PRNR	UTM X km	UTM Y UTM Y	Sb ppm	As ppm	U ppm	Th ppm	Cd ppm
756	595.78	6698.91	< 7.	38.	490.	20.	19.
757	595.67	6695.97	< 7.	20.	390.	29.	25.
758	595.80	6693.70	< 7.	44.	290.	33.	27.
759	601.90	6689.47	< 7.	25.	290.	18.	14.
760	601.47	6689.64	< 7.	13.	520.	28.	13.
761	598.16	6690.43	< 7.	15.	410.	39.	25.
762	600.27	6696.18	< 7.	22.	350.	23.	15.
763	608.63	6698.28	< 8.	13.	< 21.	< 6.	12.
764	603.50	6699.50	< 7.	21.	210.	25.	24.
765	605.70	6699.10	< 7.	20.	220.	17.	14.
766	608.58	6699.85	< 7.	28.	250.	36.	25.
767	356.30	6807.10	< 7.	11.	220.	< 5.	5.
768	355.80	6806.50	< 7.	5.	< 20.	< 5.	1.
769	358.30	6801.60	< 7.	16.	100.	< 5.	10.
770	356.30	6801.20	< 7.	23.	37.	< 5.	6.
771			< 7.	42.	< 20.	< 5.	13.
772 *			< 7.	< 3.	84.	< 5.	8.
773			< 7.	35.	58.	< 5.	8.
774			< 7.	< 3.	69.	< 5.	6.
775	650.50	6690.20	< 7.	28.	180.	14.	7.
776	650.50	6690.20	< 7.	37.	110.	< 5.	6.
777			< 7.	75.	330.	< 5.	8.
778 *			< 7.	100.	370.	10.	12.
780	459.90	6632.50	< 7.	16.	25.	5.	6.
781	409.40	6606.50	< 7.	33.	29.	< 5.	7.
782	399.70	6461.00	12.	59.	160.	31.	3.
783	511.80	6686.50	< 7.	11.	< 20.	< 5.	< 1.
784	650.50	6690.20	< 7.	5.	280.	14.	4.
785	650.50	6690.20	< 7.	10.	280.	13.	4.
786	650.50	6690.20	< 7.	67.	< 20.	< 5.	6.
787	649.90	6688.70	< 7.	30.	< 20.	< 5.	3.
788	649.90	6680.70	< 7.	12.	< 20.	< 5.	3.
789	649.90	6680.70	< 7.	95.	< 20.	< 5.	8.
790	649.90	6680.70	< 7.	47.	< 20.	< 5.	2.
791	648.90	6691.40	< 7.	33.	230.	11.	10.
792	648.90	6691.40	< 7.	92.	< 20.	< 5.	10.
793	645.80	6694.70	< 7.	71.	< 20.	< 5.	6.
794	647.40	6694.90	< 7.	28.	320.	24.	12.
795	647.40	6694.90	< 7.	110.	< 20.	< 5.	8.
796	559.50	6635.90	< 7.	< 3.	490.	14.	12.
797	559.50	6635.90	< 7.	5.	62.	< 5.	9.
798	559.55	6635.69	< 7.	< 3.	270.	< 5.	12.
799	559.55	6635.69	< 7.	14.	< 20.	< 5.	17.
800	526.60	6731.00	< 7.	65.	250.	< 5.	7.
801	594.60	6694.50	9.	33.	550.	85.	58.
802	601.60	6706.50	< 7.	12.	470.	15.	29.
803	595.80	6695.90	< 7.	15.	560.	55.	40.
804	344.20	6768.00	< 7.	20.	590.	20.	11.
805	650.70	6786.50	< 7.	59.	540.	< 5.	18.
806	631.50	6914.20	< 7.	94.	500.	36.	37.
807	595.80	6793.80	< 7.	34.	340.	< 5.	11.
808	621.50	6863.00	< 7.	18.	280.	< 5.	4.
809	347.40	6752.80	< 7.	28.	210.	9.	9.
810	612.10	6896.70	< 7.	17.	330.	13.	22.

* Sweden

Side 3-A

PRNR	UTM X km	UTM Y km	Si %	Al %	Fe %	Mn %	Ti %	Mg %	Ca %	Na %	K %	P %	Ba ppm	Be ppm	Co ppm	Cr ppm	Cu ppm
811	343.90	6864.80	.41	1.00	13.00	25.10	.00	.06	.57	< .001	.05	.79	31390.	2.	65.	47.	7.
812	649.20	6693.70	.75	.81	31.40	6.50	.02	.07	.07	< .001	.05	.30	2960.	3.	62.	20.	8.
813	649.20	6693.70	.24	3.50	10.00	15.90	.03	.11	.14	< .001	.03	.55	2780.	4.	290.	32.	49.
814	*		.10	.72	6.10	2.60	.02	.26	.18	< .001	.09	.12	1130.	< 1.	63.	12.	7.
815	573.90	6917.80	.17	1.20	11.00	.54	.09	.79	.16	< .001	.21	.05	120.	< 1.	29.	69.	17.
816	560.50	6905.00	.15	1.20	12.50	.14	.07	.75	.14	< .001	.11	.07	48.	1.	22.	53.	33.

Side 3-B

PRNR	UTM X km	UTM Y km	La ppm	Li ppm	Mo ppm	Ni ppm	Pb ppm	Rb ppm	Sc ppm	Sr ppm	V ppm	Zn ppm	Zr ppm	Y ppm	Ag ppm	W ppm	Sn ppm
811	343.90	6864.80	51.	8.	< 1.	320.	< 5.	< 30.	< 1.	99.	38.	1060.	6.	25.	< 5.	20.	< 2.
812	649.20	6693.70	43.	< 1.	< 1.	44.	< 5.	< 30.	< 1.	28.	42.	79.	11.	22.	< 1.	4.	< 2.
813	649.20	6693.70	86.	28.	< 1.	250.	16.	< 30.	5.	25.	50.	1090.	7.	29.	< 5.	22.	< 2.
814	*		15.	3.	7.	36.	< 5.	65.	< 1.	23.	16.	66.	3.	6.	< 1.	4.	< 2.
815	573.90	6917.80	28.	8.	< 1.	120.	< 5.	< 30.	2.	4.	41.	45.	5.	16.	< 1.	4.	< 2.
816	560.50	6905.00	18.	6.	< 1.	31.	< 5.	< 30.	2.	6.	38.	39.	6.	11.	< 1.	4.	< 2.

Side 3-C

PRNR	UTM X km	UTM Y UTM Y	Sb ppm	As ppm	U ppm	Th ppm	Cd ppm
811	343.90	6864.80	< 7.	25.	560.	< 5.	10.
812	649.20	6693.70	< 7.	20.	110.	< 5.	11.
813	649.20	6693.70	< 7.	25.	330.	18.	14.
814	*		< 7.	5.	48.	< 5.	< 1.
815	573.90	6917.80	< 7.	< 3.	< 20.	< 5.	< 1.
816	560.50	6905.00	< 7.	11.	< 20.	< 5.	< 1.

* Map 1616 III Å1

Side 1-A

PRNR	UTM X km	UTM Y km	Si %	Al %	Fe %	Ti %	Mg %	Ca %	Na %	K %	Mn %	P %	Cu ppm	Zn ppm	Pb ppm	Ni ppm	Co ppm
701	594.60	6694.50	< .01	2.66	10.04	.01	.10	.15	<.002	.05	10.35	< .01	11.8	2800.	< 50.0	131.9	122.9
702	601.39	6707.47	< .01	1.73	10.63	.00	.05	.14	<.002	.05	11.42	< .01	6.6	2200.	< 50.0	48.2	256.7
703	601.36	6707.44	< .01	1.66	8.29	.00	.08	.07	<.002	.05	8.89	.02	9.9	1000.	< 50.0	< 20.0	142.6
704	601.39	6707.36	.01	1.54	11.32	.01	.07	.11	<.002	.07	14.40	.02	6.7	1200.	< 50.0	48.1	194.8
705	601.43	6707.32	< .01	1.03	10.88	.02	.08	.13	.003	.05	4.95	.02	12.0	808.	< 50.0	33.8	82.7
706	601.44	6707.20	< .01	1.21	2.62	.01	.08	.09	<.002	.06	4.08	< .01	4.2	1500.	< 50.0	38.6	63.2
707	601.46	6707.06	< .01	3.00	6.60	.00	.06	.22	<.002	.06	9.16	< .01	10.9	4300.	< 50.0	85.5	102.4
708	601.50	6706.98	< .01	3.94	13.68	.01	.05	.20	<.002	.04	14.07	.04	20.4	4100.	< 50.0	84.0	139.9
709	601.48	6706.84	< .01	3.56	10.76	.02	.11	.28	<.002	.05	12.37	.03	21.1	4400.	< 50.0	88.6	129.2
710	601.56	6706.62	< .01	3.51	7.79	.01	.11	.24	.003	.08	10.38	.01	19.6	4500.	< 50.0	111.5	107.7
711	601.50	6706.40	< .01	4.10	11.04	.03	.14	.37	.002	.08	13.90	.04	17.8	5700.	< 50.0	109.8	112.5
712	601.91	6705.76	< .01	1.45	12.82	.00	.03	.20	<.002	.07	13.75	< .01	8.7	2200.	< 50.0	83.7	104.6
713	602.67	6705.46	< .01	3.33	6.89	.03	.28	.21	.006	.15	11.59	< .01	27.9	1400.	< 50.0	90.0	101.8
714	602.79	6705.34	< .01	5.18	2.83	.00	.05	.16	<.002	.05	10.08	< .01	25.5	5700.	< 50.0	252.3	100.7
715	602.84	6705.26	< .01	3.86	2.32	.03	.20	.31	.010	.09	6.64	< .01	15.7	4400.	61.7	144.4	51.6
716	602.81	6704.49	< .01	2.12	12.45	.10	.25	.53	.004	.12	9.69	.04	14.2	2900.	< 50.0	122.5	70.2
717	602.83	6704.44	< .01	3.04	2.87	.08	.36	.58	.008	.12	6.76	.04	8.9	3900.	< 50.0	103.0	51.7
718	603.11	6703.95	< .01	3.19	3.32	.10	.30	.31	.017	.18	7.57	.05	17.5	2500.	< 50.0	89.7	51.0
719	603.22	6703.51	< .01	3.96	5.18	.02	.19	.23	.003	.09	8.66	.02	23.0	4000.	57.3	145.3	68.1
721	608.98	6705.05	< .01	1.07	12.42	.02	.08	.06	<.002	.06	5.41	.03	10.4	196.	< 50.0	< 20.0	69.7
722	608.86	6705.14	.07	1.54	39.76	.01	.03	.04	<.002	.03	1.02	< .01	5.7	280.	< 50.0	< 20.0	74.9
723	608.73	6705.17	< .01	1.78	8.87	.04	.28	.15	.003	.08	12.25	.03	9.2	423.	104.2	22.4	125.0
724	608.60	6705.13	< .01	1.53	9.97	.04	.27	.30	.011	.08	8.29	.02	14.3	400.	< 50.0	22.9	99.5
730	599.33	6708.36	< .01	2.52	9.57	.07	.39	.37	.046	.15	10.05	.07	26.6	419.	< 50.0	55.5	355.7
731	597.84	6707.26	< .01	1.78	6.07	.16	1.36	.40	.022	.36	2.06	.04	7.9	96.	77.7	< 20.0	252.1
732	599.68	6706.68	< .01	3.20	7.04	.07	.24	.38	.004	.14	9.42	.05	13.0	1500.	70.3	89.1	275.4
733	597.03	6705.20	< .01	1.71	15.54	.03	.11	.18	<.002	.06	12.97	.03	22.0	570.	< 50.0	31.9	518.8
734	596.21	6703.77	< .01	3.05	11.02	.06	.40	.22	<.002	.12	7.68	.05	21.7	591.	< 50.0	67.1	417.0
738	603.23	6686.61	< .01	1.60	3.20	.02	.20	.11	.004	.08	7.08	< .01	5.5	482.	68.7	< 20.0	60.2
739	600.08	6686.24	< .01	4.04	11.05	.02	.10	.19	<.002	.04	14.91	.03	9.6	2100.	52.1	64.4	203.8
741	612.23	6686.92	< .01	1.48	9.47	.01	.10	.13	<.002	.05	9.91	< .01	7.9	1100.	< 50.0	49.4	216.1
743	605.79	6683.00	< .01	2.55	23.02	.01	.08	.05	<.002	.04	5.32	.02	8.9	706.	77.3	24.9	117.6
745	605.61	6685.82	< .01	1.30	23.51	.02	.07	.02	<.002	.09	5.41	.02	9.9	132.	111.3	< 20.0	114.6
747	603.13	6689.20	< .01	1.72	17.00	.05	.14	.09	<.002	.11	8.67	.03	11.0	377.	< 50.0	28.2	221.2
748	602.82	6692.50	< .01	1.00	16.45	.02	.10	.06	<.002	.06	9.12	.03	6.5	175.	72.7	20.8	251.4
749	605.66	6691.01	< .01	1.62	5.99	.00	.04	.01	<.002	.07	8.32	< .01	4.4	350.	101.2	< 20.0	83.0
750	608.32	6695.69	< .01	1.36	8.70	.02	.08	.05	<.002	.08	4.84	.02	26.8	255.	74.2	< 20.0	51.1
752	602.36	6697.35	< .01	1.12	4.60	.00	.04	.06	<.002	.05	4.88	< .01	3.4	893.	< 50.0	21.7	118.4
753	601.98	6696.17	< .01	2.98	9.77	.00	.09	.05	<.002	.06	13.13	< .01	16.1	1500.	< 50.0	28.1	176.3
754	602.49	6695.50	< .01	2.81	8.53	.01	.12	.11	.030	.09	13.29	< .01	10.1	1600.	51.4	91.0	185.9
756	595.78	6698.91	< .01	1.38	10.71	.01	.25	.32	<.002	.07	7.59	< .01	12.8	2100.	< 50.0	108.6	115.4
757	595.67	6695.97	< .01	2.17	4.85	.01	.11	.12	.003	.05	6.89	< .01	14.0	1800.	< 50.0	104.3	134.0
759	601.90	6689.47	< .01	1.93	20.82	.01	.05	.18	<.002	.06	10.21	.01	13.2	942.	< 50.0	31.7	134.7
760	601.47	6689.64	< .01	2.05	9.52	.00	.07	.05	<.002	.05	14.51	< .01	7.3	926.	54.1	29.9	136.6
761	598.16	6690.43	< .01	1.49	11.92	.01	.06	.27	<.002	.06	10.12	< .01	9.4	2200.	< 50.0	65.5	111.2
762	600.27	6696.18	< .01	3.07	4.79	.01	.11	.07	<.002	.07	9.84	< .01	15.0	783.	< 50.0	47.5	177.8
763	608.63	6698.28	.06	2.10	38.81	.01	.03	.02	<.002	.05	4.71	.01	8.7	146.	62.3	< 20.0	154.9
766	608.58	6699.85	< .01	2.09	4.90	.03	.18	.23	.005	.09	5.71	.02	16.1	1300.	< 50.0	80.0	104.3
767	356.30	6807.10	< .01	.87	18.59	.05	.18	.37	.007	.14	10.74	.06	14.4	233.	< 50.0	< 20.0	138.2
770	356.30	6801.20	.05	1.12	26.64	.07	.33	.42	.024	.14	2.74	.05	25.5	192.	< 50.0	< 20.0	93.7
772			.02	1.61	34.39	.02	.03	.04	<.002	.03	5.86	.06	11.9	20.	< 50.0	< 20.0	336.6
773	*		< .01	1.96	27.50	.02	.12	.17	<.002	.03	1.64	.07	3.3	163.	< 50.0	< 20.0	166.8
774			< .01	.76	29.29	.02	.06	.06	<.002	.06	2.84	.03	6.1	14.	< 50.0	< 20.0	180.9
775	650.50	6690.20	< .01	1.82	10.35	.04	.24	.10	<.002	.18	4.21	.08	29.5	266.	51.1	48.6	133.7

* Sweden

NGU-report 86.169. FIGURE 7.2

Side 1-B

PRNR	UTM X km	UTM Y km	V ppm	Mo ppm	Cd ppm	Cr ppm	Ba ppm	Sr ppm	Zr ppm	Ag ppm	B ppm	Be ppm	Li ppm	Sc ppm	Ce ppm	La ppm
701	594.60	6694.50	< 5.0	< 10.0	35.0	< 20.0	3100.	23.9	12.3	< 5.0	4.2	7.2	20.9	5.0	1900.	183.0
702	601.39	6707.47	< 5.0	< 10.0	23.7	< 20.0	3500.	34.9	10.2	< 5.0	8.7	6.0	9.2	< 2.0	783.	113.6
703	601.36	6707.44	< 5.0	< 10.0	< 10.0	< 20.0	1700.	15.1	11.7	< 5.0	11.6	5.8	10.2	< 2.0	778.	105.0
704	601.39	6707.36	18.3	84.3	15.6	< 20.0	2700.	34.1	12.6	< 5.0	16.4	5.0	7.3	< 2.0	649.	68.5
705	601.43	6707.32	14.5	357.0	< 10.0	< 20.0	1300.	34.1	13.5	< 5.0	6.6	4.6	10.2	< 2.0	360.	73.3
706	601.44	6707.20	< 5.0	< 10.0	13.3	< 20.0	1000.	24.1	11.4	< 5.0	13.4	5.1	13.2	< 2.0	576.	70.1
707	601.46	6707.06	6.2	< 10.0	31.2	< 20.0	3600.	72.2	15.4	< 5.0	17.9	12.2	34.1	4.4	1400.	220.1
708	601.50	6706.98	24.1	902.8	30.5	< 20.0	3500.	61.7	18.2	< 5.0	14.1	16.1	28.2	4.5	1400.	230.5
709	601.48	6706.84	16.0	220.8	37.6	< 20.0	4100.	76.3	18.7	< 5.0	6.6	16.6	31.2	6.0	1500.	297.8
710	601.56	6706.62	7.0	< 10.0	29.7	< 20.0	3500.	59.7	15.8	< 5.0	14.1	16.1	35.6	4.0	1300.	229.1
711	601.50	6706.40	20.7	267.9	36.7	< 20.0	4200.	98.2	22.1	< 5.0	11.6	18.2	40.4	5.5	1400.	302.7
712	601.91	6705.76	6.3	< 10.0	14.8	< 20.0	4600.	81.8	10.7	< 5.0	9.9	4.4	12.6	< 2.0	503.	100.6
713	602.67	6705.46	14.8	< 10.0	12.9	< 20.0	2500.	30.6	17.4	< 5.0	18.7	6.7	23.4	6.5	915.	138.7
714	602.79	6705.34	5.6	< 10.0	42.4	< 20.0	2700.	34.0	10.2	< 5.0	14.8	15.4	46.8	5.4	1300.	167.2
715	602.84	6705.26	< 5.0	< 10.0	41.1	< 20.0	1600.	40.5	15.8	< 5.0	18.3	10.2	38.0	5.0	962.	138.2
716	602.81	6704.49	< 5.0	< 10.0	24.3	< 20.0	2900.	214.6	20.2	< 5.0	15.2	5.0	28.3	2.2	552.	101.5
717	602.83	6704.44	5.6	< 10.0	29.7	< 20.0	2100.	74.9	16.7	< 5.0	19.9	8.7	37.5	< 2.0	693.	122.8
718	603.11	6703.95	24.1	57.8	23.6	< 20.0	1200.	39.5	23.2	< 5.0	20.7	8.6	31.2	4.3	641.	93.5
719	603.22	6703.51	11.6	< 10.0	33.9	< 20.0	2300.	43.9	20.1	< 5.0	17.0	13.7	36.0	5.2	933.	122.3
721	608.98	6705.05	10.1	260.9	< 10.0	< 20.0	1300.	11.7	17.1	< 5.0	7.7	7.1	2.4	< 2.0	121.	< 10.0
722	608.86	6705.14	< 5.0	102.4	< 10.0	< 20.0	167.	6.2	9.2	< 5.0	< 3.0	3.4	< 2.0	< 2.0	122.	< 10.0
723	608.73	6705.17	28.1	56.9	< 10.0	20.8	1200.	21.2	17.4	< 5.0	9.2	4.1	7.3	< 2.0	295.	24.5
724	608.60	6705.13	< 5.0	< 10.0	< 10.0	< 20.0	1400.	44.6	15.1	< 5.0	12.5	1.6	7.3	< 2.0	232.	15.7
730	599.33	6708.36	24.2	< 10.0	11.6	21.1	2900.	32.6	15.4	< 5.0	13.5	1.7	12.7	5.9	759.	79.5
731	597.84	6707.26	70.6	354.9	< 10.0	40.8	286.	35.1	14.4	< 5.0	16.6	< 1.0	15.6	7.0	81.	< 10.0
732	599.68	6706.68	36.4	85.1	13.7	< 20.0	2500.	46.4	24.7	< 5.0	19.1	3.2	31.2	5.3	758.	79.4
733	597.03	6705.20	14.0	173.4	< 10.0	< 20.0	3400.	37.4	9.4	< 5.0	10.2	1.7	6.3	< 2.0	438.	18.7
734	596.21	6703.77	48.4	45.0	< 10.0	24.4	1300.	30.5	16.7	< 5.0	6.6	1.9	20.4	3.6	321.	10.1
738	603.23	6686.61	9.5	< 10.0	12.5	< 20.0	413.	17.2	14.3	< 5.0	15.7	2.8	7.3	2.5	787.	70.7
739	600.08	6686.24	15.2	< 10.0	31.8	< 20.0	2000.	34.3	17.6	< 5.0	7.3	7.6	19.5	3.8	1700.	121.9
741	612.23	6686.92	< 5.0	< 10.0	< 10.0	< 20.0	2700.	31.2	13.1	< 5.0	7.4	2.4	7.3	< 2.0	461.	50.8
743	605.79	6683.00	14.9	66.6	10.8	< 20.0	719.	8.9	15.9	< 5.0	12.1	29.4	5.9	< 2.0	642.	84.5
745	605.61	6685.82	17.1	57.0	< 10.0	< 20.0	686.	4.7	27.3	< 5.0	8.8	1.3	< 2.0	< 2.0	263.	< 10.0
747	603.13	6689.20	23.6	61.2	< 10.0	< 20.0	1700.	12.6	18.6	< 5.0	15.7	2.5	4.8	< 2.0	543.	33.8
748	602.82	6692.50	20.8	69.1	< 10.0	< 20.0	1600.	8.9	13.9	< 5.0	14.3	2.1	4.9	< 2.0	260.	12.3
749	605.66	6691.01	< 5.0	< 10.0	< 10.0	< 20.0	856.	4.2	18.5	< 5.0	15.8	3.9	6.8	2.2	712.	36.8
750	608.32	6695.69	34.1	69.1	< 10.0	< 20.0	416.	7.2	27.2	< 5.0	17.6	6.3	8.3	< 2.0	294.	21.0
752	602.36	6697.35	< 5.0	< 10.0	< 10.0	< 20.0	1300.	12.0	7.8	< 5.0	11.8	3.7	8.7	< 2.0	696.	105.8
753	601.98	6696.17	< 5.0	< 10.0	23.7	< 20.0	1400.	9.3	12.7	< 5.0	15.0	6.0	15.1	3.8	1600.	124.0
754	602.49	6695.50	8.1	< 10.0	36.9	< 20.0	1700.	15.3	12.9	< 5.0	14.0	3.7	12.7	2.5	1400.	118.6
756	595.78	6698.91	< 5.0	< 10.0	19.7	< 20.0	5200.	59.7	11.1	< 5.0	9.0	2.9	14.1	< 2.0	500.	102.9
757	595.67	6695.97	5.4	< 10.0	20.9	< 20.0	2200.	17.3	14.2	< 5.0	19.9	7.2	18.5	< 2.0	1100.	136.1
759	601.90	6689.47	15.2	419.9	13.0	< 20.0	1600.	32.9	13.1	< 5.0	13.2	6.1	5.8	< 2.0	812.	111.9
760	601.47	6689.64	6.6	< 10.0	13.7	< 20.0	1500.	10.5	11.1	< 5.0	14.2	4.2	6.8	< 2.0	911.	93.4
761	598.16	6690.43	< 5.0	< 10.0	20.1	< 20.0	3600.	44.1	14.6	< 5.0	9.8	3.2	15.1	2.5	1400.	169.9
762	600.27	6696.18	5.7	< 10.0	< 10.0	< 20.0	1100.	8.3	12.0	< 5.0	19.5	4.5	19.0	2.4	884.	62.7
763	608.63	6698.28	< 5.0	30.3	< 10.0	< 20.0	935.	9.0	12.6	< 5.0	< 3.0	< 1.0	< 2.0	< 2.0	178.	< 10.0
766	608.58	6699.85	9.6	< 10.0	16.2	< 20.0	1600.	32.9	16.8	< 5.0	18.1	5.3	21.5	3.2	590.	98.9
767	356.30	6807.10	49.5	11.0	< 10.0	< 20.0	2200.	110.6	19.1	< 5.0	20.6	< 1.0	5.8	< 2.0	133.	< 10.0
770	356.30	6801.20	30.2	14.8	< 10.0	< 20.0	816.	83.0	24.4	< 5.0	14.6	< 1.0	4.8	< 2.0	139.	< 10.0
772			62.6	< 10.0	< 10.0	< 20.0	943.	6.6	34.6	< 5.0	3.9	4.8	2.4	< 2.0	324.	< 10.0
773	*		93.4	< 10.0	< 10.0	< 20.0	310.	13.1	16.8	< 5.0	6.0	14.5	3.9	< 2.0	239.	15.4
774			11.6	< 10.0	< 10.0	< 20.0	630.	15.0	15.7	< 5.0	9.5	< 1.0	< 2.0	< 2.0	73.	< 10.0
775	650.50	6690.20	30.9	< 10.0	< 10.0	< 20.0	721.	17.0	21.2	< 5.0	11.5	< 1.0	13.7	< 2.0	335.	17.9

* Sweden

Side 2-A

PRNR	UTM X km	UTM Y km	Si %	Al %	Fe %	Ti %	Mg %	Ca %	Na %	K %	Mn %	P %	Cu ppm	Zn ppm	Pb ppm	Ni ppm	Co ppm
776	650.50	6690.20	< .01	1.62	9.54	.02	.10	.13	<.002	.10	4.99	.05	21.2	266.	< 50.0	48.2	151.3
780	459.90	6632.50	< .01	1.99	14.82	.10	.53	.27	<.002	.18	7.83	.04	10.9	297.	< 50.0	24.6	194.7
781	409.40	6606.50	< .01	1.61	14.11	.15	.80	.60	.034	.08	4.84	.03	38.2	278.	< 50.0	50.1	94.1
782	399.70	6461.00	< .01	.98	3.49	.08	.17	.21	<.002	.10	1.44	.04	11.3	297.	327.0	< 20.0	98.9
783	511.80	6686.50	< .01	.98	16.17	.18	.21	.31	.003	.07	.24	.06	19.4	67.	< 50.0	< 20.0	31.3
784	650.50	6690.20	< .01	1.76	7.50	.02	.12	.12	<.002	.09	5.47	.03	31.1	390.	< 50.0	60.2	144.6
785	650.50	6690.20	< .01	1.53	3.75	.01	.12	.09	<.002	.10	4.02	.02	23.7	284.	< 50.0	48.1	125.6
787	649.90	6688.70	< .01	2.86	30.48	.02	.08	.10	<.002	.06	1.62	.13	30.2	302.	64.7	< 20.0	98.6
788	649.90	6680.70	< .01	.99	12.42	.02	.06	.07	<.002	.07	3.30	.05	14.3	146.	< 50.0	23.6	109.5
789	649.90	6680.70	< .01	1.30	12.65	.02	.06	.05	<.002	.06	3.68	.06	21.1	193.	< 50.0	22.1	113.0
790	649.90	6680.70	< .01	1.69	21.89	.04	.13	.12	<.002	.11	2.67	.10	27.3	298.	< 50.0	< 20.0	95.9
791	648.90	6691.40	< .01	1.91	13.58	.02	.06	.06	<.002	.07	4.27	.09	30.5	349.	< 50.0	71.0	118.4
792	648.90	6691.40	< .01	.90	26.29	.02	.08	.06	<.002	.10	1.56	.80	28.3	134.	64.2	< 20.0	45.6
793	645.80	6694.70	< .01	2.02	26.30	.03	.13	.11	<.002	.07	1.20	.09	19.1	263.	< 50.0	29.8	67.8
794	647.40	6694.90	< .01	1.97	17.63	.02	.07	.06	<.002	.06	5.28	.10	23.5	310.	73.9	70.6	141.8
795	647.40	6694.90	< .01	1.22	15.77	.03	.10	.06	<.002	.10	2.10	.33	20.2	207.	120.5	28.8	57.7
796	559.50	6635.90	< .01	.98	3.57	.00	.02	.04	<.002	.03	7.42	< .01	10.5	792.	< 50.0	21.1	46.4
797	559.50	6635.90	< .01	1.81	39.90	.00	.02	.01	<.002	.05	3.31	< .01	16.2	127.	225.4	< 20.0	72.6
798	559.55	6635.69	< .01	.58	34.12	.00	.02	.01	<.002	.05	8.25	< .01	15.6	235.	< 50.0	< 20.0	68.2
799	559.55	6635.69	.07	.58	54.93	.00	.02	< .00	<.002	.02	.47	< .01	14.8	159.	< 50.0	< 20.0	32.2
800	526.60	6731.00	< .01	1.11	17.55	.01	.11	.20	<.002	.08	11.03	.01	20.2	1100.	< 50.0	102.2	161.3
801	594.60	6694.50	< .01	2.90	9.72	.00	.06	.19	<.002	.06	11.90	< .01	21.8	3800.	< 50.0	219.7	167.9
803	595.80	6695.90	< .01	3.74	8.64	.01	.07	.13	<.002	.05	13.71	.01	14.5	2200.	< 50.0	209.5	162.1
804	344.20	6768.00	< .01	.91	17.78	.01	.05	.08	<.002	.05	15.83	.02	27.6	171.	< 50.0	< 20.0	724.7
805	650.70	6786.50	< .01	.50	12.65	.00	.04	.29	<.002	.09	9.88	< .01	14.0	605.	< 50.0	56.3	258.6
806	631.50	6914.20	< .01	7.94	4.43	.01	.20	.59	<.002	.07	18.23	.02	88.5	6100.	< 50.0	749.2	316.2
807	595.80	6793.80	< .01	.79	15.66	.03	.17	.51	.003	.16	9.33	.08	102.2	569.	< 50.0	339.0	133.4
812	649.20	6693.70	< .01	.74	36.04	.02	.08	.07	<.002	.09	4.98	.06	17.8	68.	< 50.0	< 20.0	72.0
813	649.20	6693.70	< .01	2.51	5.22	.01	.09	.12	<.002	.06	5.87	.01	36.5	828.	< 50.0	142.4	175.5
814	*		< .01	.94	4.40	.08	.32	.33	<.002	.23	3.94	.03	12.4	59.	< 50.0	< 20.0	32.9
815	573.90	6917.80	< .01	1.56	8.40	.12	1.13	.28	.009	.31	2.52	.03	22.1	56.	< 50.0	147.1	54.1
816	560.50	6905.00	< .01	1.40	4.66	.10	.99	.29	.008	.17	.10	.05	20.2	34.	< 50.0	< 20.0	31.0

* Map 1616 III Å1

Side 2-B

PRNR	UTM X km	UTM Y km	V ppm	Mo ppm	Cd ppm	Cr ppm	Ba ppm	Sr ppm	Zr ppm	Ag ppm	B ppm	Be ppm	Li ppm	Sc ppm	Ce ppm	La ppm
776	650.50	6690.20	8.4	< 10.0	< 10.0	< 20.0	1900.	22.1	15.8	< 5.0	9.4	1.5	17.5	3.0	425.	47.2
780	459.90	6632.50	26.3	< 10.0	< 10.0	21.1	1600.	29.8	16.7	< 5.0	14.2	< 1.0	13.7	2.2	528.	32.3
781	409.40	6606.50	55.9	14.3	< 10.0	< 20.0	1800.	26.1	12.6	< 5.0	10.6	< 1.0	15.6	3.6	110.	17.0
782	399.70	6461.00	17.0	38.1	< 10.0	< 20.0	271.	22.8	11.7	< 5.0	23.6	< 1.0	5.3	< 2.0	293.	42.7
783	511.80	6686.50	25.7	< 10.0	< 10.0	< 20.0	86.	28.9	22.7	< 5.0	12.1	< 1.0	4.9	< 2.0	146.	22.6
784	650.50	6690.20	< 5.0	< 10.0	< 10.0	< 20.0	1500.	29.0	11.2	< 5.0	15.9	< 1.0	17.1	2.7	433.	44.4
785	650.50	6690.20	6.5	< 10.0	< 10.0	< 20.0	1100.	22.6	11.1	< 5.0	18.5	< 1.0	12.7	< 2.0	375.	30.6
787	649.90	6688.70	59.5	14.3	< 10.0	< 20.0	497.	12.0	16.9	< 5.0	10.9	< 1.0	< 2.0	< 2.0	197.	< 10.0
788	649.90	6680.70	14.7	< 10.0	< 10.0	< 20.0	2100.	15.8	14.8	< 5.0	11.2	2.4	4.9	< 2.0	240.	24.3
789	649.90	6680.70	27.7	< 10.0	< 10.0	< 20.0	1200.	11.2	13.7	< 5.0	8.5	< 1.0	5.8	< 2.0	246.	26.2
790	649.90	6680.70	48.4	15.0	< 10.0	< 20.0	975.	17.6	20.4	5.6	17.6	3.6	5.4	2.5	256.	27.1
791	648.90	6691.40	20.4	< 10.0	< 10.0	< 20.0	627.	11.0	16.1	< 5.0	10.3	3.5	14.1	2.7	443.	27.0
792	648.90	6691.40	22.9	19.6	< 10.0	< 20.0	1200.	9.7	18.5	< 5.0	6.9	1.2	3.4	< 2.0	272.	43.2
793	645.80	6694.70	36.9	19.9	< 10.0	< 20.0	625.	16.6	13.0	< 5.0	6.2	1.1	4.8	< 2.0	166.	18.1
794	647.40	6694.90	26.6	< 10.0	< 10.0	< 20.0	1200.	11.7	17.0	< 5.0	13.2	2.7	12.2	2.2	433.	41.8
795	647.40	6694.90	21.9	< 10.0	< 10.0	< 20.0	386.	10.6	16.6	< 5.0	15.5	1.9	5.9	< 2.0	268.	20.4
796	559.50	6635.90	< 5.0	< 10.0	< 10.0	< 20.0	1400.	7.3	14.4	< 5.0	16.8	2.7	2.4	< 2.0	850.	68.7
797	559.50	6635.90	< 5.0	17.4	< 10.0	< 20.0	304.	1.2	22.4	5.6	< 3.0	< 1.0	< 2.0	< 2.0	387.	< 10.0
798	559.55	6635.69	< 5.0	73.1	< 10.0	< 20.0	1100.	7.1	15.7	< 5.0	4.1	< 1.0	< 2.0	< 2.0	186.	< 10.0
799	559.55	6635.69	< 5.0	175.3	< 10.0	< 20.0	43.	< 1.0	13.4	< 5.0	< 3.0	< 1.0	< 2.0	< 2.0	203.	< 10.0
800	526.60	6731.00	< 5.0	< 10.0	< 10.0	< 20.0	4300.	64.2	13.6	< 5.0	14.9	2.3	17.1	< 2.0	214.	39.6
801	594.60	6694.50	< 5.0	< 10.0	53.5	< 20.0	4100.	32.8	14.4	< 5.0	11.7	5.6	26.3	4.8	2300.	244.0
803	595.80	6695.90	< 5.0	< 10.0	33.1	< 20.0	2700.	21.3	17.8	< 5.0	15.3	8.3	32.2	5.9	1400.	167.0
804	344.20	6768.00	12.5	< 10.0	< 10.0	< 20.0	3500.	11.3	16.1	< 5.0	11.9	2.1	3.4	< 2.0	555.	< 10.0
805	650.70	6786.50	< 5.0	< 10.0	< 10.0	< 20.0	3100.	40.0	7.3	< 5.0	10.7	2.0	12.6	< 2.0	92.	< 10.0
806	631.50	6914.20	18.3	< 10.0	37.1	< 20.0	9900.	118.8	14.2	< 5.0	18.3	9.5	91.7	6.6	1600.	170.0
807	595.80	6793.80	< 5.0	< 10.0	< 10.0	34.8	3300.	135.2	19.1	< 5.0	21.7	< 1.0	6.3	< 2.0	375.	60.9
812	649.20	6693.70	< 5.0	13.8	< 10.0	< 20.0	1900.	22.7	13.1	< 5.0	4.7	< 1.0	< 2.0	< 2.0	181.	12.4
813	649.20	6693.70	< 5.0	< 10.0	< 10.0	< 20.0	2000.	23.2	11.6	< 5.0	14.0	1.9	26.8	4.9	662.	63.0
814	*		16.2	< 10.0	< 10.0	< 20.0	294.	52.8	22.2	< 5.0	21.2	< 1.0	11.7	2.4	72.	13.6
815	573.90	6917.80	40.9	< 10.0	< 10.0	95.5	342.	12.8	19.4	< 5.0	6.7	< 1.0	20.4	4.9	73.	13.7
816	560.50	6905.00	33.9	< 10.0	< 10.0	62.0	45.	14.3	17.0	< 5.0	14.6	< 1.0	14.6	3.2	37.	13.5

* Map 1616 III Å1

Values below detection limits have been set equal to zero. Detection limits: 0.005% Fe, 0.003% Na, 0.5ppm Br, 0.2ppm Cs, 0.2ppm Hf, 0.1ppm Sb, 0.5ppm Se, 0.5ppm Ta, 0.1ppm La, 1ppm Ce, 3ppm Nd, 0.01ppm Sm, 0.05ppm Eu, 0.1ppm Tb, 0.05ppm Yb, 0.01ppm Lu, 1ppm As, 20ppm Ba, 0.1ppm Co, 0.5ppm Cr, 2ppm Mo, 50ppm Ni, 10ppm Rb, 0.01ppm Sc, 0.2ppm Th, 0.1ppm U, 1ppm W, 5ppm Zn, 0.1ppb Au.

Side 1-A

PRNR	UTM X km	UTM Y km	Fe %	Na %	Br ppm	Cs ppm	Hf ppm	Sb ppm	Se ppm	Ta ppm	La ppm	Ce ppm	Nd ppm	Sm ppm	Eu ppm	Tb ppm	Yb ppm
701	594.60	6694.50	11.60	.88	5.7	.0	2.3	1.1	.0	.8	216.	1770.	96.	13.90	2.14	1.3	3.27
702	601.39	6707.47	10.20	.68	7.2	.9	5.4	1.0	.0	2.3	184.	659.	99.	16.50	1.34	1.7	3.88
703	601.36	6707.44	11.60	2.40	6.8	.7	7.9	.8	.0	3.4	122.	539.	77.	14.20	1.70	1.8	5.00
704	601.39	6707.36	13.40	.64	5.3	.8	2.9	1.0	.0	1.9	114.	662.	71.	14.60	1.63	1.8	4.08
705	601.43	6707.32	9.10	2.40	4.9	.8	8.4	.7	13.0	5.6	120.	411.	92.	16.50	1.92	1.7	5.28
706	601.44	6707.20	5.50	2.70	5.2	1.3	11.0	.9	.0	8.2	119.	739.	86.	15.20	2.13	2.0	5.87
707	601.46	6707.06	7.90	1.10	6.3	1.6	3.8	.6	.0	2.2	308.	1260.	164.	37.40	3.76	3.9	8.04
708	601.50	6706.98	16.30	.54	10.0	.8	2.2	.9	.0	1.2	275.	1220.	237.	40.50	4.19	4.6	9.17
709	601.48	6706.84	9.60	1.60	4.7	.5	6.0	.8	.0	3.5	346.	1450.	254.	46.80	5.55	7.1	11.40
710	601.56	6706.62	10.00	.90	6.0	1.5	5.2	.8	.0	2.0	385.	1400.	247.	50.60	6.10	5.0	14.10
711	601.50	6706.40	10.50	.76	6.0	1.8	3.2	.5	.0	2.3	339.	1060.	221.	40.80	4.19	6.0	9.88
712	601.91	6705.76	14.90	.25	6.9	.4	2.5	1.0	.0	3.1	142.	408.	77.	12.90	1.63	1.5	4.20
713	602.67	6705.46	7.20	.81	4.3	1.6	4.3	2.2	1.7	1.5	157.	643.	106.	18.40	2.84	1.7	5.35
714	602.79	6705.34	5.30	.23	2.9	.0	1.5	1.4	.7	.0	221.	1360.	148.	28.30	3.83	4.6	9.06
715	602.84	6705.26	3.20	2.30	3.6	1.2	8.1	.6	.0	4.3	185.	757.	118.	20.00	3.30	2.4	8.50
716	602.81	6704.49	12.10	.97	5.2	.0	1.8	.6	3.2	1.5	152.	529.	108.	16.50	3.31	2.5	5.29
717	602.83	6704.44	4.30	2.60	4.3	1.0	8.8	.8	.0	4.2	165.	616.	106.	19.70	3.24	2.2	6.79
718	603.11	6703.95	5.50	1.70	3.2	1.2	8.5	.8	.0	3.5	116.	480.	80.	14.20	2.00	1.7	5.42
719	603.22	6703.51	6.30	2.00	4.9	1.0	8.2	1.1	.0	3.8	131.	703.	85.	16.80	2.88	2.0	6.37
721	608.98	6705.05	14.20	1.40	5.9	1.3	6.0	.4	.9	3.3	44.	123.	27.	4.28	.55	.5	1.90
722	608.86	6705.14	44.00	.06	7.6	1.1	.5	1.8	.5	.0	31.	100.	19.	3.22	.51	.3	.98
723	608.73	6705.17	11.60	.76	4.4	.7	2.2	1.3	.0	.9	220.	1820.	102.	14.00	1.98	1.9	3.45
724	608.60	6705.13	9.60	1.30	3.5	1.0	4.4	1.3	.0	2.9	51.	249.	32.	5.50	.98	.6	2.04
730	599.33	6708.36	8.70	.63	3.6	1.9	1.4	.6	.0	1.1	155.	925.	91.	15.10	2.26	1.5	3.66
731	597.84	6707.26	11.70	2.00	3.3	2.1	3.4	.7	.0	1.5	20.	145.	21.	4.67	1.00	.7	2.55
732	599.68	6706.68	8.00	1.10	4.8	1.3	5.4	.7	.0	2.7	106.	570.	68.	11.30	2.30	1.3	3.94
733	597.03	6705.20	16.90	.25	4.9	2.4	1.0	3.7	.0	.0	68.	436.	40.	7.18	1.31	.8	2.24
734	596.21	6703.77	12.10	.75	7.1	2.0	2.2	1.1	.0	.6	35.	287.	28.	5.79	1.06	.7	2.18
737	629.20	6693.40	19.00	.37	4.7	1.5	1.3	1.1	.0	.5	32.	295.	25.	4.66	.75	.5	1.50
738	603.23	6686.61	3.50	2.60	4.0	.9	8.5	.9	.0	2.9	83.	587.	55.	9.80	1.20	1.2	3.14
739	600.08	6686.24	11.30	.60	5.5	.7	3.0	1.1	.6	.8	140.	1640.	93.	16.80	2.28	1.7	3.45
741	612.23	6686.92	12.00	.83	4.2	.8	3.0	1.0	.0	1.0	83.	446.	58.	11.70	1.63	1.3	3.86
743	605.79	6683.00	26.00	.63	8.1	1.0	3.4	.6	.0	1.2	120.	503.	103.	19.60	2.09	2.5	6.29
745	605.61	6685.82	11.90	.04	1.5	.9	6.2	.1	.0	3.4	62.	111.	48.	8.62	1.99	1.0	2.77
747	603.13	6689.20	18.00	.76	6.3	1.1	4.7	.8	.0	3.5	64.	460.	43.	7.48	1.30	1.0	2.62
748	602.82	6692.50	16.40	.54	5.7	.8	2.4	1.2	.0	.6	41.	216.	24.	3.73	.71	.5	1.49
749	605.66	6691.01	8.00	.71	2.4	.6	6.4	1.7	11.0	5.2	50.	619.	25.	5.83	.52	.9	5.34
750	608.32	6695.69	7.70	2.10	3.1	.9	7.7	.9	.0	4.3	49.	199.	33.	5.55	.64	.8	3.82
752	602.36	6697.35	10.70	.60	4.8	.8	1.5	1.0	.0	.8	384.	1340.	167.	23.00	3.07	2.4	4.27
753	601.98	6696.17	11.30	.35	5.3	1.1	2.1	1.2	.0	.7	185.	1630.	84.	14.10	1.32	1.3	3.25
754	602.49	6695.50	9.20	.81	6.3	1.0	4.2	1.4	.0	1.2	159.	1160.	74.	11.60	2.19	1.5	3.46
756	595.78	6698.91	10.90	.49	3.4	1.4	2.8	1.3	.0	1.3	155.	467.	57.	9.63	1.68	1.2	3.93
757	595.67	6695.97	10.00	1.70	4.0	.0	6.5	1.1	.0	2.3	212.	1080.	98.	16.80	1.84	1.5	4.34
759	601.90	6689.47	23.10	.21	8.2	.0	1.3	1.3	.0	.0	148.	688.	91.	14.30	1.81	1.3	3.23
760	601.47	6689.64	10.50	.34	5.7	.0	1.4	1.0	.0	.7	128.	680.	63.	10.30	1.72	1.2	3.06
761	598.16	6690.43	12.20	1.50	4.9	1.0	9.3	.7	.0	3.1	207.	844.	111.	17.40	2.50	1.8	4.43
762	600.27	6696.18	7.00	.96	4.2	1.1	5.1	.9	.0	3.6	100.	883.	73.	12.40	2.05	1.3	3.21
763	608.63	6698.28	47.30	.01	7.8	.0	.3	.8	.0	.5	21.	87.	16.	3.22	.35	.5	2.37
766	608.58	6699.85	8.20	1.30	4.8	1.6	6.2	.9	.0	2.2	207.	766.	102.	20.20	1.84	2.2	5.47
767	356.30	6807.10	18.70	1.00	3.7	.8	2.3	.5	.0	.0	24.	82.	18.	2.85	.49	.4	1.15
768	355.80	6806.50	15.50	1.80	5.8	1.6	3.8	.5	.0	.0	30.	68.	26.	4.97	1.14	.6	1.89
769	358.30	6801.60	23.80	.94	6.1	.8	2.5	.7	.0	.0	57.	296.	45.	8.21	.88	.8	3.41
770	356.30	6801.20	27.20	.86	3.6	1.0	2.7	.2	.0	.0	44.	105.	37.	6.04	.83	.5	2.34
772	*		36.40	.11	5.3	1.6	1.7	.5	.0	.0	25.	251.	25.	5.26	.72	.6	2.37

* Sweden

NGU-report 86.169. FIGURE 7.3

Side 1-B

PRNR	UTM X km	UTM Y km	Lu ppm	As ppm	Ba ppm	Co ppm	Cr ppm	Mo ppm	Ni ppm	Rb ppm	Sc ppm	Th ppm	U ppm	W ppm	Zn ppm	Au ppb
701	594.60	6694.50	.48	38.	4100.	140.	24.	130.	140.	30.	5.7	6.4	4.4	1.	2700.	1.0
702	601.39	6707.47	.58	42.	4400.	270.	4.	130.	0.	30.	2.1	5.7	5.5	0.	2000.	.7
703	601.36	6707.44	.81	24.	2000.	150.	13.	150.	0.	100.	3.3	13.0	11.9	1.	1100.	.7
704	601.39	6707.36	.72	23.	4000.	230.	12.	200.	80.	40.	3.2	13.0	10.5	2.	1700.	.0
705	601.43	6707.32	1.05	13.	2000.	91.	7.	310.	110.	140.	2.6	10.0	51.4	1.	1300.	.3
706	601.44	6707.20	1.02	15.	1800.	85.	6.	290.	80.	180.	4.8	18.0	28.4	2.	2000.	1.1
707	601.46	6707.06	2.05	16.	4800.	130.	19.	660.	150.	60.	5.7	12.0	81.4	6.	3600.	13.0
708	601.50	6706.98	2.38	24.	4000.	140.	33.	1200.	120.	30.	5.5	11.0	128.0	0.	3900.	1.8
709	601.48	6706.84	2.40	21.	4800.	110.	33.	910.	120.	80.	7.4	21.0	118.0	16.	4000.	.8
710	601.56	6706.62	3.10	13.	6600.	140.	44.	830.	210.	50.	8.6	19.0	154.0	0.	5900.	1.3
711	601.50	6706.40	2.68	16.	4200.	97.	29.	690.	160.	50.	6.6	12.0	109.0	2.	3500.	2.8
712	601.91	6705.76	.66	21.	9900.	120.	5.	140.	70.	40.	2.3	8.7	13.7	17.	2300.	2.4
713	602.67	6705.46	1.00	36.	3200.	84.	38.	86.	0.	70.	10.0	12.0	19.6	0.	1100.	1.6
714	602.79	6705.34	1.52	49.	4400.	140.	6.	300.	290.	10.	10.3	12.0	38.1	0.	6600.	.5
715	602.84	6705.26	1.54	32.	3200.	53.	34.	280.	260.	110.	7.0	15.0	33.1	3.	4500.	1.2
716	602.81	6704.49	.00	15.	5900.	71.	10.	460.	130.	30.	4.5	7.3	53.6	1.	3600.	.8
717	602.83	6704.44	1.16	25.	3300.	44.	16.	230.	110.	90.	8.2	13.0	58.8	5.	3800.	.9
718	603.11	6703.95	1.03	18.	2000.	48.	23.	210.	110.	80.	7.1	11.0	25.7	1.	2400.	1.1
719	603.22	6703.51	1.21	25.	2900.	68.	21.	280.	130.	70.	7.8	20.0	34.4	0.	3300.	.2
721	608.98	6705.05	.29	16.	1800.	85.	20.	300.	0.	130.	2.2	8.6	26.0	3.	220.	.7
722	608.86	6705.14	.18	34.	390.	77.	12.	100.	0.	0.	1.3	2.3	3.6	0.	250.	.0
723	608.73	6705.17	.53	34.	4300.	140.	25.	130.	140.	40.	5.5	6.4	3.9	0.	2800.	1.4
724	608.60	6705.13	.32	16.	2400.	110.	20.	50.	50.	100.	3.6	6.5	5.0	0.	520.	.0
730	599.33	6708.36	.57	10.	5000.	330.	52.	70.	0.	20.	17.8	6.4	8.2	1.	640.	.5
731	597.84	6707.26	.38	16.	1100.	760.	56.	920.	0.	200.	17.7	7.0	2.7	13.	310.	.0
732	599.68	6706.68	.63	16.	2700.	300.	38.	160.	120.	80.	10.3	11.0	8.2	1.	1500.	1.3
733	597.03	6705.20	.33	18.	5400.	700.	19.	1000.	120.	30.	5.3	4.8	2.5	6.	740.	.9
734	596.21	6703.77	.34	28.	1800.	470.	56.	33.	70.	80.	11.1	8.2	3.6	3.	740.	1.1
737	629.20	6693.40	.24	36.	3000.	1300.	85.	21.	0.	20.	9.2	8.3	3.5	0.	620.	1.0
738	603.23	6686.61	.48	10.	740.	42.	17.	30.	0.	130.	3.6	13.0	3.5	2.	420.	.3
739	600.08	6686.24	.53	14.	2400.	220.	24.	90.	70.	40.	8.8	15.0	13.0	1.	1900.	.8
741	612.23	6686.92	.60	15.	4800.	250.	20.	190.	0.	40.	4.7	7.7	15.1	1.	1300.	1.8
743	605.79	6683.00	1.04	42.	1000.	110.	36.	65.	0.	30.	4.6	9.1	16.1	2.	750.	1.0
745	605.61	6685.82	.41	3.	200.	12.	43.	0.	80.	140.	19.6	5.8	3.1	1.	110.	.5
747	603.13	6689.20	.46	23.	1800.	270.	22.	100.	0.	60.	4.2	11.0	10.1	1.	360.	.9
748	602.82	6692.50	.23	26.	2300.	280.	19.	99.	0.	50.	3.1	4.9	3.1	0.	300.	.9
749	605.66	6691.01	.97	9.	1400.	79.	15.	130.	0.	70.	4.1	43.0	19.2	0.	450.	.4
750	608.32	6695.69	.71	16.	550.	35.	22.	52.	0.	210.	3.0	20.0	10.1	2.	220.	.7
752	602.36	6697.35	.61	8.	3400.	250.	25.	130.	90.	0.	4.6	4.7	7.1	0.	1200.	1.2
753	601.98	6696.17	.49	16.	1900.	190.	20.	200.	160.	10.	5.3	9.9	7.9	2.	1800.	1.2
754	602.49	6695.50	.48	28.	2100.	200.	13.	100.	100.	40.	4.0	5.4	3.5	1.	1800.	1.7
756	595.78	6698.91	.57	34.1	0.	170.	51.	85.	130.	50.	7.0	5.8	6.1	0.	2100.	.6
757	595.67	6695.97	.57	19.	5400.	180.	10.	100.	450.	50.	5.5	6.3	7.2	0.	2200.	.8
759	601.90	6689.47	.63	23.	2100.	160.	16.	360.	0.	10.	2.7	4.8	22.5	1.	1000.	.4
760	601.47	6689.64	.42	15.	2100.	150.	25.	100.	100.	0.	2.6	4.5	5.1	0.	970.	1.3
761	598.16	6690.43	.65	16.	3800.	120.	9.	150.	140.	50.	4.8	7.7	4.6	1.	1900.	.6
762	600.27	6696.18	.56	12.	1700.	200.	23.	310.	110.	50.	8.6	11.0	11.7	3.	930.	1.1
763	608.63	6698.28	.39	11.	710.	240.	14.	22.	0.	0.	1.6	9.4	5.0	0.	250.	.5
766	608.58	6699.85	.79	24.	3500.	150.	30.	170.	130.	70.	9.8	18.0	13.7	1.	1900.	1.1
767	356.30	6807.10	.19	9.	2500.	120.	11.	11.	0.	60.	3.6	3.7	1.6	0.	280.	1.6
768	355.80	6806.50	.31	2.	750.	68.	34.	6.	0.	100.	12.9	5.0	4.5	0.	130.	.0
769	358.30	6801.60	.53	18.	2300.	130.	17.	54.	0.	80.	4.1	5.8	10.3	0.	680.	1.0
770	356.30	6801.20	.38	23.	1500.	83.	18.	8.	0.	90.	9.1	5.2	1.7	1.	230.	1.2
772	*		.36	11.	1100.	370.	28.	9.	0.	0.	3.8	9.7	2.6	0.	65.	.5

* Sweden

NGU-report 86.169. FIGURE 7.3

Side 2-A

PRNR	UTM X km	UTM Y km	Fe %	Na %	Br ppm	Cs ppm	Hf ppm	Sb ppm	Se ppm	Ta ppm	La ppm	Ce ppm	Nd ppm	Sm ppm	Eu ppm	Tb ppm	Yb ppm
773			31.60	.17	6.6	.0	1.2	.4	.0	.5	55.	267.	50.	9.26	1.00	1.4	4.72
774	*		32.30	.33	5.8	.7	3.4	1.5	.0	.0	18.	72.	15.	3.15	.46	.4	1.64
775	650.50	6690.20	12.70	.48	6.8	1.9	3.4	1.3	.0	.6	78.	557.	58.	10.80	1.79	1.4	3.81
776	650.50	6690.20	12.30	.60	5.0	.7	5.1	.8	.0	1.7	89.	360.	64.	11.40	1.65	1.4	4.46
777	*		18.90	1.40	3.0	1.1	1.6	.4	.9	.0	87.	209.	51.	7.45	.73	1.2	2.36
780	459.90	6632.50	15.00	.85	4.5	2.4	2.7	1.1	.0	.0	53.	403.	45.	8.73	1.30	.9	3.54
781	409.40	6606.50	25.80	.78	7.2	1.9	3.4	2.3	.0	.0	42.	96.	44.	8.14	1.34	1.3	4.40
782	399.70	6461.00	4.50	1.50	120.0	.4	4.3	3.4	1.9	.0	62.	264.	48.	8.23	1.11	.7	1.73
783	511.80	6686.50	10.20	1.60	4.0	3.0	8.9	.7	.0	.0	38.	85.	36.	7.88	.87	1.1	3.44
784	650.50	6690.20	3.90	.52	3.6	1.2	3.6	.5	.0	1.1	48.	297.	35.	6.93	1.09	.9	2.56
785	650.50	6690.20	4.70	.47	3.9	1.1	3.4	1.0	.0	.0	49.	283.	36.	7.07	1.03	.8	2.57
786	650.50	6690.20	27.80	.48	3.9	2.3	3.2	3.6	.0	.0	47.	149.	30.	6.10	.92	.7	2.16
787	649.90	6688.70	30.90	.31	5.3	1.7	2.7	.7	.0	.5	51.	186.	49.	9.34	1.30	1.1	4.11
788	649.90	6680.70	18.40	.67	3.9	1.2	7.3	.4	.0	.0	42.	148.	36.	6.81	1.14	.9	3.16
789	649.90	6680.70	38.40	.26	6.0	1.2	2.7	1.0	.0	.0	62.	150.	59.	11.70	2.06	1.5	5.10
790	649.90	6680.70	20.90	.80	5.6	1.3	5.5	.9	.0	.0	42.	129.	41.	8.30	1.42	1.0	3.76
791	648.90	6691.40	11.60	.34	3.8	.7	2.7	.9	.0	.0	65.	472.	47.	9.57	1.48	1.2	3.46
792	648.90	6691.40	35.20	.24	5.7	2.0	2.5	.7	.0	.0	108.	191.	73.	14.30	1.35	1.8	4.89
793	645.80	6694.70	29.90	.80	4.3	1.4	3.2	.7	.0	.0	70.	179.	62.	9.59	1.49	1.0	3.99
794	647.40	6694.90	8.50	.28	5.2	2.1	2.2	1.0	.0	1.1	79.	610.	51.	11.10	1.68	1.5	4.19
795	647.40	6694.90	27.10	.42	10.0	2.1	3.4	3.4	.0	.0	98.	368.	97.	17.30	2.23	2.1	6.90
796	559.50	6635.90	6.10	.01	2.9	.9	.9	.4	.0	.0	85.	688.	68.	15.00	1.08	1.3	1.98
797	559.50	6635.90	43.30	.00	19.0	.0	.3	.6	1.4	.0	46.	273.	114.	28.60	1.88	1.8	3.70
798	559.55	6635.69	37.20	.00	8.1	.7	.2	.5	.0	.0	46.	170.	67.	13.80	.89	.9	2.24
799	559.55	6635.69	53.60	.00	5.7	.0	.4	.1	.0	.0	39.	104.	56.	14.10	.94	1.0	2.66
800	526.60	6731.00	18.80	.59	5.9	2.2	1.9	.9	.0	.0	75.	188.	50.	8.49	1.22	1.0	3.54
801	594.60	6694.50	10.30	.74	4.1	.0	1.6	.8	.0	1.1	242.	1550.	106.	16.40	1.60	1.6	3.49
803	595.80	6695.90	8.10	1.00	6.5	.5	6.1	1.1	.0	3.1	194.	1210.	132.	20.70	2.30	2.4	5.60
804	344.20	6768.00	18.60	.31	6.1	1.0	1.5	1.6	.0	.0	37.	389.	27.	4.58	.64	.6	1.86
805	650.70	6786.50	16.10	.10	4.6	.0	.9	1.1	.0	.0	22.	69.	23.	3.59	.69	.4	1.33
806	631.50	6914.20	4.90	.16	9.6	1.3	1.2	.6	.0	.5	192.	1190.	127.	25.00	5.10	3.5	14.60
807	595.80	6793.80	15.40	.62	3.9	1.0	3.3	3.9	.0	.0	88.	277.	71.	11.70	2.10	1.3	4.20
812	649.20	6693.70	31.10	.21	6.4	1.9	1.2	.2	.0	.0	57.	126.	41.	7.42	.98	.8	2.36
813	649.20	6693.70	7.90	.51	7.4	1.3	3.3	1.7	.0	.0	85.	622.	58.	10.90	1.76	1.2	3.62
815	573.90	6917.80	9.60	1.10	3.4	3.0	4.4	.2	.0	.8	34.	72.	29.	6.44	1.32	.8	3.27
816	560.50	6905.00	6.40	1.50	3.2	1.8	4.1	.1	.0	.6	29.	50.	22.	5.06	1.14	1.0	2.54

* Sweden

NGU-report 86.169. FIGURE 7.3

Side 2-B

PRNR	UTM X km	UTM Y km	Lu ppm	As ppm	Ba ppm	Co ppm	Cr ppm	Mo ppm	Ni ppm	Rb ppm	Sc ppm	Th ppm	U ppm	W ppm	Zn ppm	Au ppb
773			.74	36.	1100.	300.	20.	9.	0.	30.	3.3	3.5	3.6	0.	340.	.7
774	*		.30	4.	1200.	240.	13.	4.	0.	30.	2.3	2.5	1.1	0.	67.	.5
775	650.50	6690.20	.61	25.	1900.	260.	32.	18.	110.	70.	8.3	10.0	4.8	2.	590.	.7
776	650.50	6690.20	.69	19.	3200.	200.	31.	12.	140.	50.	7.0	6.8	3.7	0.	350.	1.0
777	*		.38	79.1	9000.	150.	13.	65.	0.	60.	3.4	2.7	1.7	2.	500.	2.2
780	459.90	6632.50	.57	19.	2000.	180.	58.	18.	0.	70.	8.5	8.6	2.8	0.	320.	1.0
781	409.40	6606.50	.68	34.	1300.	64.	54.	17.	80.	70.	12.2	3.7	4.7	1.	290.	.5
782	399.70	6461.00	.26	59.	1100.	95.	28.	35.	0.	150.	3.0	7.5	20.0	0.	320.	.9
783	511.80	6686.50	.60	6.	630.	16.	41.	0.	0.	80.	10.2	7.5	3.6	1.	61.	1.0
784	650.50	6690.20	.41	6.	1900.	110.	21.	12.	70.	50.	6.5	6.7	2.5	0.	310.	.0
785	650.50	6690.20	.39	9.	1800.	150.	18.	8.	100.	40.	5.9	5.5	2.1	1.	340.	1.6
786	650.50	6690.20	.35	41.	3100.	86.	29.	12.	0.	50.	4.0	3.9	2.0	0.	110.	7.7
787	649.90	6688.70	.65	76.	1100.	110.	37.	13.	100.	50.	5.2	6.1	6.4	0.	400.	.9
788	649.90	6680.70	.52	19.	2200.	120.	24.	5.	0.	30.	5.4	4.4	2.5	1.	220.	.7
789	649.90	6680.70	.86	100.	430.	60.	44.	17.	160.	30.	5.9	6.5	9.8	0.	420.	.8
790	649.90	6680.70	.58	51.	1100.	74.	38.	8.	60.	60.	7.2	6.8	5.1	0.	260.	.6
791	648.90	6691.40	.56	22.	1500.	170.	18.	10.	90.	20.	5.6	6.1	3.6	1.	510.	1.3
792	648.90	6691.40	.86	98.	1000.	30.	37.	9.	0.	30.	3.3	3.2	4.1	0.	120.	3.5
793	645.80	6694.70	.72	75.	1600.	85.	30.	20.	160.	50.	5.4	5.1	10.5	1.	330.	.6
794	647.40	6694.90	.60	18.	1500.	220.	21.	7.	140.	20.	6.4	6.8	3.6	0.	680.	1.3
795	647.40	6694.90	1.10	110.	750.	61.	42.	18.	90.	80.	6.6	6.7	7.0	0.	300.	1.1
796	559.50	6635.90	.44	3.	2100.	46.	6.	25.	50.	0.	2.5	4.6	20.4	0.	830.	1.2
797	559.50	6635.90	.00	16.	360.	41.	16.	0.	0.	0.	3.3	1.8	79.0	1.	170.	.7
798	559.55	6635.69	.40	2.	1300.	69.	10.	65.	70.	20.	1.8	1.8	16.8	0.	310.	.8
799	559.55	6635.69	.53	3.	150.	15.	26.	140.	0.	0.	1.4	1.5	14.5	0.	220.	.5
800	526.60	6731.00	.67	78.	6700.	160.	25.	7.	120.	60.	3.8	5.9	34.4	1.	1300.	.7
801	594.60	6694.50	.49	29.	4600.	130.	10.	170.	200.	20.	4.7	5.0	4.1	0.	2900.	3.9
803	595.80	6695.90	.80	26.	3800.	170.	14.	200.	210.	30.	9.3	10.0	10.1	0.	2100.	1.4
804	344.20	6768.00	.27	21.	5300.	700.	14.	4.	0.	30.	1.8	3.6	1.3	0.	290.	.9
805	650.70	6786.50	.18	40.	5000.	360.	6.	6.	0.	30.	.7	1.9	.6	0.	900.	.9
806	631.50	6914.20	2.46	79.	9400.	320.	17.	9.	860.	10.	7.3	12.0	26.1	1.	6000.	3.0
807	595.80	6793.80	.77	44.	4900.	130.	86.	7.	340.	70.	3.9	5.2	8.2	1.	580.	6.5
812	649.20	6693.70	.37	26.	2300.	61.	21.	9.	0.	30.	2.9	3.4	1.6	0.	70.	1.1
813	649.20	6693.70	.55	14.	3000.	220.	21.	23.	130.	40.	7.8	8.0	2.8	1.	980.	1.3
815	573.90	6917.80	.52	0.	570.	46.	190.	0.	170.	50.	16.8	8.5	3.8	0.	150.	1.1
816	560.50	6905.00	.39	5.	260.	24.	140.	0.	50.	60.	18.4	6.2	2.4	0.	110.	.8

* Sweden

PRNR	UTM X km	UTM Y km	C %	Cl ppm	S ppm
701	594.60	6694.50	2.1	52.	1336.
702	601.39	6707.47	2.3	57.	1372.
703	601.36	6707.44	2.3	61.	1135.
704	601.39	6707.36	3.1	67.	1248.
705	601.43	6707.32	1.7	88.	960.
706	601.44	6707.20	1.3	104.	753.
707	601.46	6707.06	2.0	64.	1390.
708	601.50	6706.98	3.5	90.	2020.
709	601.48	6706.84	2.3	90.	1426.
710	601.56	6706.62	2.5	82.	1384.
711	601.50	6706.40	3.1	81.	1509.
712	601.91	6705.76	2.5	35.	1174.
713	602.67	6705.46	1.8	75.	2166.
714	602.79	6705.34	2.3	34.	2460.
715	602.84	6705.26	1.3		
716	602.81	6704.49	2.1	77.	1120.
717	602.83	6704.44	1.1	85.	1215.
718	603.11	6703.95	1.4		
719	603.22	6703.51	1.7	40.	1402.
720	603.20	6702.30	2.4		
721	608.98	6705.05	2.3	77.	1330.
722	608.86	6705.14	6.1	95.	1747.
723	608.73	6705.17	3.3		
724	608.60	6705.13	1.7	51.	1109.
725	608.50	6705.10	1.4		
727	607.60	6706.70	3.1		
728	614.00	6707.30	1.1		
729	613.90	6705.50	.8		
730	599.33	6708.36	2.0	286.	1206.
731	597.84	6707.26	1.8		
732	599.68	6706.68	1.9	68.	901.
733	597.03	6705.20	2.7	87.	1188.
734	596.21	6703.77	3.1		
735	607.50	6703.10	2.7		
736	609.50	6700.60	2.1		
737	629.20	6693.40	2.3		
738	603.23	6686.61	1.3		
739	600.08	6686.24	2.3		

PRNR	UTM X km	UTM Y km	C %	Cl ppm	S ppm
740	597.40	6688.30	2.4		
741	612.23	6686.92	2.3	53.	1099.
742	613.10	6685.90	3.2		
743	605.79	6683.00	4.1	90.	2513.
744	606.20	6684.60	1.3		
745	605.61	6685.82	2.8	152.	2343.
746	604.70	6687.60	.7		
747	603.13	6689.20	2.8	127.	1967.
748	602.82	6692.50	3.5	120.	1771.
749	605.66	6691.01	1.7	49.	2237.
750	608.32	6695.69	1.1	30.	724.
751	606.50	6693.90	1.1		
752	602.36	6697.35	7.0	57.	1440.
753	601.98	6696.17	2.5	50.	2935.
754	602.49	6695.50	2.4	72.	1813.
755	602.80	6695.40	1.3		
756	595.78	6698.91	1.4	26.	635.
757	595.67	6695.97	1.7	34.	1240.
758	595.80	6693.70	1.9		
759	601.90	6689.47	6.1		
760	601.47	6689.64	2.6	64.	2105.
761	598.16	6690.43	1.8	40.	789.
762	600.27	6696.18	2.2	66.	3132.
763	608.63	6698.28	5.5	149.	2672.
764	603.50	6699.50	1.9		
765	605.70	6699.10	1.9		
766	608.58	6699.85	2.0		
767	356.30	6807.10	2.6		
768	355.80	6806.50	2.8		
769	358.30	6801.60	3.4		
770	356.30	6801.20	3.1		
771			8.9		
772			4.0	47.	1457.
773			5.4	79.	1370.
774			3.3	64.	1443.
775	650.50	6690.20	1.5	2.	805.
776	650.50	6690.20	1.7	23.	871.
777			1.5		

PRNR	UTM X km	UTM Y km	C %	Cl ppm	S ppm
778	.00	.00	2.5		
780	459.90	6632.50	2.4	49.	692.
781	409.40	6606.50	2.9		
782	399.70	6461.00	12.1		
783	511.80	6686.50	2.8		
784	650.50	6690.20	.9	24.	526.
785	650.50	6690.20	1.0	21.	531.
786	650.50	6690.20	1.7		
787	649.90	6688.70	2.6	68.	709.
788	649.90	6680.70	1.7	19.	493.
789	649.90	6680.70	3.2	13.	583.
790	649.90	6680.70	1.9	64.	586.
791	648.90	6691.40	1.3	52.	1168.
792	648.90	6691.40	1.5	83.	669.
793	645.80	6694.70	2.2	58.	606.
794	647.40	6694.90	1.5	35.	1063.
795	647.40	6694.90	1.9	36.	642.
796	559.50	6635.90	2.1	31.	1651.
797	559.50	6635.90	4.5	124.	5101.
798	559.55	6635.69	2.9	91.	4504.
799	559.55	6635.69	2.9	61.	5696.
800	526.60	6731.00	1.9	11.	830.
801	594.60	6694.50	2.0	64.	1504.
802	601.60	6706.50	2.6		
803	595.80	6695.90	2.0	81.	1820.
804	344.20	6768.00	2.5	84.	1171.
805	650.70	6786.50	2.2	187.	1232.
806	631.50	6914.20	3.0	42.	2361.
807	595.80	6793.80	1.9		
808	621.50	6863.00	1.5		
809	347.40	6752.80	3.1		
810	612.10	6896.70	6.0		
811	343.90	6864.80	1.9		
812	649.20	6693.70	2.5	19.	669.
813	649.20	6693.70	1.8	48.	1069.
814			1.1	71.	620.
815	573.90	6917.80	1.2	26.	510.
816	560.50	6905.00	2.0	58.	596.

Sample no.	Hg ppm
706	0.12
714	0.58
730	0.47
752	0.44
767	0.30
780	0.48
787	0.38
806	0.27

Sample no.	H_2OTot %	H_2O^- %	H_2O^+ %
701	23.82	19.20	4.62
704	36.10	31.35	4.75
714	34.39	29.05	5.34
715	14.61	9.74	4.87
717	14.81	12.14	2.67
738	12.15	10.30	1.84
743	25.71	18.07	7.64
759	25.11	17.74	7.37
772	37.62	37.48	0.14
805	18.91	13.05	5.86
806	25.09	14.14	10.95
812	15.87	7.62	8.25
813	37.08	33.32	3.76
815	6.09	3.08	3.01

	Si	Al	Fe	Mn	Ti	Mg	Ca	Na	K	P	Ba	Be	Co	Cr	Cu	La	Li	Mo	Ni	Pb	Rb	Sc	Sr	V	Zn	Zr	Y	W	As	U	Th	Cd
Si	1.00																															
Al	-.05	1.00																														
Fe	.64	-.25	1.00																													
Mn	.12	.40	-.30	1.00																												
Ti	-.30	-.15	-.23	-.41	1.00																											
Mg	-.39	-.09	-.35	-.29	.66	1.00																										
Ca	.03	.17	-.31	.15	.41	.34	1.00																									
Na	-.36	-.13	-.38	-.22	.34	.38	.20	1.00																								
K	-.21	-.20	-.31	-.19	.45	.78	.33	.40	1.00																							
P	.15	.37	-.14	.76	-.22	-.28	.17	-.21	-.18	1.00																						
Ba	.37	.02	-.06	.57	-.18	-.18	.42	-.12	-.00	.51	1.00																					
Be	.17	.54	.14	.06	-.22	-.23	.03	-.11	-.25	.09	-.04	1.00																				
Co	.03	.17	.01	.38	-.01	.03	-.03	-.16	-.02	.32	.14	-.06	1.00																			
Cr	-.03	.18	-.17	.37	.25	.38	.18	-.08	.08	.33	.26	-.10	.26	1.00																		
Cu	.08	.38	-.00	.06	.07	.09	.07	-.09	-.02	.18	.03	.08	.51	.20	1.00																	
La	.06	.52	-.29	.53	-.19	-.17	.26	-.08	-.14	.47	.20	.37	-.01	.16	.03	1.00																
Li	-.11	.78	-.47	.42	-.06	.12	.37	.01	.10	.36	.16	.26	.09	.16	.32	.51	1.00															
Mo	-.04	.38	-.23	.26	-.10	.01	.22	-.01	.02	.21	.06	.38	.05	.01	-.13	.56	.39	1.00														
Ni	.09	.66	-.33	.63	-.02	-.08	.46	-.14	-.04	.59	.47	.10	.21	.32	.32	.50	.75	.19	1.00													
Pb	-.17	-.05	-.13	-.11	.06	.10	.06	.34	.05	-.09	-.12	.02	-.06	-.15	-.03	-.08	-.03	-.07	-.12	1.00												
Rb	-.09	-.08	-.02	-.15	-.03	-.02	.05	.03	.05	-.09	-.12	.05	-.08	-.19	-.01	-.03	-.06	.01	-.15	.21	1.00											
Sc	-.27	.71	-.53	.31	.15	.26	.27	.17	.16	.25	-.01	.23	.11	.19	.25	.53	.72	.38	.49	.04	-.06	1.00										
Sr	.25	.12	-.17	.30	.19	.01	.73	.01	.13	.34	.47	.07	-.03	.11	.01	.33	.33	.31	.47	-.04	.03	.09	1.00									
V	.03	.14	.35	-.23	.07	-.01	.03	-.09	-.08	-.10	-.06	.39	.05	.02	.08	-.20	-.15	-.12	-.17	-.05	.10	-.14	-.11	1.00								
Zn	-.02	.72	-.38	.51	-.21	-.12	.38	-.03	-.10	.42	.23	.46	-.03	.10	.11	.70	.78	.64	.68	-.05	-.05	.57	.46	-.20	1.00							
Zr	.52	.16	.73	-.25	-.20	-.22	-.12	-.14	-.13	-.06	-.10	.40	-.03	-.21	.22	-.10	-.05	-.11	-.06	.17	.10	-.14	-.12	.35	-.06	1.00						
Y	.23	.59	-.07	.27	-.16	-.17	.28	-.08	-.16	.40	.16	.62	-.09	.02	.21	.74	.55	.56	.45	.10	.04	.43	.36	-.05	.71	.29	1.00					
W	-.05	.70	-.40	.50	-.20	-.10	.37	-.01	-.09	.40	.21	.46	-.03	.08	.08	.70	.76	.67	.65	-.04	-.04	.57	.46	-.22	1.00	-.09	.70	1.00				
As	.21	.21	.22	.04	-.17	-.19	.13	-.15	-.12	.32	.19	.10	.01	.00	.20	.09	.12	-.06	.25	-.05	.04	-.08	.14	.15	.17	.27	.28	.15	1.00			
U	.00	.42	-.41	.93	-.28	-.25	.21	-.14	-.15	.74	.49	.12	.34	.33	.04	.57	.45	.42	.64	-.06	-.09	.34	.41	-.27	.61	-.34	.34	.61	-.00	1.00		
Th	-.33	.55	-.54	.58	-.21	-.11	.08	.09	-.07	.40	.03	.19	.10	.11	-.01	.68	.53	.43	.48	.17	.09	.63	.10	-.26	.63	-.26	.35	.64	-.06	.66	1.00	
Cd	-.01	.70	-.25	.59	-.28	-.24	.22	-.10	-.21	.46	.18	.45	.07	.11	.04	.70	.64	.57	.62	-.05	-.09	.54	.33	-.14	.89	-.03	.55	.89	.13	.65	.74	1.00

NGU-report 86.169. FIGURE 8.1

	Si	Al	Fe	Mn	Ti	Mg	Ca	Na	K	P	Ba	Be	Co	Cr	Cu	La	Li	Mo	Ni	Pb	Rb	Sc	Sr	V	Zn	Zr	Y	W	As	U	Th	Cd
Si	1.00																															
Al	.27	1.00																														
Fe	.69	-.11	1.00																													
Mn	.23	.38	-.06	1.00																												
Ti	-.48	-.16	-.36	-.43	1.00																											
Mg	-.40	-.16	-.30	-.39	.86	1.00																										
Ca	.06	.16	-.29	-.01	.41	.49	1.00																									
Na	-.51	-.26	-.41	-.48	.53	.43	.23	1.00																								
K	-.32	-.21	-.28	-.33	.54	.80	.37	.40	1.00																							
P	.25	.42	-.09	.87	-.32	-.30	.12	-.39	-.27	1.00																						
Ba	.31	.25	.00	.74	-.30	-.16	.34	-.34	-.13	.72	1.00																					
Be	.57	.58	.20	.09	-.29	-.25	.05	-.21	-.23	.15	.13	1.00																				
Co	.13	.09	.21	.28	.14	.16	-.03	-.25	.06	.27	.19	-.17	1.00																			
Cr	-.06	.07	-.08	.28	.40	.34	.15	-.08	-.05	.25	.24	-.13	.19	1.00																		
Cu	-.06	.55	-.25	.13	.18	.14	.41	.17	.07	.23	.25	.17	.05	.11	1.00																	
La	.42	.47	-.10	.51	-.31	-.24	.27	-.21	-.20	.47	.49	.45	-.05	.08	.30	1.00																
Li	.05	.76	-.36	.24	-.01	.13	.48	-.03	.17	.32	.40	.45	-.16	.01	.54	.45	1.00															
Mo	.42	.47	.00	.24	-.09	-.04	.35	-.18	.00	.30	.38	.46	.23	-.00	.16	.47	.51	1.00														
Ni	.14	.72	-.24	.70	-.28	-.18	.27	-.31	-.14	.69	.68	.33	.02	.20	.54	.54	.74	.36	1.00													
Pb	-.17	-.12	-.07	-.17	.14	.14	.11	.36	.06	-.09	-.21	-.01	-.11	-.13	-.09	-.13	-.07	-.15	-.21	1.00												
Rb	.08	-.05	-.01	-.06	-.07	.02	.08	.12	.10	-.03	-.05	.06	-.10	-.14	-.03	.06	.06	.08	-.08	.13	1.00											
Sc	-.12	.68	-.42	.08	.32	.30	.45	.16	.21	.18	.10	.25	.08	.09	.73	.40	.65	.36	.45	-.01	-.01	1.00										
Sr	.38	.20	-.06	.32	-.02	.04	.68	-.09	.06	.39	.57	.18	-.08	.09	.20	.33	.46	.41	.43	-.03	.14	.14	1.00									
V	.11	.07	.35	-.12	.41	.41	.17	-.10	.18	-.03	-.01	-.03	.55	.36	.28	-.16	-.12	.07	-.06	.01	-.06	.20	-.04	1.00								
Zn	.26	.74	-.20	.43	-.26	-.20	.39	-.18	-.14	.47	.52	.59	-.20	-.01	.40	.60	.85	.62	.81	-.13	.02	.47	.54	-.18	1.00							
Zr	.42	.09	.56	-.29	-.16	-.01	-.01	.03	.16	-.20	-.16	.38	-.11	-.28	-.00	-.00	.11	.13	-.15	.41	.25	-.02	-.02	.17	.05	1.00						
Y	.48	.56	-.03	.30	-.25	-.19	.34	-.10	-.15	.37	.39	.75	-.18	-.05	.33	.79	.61	.64	.50	.13	.15	.43	.42	-.14	.75	.31	1.00					
W	.26	.73	-.20	.42	-.24	-.18	.39	-.17	-.13	.46	.51	.60	-.18	-.01	.39	.60	.85	.64	.80	-.12	.02	.47	.53	-.17	1.00	.05	.76	1.00				
As	.21	.62	.08	.28	-.23	-.16	.02	-.29	-.21	.29	.28	.46	.05	-.02	.33	.24	.52	.23	.64	-.16	-.05	.23	.09	.10	.57	.05	.34	.57	1.00			
U	.24	.42	-.12	.95	-.41	-.38	.04	-.41	-.31	.89	.74	.20	.25	.24	.18	.51	.33	.38	.73	-.16	-.00	.12	.39	-.12	.53	-.28	.41	.52	.32	1.00		
Th	.04	.49	-.34	.60	-.34	-.31	.06	-.09	-.17	.52	.32	.22	-.04	-.03	.22	.62	.42	.29	.53	.16	.23	.42	.13	-.27	.50	-.04	.49	.50	.18	.61	1.00	
Cd	.31	.79	-.08	.53	-.36	-.32	.27	-.31	-.27	.50	.51	.53	-.03	.01	.42	.57	.72	.51	.84	-.12	-.04	.41	.44	-.02	.90	.03	.61	.89	.61	.58	.58	1.00

	Si	Al	Fe	Ti	Mg	Ca	Na	K	Mn	P	Cu	Zn	Pb	Ni	Co	V	Mo	Cd	Cr	Ba	Sr	Zr	Ag	B	Be	Li	Sc	Ce	La
Si	1.00																												
Al	-.14	1.00																											
Fe	.60	-.34	1.00																										
Ti	-.08	-.10	-.15	1.00																									
Mg	-.09	.01	-.25	.78	1.00																								
Ca	-.13	.32	-.34	.59	.53	1.00																							
Na	.05	.05	-.14	.50	.53	.48	1.00																						
K	-.14	-.07	-.26	.69	.81	.46	.41	1.00																					
Mn	-.26	.50	-.34	-.34	-.23	.19	-.02	-.22	1.00																				
P	-.07	-.14	.19	.09	-.00	-.06	-.02	.11	-.29	1.00																			
Cu	-.09	.30	-.05	.05	.09	.41	.09	.16	.11	.17	1.00																		
Zn	-.16	.79	-.39	-.19	-.13	.40	-.04	-.17	.56	-.18	.15	1.00																	
Pb	-.05	-.07	.06	.06	-.01	-.19	-.04	.04	-.21	.15	-.12	-.18	1.00																
Ni	-.15	.70	-.32	-.11	.02	.48	-.01	.03	.45	-.10	.69	.64	-.18	1.00															
Co	-.08	.12	-.01	-.08	-.02	.02	.05	-.05	.46	-.11	.12	-.05	-.12	.11	1.00														
V	-.08	.01	.15	.49	.46	.19	.25	.37	-.31	.24	.05	-.27	.06	-.17	.14	1.00													
Mo	.06	.10	.09	.02	.04	.02	-.02	-.00	.12	-.04	-.07	.16	-.03	-.08	.02	.13	1.00												
Cd	-.16	.73	-.37	-.19	-.12	.31	.07	-.16	.57	-.19	.03	.90	-.14	.55	-.04	-.28	.10	1.00											
Cr	-.07	-.08	-.13	.48	.78	.25	.25	.67	-.18	.01	.18	-.18	-.04	.08	.00	.29	.01	-.17	1.00										
Ba	-.21	.53	-.28	-.27	-.16	.44	-.05	-.18	.73	-.15	.40	.68	-.31	.74	.35	-.28	.05	.56	-.16	1.00									
Sr	-.08	.28	-.21	.19	.09	.75	.11	.19	.37	-.07	.37	.51	-.23	.49	-.01	-.09	.08	.37	.00	.58	1.00								
Zr	-.02	.05	.15	.30	.11	.13	.07	.26	-.14	.17	.11	-.06	.15	-.07	-.09	.43	.04	-.05	.09	-.20	.12	1.00							
Ag	-.04	-.04	.26	-.05	-.07	-.13	-.06	-.02	-.16	.01	.04	-.10	.27	-.10	-.09	.06	-.04	-.11	-.04	-.13	-.11	.18	1.00						
B	-.40	.22	-.67	.23	.16	.40	.17	.35	.20	-.07	.23	.22	.07	.26	-.04	-.00	-.09	.19	-.01	.14	.33	.08	-.11	1.00					
Be	-.15	.60	-.21	-.26	-.20	.08	-.12	-.29	.36	-.14	-.07	.68	-.09	.28	-.06	-.04	.27	.63	-.21	.32	.19	.06	-.08	.11	1.00				
Li	-.23	.86	-.52	.04	.14	.55	.07	.11	.46	-.14	.38	.84	-.19	.82	.05	-.10	.03	.71	.02	.66	.49	.00	-.13	.37	.49	1.00			
Sc	-.20	.71	-.44	.20	.38	.40	.31	.33	.32	-.13	.23	.57	-.12	.49	.06	.08	.12	.59	.24	.34	.22	.10	-.04	.25	.35	.73	1.00		
Ce	-.21	.69	-.40	-.35	-.25	.09	-.05	-.29	.67	-.21	.05	.76	-.13	.49	.09	-.35	.08	.86	-.22	.55	.19	-.12	-.09	.17	.56	.60	.57	1.00	
La	-.23	.66	-.43	-.25	-.18	.26	-.04	-.21	.58	-.16	.05	.88	-.19	.48	-.08	-.31	.22	.87	-.18	.60	.38	-.09	-.12	.21	.69	.67	.58	.88	1.00

NGU-report 86.169. FIGURE 8.3

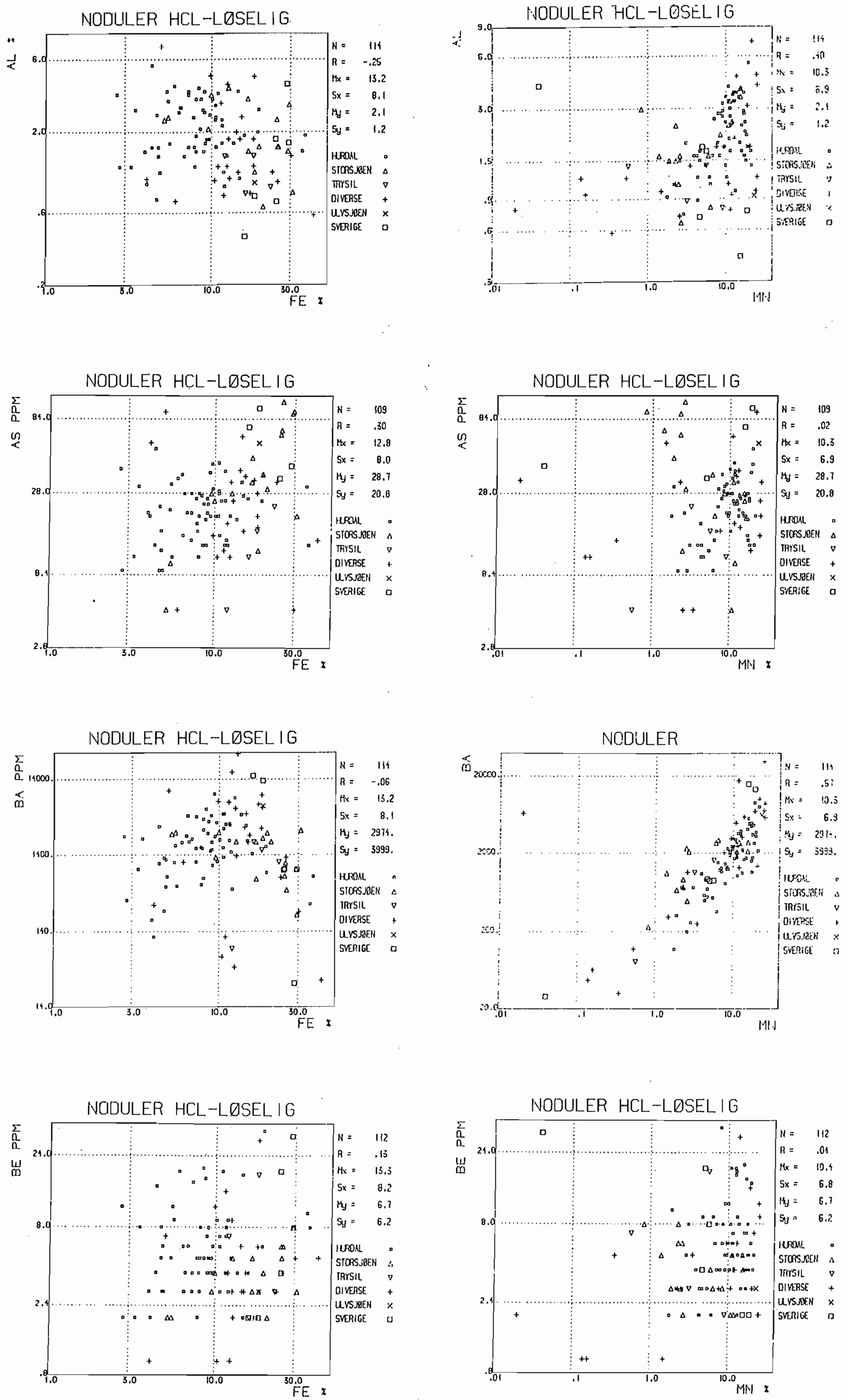
	Br	Cs	Hf	Sb	Se	Ta	La	Ce	Nd	Sm	Eu	Tb	Yb	Lu	As	Au	Ba	Co	Cr	Fe	Mo	Na	Ni	Rb	Sc	Th	U	W	Zn
Br	1.00																												
Cs	-.13	1.00																											
Hf	-.03	.13	1.00																										
Sb	.34	.12	-.08	1.00																									
Se	.07	-.14	.19	.06	1.00																								
Ta	-.12	-.12	.75	-.17	.35	1.00																							
La	-.05	-.19	.13	-.05	-.04	.29	1.00																						
Ce	-.06	-.28	.04	.01	-.02	.24	.84	1.00																					
Nd	-.01	-.18	.12	-.07	-.01	.27	.92	.73	1.00																				
Sm	-.00	-.13	.11	-.10	-.01	.24	.86	.66	.98	1.00																			
Eu	-.04	-.06	.18	-.04	-.04	.28	.83	.65	.91	.90	1.00																		
Tb	-.05	-.09	.14	-.09	-.01	.26	.83	.62	.94	.94	.90	1.00																	
Yb	-.07	.00	.24	-.07	.06	.32	.71	.52	.82	.84	.90	.88	1.00																
Lu	-.07	.08	.23	-.07	.03	.31	.70	.48	.81	.84	.85	.87	.94	1.00															
As	.18	.13	-.17	.29	-.08	-.26	.00	-.07	.04	.02	.09	.08	.21	.15	1.00														
Au	-.02	.14	-.09	.22	-.09	-.06	.29	.19	.23	.28	.23	.24	.21	.28	.13	1.00													
Ba	-.09	-.09	-.15	.04	-.03	.00	.38	.28	.29	.25	.30	.27	.27	.23	.24	.23	1.00												
Co	-.05	.11	-.30	.15	-.11	-.16	-.13	-.00	-.18	-.19	-.14	-.17	-.18	-.16	-.02	-.07	.14	1.00											
Cr	-.03	.52	-.01	.00	-.13	-.17	-.16	-.22	-.13	-.10	-.01	-.07	-.02	.00	-.01	.04	-.17	.09	1.00										
Fe	-.03	-.08	-.50	-.02	-.10	-.47	-.39	-.45	-.26	-.21	-.37	-.27	-.28	-.25	.24	-.06	-.25	-.02	-.06	1.00									
Mo	-.04	.00	.09	.04	.06	.29	.55	.41	.63	.63	.58	.63	.50	.58	-.17	.14	.20	.15	-.07	-.21	1.00								
Na	.05	.10	.80	-.11	.18	.66	.15	.07	.11	.09	.15	.12	.17	.17	-.17	-.07	-.00	-.19	.04	-.51	.21	1.00							
Ni	-.07	-.04	.04	.06	-.05	.08	.44	.46	.41	.40	.58	.42	.62	.49	.23	.22	.34	-.04	.04	-.32	.13	.00	1.00						
Rb	.18	.22	.65	.04	.19	.56	-.14	-.22	-.13	-.13	-.06	-.07	.01	.05	-.06	-.07	-.15	-.12	.09	-.37	.13	.75	-.14	1.00					
Sc	-.13	.46	.18	-.15	-.13	.04	.03	.04	.04	.05	.21	.10	.13	.11	-.16	-.09	-.12	.09	.63	-.35	.08	.19	.14	.26	1.00				
Th	-.05	-.00	.51	-.01	.42	.66	.30	.34	.31	.33	.36	.39	.50	.49	-.15	-.04	-.01	-.09	-.03	-.43	.30	.40	.14	.34	.11	1.00			
U	.06	-.09	.12	-.13	.14	.28	.63	.39	.81	.87	.76	.82	.73	.78	-.07	.19	.18	-.18	-.06	-.13	.71	.16	.20	.03	-.01	.37	1.00		
W	-.05	.03	.12	-.02	-.05	.28	.20	.11	.23	.24	.24	.31	.20	.21	-.09	.12	.23	.14	-.04	-.16	.49	.22	.01	.28	.12	.19	.25	1.00	
Zn	-.06	-.22	.14	-.08	-.01	.31	.78	.72	.77	.75	.84	.78	.81	.73	.07	.19	.44	-.07	-.19	-.43	.53	.19	.64	-.09	.06	.38	.64	.20	1.00

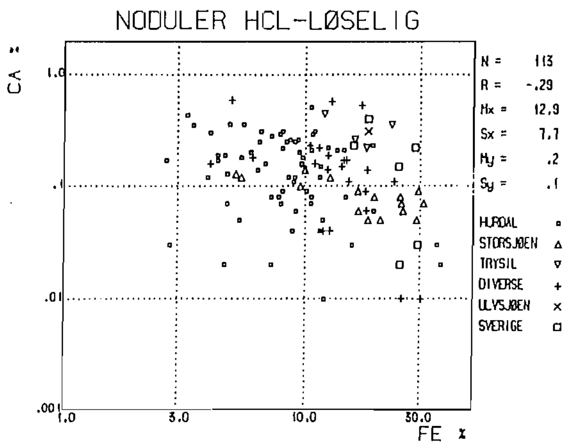
NGU-report 86.169. FIGURE 8.4

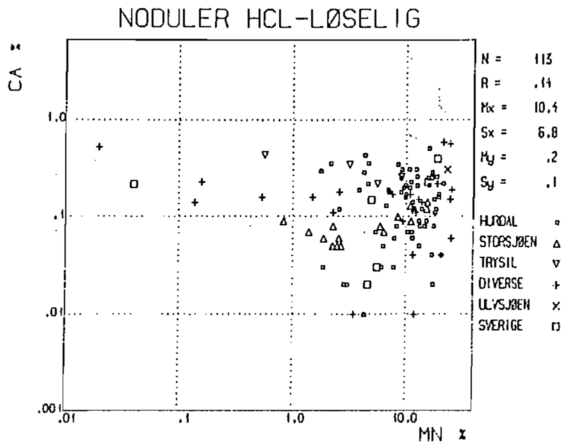
	Br	Cs	Hf	Sb	Se	Ta	La	Ce	Nd	Sm	Eu	Tb	Yb	Lu	As	Au	Ba	Co	Cr	Fe	Mo	Na	Ni	Rb	Sc	Th	U	W	Zn	C	Cl	S
Br	1.00																															
Cs	-.13	1.00																														
Hf	-.30	.07	1.00																													
Sb	.08	.15	-.08	1.00																												
Se	-.08	-.13	.23	.06	1.00																											
Ta	-.22	-.12	.80	-.10	.39	1.00																										
La	.02	-.12	.13	-.01	-.05	.24	1.00																									
Ce	-.01	-.21	.07	.09	-.03	.20	.85	1.00																								
Nd	.23	-.11	.11	-.05	-.03	.21	.92	.74	1.00																							
Sm	.29	-.08	.08	-.09	-.02	.18	.85	.67	.98	1.00																						
Eu	.13	.00	.17	-.04	-.05	.21	.83	.67	.90	.90	1.00																					
Tb	.15	-.06	.11	-.07	-.02	.21	.82	.64	.94	.94	.90	1.00																				
Yb	.17	.04	.20	-.03	.07	.24	.71	.56	.82	.84	.91	.88	1.00																			
Lu	.09	.12	.20	-.05	.03	.24	.71	.52	.81	.84	.84	.88	.93	1.00																		
As	.22	.20	-.14	.26	-.12	-.28	-.01	-.07	.04	.03	.11	.09	.26	.17	1.00																	
Au	.09	.12	-.07	-.08	-.10	.00	.40	.33	.33	.39	.31	.33	.30	.37	.06	1.00																
Ba	-.03	-.07	-.09	.14	-.07	.06	.51	.43	.40	.35	.46	.36	.41	.34	.07	.23	1.00															
Co	.02	.06	-.29	.41	-.15	-.22	-.06	.08	-.15	-.18	-.11	-.15	-.14	-.13	-.08	-.03	.34	1.00														
Cr	-.18	.54	.01	-.19	-.12	-.16	-.12	-.20	-.09	-.07	.01	-.04	-.00	.03	-.03	-.03	-.20	-.19	1.00													
Fe	.47	-.10	-.47	-.06	-.10	-.46	-.41	-.49	-.26	-.20	-.37	-.27	-.28	-.25	.26	-.15	-.40	-.06	-.06	1.00												
Mo	.06	.00	.11	.17	.07	.27	.63	.49	.76	.70	-.63	.70	.54	.63	-.17	-.27	.33	.10	-.09	-.21	1.00											
Na	-.25	.03	.84	-.09	.23	.76	.23	.18	.19	.16	.23	.18	.22	.21	-.17	-.00	.01	-.25	.06	-.49	.23	1.00										
Ni	.04	-.01	.01	-.00	-.06	.01	.42	.48	.37	.36	.55	.39	.60	.46	.25	.20	.48	.05	-.01	-.33	.14	.04	1.00									
Rb	-.28	.18	.75	-.01	.24	.73	-.07	-.15	-.05	-.06	.01	-.00	.08	.12	-.06	-.05	-.13	-.27	.06	-.37	.08	.72	-.11	1.00								
Sc	-.33	.40	.20	-.13	-.12	.07	.12	.13	.13	.13	.32	.17	.20	.17	-.11	-.00	-.02	-.14	.67	-.41	.01	.13	.22	.17	1.00							
Th	-.21	.01	.51	.09	.45	.64	.26	.31	.27	.29	.33	.36	.48	.49	-.13	.03	.07	-.16	-.02	-.40	.33	.45	.10	.43	.12	1.00						
U	.28	-.05	.12	-.14	.13	.25	.64	.42	.82	.87	.76	.82	.73	.78	-.08	.27	.28	-.22	-.04	-.12	.77	.22	.18	.09	.04	.37	1.00					
W	.02	-.05	.13	.05	-.05	.29	.28	.19	.30	.31	.30	.37	.24	.25	-.09	.23	.37	.01	-.11	-.16	.40	.17	.03	.16	-.03	.22	.30	1.00				
Zn	.03	-.20	.11	-.01	-.02	.23	.77	.73	.76	.75	.84	.78	.81	.73	.08	.30	.64	-.03	-.18	-.43	.58	.23	.64	-.05	.12	.34	.64	.26	1.00			
C	.43	-.26	-.48	-.02	-.10	-.28	.07	-.02	.09	.07	-.03	.03	-.05	-.04	-.01	-.08	-.14	.18	-.14	.56	.04	-.41	-.13	-.44	-.28	-.23	.05	-.07	-.09	1.00		
Cl	.12	-.16	-.12	-.07	.03	.11	.01	-.00	.08	.07	.03	.03	-.06	-.04	-.16	-.04	-.03	.21	-.06	.13	.13	-.05	-.25	-.01	.15	-.08	.13	.02	-.06	.28	1.00	
S	.44	-.45	-.34	-.12	.05	-.08	.01	.11	.14	.21	.03	.07	.01	-.01	-.24	-.02	-.16	-.09	-.22	.39	.07	-.33	-.00	-.33	-.17	-.04	.17	-.03	.05	.39	.28	1.00

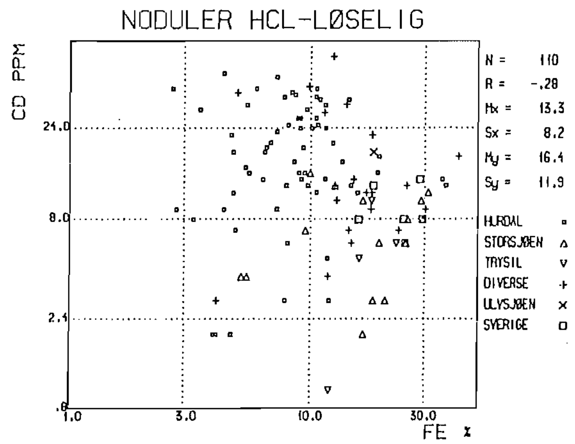
NGU-report 86.169. FIGURE 8.5

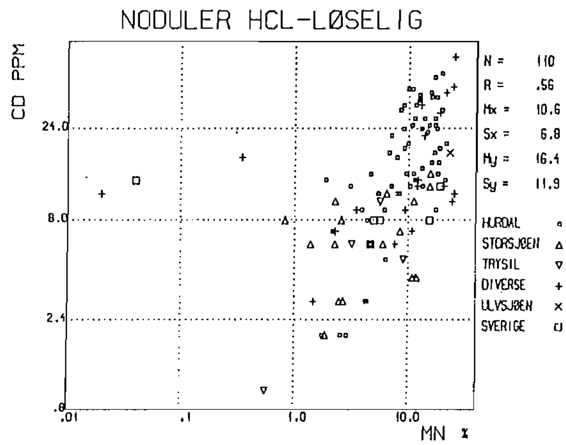
 FIGURE 9.1

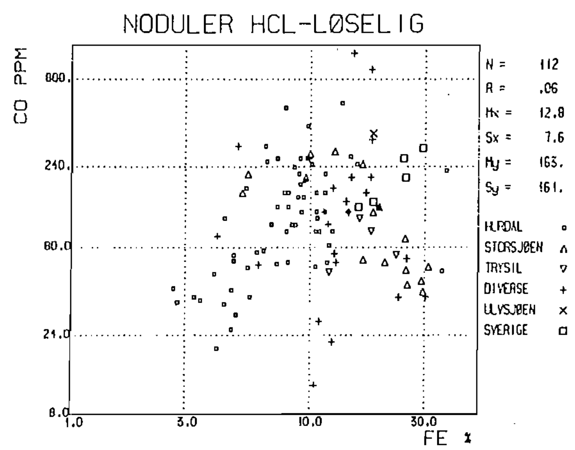

NODULER HCL-LØSELIG
AL %
FE %
N = 114
R = -.25
Mx = 13.2
Sx = 8.1
My = 2.1
Sy = 1.2
NODULER HCL-LØSELIG
AL
MN
N = 114
R = .40
Mx = 10.3
Sx = 6.9
My = 2.1
Sy = 1.2
NODULER HCL-LØSELIG
AS PPM
FE %
N = 109
R = .30
Mx = 12.8
Sx = 8.0
My = 28.7
Sy = 20.8
NODULER HCL-LØSELIG
AS PPM
MN %
N = 109
R = .02
Mx = 10.3
Sx = 6.9
My = 28.7
Sy = 20.8
NODULER HCL-LØSELIG
BA PPM
FE %
N = 114
R = -.06
Mx = 13.2
Sx = 8.1
My = 2974.
Sy = 3999.
NODULER
BA
MN
N = 114
R = .57
Mx = 10.3
Sx = 6.9
My = 2974.
Sy = 3999.
NODULER HCL-LØSELIG
BE PPM
FE %
N = 112
R = .13
Mx = 13.3
Sx = 8.2
My = 6.7
Sy = 6.2
NODULER HCL-LØSELIG
BE PPM
MN %
N = 112
R = .04
Mx = 10.4
Sx = 6.8
My = 6.7
Sy = 6.2
HURDAL
STORSJØEN
TRYSIL
DIVERSE
ULVSJØEN
SVERIGE

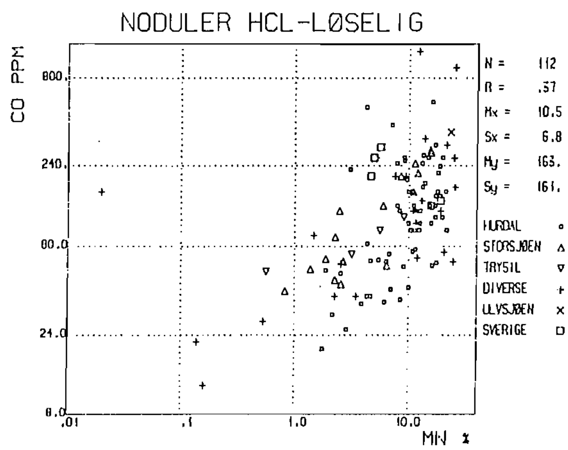

NODULER HCL-LØSELIG
CA %
1.0
.1
.01
.001
1.0
3.0
10.0
30.0
FE %
N = 113
R = -.29
Mx = 12.9
Sx = 7.7
My = .2
Sy = .1
HURDAL
STORSJØEN
TRYSIL
DIVERSE
ULVSJØEN
SVERIGE

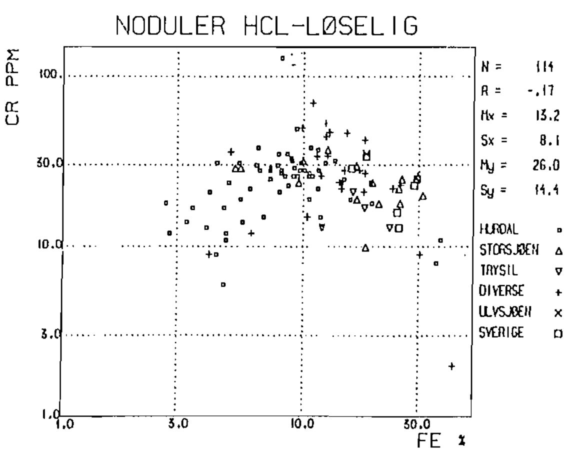

NODULER HCL-LØSELIG
CA %
1.0
.1
.01
.001
.01
.1
1.0
10.0
MN %
N = 113
R = .14
Mx = 10.4
Sx = 6.8
My = .2
Sy = .1
HURDAL
STORSJØEN
TRYSIL
DIVERSE
ULVSJØEN
SVERIGE

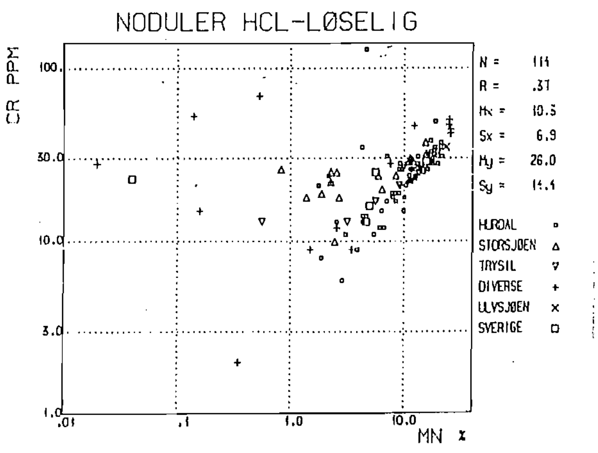

NODULER HCL-LØSELIG
CD PPM
24.0
8.0
2.4
.8
1.0
3.0
10.0
30.0
FE %
N = 110
R = -.28
Mx = 13.3
Sx = 8.2
My = 16.4
Sy = 11.9
HURDAL
STORSJØEN
TRYSIL
DIVERSE
ULVSJØEN
SVERIGE


NODULER HCL-LØSELIG
CD PPM
24.0
8.0
2.4
.8
.01
.1
1.0
10.0
MN %
N = 110
R = .56
Mx = 10.6
Sx = 6.8
My = 16.4
Sy = 11.9
HURDAL
STORSJØEN
TRYSIL
DIVERSE
ULVSJØEN
SVERIGE

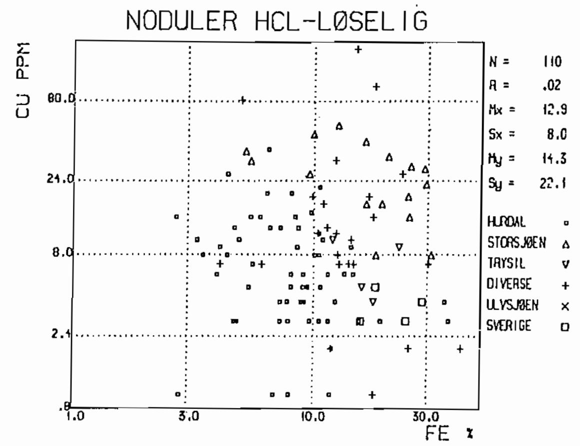

NODULER HCL-LØSELIG
CO PPM
800.
240.
80.0
24.0
8.0
1.0
3.0
10.0
30.0
FE %
N = 112
R = .06
Mx = 12.8
Sx = 7.6
My = 163.
Sy = 161.
HURDAL
STORSJØEN
TRYSIL
DIVERSE
ULVSJØEN
SVERIGE

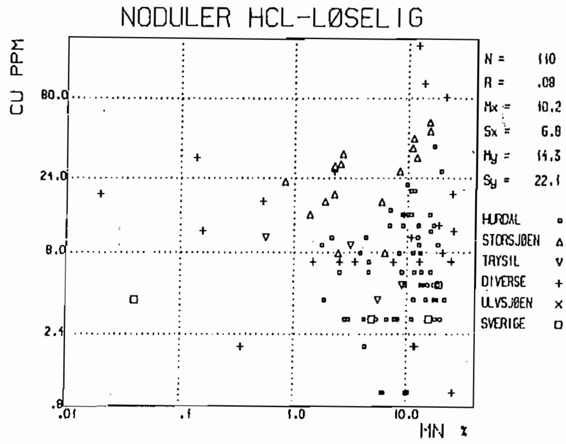

NODULER HCL-LØSELIG
CO PPM
800.
240.
80.0
24.0
8.0
.01
.1
1.0
10.0
MN %
N = 112
R = .37
Mx = 10.5
Sx = 6.8
My = 163.
Sy = 161.
HURDAL
STORSJØEN
TRYSIL
DIVERSE
ULVSJØEN
SVERIGE

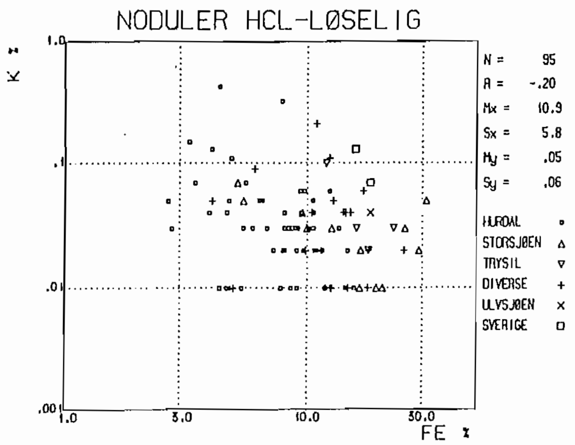

NODULER HCL-LØSELIG
CR PPM
100.
30.0
10.0
3.0
1.0
1.0
3.0
10.0
30.0
FE %
N = 114
R = -.17
Mx = 13.2
Sx = 8.1
My = 26.0
Sy = 14.4
HURDAL
STORSJØEN
TRYSIL
DIVERSE
ULVSJØEN
SVERIGE

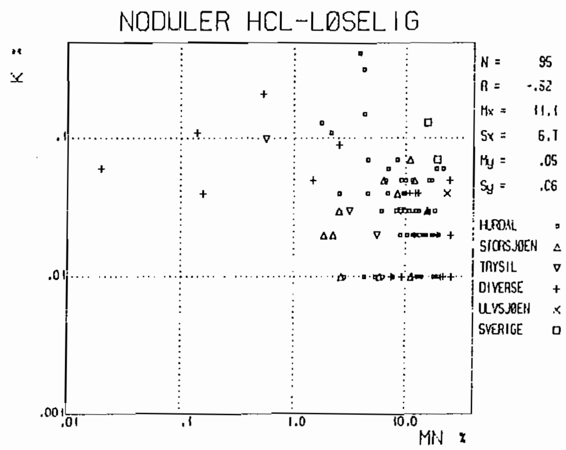

NODULER HCL-LØSELIG
CR PPM
100.
30.0
10.0
3.0
1.0
.01
.1
1.0
10.0
MN %
N = 114
R = .37
Mx = 10.3
Sx = 6.9
My = 26.0
Sy = 14.4
HURDAL
STORSJØEN
TRYSIL
DIVERSE
ULVSJØEN
SVERIGE

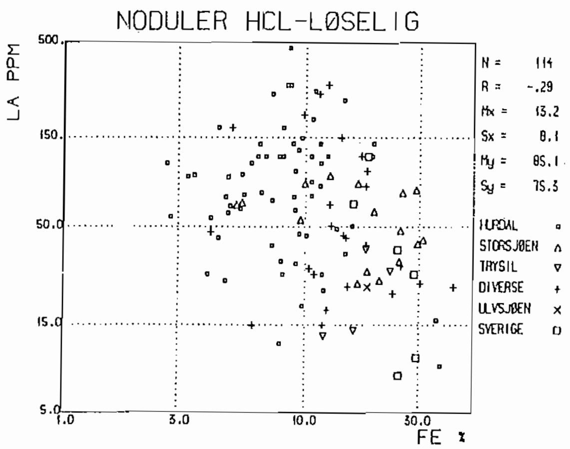
NGU-report 86.169. FIGURE 9.3

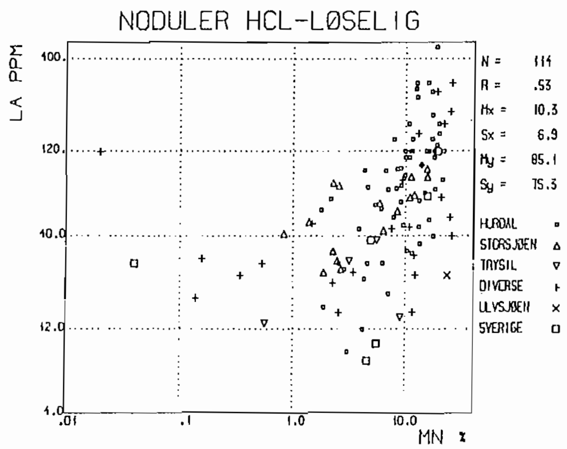


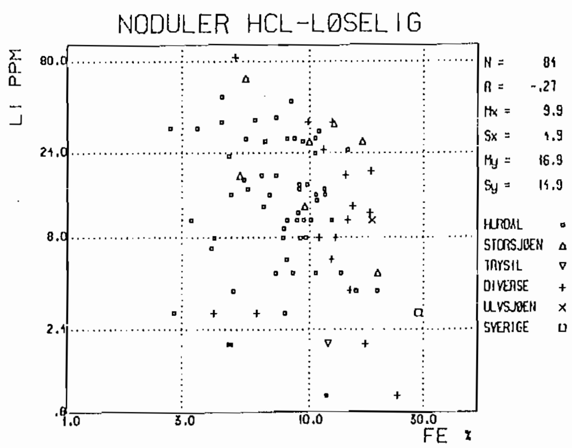


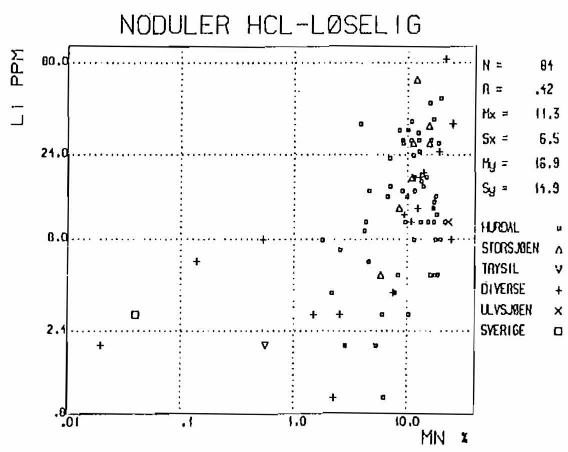


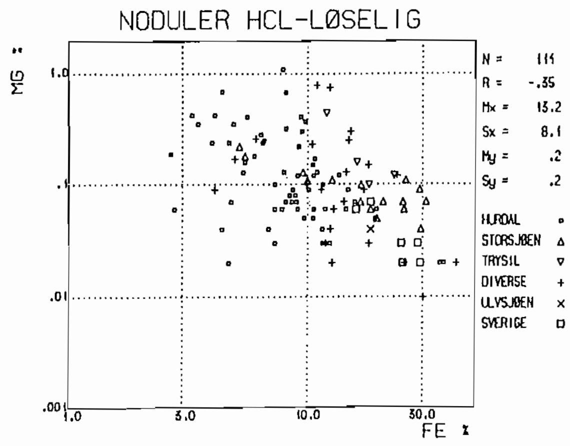


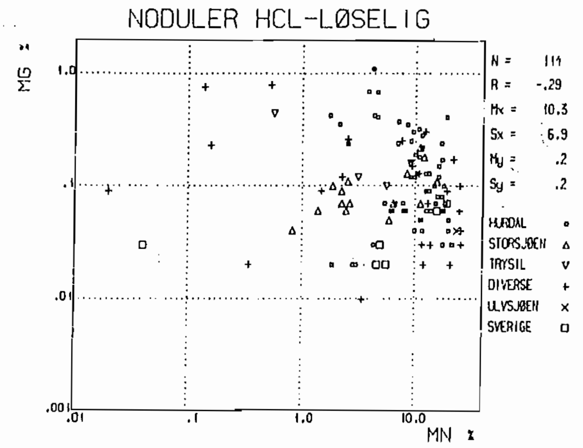


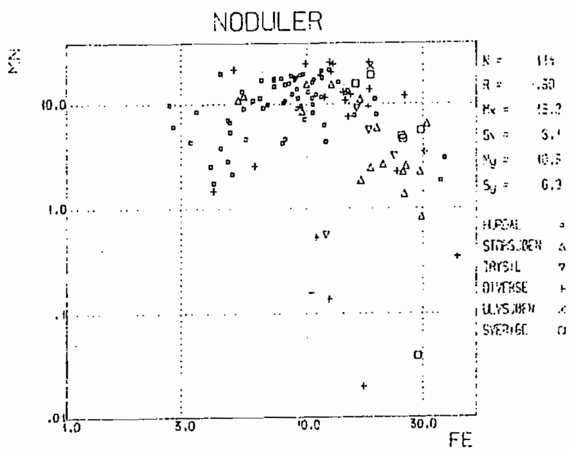


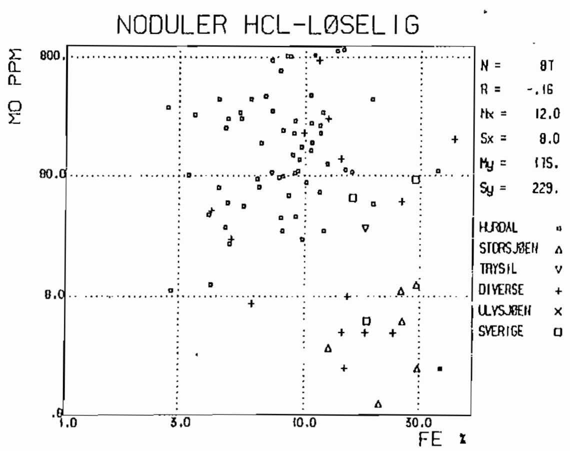


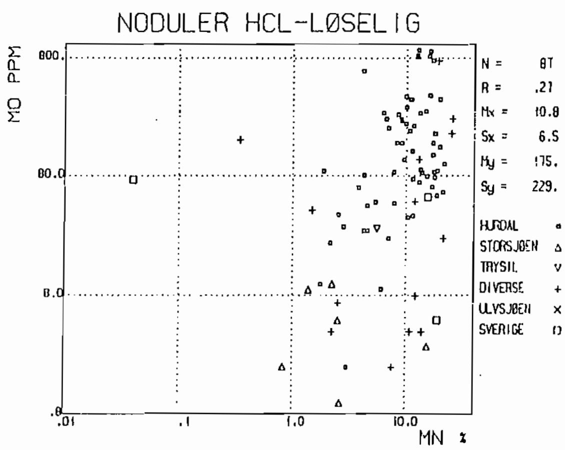


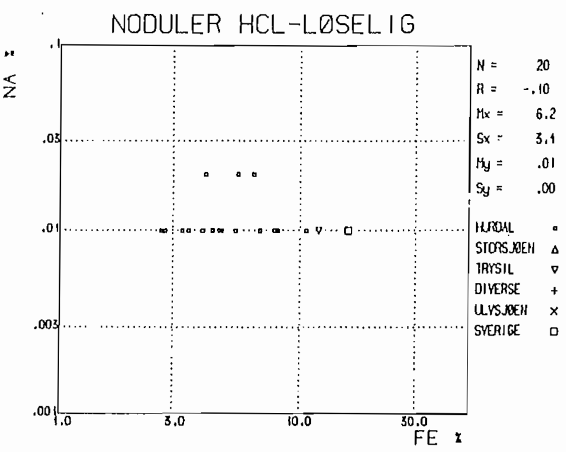

NODULER HCL-LØSELIG
MG %
FE %
N = 114
R = -.35
Mx = 13.2
Sx = 8.1
My = .2
Sy = .2
HURDAL
STORSJØEN
TRYSIL
DIVERSE
ULVSJØEN
SVERIGE

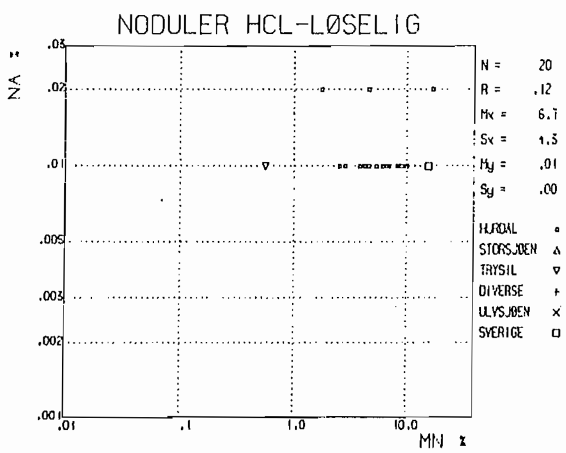

NODULER HCL-LØSELIG
MG %
MN %
N = 114
R = -.29
Mx = 10.3
Sx = 6.9
My = .2
Sy = .2
HURDAL
STORSJØEN
TRYSIL
DIVERSE
ULVSJØEN
SVERIGE


NODULER
MN
FE

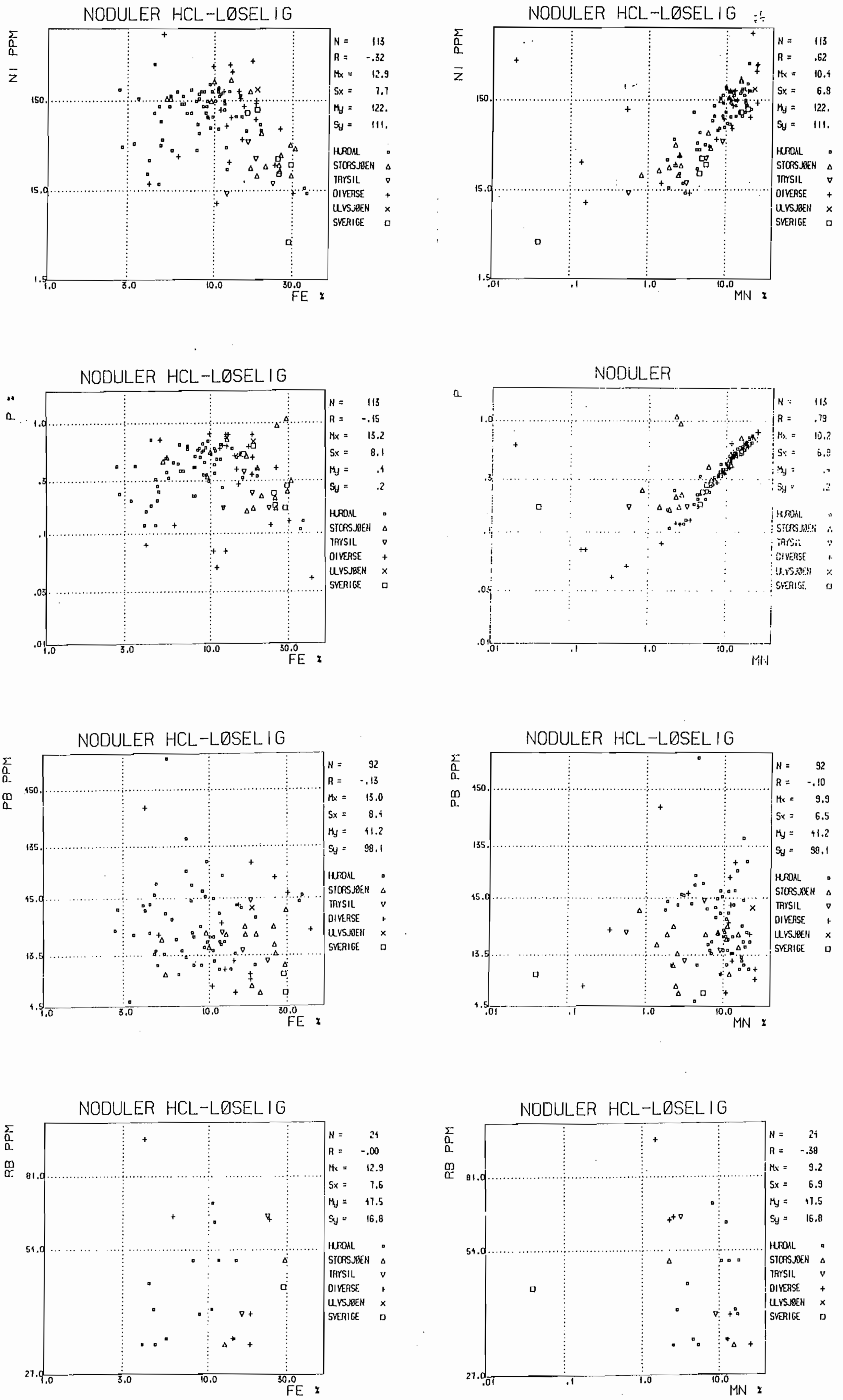

NODULER HCL-LØSELIG
MO PPM
FE %
N = 87
R = -.16
Mx = 12.0
Sx = 8.0
My = 175.
Sy = 229.
HURDAL
STORSJØEN
TRYSIL
DIVERSE
ULVSJØEN
SVERIGE


NODULER HCL-LØSELIG
MO PPM
MN %
N = 87
R = .21
Mx = 10.8
Sx = 6.5
My = 175.
Sy = 229.
HURDAL
STORSJØEN
TRYSIL
DIVERSE
ULVSJØEN
SVERIGE

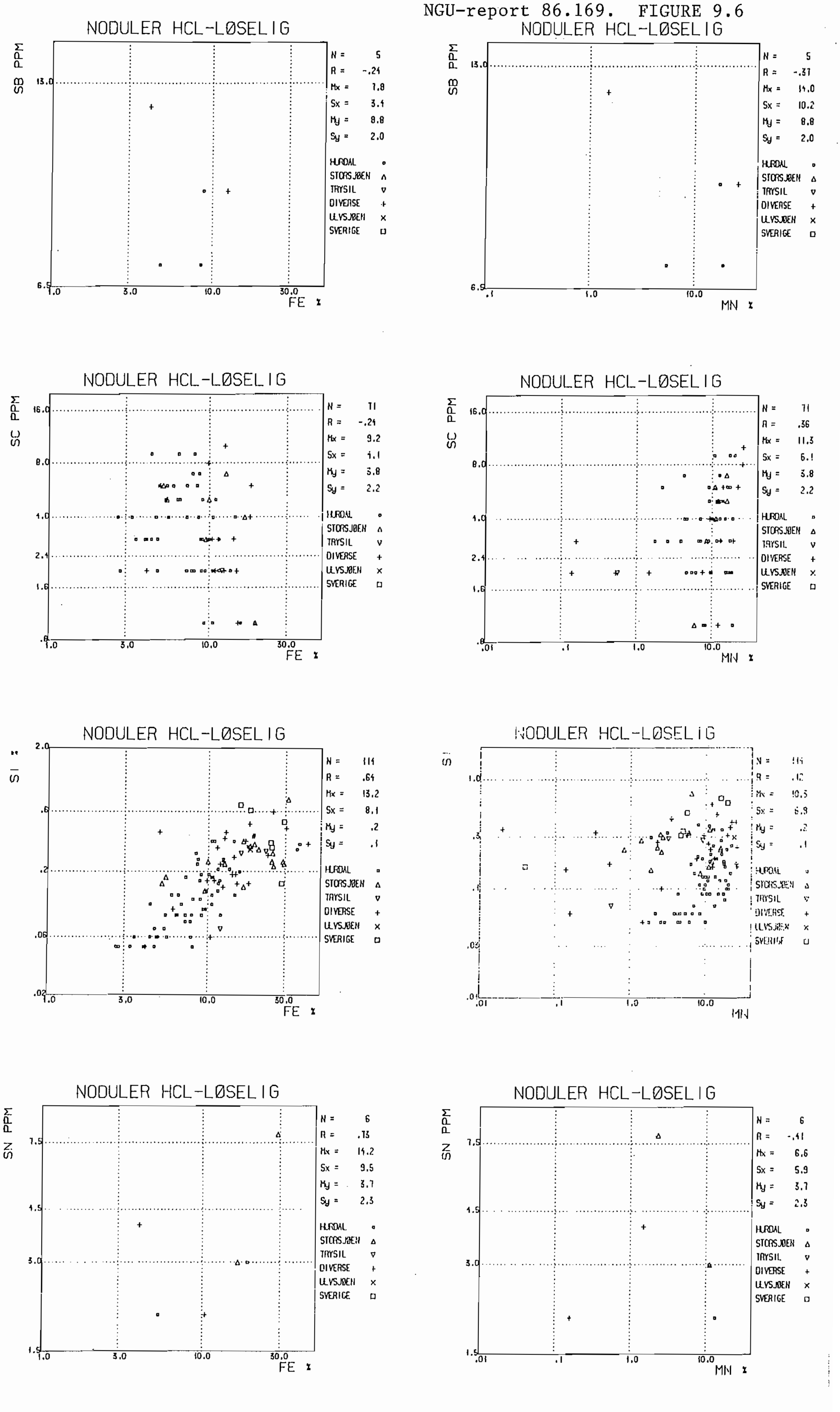

NODULER HCL-LØSELIG
NA %
FE %
N = 20
R = -.10
Mx = 6.2
Sx = 3.1
My = .01
Sy = .00
HURDAL
STORSJØEN
TRYSIL
DIVERSE
ULVSJØEN
SVERIGE

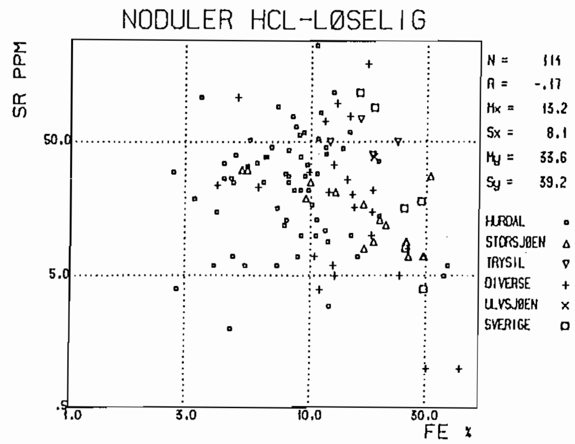

NODULER HCL-LØSELIG
NA %
MN %
N = 20
R = .12
Mx = 6.7
Sy = .00
My = .01
HURDAL
STORSJØEN
TRYSIL
DIVERSE
ULVSJØEN
SVERIGE

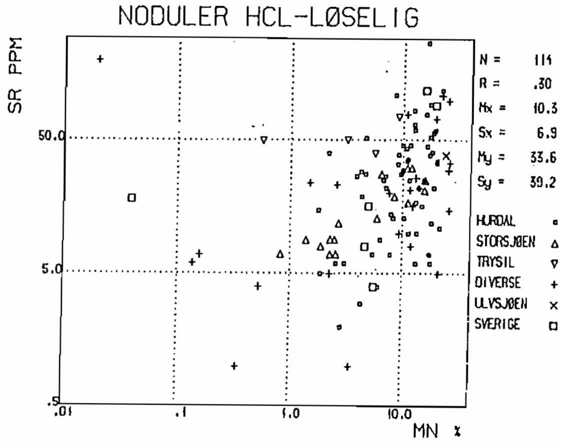
NGU-report 86.169. FIGURE 9.5

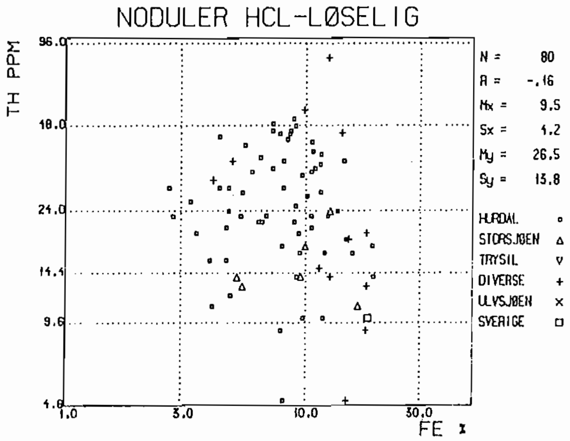


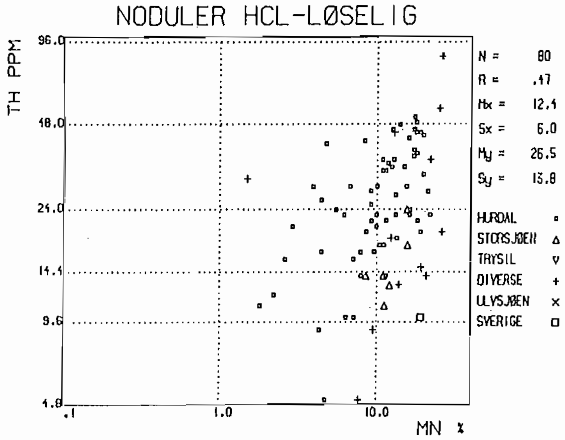
NGU-report 86.169. FIGURE 9.6

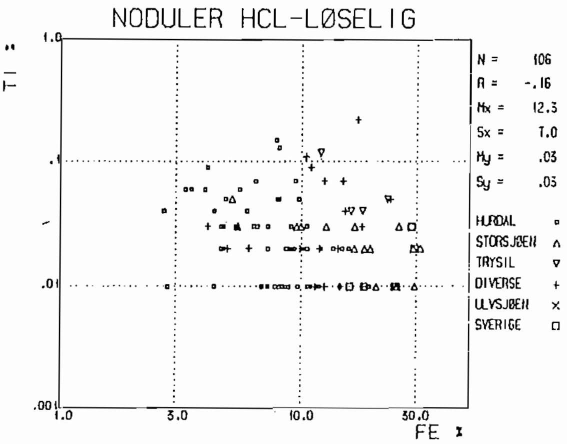


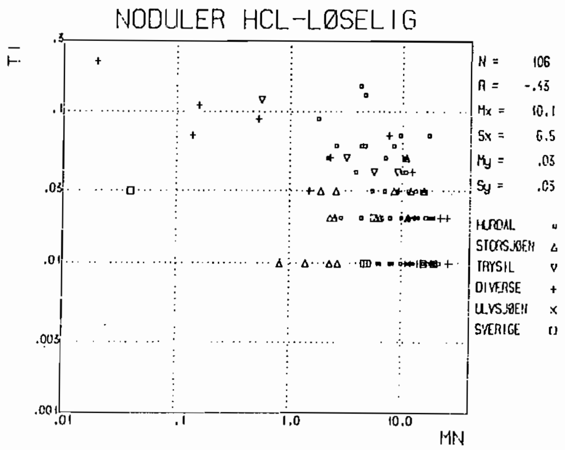

NODULER HCL-LØSELIG
SR PPM
FE %
N = 114
R = -.17
Mx = 15.2
Sx = 8.1
My = 33.6
Sy = 39.2
HURDAL
STORSJØEN
TRYSIL
DIVERSE
ULVSJØEN
SVERIGE

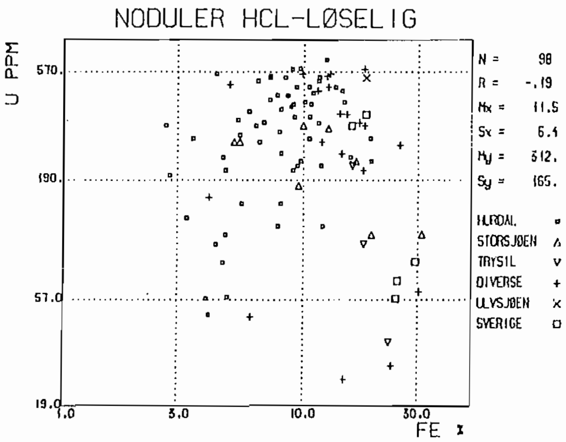

NODULER HCL-LØSELIG
SR PPM
MN %
N = 114
R = .30
Mx = 10.3
Sx = 6.9
My = 33.6
Sy = 39.2
HURDAL
STORSJØEN
TRYSIL
DIVERSE
ULVSJØEN
SVERIGE

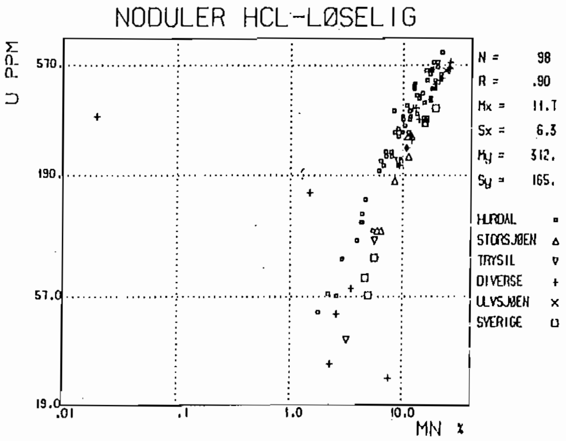

NODULER HCL-LØSELIG
TH PPM
FE %
N = 80
R = -.16
Mx = 9.5
Sx = 4.2
My = 26.5
Sy = 13.8
HURDAL
STORSJØEN
TRYSIL
DIVERSE
ULVSJØEN
SVERIGE


NODULER HCL-LØSELIG
TH PPM
MN %
N = 80
R = .47
Mx = 12.4
Sx = 6.0
My = 26.5
Sy = 13.8
HURDAL
STORSJØEN
TRYSIL
DIVERSE
ULVSJØEN
SVERIGE

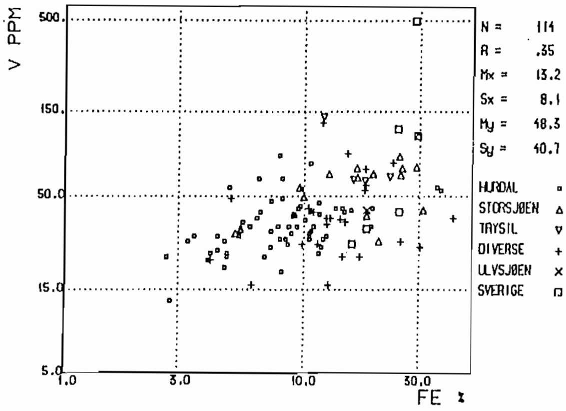

NODULER HCL-LØSELIG
TI %
FE %
N = 106
R = -.16
Mx = 12.3
Sx = 7.0
My = .03
Sy = .05
HURDAL
STORSJØEN
TRYSIL
DIVERSE
ULVSJØEN
SVERIGE


NODULER HCL-LØSELIG
TI
MN
N = 106
R = -.43
Mx = 10.1
Sx = 6.5
My = .03
Sy = .05
HURDAL
STORSJØEN
TRYSIL
DIVERSE
ULVSJØEN
SVERIGE

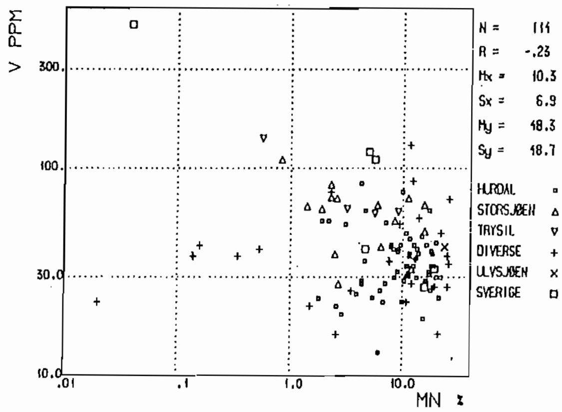

NODULER HCL-LØSELIG
U PPM
FE %
N = 98
R = -.19
Mx = 11.5
Sx = 6.4
My = 312.
Sy = 165.
HURDAL
STORSJØEN
TRYSIL
DIVERSE
ULVSJØEN
SVERIGE


NODULER HCL-LØSELIG
U PPM
MN %
N = 98
R = .90
Mx = 11.7
Sx = 6.3
My = 312.
Sy = 165.
HURDAL
STORSJØEN
TRYSIL
DIVERSE
ULVSJØEN
SVERIGE

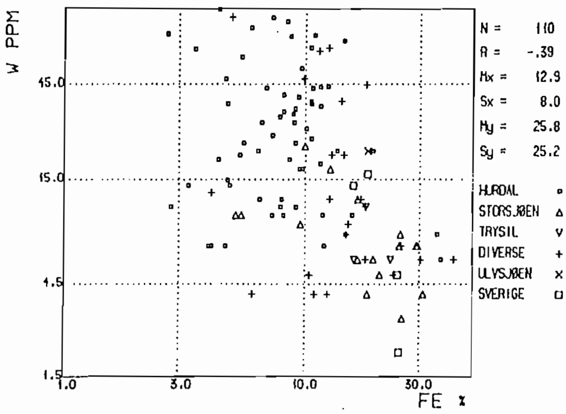
NODULER HCL-LØSELIG



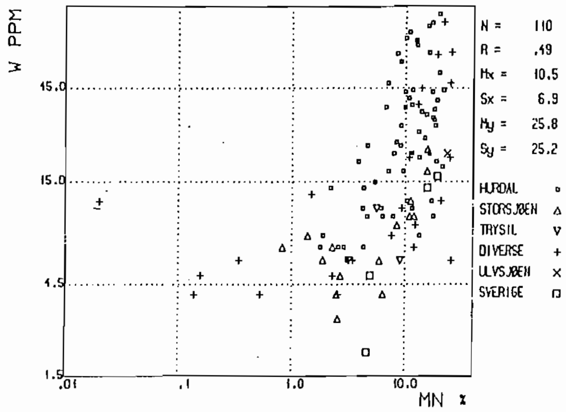
NODULER HCL-LØSELIG



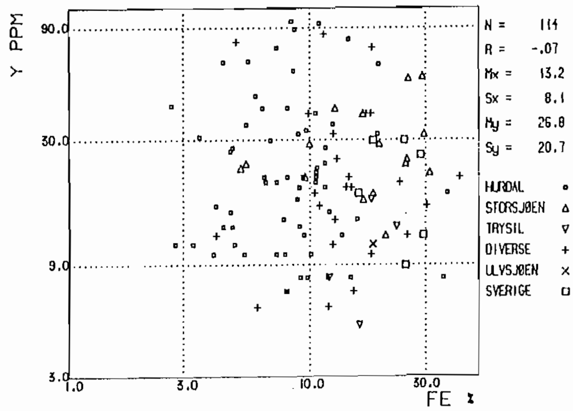
NODULER HCL-LØSELIG



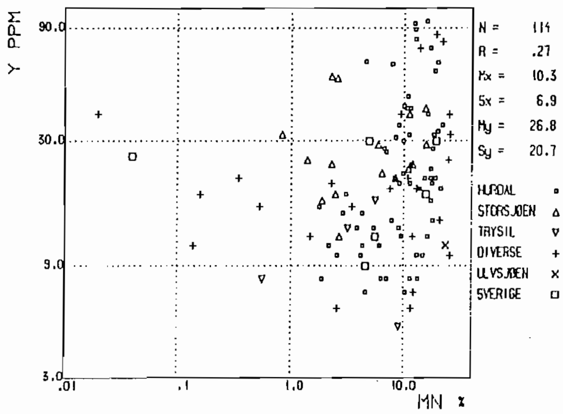
NODULER HCL-LØSELIG



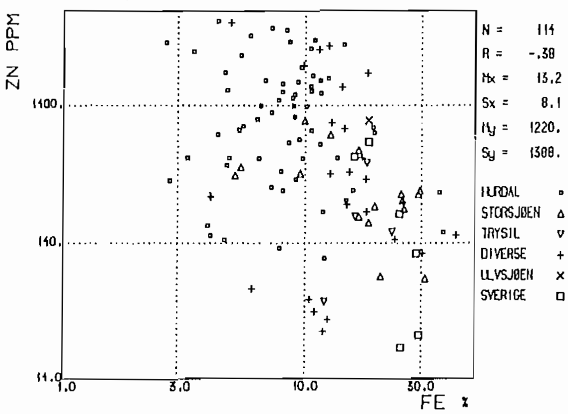
NODULER HCL-LØSELIG



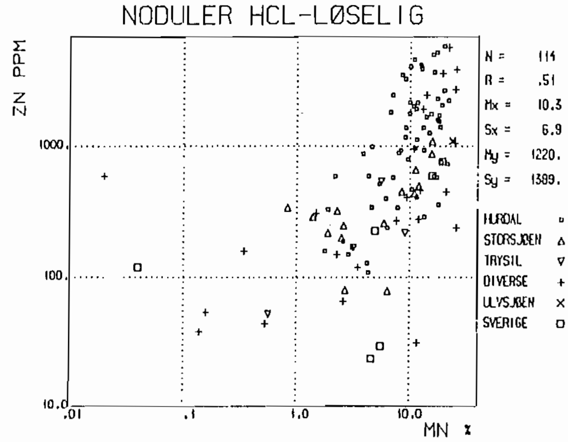
NODULER HCL-LØSELIG

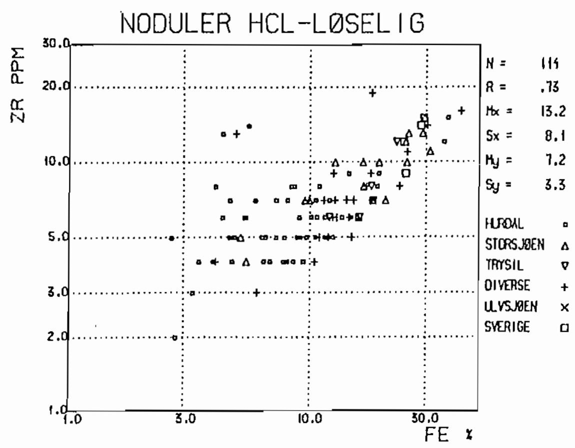


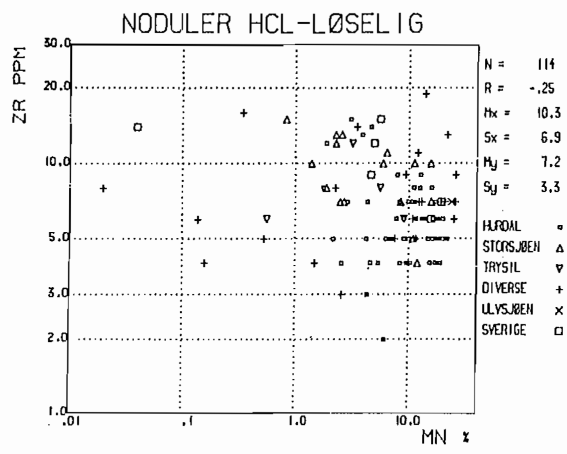
NODULER HCL-LØSELIG

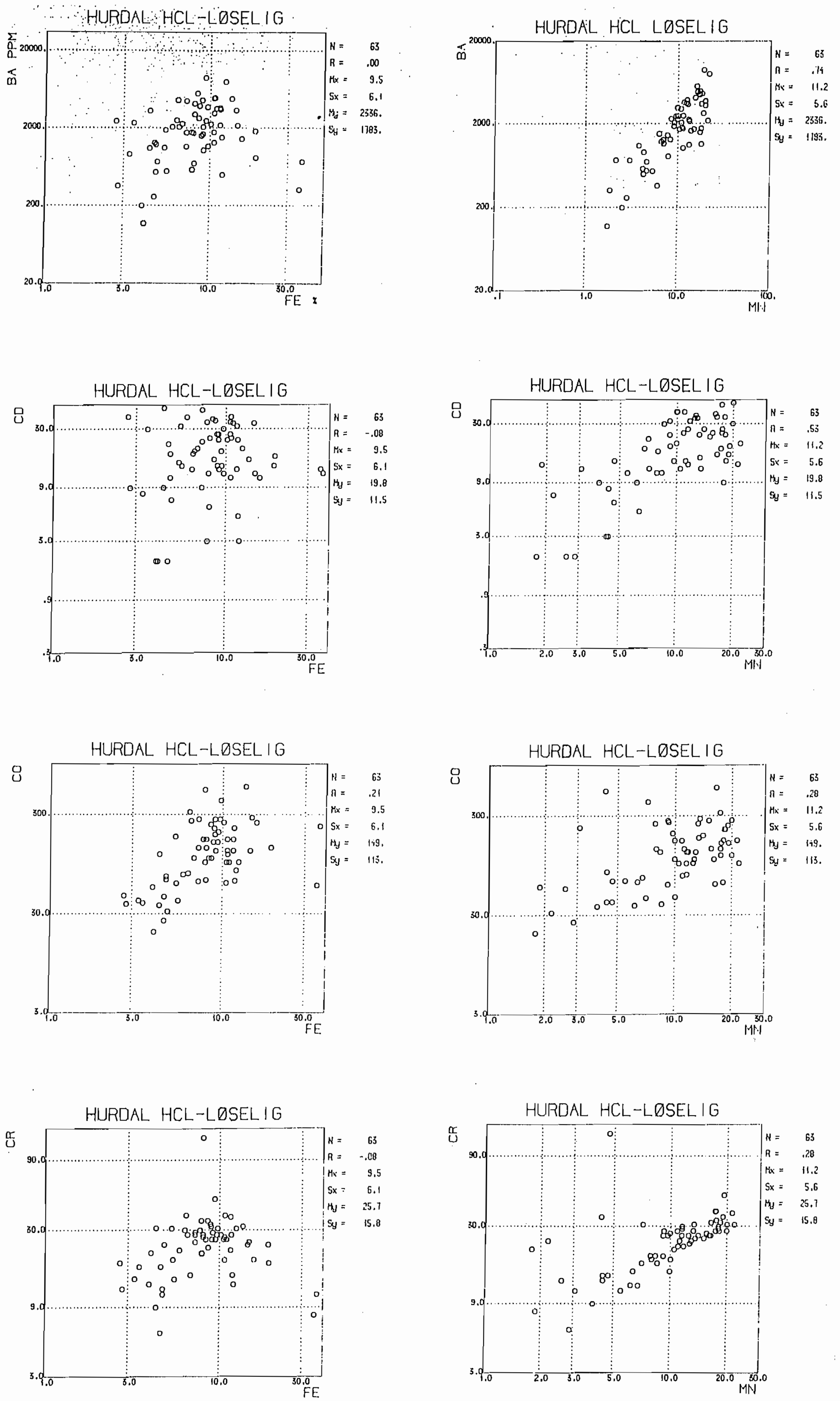


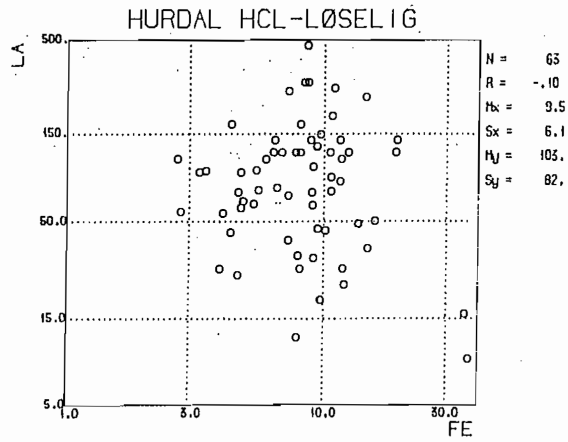
NODULER HCL-LØSELIG

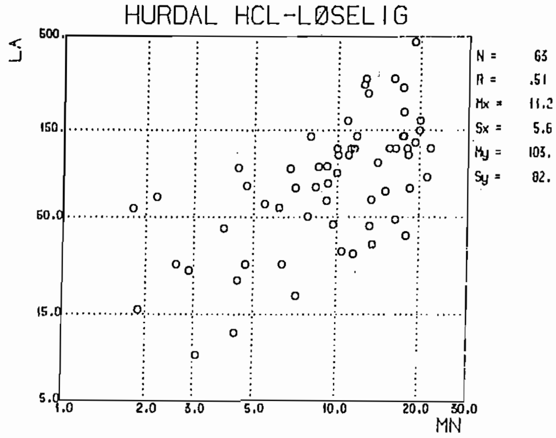


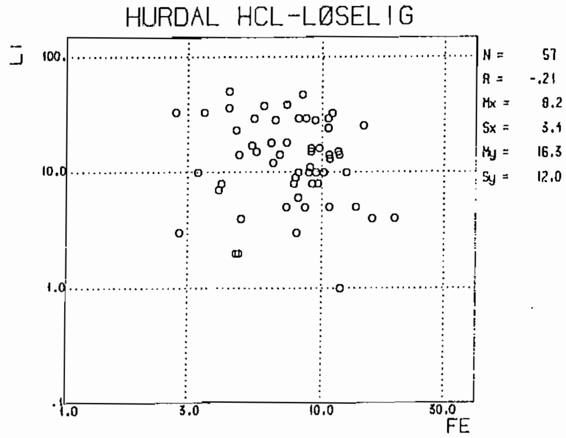

NODULER HCL-LØSELIG
ZR PPM
FE %
N = 114
R = .73
Mx = 13.2
Sx = 8.1
My = 7.2
Sy = 3.3
HURDAL
STORSJØEN
TRYSIL
DIVERSE
ULVSJØEN
SVERIGE

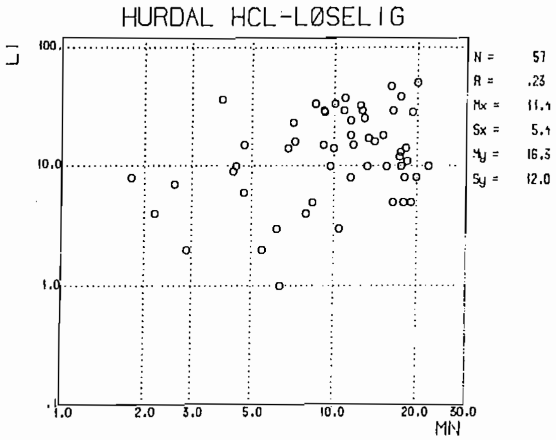

NODULER HCL-LØSELIG
ZR PPM
MN %
N = 114
R = -.25
Mx = 10.3
Sx = 6.9
My = 7.2
Sy = 3.3
HURDAL
STORSJØEN
TRYSIL
DIVERSE
ULVSJØEN
SVERIGE

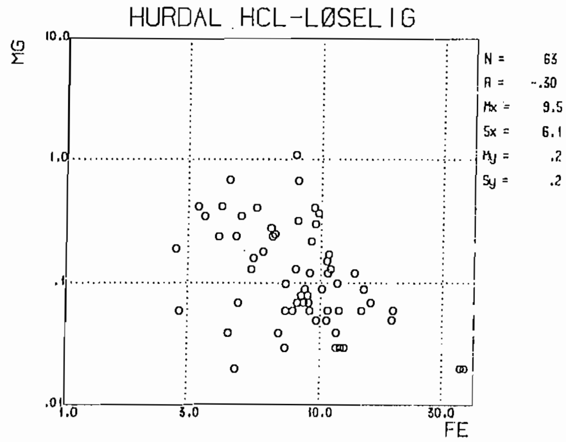

HURDAL HCL-LØSELIG
BA PPM
FE %
N = 63
R = .00
Mx = 9.5
Sx = 6.1
My = 2336.
Sy = 1783.
HURDAL HCL LØSELIG
BA
MN
N = 63
R = .74
Mx = 11.2
Sx = 5.6
My = 2336.
Sy = 1783.
HURDAL HCL-LØSELIG
CD
FE
N = 63
R = -.08
Mx = 9.5
Sx = 6.1
My = 19.8
Sy = 11.5
HURDAL HCL-LØSELIG
CD
MN
N = 63
R = .53
Mx = 11.2
Sx = 5.6
My = 19.8
Sy = 11.5
HURDAL HCL-LØSELIG
CO
FE
N = 63
R = .21
Mx = 9.5
Sx = 6.1
My = 149.
Sy = 113.
HURDAL HCL-LØSELIG
CO
MN
N = 63
R = .28
Mx = 11.2
Sx = 5.6
My = 149.
Sy = 113.
HURDAL HCL-LØSELIG
CR
FE
N = 63
R = -.08
Mx = 9.5
Sx = 6.1
My = 25.7
Sy = 15.8
HURDAL HCL-LØSELIG
CR
MN
N = 63
R = .28
Mx = 11.2
Sx = 5.6
My = 25.7
Sy = 15.8

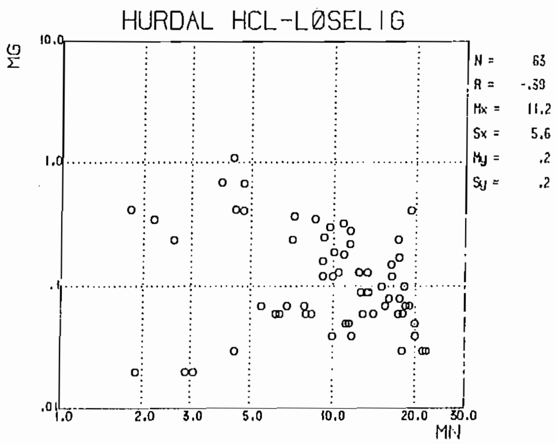

HURDAL HCL-LØSELIG
LA
FE
N = 63
R = -.10
Mx = 9.5
Sx = 6.1
My = 103.
Sy = 82.

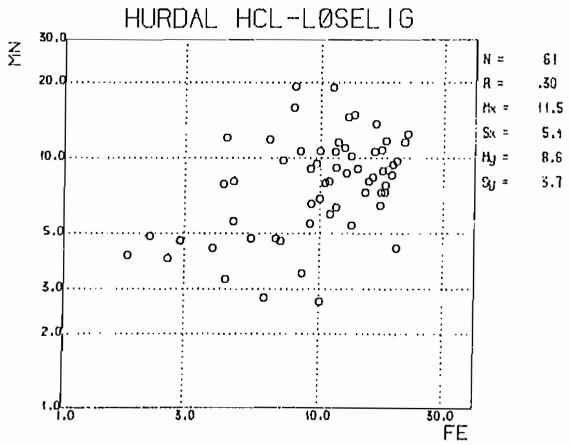

HURDAL HCL-LØSELIG
LA
MN
N = 63
R = .51
Mx = 11.2
Sx = 5.6
My = 103.
Sy = 82.

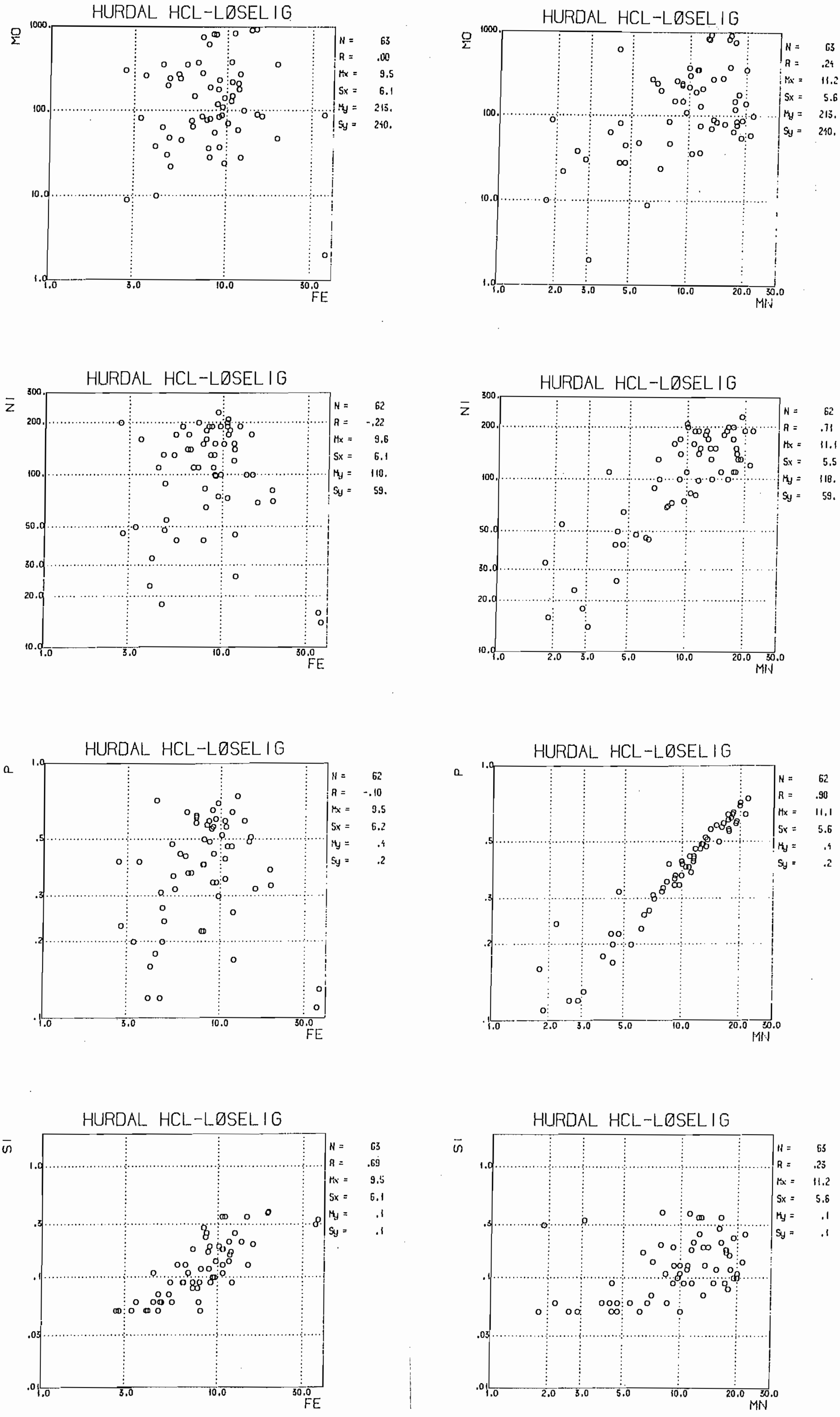

HURDAL HCL-LØSELIG
LI
FE
N = 57
R = -.21
Mx = 8.2
Sx = 3.4
My = 16.3
Sy = 12.0

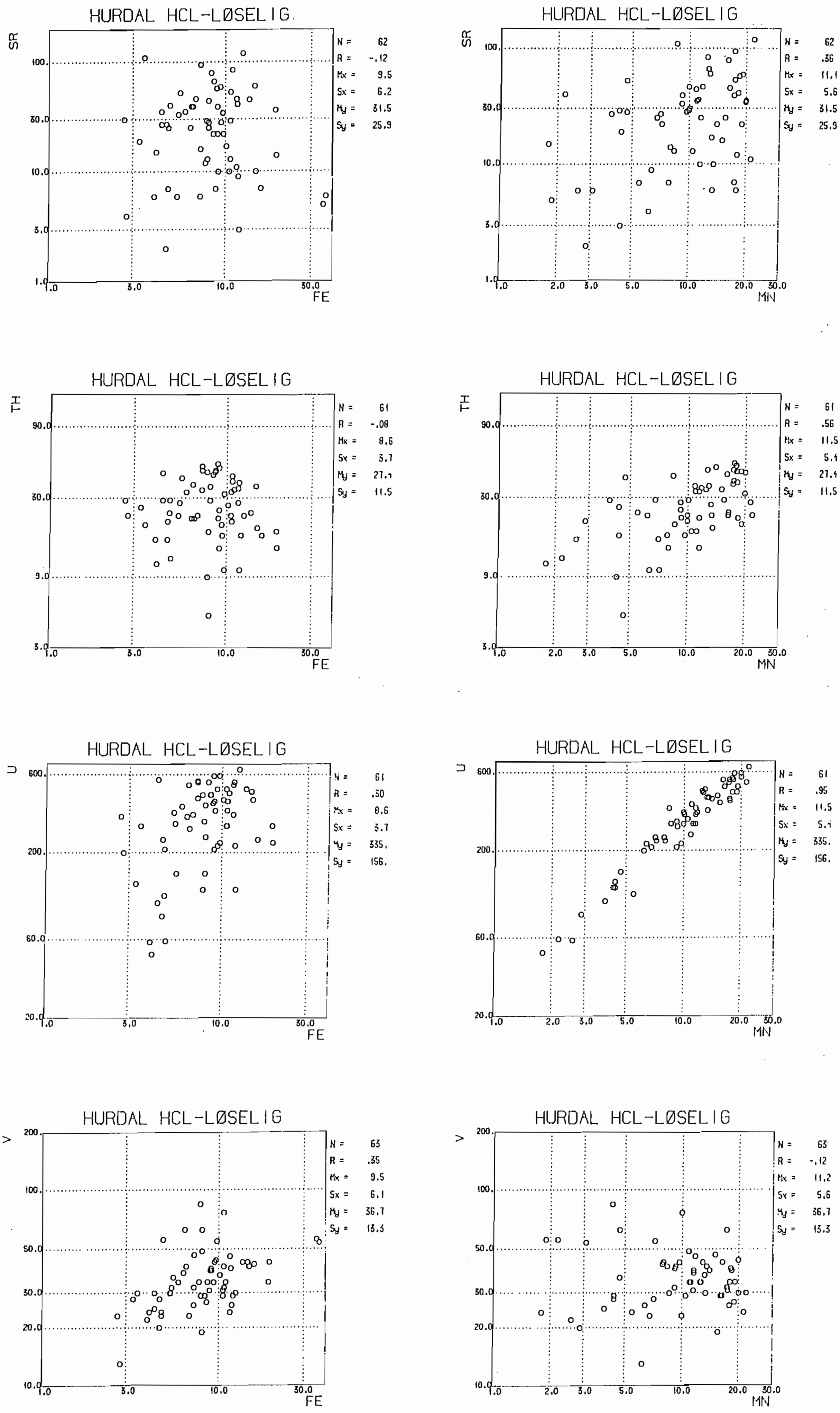

HURDAL HCL-LØSELIG
LI
MN
N = 57
R = .23
Mx = 11.4
Sx = 5.4
My = 16.3
Sy = 12.0

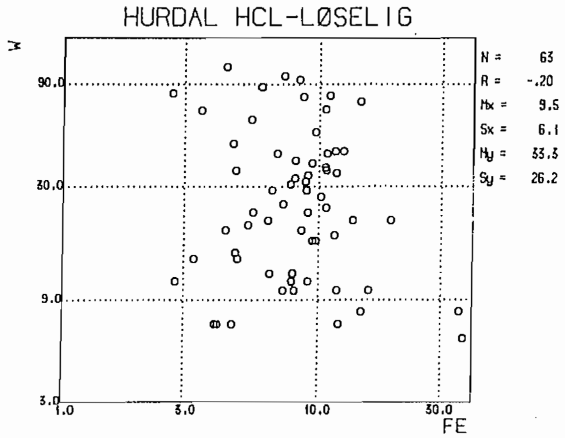

HURDAL HCL-LØSELIG
MG
FE
N = 63
R = -.30
Mx = 9.5
Sx = 6.1
My = .2
Sy = .2

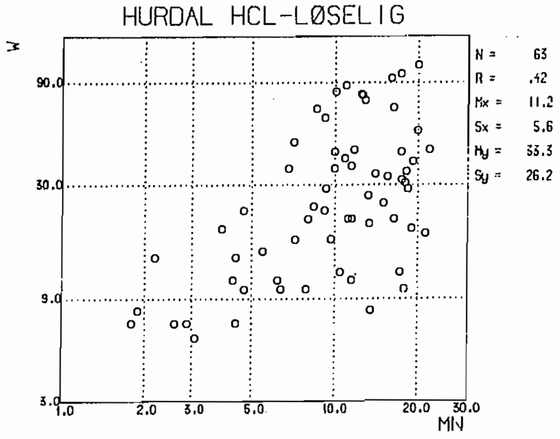

HURDAL HCL-LØSELIG
MG
MN
N = 63
R = -.39
Mx = 11.2
Sx = 5.6
My = .2
Sy = .2

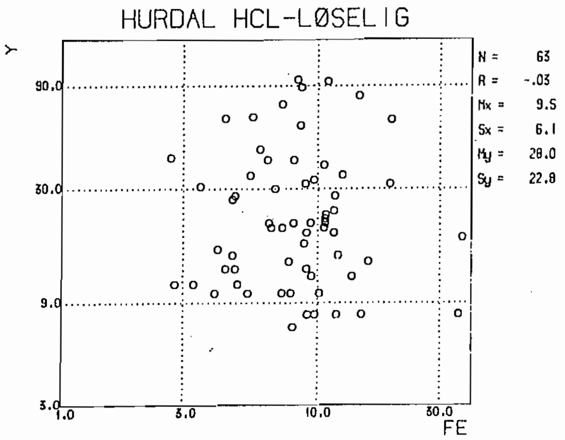

HURDAL HCL-LØSELIG
MN
FE
N = 61
R = .30
Mx = 11.5
Sx = 5.4
My = 8.6
Sy = 3.7

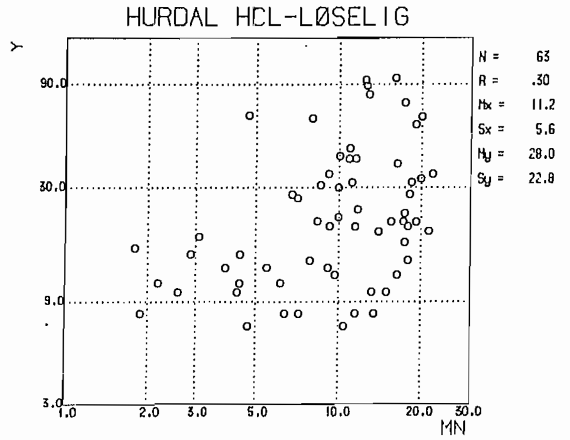

HURDAL HCL-LØSELIG
MO
FE
N = 63
R = .00
Mx = 9.5
Sx = 6.1
My = 215.
Sy = 240.
HURDAL HCL-LØSELIG
MO
MN
N = 63
R = .24
Mx = 11.2
Sx = 5.6
My = 215.
Sy = 240.
HURDAL HCL-LØSELIG
NI
FE
N = 62
R = -.22
Mx = 9.6
Sx = 6.1
My = 110.
Sy = 59.
HURDAL HCL-LØSELIG
NI
MN
N = 62
R = .71
Mx = 11.1
Sx = 5.5
My = 118.
Sy = 59.
HURDAL HCL-LØSELIG
P
FE
N = 62
R = -.10
Mx = 9.5
Sx = 6.2
My = .4
Sy = .2
HURDAL HCL-LØSELIG
P
MN
N = 62
R = .90
Mx = 11.1
Sx = 5.6
My = .4
Sy = .2
HURDAL HCL-LØSELIG
SI
FE
N = 63
R = .69
Mx = 9.5
Sx = 6.1
My = .1
Sy = .1
HURDAL HCL-LØSELIG
SI
MN
N = 63
R = .25
Mx = 11.2
Sx = 5.6
My = .1
Sy = .1

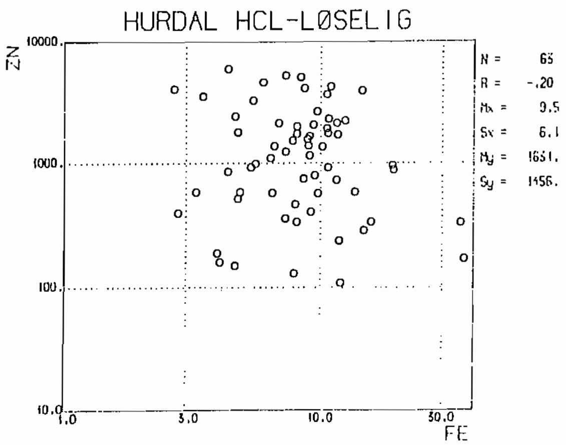

HURDAL HCL-LØSELIG
SR
FE
N = 62
R = -.12
Mx = 9.5
Sx = 6.2
My = 31.5
Sy = 25.9
HURDAL HCL-LØSELIG
SR
MN
N = 62
R = .36
Mx = 11.1
Sx = 5.6
My = 31.5
Sy = 25.9
HURDAL HCL-LØSELIG
TH
FE
N = 61
R = -.08
Mx = 8.6
Sx = 3.7
HURDAL HCL-LØSELIG
TH
MN
N = 61
R = .56
Mx = 11.5
Sy = 11.5
HURDAL HCL-LØSELIG
U
FE
N = 61
R = .30
Mx = 8.6
Sx = 3.7
My = 335.
Sy = 156.
HURDAL HCL-LØSELIG
U
MN
N = 61
R = .95
Mx = 11.5
My = 335.
Sy = 156.
HURDAL HCL-LØSELIG
V
FE
N = 63
R = .35
Mx = 9.5
Sx = 6.1
My = 36.7
Sy = 13.3
HURDAL HCL-LØSELIG
V
MN
N = 63
R = -.12
Mx = 11.2
Sx = 5.6
My = 36.7
Sy = 13.3

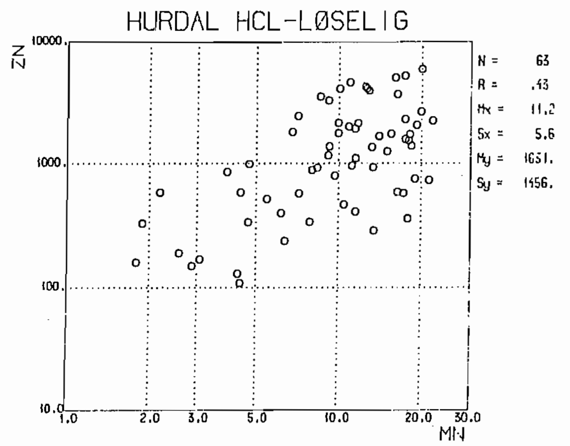

HURDAL HCL-LØSELIG
W
N = 63
R = -.20
Mx = 9.5
Sx = 6.1
My = 33.3
Sy = 26.2
FE

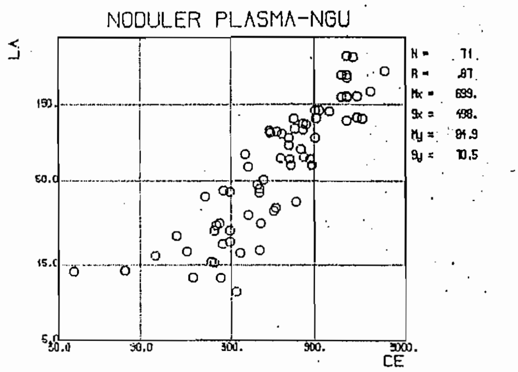

HURDAL HCL-LØSELIG
W
N = 63
R = .42
Mx = 11.2
Sx = 5.6
My = 33.3
Sy = 26.2
MN

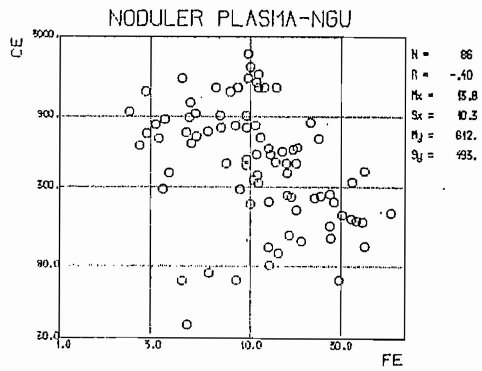

HURDAL HCL-LØSELIG
Y
N = 63
R = -.03
Mx = 9.5
Sx = 6.1
My = 28.0
Sy = 22.8
FE

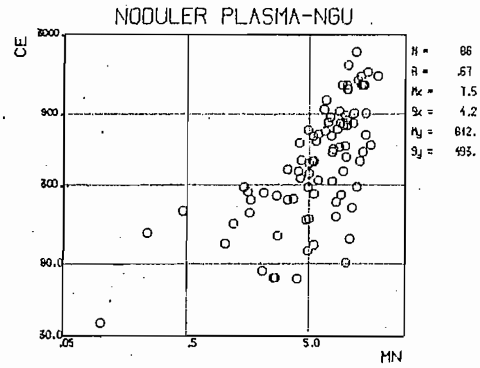

HURDAL HCL-LØSELIG
Y
N = 63
R = .30
Mx = 11.2
Sx = 5.6
My = 28.0
Sy = 22.8
MN

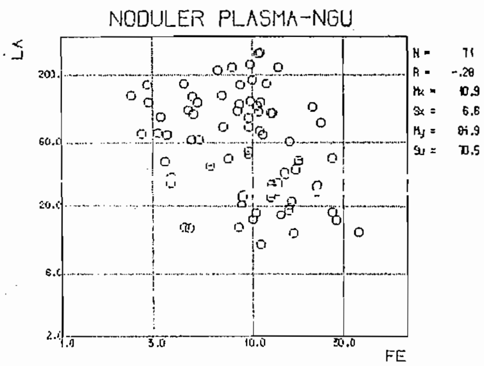

HURDAL HCL-LØSELIG
ZN
N = 63
R = -.20
Mx = 9.5
Sx = 6.1
My = 1651.
Sy = 1456.
FE

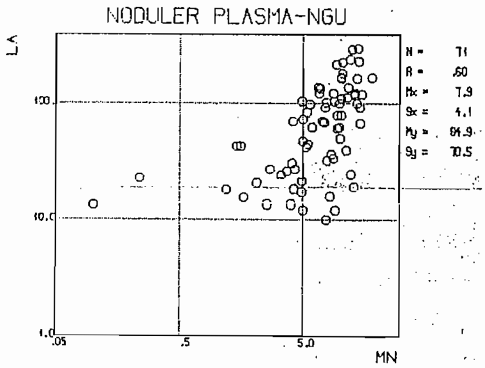

HURDAL HCL-LØSELIG
ZN
N = 63
R = .43
Mx = 11.2
Sx = 5.6
My = 1651.
Sy = 1456.
MN

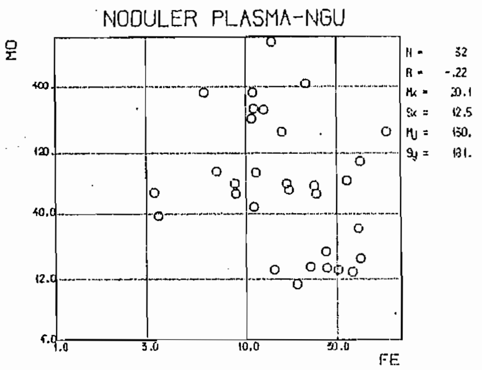

NODULER PLASMA-NGU
LA
CE
N = 71.
R = .87.
Mx = 639.
Sx = 498.
My = 84.9
Sy = 70.5

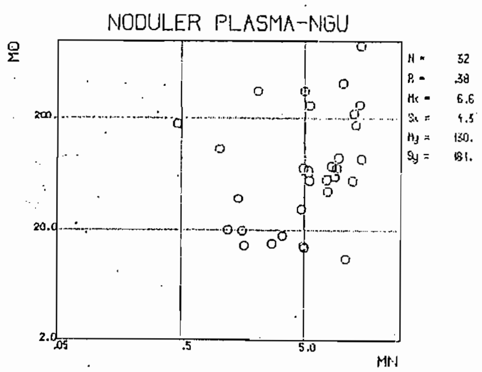

NODULER PLASMA-NGU
CE
FE
N = 86
R = -.40
Mx = 13.8
Sx = 10.3
My = 612.
Sy = 493.

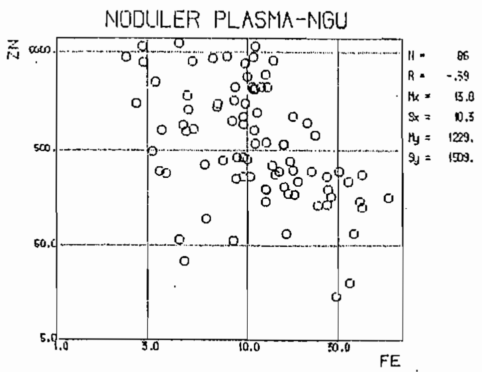

NODULER PLASMA-NGU
CE
MN
N = 86
R = .67
Mx = 7.5
Sx = 4.2
My = 612.
Sy = 493.

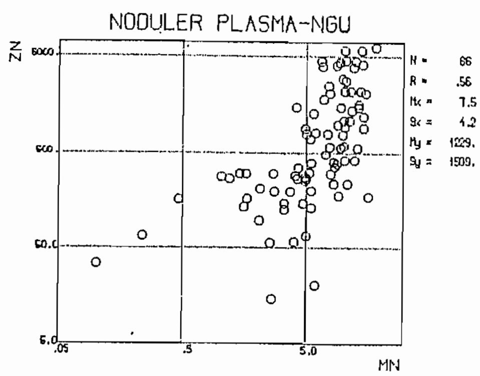

NODULER PLASMA-NGU
LA
FE
N = 71
R = -.28
Mx = 10.9
Sx = 6.8
My = 84.9
Sy = 70.5

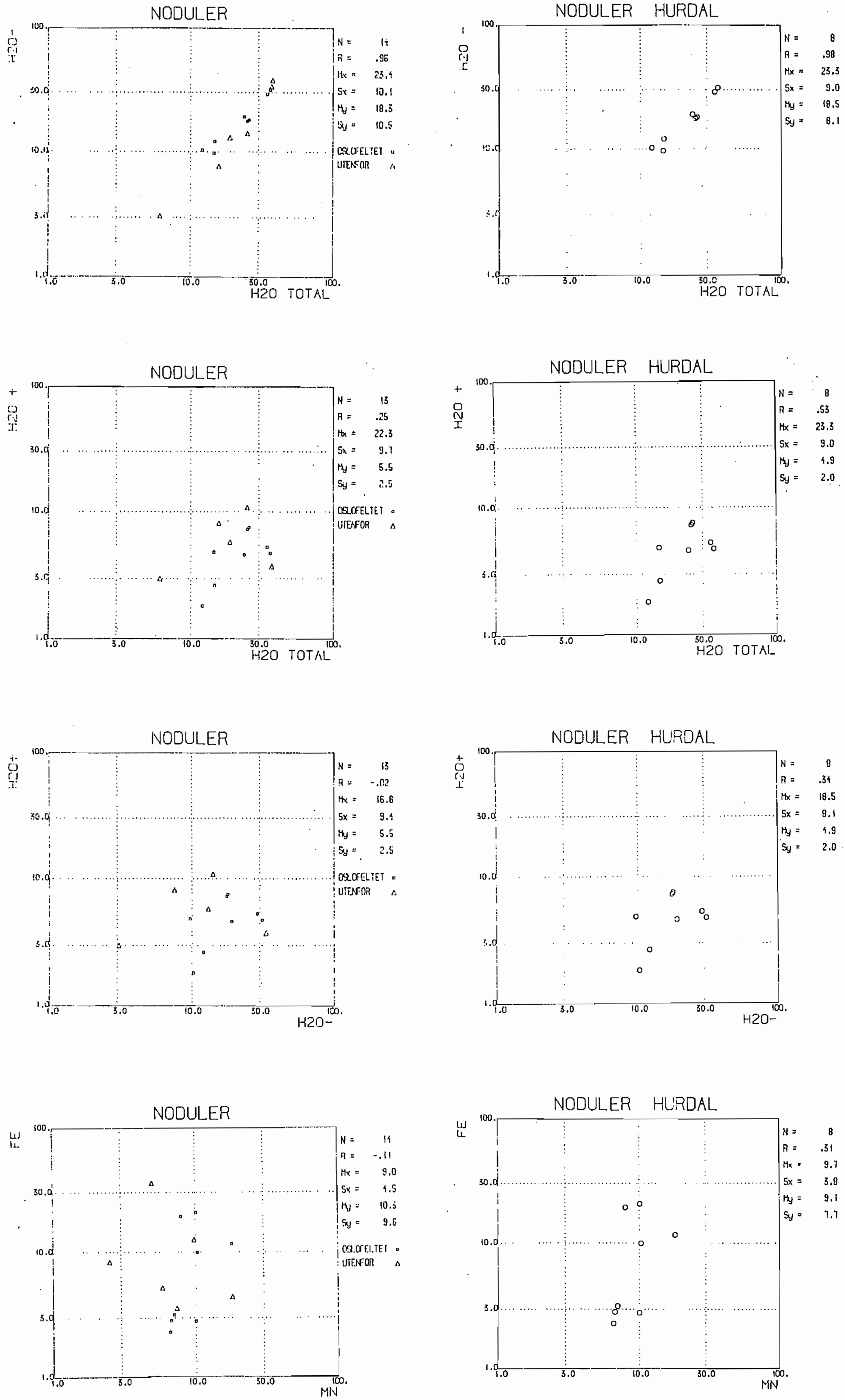

NODULER PLASMA-NGU
LA
MN
N = 71
R = .60
Mx = 7.9
Sx = 4.1
My = 84.9
Sy = 70.5


NODULER PLASMA-NGU
MO
FE
N = 32
R = -.22
Mx = 20.1
Sx = 12.5
My = 150.
Sy = 181.

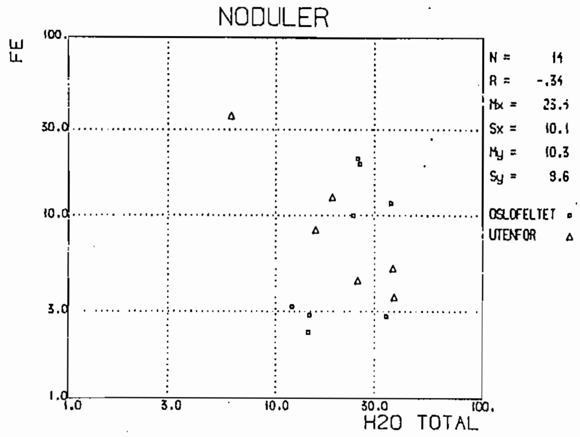

NODULER PLASMA-NGU
MO
MN
N = 32
R = .38
Mx = 6.6
Sx = 4.5
My = 150.
Sy = 181.

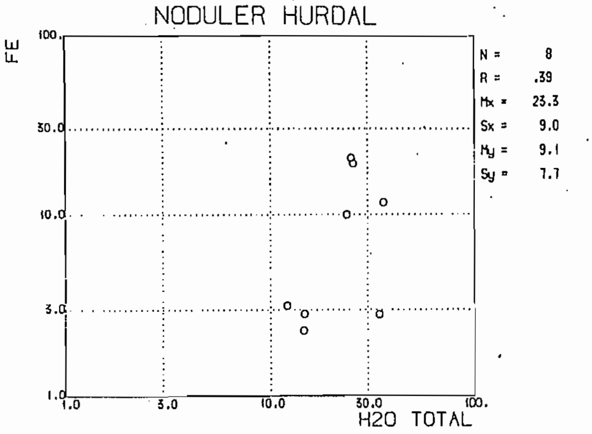

NODULER PLASMA-NGU
ZN
FE
N = 86
R = -.59
Mx = 13.8
Sx = 10.3
My = 1229.
Sy = 1509.

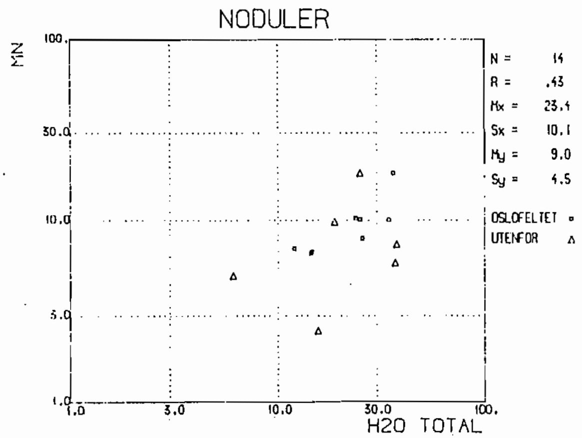

NODULER PLASMA-NGU
ZN
MN
N = 86
R = .56
Mx = 7.5
Sx = 4.2
My = 1229.
Sy = 1509.

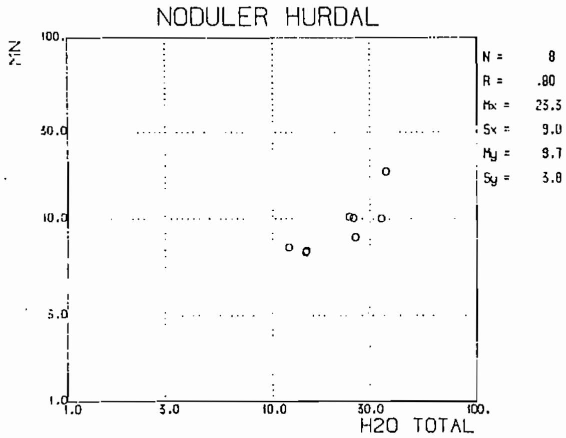

NODULER
H2O-
H2O TOTAL
N = 14
R = .96
Mx = 23.4
Sx = 10.1
My = 18.3
Sy = 10.5
OSLOFELTET
UTENFOR
NODULER HURDAL
N = 8
R = .98
Mx = 23.3
Sx = 9.0
My = 18.5
Sy = 8.1
NODULER
H2O +
N = 13
R = .25
Mx = 22.3
Sx = 9.7
My = 5.5
Sy = 2.5
NODULER HURDAL
N = 8
R = .53
Mx = 23.3
Sx = 9.0
My = 4.9
Sy = 2.0
NODULER
H2O+
H2O-
N = 13
R = -.02
Mx = 16.6
Sx = 9.4
My = 5.5
Sy = 2.5
NODULER HURDAL
N = 8
R = .34
Mx = 18.5
Sx = 8.1
My = 4.9
Sy = 2.0
NODULER
FE
MN
N = 14
R = -.11
Mx = 9.0
Sx = 4.5
My = 10.3
Sy = 9.6
NODULER HURDAL
N = 8
R = .31
Mx = 9.7
Sx = 3.8
My = 9.1
Sy = 7.7

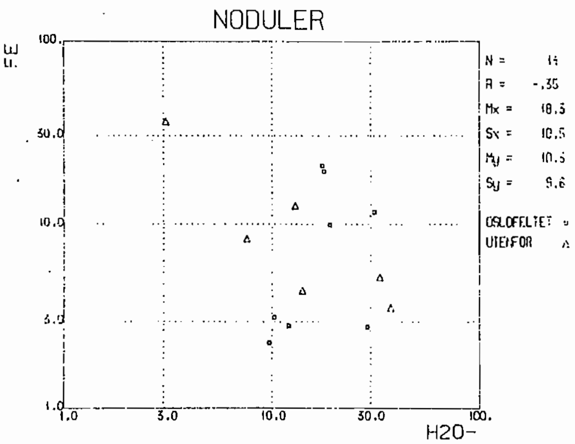
NGU-report 86.169. FIGURE 12.2

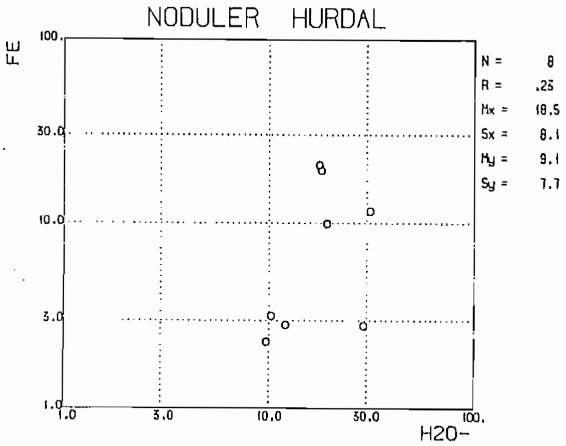


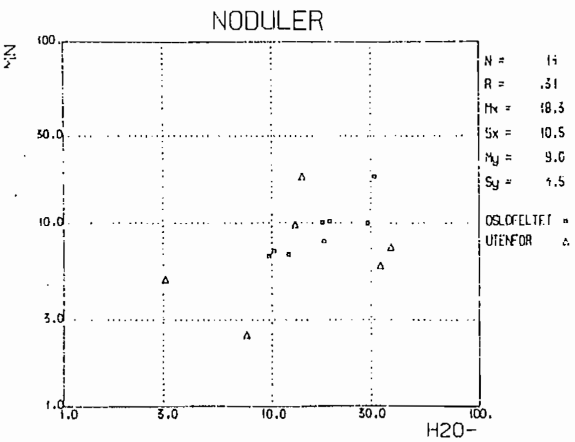


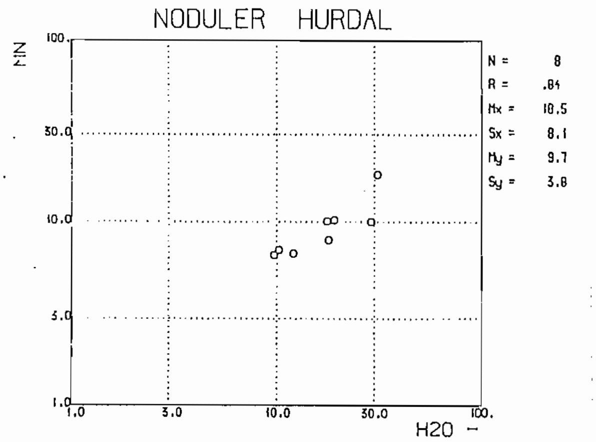


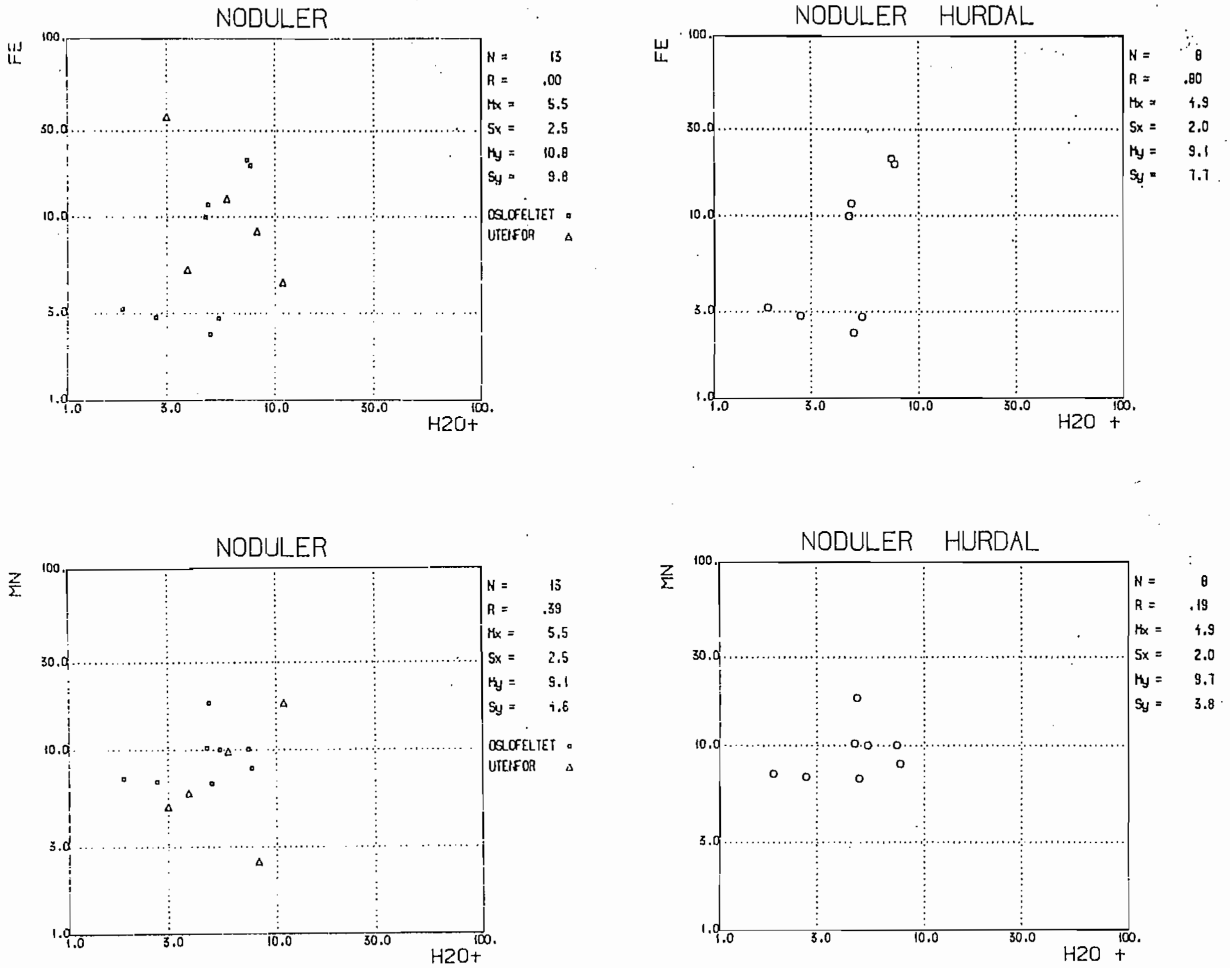


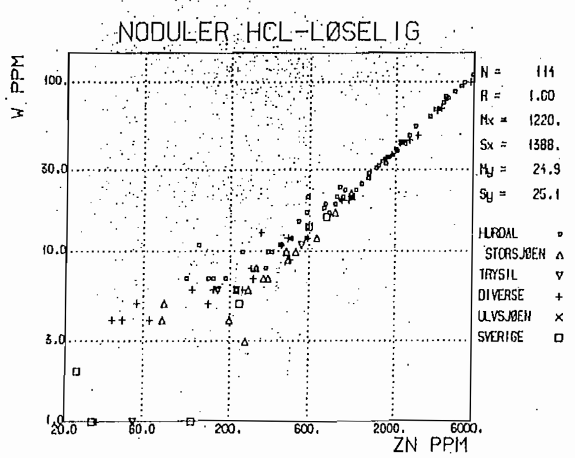


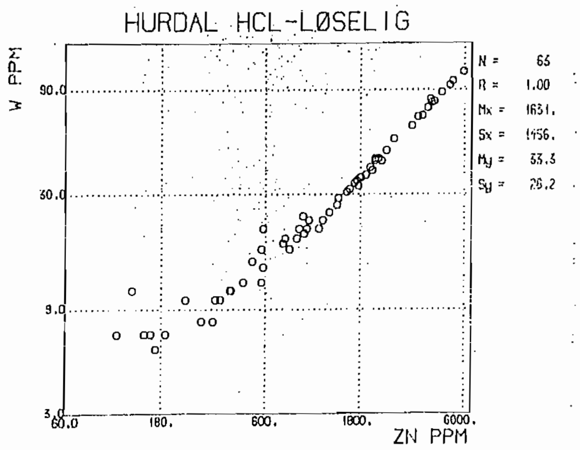


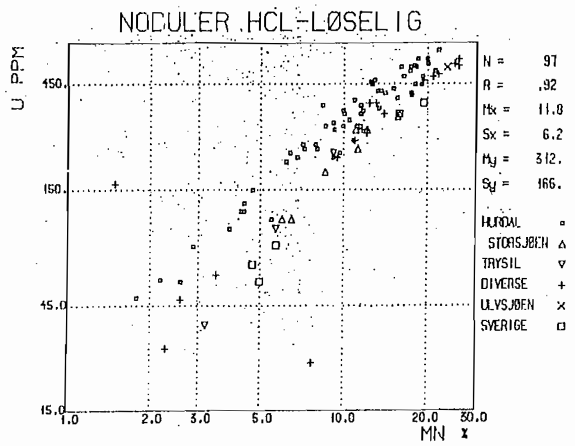


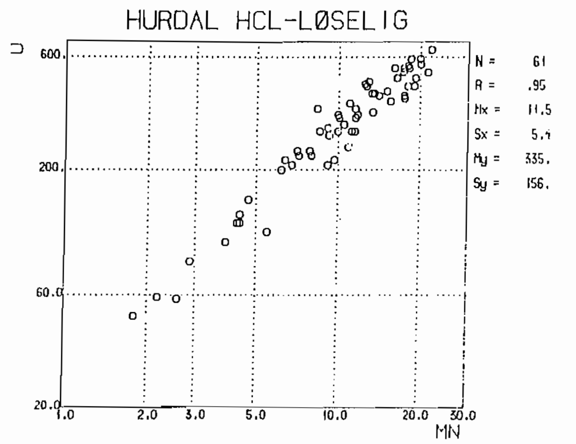


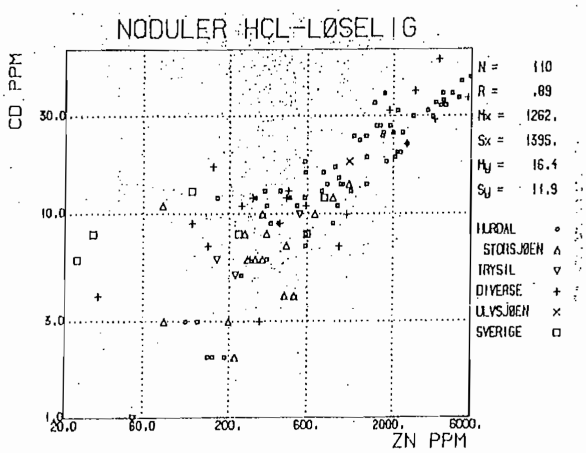

NODULER
FE
N = 13
R = .00
Mx = 5.5
Sx = 2.5
My = 10.8
Sy = 9.8
OSLOFELTET
UTENFOR
H20+
NODULER HURDAL
FE
N = 8
R = .80
Mx = 4.9
Sx = 2.0
My = 9.1
Sy = 7.7
H20 +
NODULER
MN
N = 13
R = .39
Mx = 5.5
Sx = 2.5
My = 9.1
Sy = 4.6
OSLOFELTET
UTENFOR
H20+
NODULER HURDAL
MN
N = 8
R = .19
Mx = 4.9
Sx = 2.0
My = 9.7
Sy = 3.8
H20 +

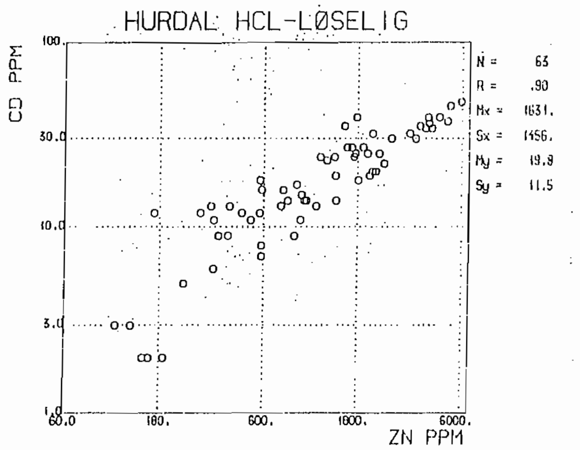

NODULER HCL-LØSELIG
W PPM
ZN PPM
N = 114
R = 1.00
Mx = 1220.
Sx = 1388.
My = 24.9
Sy = 25.1
HURDAL
STORSJØEN
TRYSIL
DIVERSE
ULVSJØEN
SVERIGE

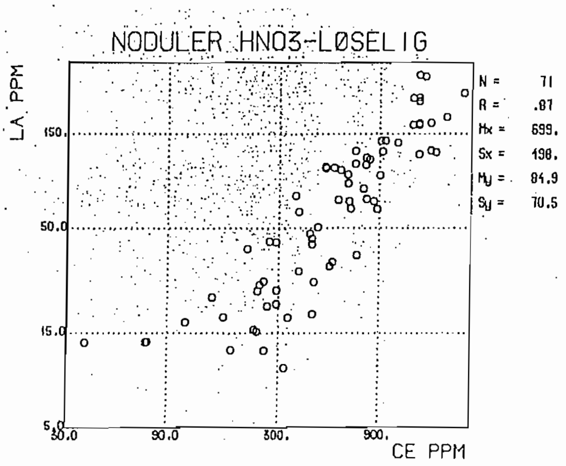

HURDAL HCL-LØSELIG
W PPM
ZN PPM
N = 63
R = 1.00
Mx = 1631.
Sx = 1456.
My = 33.3
Sy = 26.2

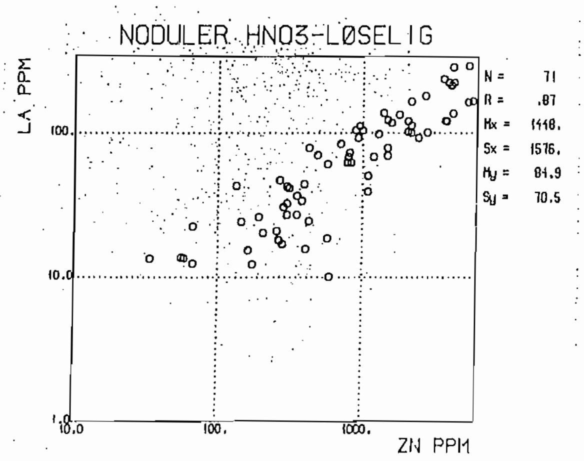

NODULER HCL-LØSELIG
U PPM
MN %
N = 97
R = .92
Mx = 11.8
Sx = 6.2
My = 312.
Sy = 166.
HURDAL
STORSJØEN
TRYSIL
DIVERSE
ULVSJØEN
SVERIGE

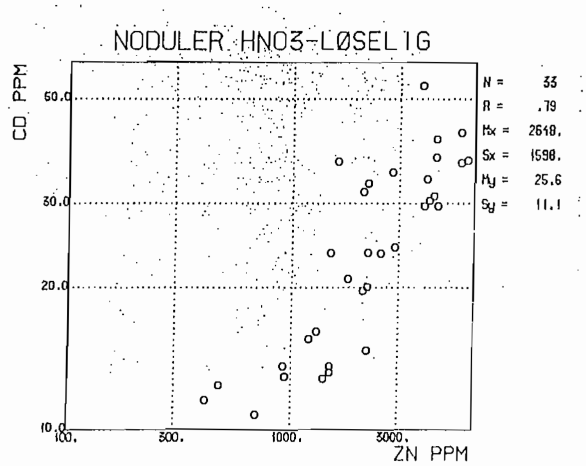

HURDAL HCL-LØSELIG
U
MN
N = 61
R = .95
Mx = 11.5
Sx = 5.4
My = 335.
Sy = 156.

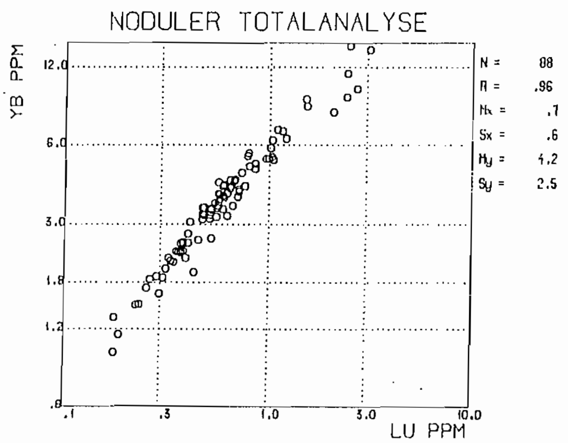

NODULER HCL-LØSELIG
CD PPM
ZN PPM
N = 110
R = .89
Mx = 1262.
Sx = 1395.
My = 16.4
Sy = 11.9
HURDAL
STORSJØEN
TRYSIL
DIVERSE
ULVSJØEN
SVERIGE

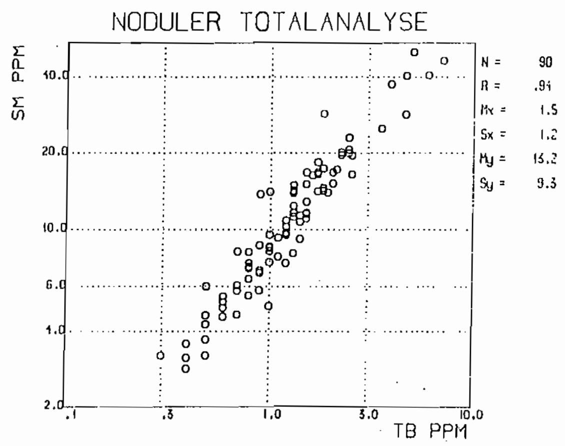

HURDAL HCL-LØSELIG
CD PPM
ZN PPM
N = 63
R = .90
Mx = 1631.
Sx = 1456.
My = 19.9
Sy = 11.5

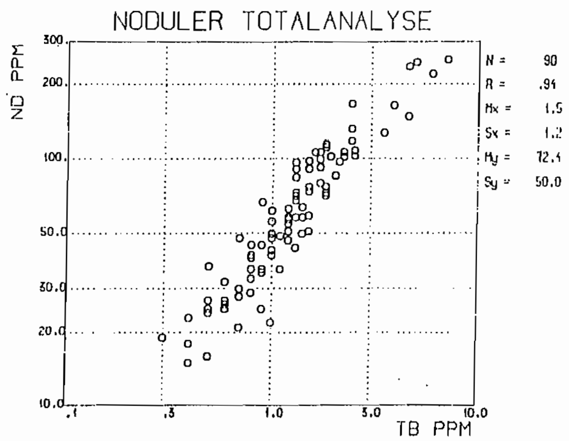

NODULER HNO3-LØSELIG
LA PPM
CE PPM
N = 71
R = .87
Mx = 699.
Sx = 498.
My = 84.9
Sy = 70.5


NODULER HNO3-LØSELIG
LA PPM
ZN PPM
N = 71
R = .87
Mx = 1448.
Sx = 1576.
My = 84.9
Sy = 70.5

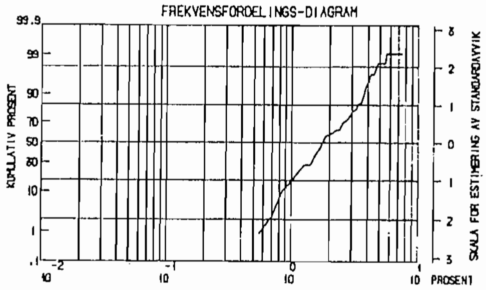

NODULER HNO3-LØSELIG
CD PPM
ZN PPM
N = 33
R = .79
Mx = 2648.
Sx = 1598.
My = 25.6
Sy = 11.1


NODULER TOTALANALYSE
YB PPM
LU PPM
N = 88
R = .96
Mx = .7
Sx = .6
My = 4.2
Sy = 2.5


NODULER TOTALANALYSE
SM PPM
TB PPM
N = 90
R = .94
Mx = 1.5
Sx = 1.2
My = 13.2
Sy = 9.3


NODULER TOTALANALYSE
ND PPM
TB PPM
N = 90
R = .94
Mx = 1.5
Sx = 1.2
My = 72.4
Sy = 50.0

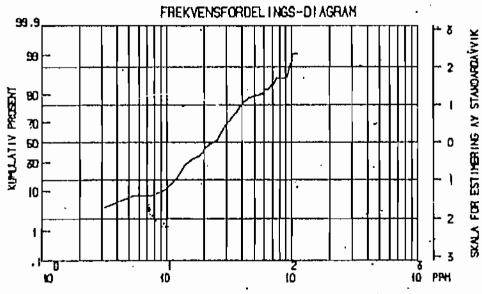
NODULER
ICP



% AL

N= 114
MIN= .420
MAX= 7.400
X̄ = 2.097

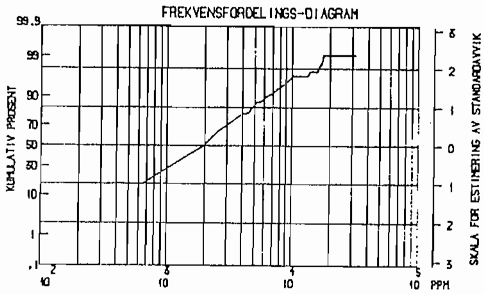
NODULER
ICP



PPM AS

N= 114
MIN= 1.0
MAX= 110.0
X̄ = 27.5

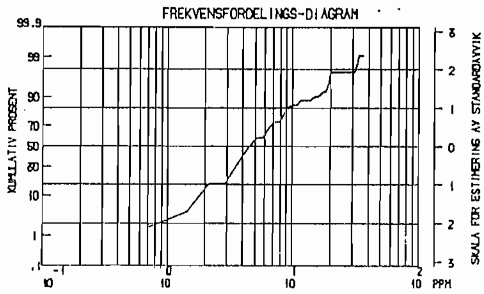
NODULER
ICP



PPM BA

N= 114
MIN= 29.0
MAX=31390.0
X̄ = 2973.7

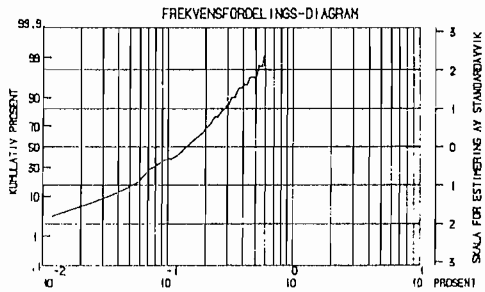
NODULER
ICP



PPM BE

N= 114
MIN= .00
MAX= 36.00
X̄ = 6.61

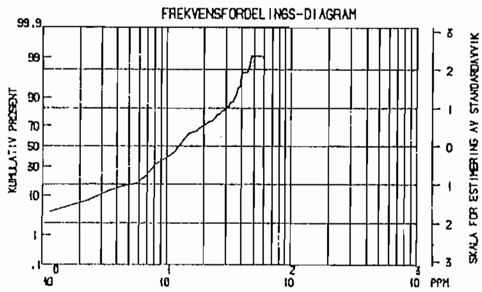
NODULER
ICP



% CA

N= 114
MIN= .000
MAX= .590
X̄ = .165

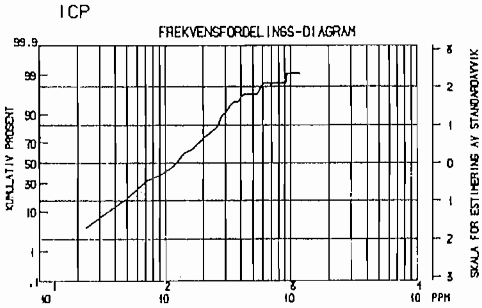
NODULER
ICP



PPM CD

N= 114
MIN= .0
MAX= 58.0
X̄ = 15.9

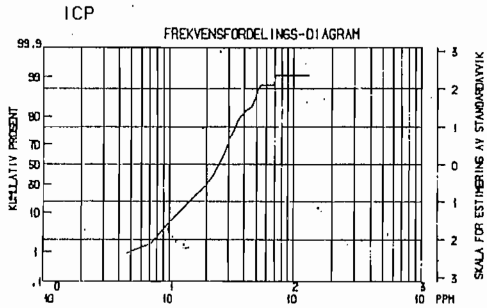
NODULER
ICP



PPM CO

N= 114
MIN= .0
MAX= 1170.0
X̄ = 160.1

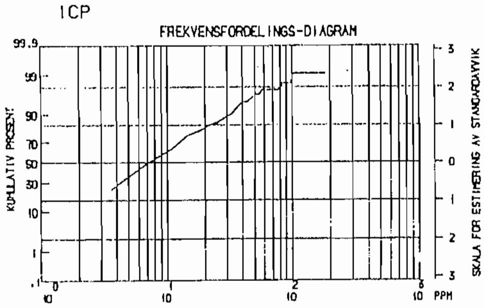
NODULER
ICP



PPM CR

N= 114
MIN= 2.0
MAX= 130.0
X̄ = 26.0

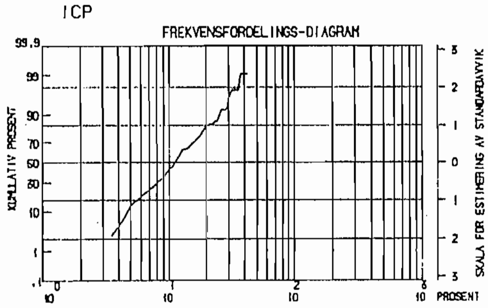
NODULER
ICP



PPM CU

N= 114
MIN= 0
MAX= 180
X̄ = 13

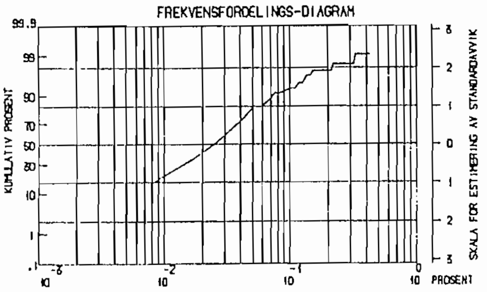
NODULER
ICP



% FE

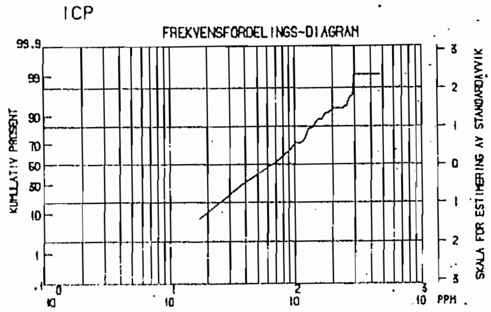
N= 114
MIN= 2.70
MAX= 41.80
X̄ = 13.18

NODULER
ICP



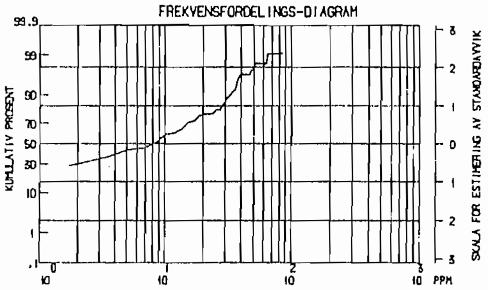
%K
N= 114
MIN= .000
MAX= .420
X̄ = .058

NODULER
ICP



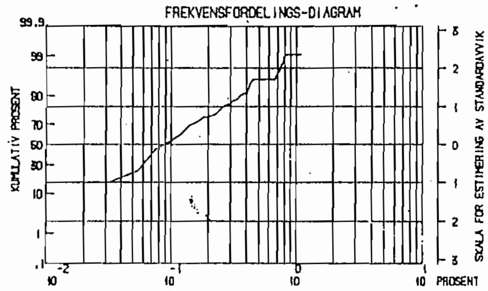
PPM LA
N= 114
MIN= 8.0
MAX= 470.0
X̄ = 85.1

NODULER
ICP



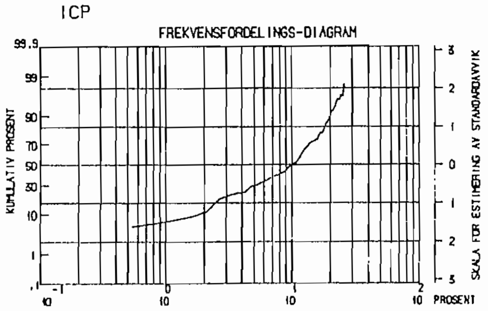
PPM LI
N= 114
MIN= .0
MAX= 85.0
X̄ = 12.5

NODULER
ICP



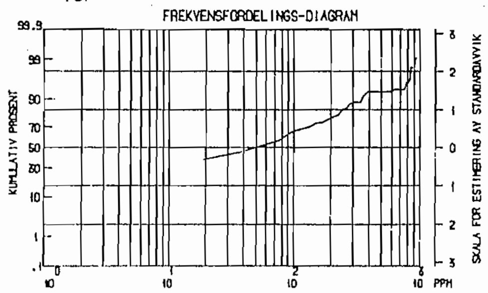
%MG
N= 114
MIN= .010
MAX= 1.100
X̄ = .152

NODULER
ICP



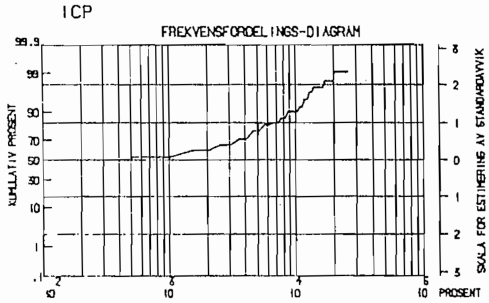
% MN
N= 114
MIN= .02
MAX= 26.10
X̄ = 10.28

NODULER
ICP



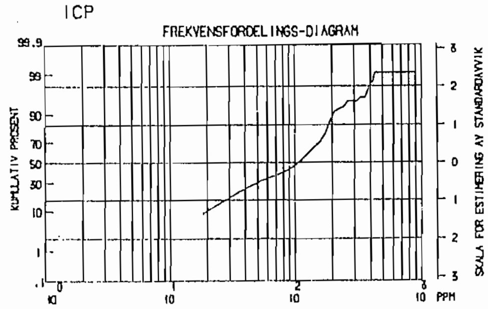
PPM MO
N= 114
MIN= .0
MAX= 940.0
X̄ = 133.3

NODULER
ICP



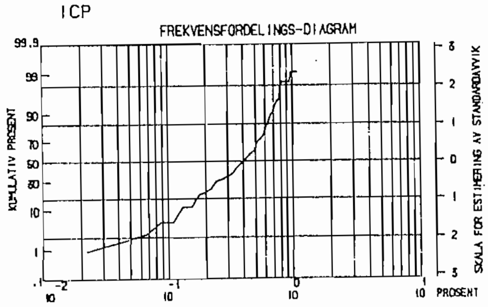
% NA
N= 114
MIN= .000
MAX= .025
X̄ = .003

NODULER
ICP



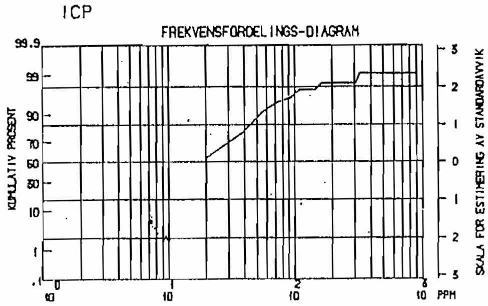
PPM NI
N= 114
MIN= 1.0
MAX= 870.0
X̄ = 121.4

NODULER
ICP

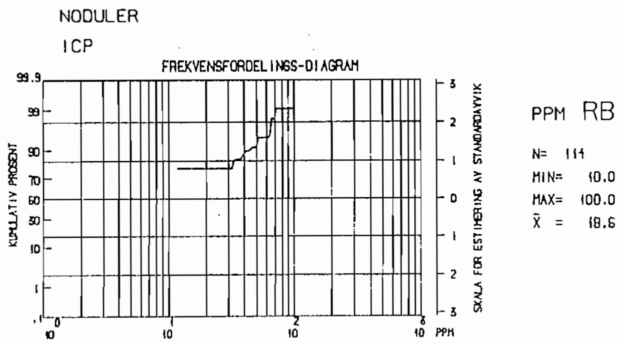


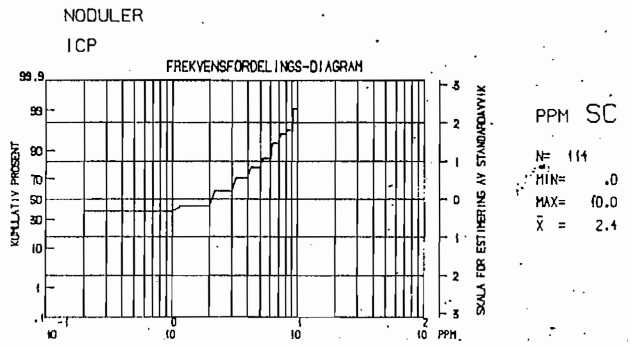
%P
N= 114
MIN= .000
MAX= 1.100
X̄ = .105

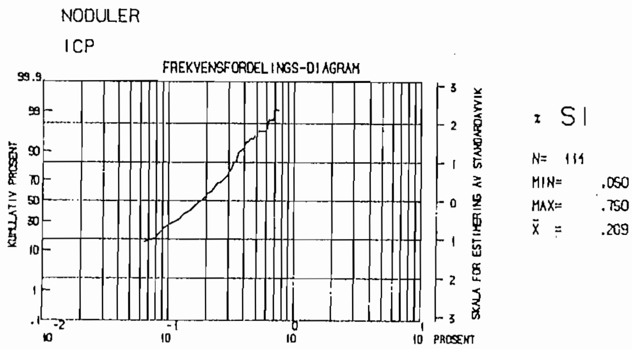
NODULER
ICP

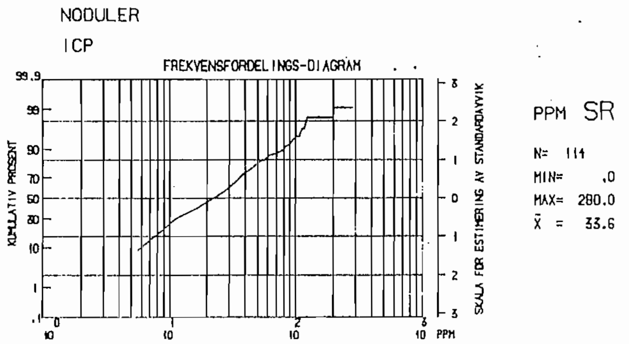


PPM PB
N= 114
MIN= 2.0
MAX= 900.0
X̄ = 33.6


NODULER
ICP
FREKVENSFORDELINGS-DIAGRAM
KUMULATIV PROSENT
SKALA FOR ESTIMERING AV STANDARDAVVIK
PPM
PPM RB
N= 114
MIN= 10.0
MAX= 100.0
X̄ = 18.6


NODULER
ICP
FREKVENSFORDELINGS-DIAGRAM
KUMULATIV PROSENT
SKALA FOR ESTIMERING AV STANDARDAVVIK
PPM
PPM SC
N= 114
MIN= .0
MAX= 10.0
X̄ = 2.4


NODULER
ICP
FREKVENSFORDELINGS-DIAGRAM
KUMULATIV PROSENT
SKALA FOR ESTIMERING AV STANDARDAVVIK
PROSENT
% SI
N= 114
MIN= .050
MAX= .750
X̄ = .209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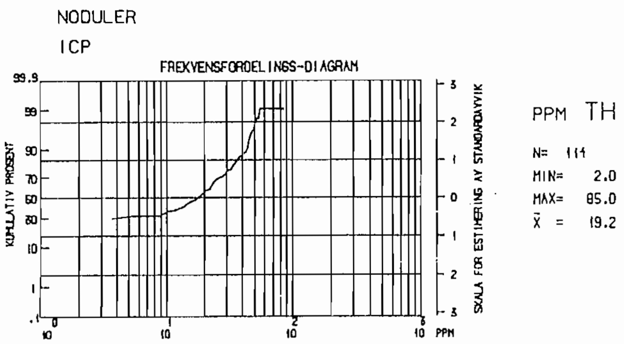
ICP
FREKVENSFORDELINGS-DIAGRAM
KUMULATIV PROSENT
SKALA FOR ESTIMERING AV STANDARDAVVIK
PPM
PPM SR
N= 114
MIN= .0
MAX= 280.0
X̄ = 33.6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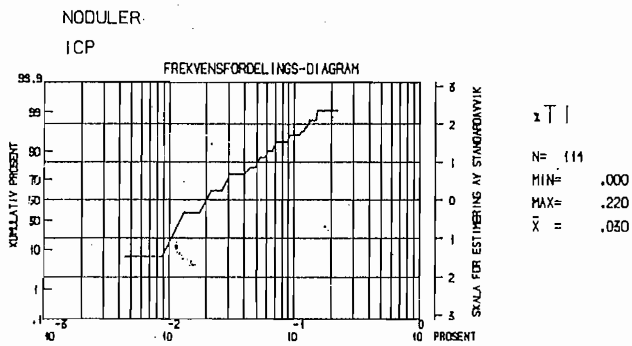
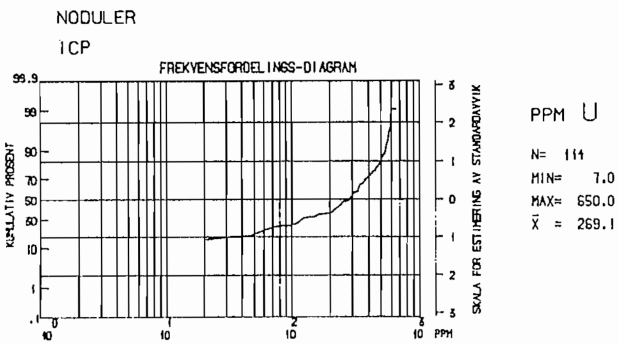
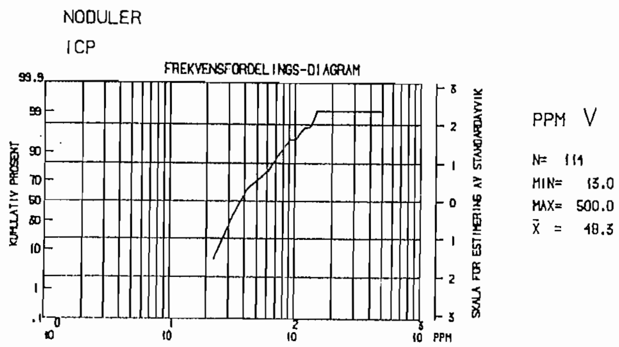
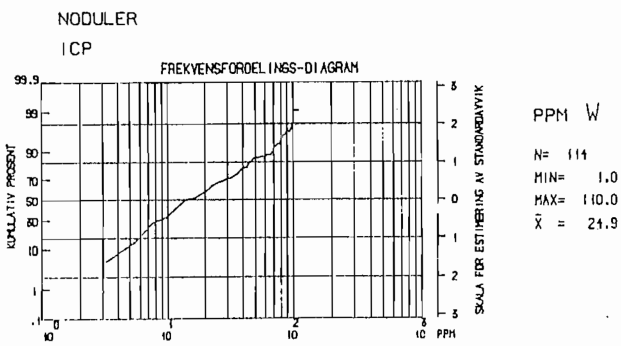
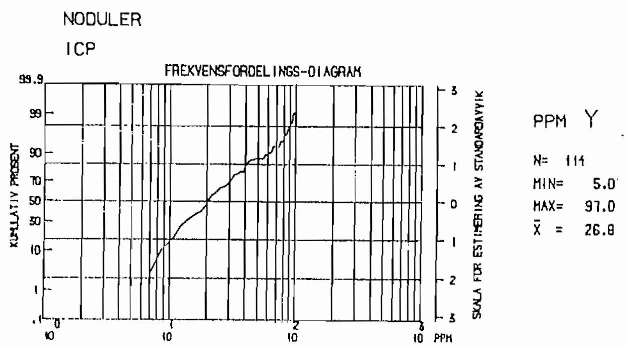
ICP
FREKVENSFORDELINGS-DIAGRAM
KUMULATIV PROSENT
SKALA FOR ESTIMERING AV STANDARDAVVIK
PPM
PPM TH
N= 114
MIN= 2.0
MAX= 85.0
X̄ = 19.2

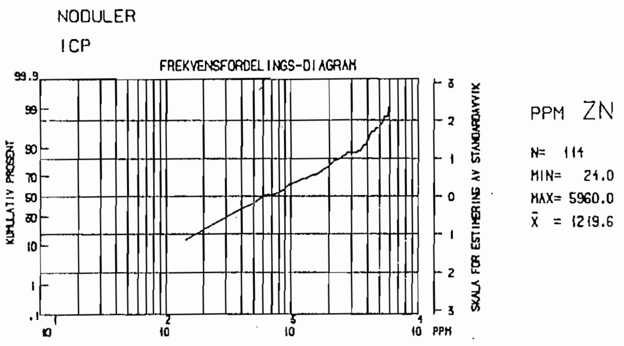

NODULER
ICP
FREKVENSFORDELINGS-DIAGRAM
KUMULATIV PROSENT
SKALA FOR ESTIMERING AV STANDARDAVVIK
PROSENT
% TI
N= 114
MIN= .000
MAX= .220
X̄ = .030

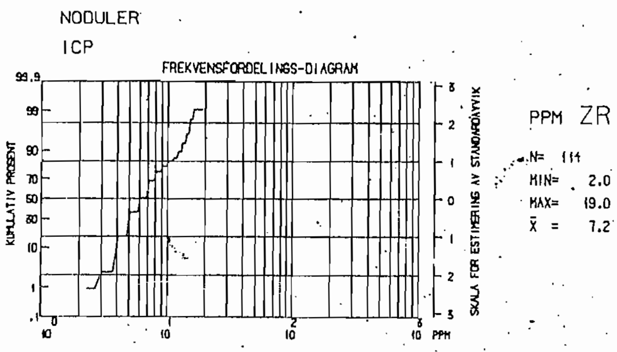

NODULER
ICP
FREKVENSFORDELINGS-DIAGRAM
KUMULATIV PROSENT
SKALA FOR ESTIMERING AV STANDARDAVVIK
PPM
PPM U
N= 114
MIN= 7.0
MAX= 650.0
X̄ = 269.1

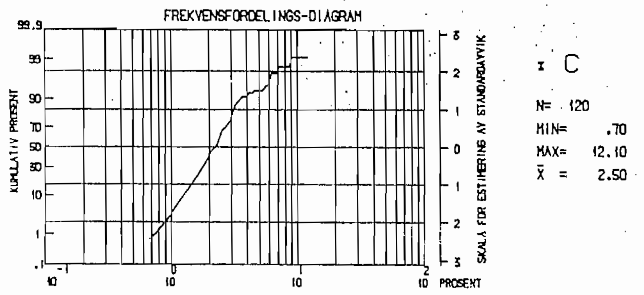

NODULER
ICP
FREKVENSFORDELINGS-DIAGRAM
KUMULATIV PROSENT
SKALA FOR ESTIMERING AV STANDARDAVVIK
PPM
PPM V
N= 114
MIN= 13.0
MAX= 500.0
X̄ = 48.3

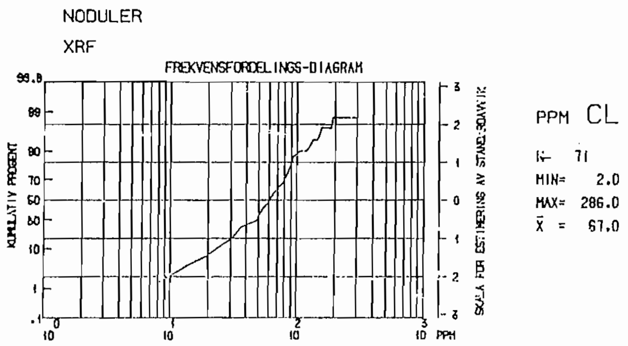

NODULER
ICP
FREKVENSFORDELINGS-DIAGRAM
KUMULATIV PROSENT
SKALA FOR ESTIMERING AV STANDARDAVVIK
PPM
PPM W
N= 114
MIN= 1.0
MAX= 110.0
X̄ = 24.9

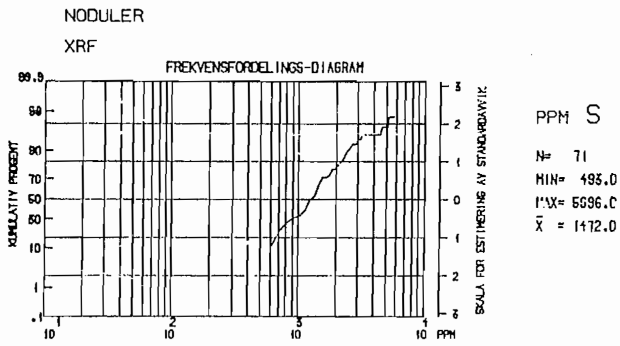

NODULER
ICP
FREKVENSFORDELINGS-DIAGRAM
KUMULATIV PROSENT
SKALA FOR ESTIMERING AV STANDARDAVVIK
PPM
PPM Y
N= 114
MIN= 5.0
MAX= 97.0
X̄ = 26.8


NODULER
ICP
FREKVENSFORDELINGS-DIAGRAM
KUMULATIV PROSENT
SKALA FOR ESTIMERING AV STANDARDAVVIK
PPM
PPM ZN
N= 114
MIN= 24.0
MAX= 5960.0
X̄ = 1219.6

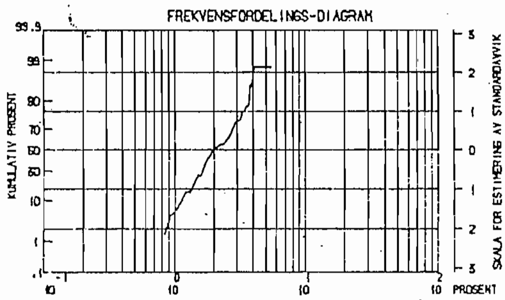

NODULER
ICP
FREKVENSFORDELINGS-DIAGRAM
KUMULATIV PROSENT
SKALA FOR ESTIMERING AV STANDARDAVVIK
PPM
PPM ZR
N= 114
MIN= 2.0
MAX= 19.0
X̄ = 7.2


FREKVENSFORDELINGS-DIAGRAM
KUMULATIV PROSENT
SKALA FOR ESTIMERING AV STANDARDAVVIK
PROSENT
% C
N= 120
MIN= .70
MAX= 12.10
X̄ = 2.50

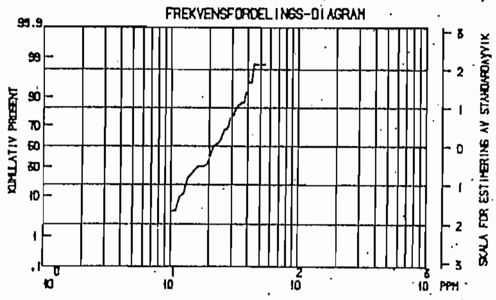

NODULER
XRF
FREKVENSFORDELINGS-DIAGRAM
KUMULATIV PROSENT
SKALA FOR ESTIMERING AV STANDARDAVVIK
PPM
PPM CL
N= 71
MIN= 2.0
MAX= 286.0
X̄ = 67.0


NODULER
XRF
FREKVENSFORDELINGS-DIAGRAM
KUMULATIV PROSENT
SKALA FOR ESTIMERING AV STANDARDAVVIK
PPM
PPM S
N= 71
MIN= 493.0
MAX= 5696.0
X̄ = 1472.0

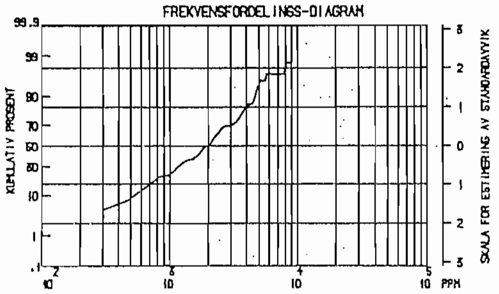
HURDAL



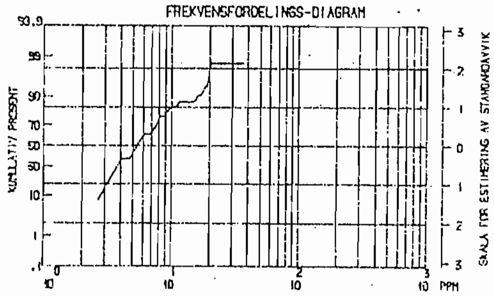
%AL
N= 63
MIN= .7
MAX= 5.5
X̄ = 2.3



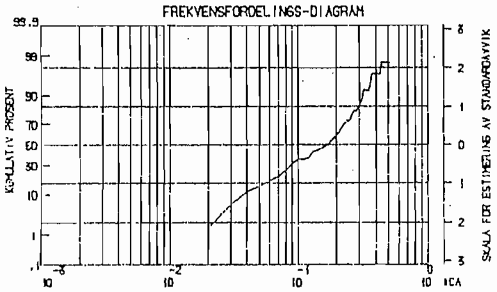
PPMAS
N= 63
MIN= 9
MAX= 54
X̄ = 23



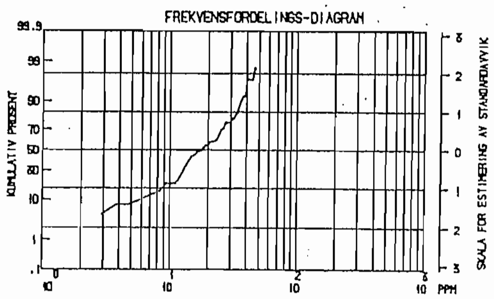
PPMBA
N= 63
MIN= 120
MAX= 8910
X̄ = 2335



PPMBE
N= 63
MIN= 2
MAX= 36
X̄ = 7

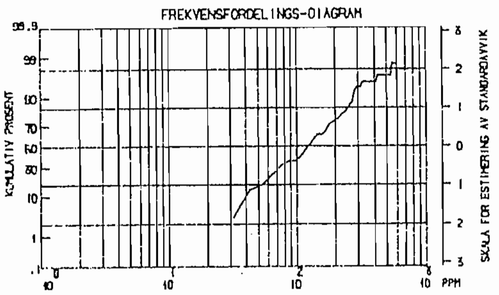


% CA
N= 63
MIN= .01
MAX= .51
X̄ = .17



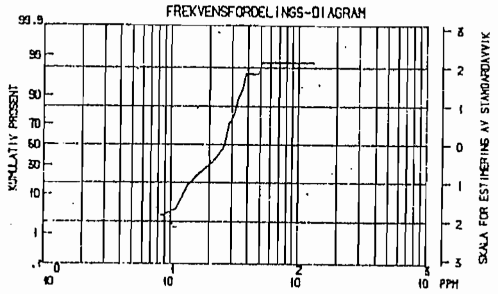
PPMCD
N= 63
MIN= 2
MAX= 47
X̄ = 19

HURDAL



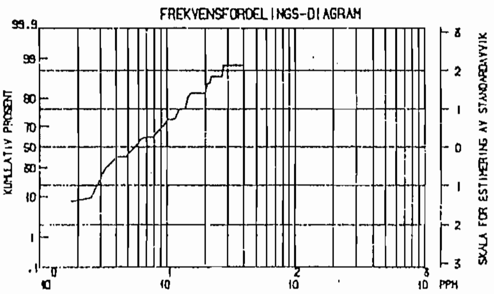
PPMCO
N= 63
MIN= 20
MAX= 580
X̄ = 149

HURDAL

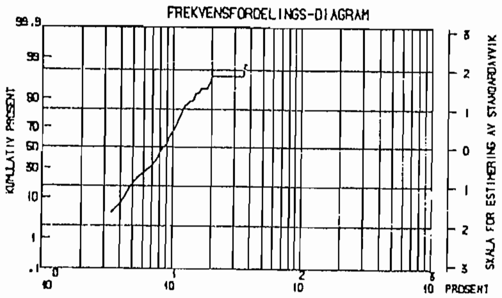


PPMCR
N= 63
MIN= 6
MAX= 130
X̄ = 25

HURDAL

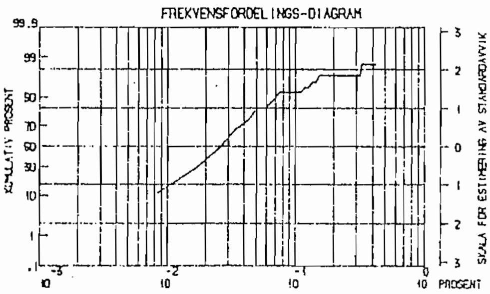


PPMCU
N= 63
MIN= 1
MAX= 39
X̄ = 7



%FE
N= 63
MIN= 2.7
MAX= 37.1
X̄ = 9.5

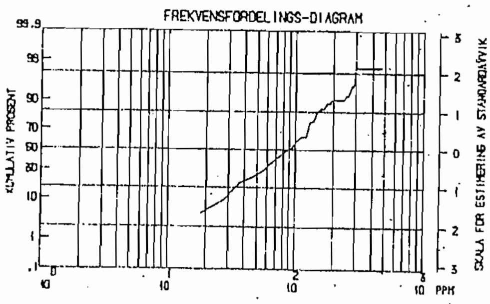
HURDAL



%K

N= 63
MIN= .00
MAX= .42
X̄ = .04

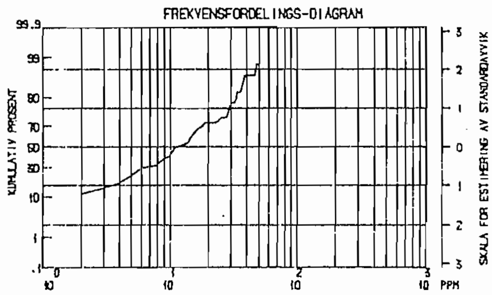
HURDAL



PPML A

N= 63
MIN= 9
MAX= 470
X̄ = 103

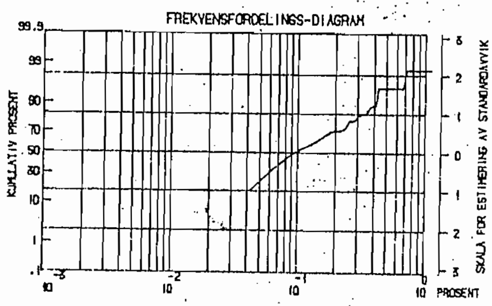
HURDAL



PPML I

N= 63
MIN= 1
MAX= 50
X̄ = 14

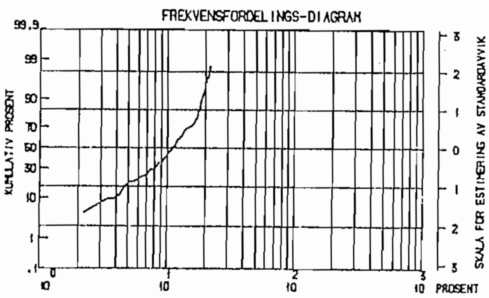
HURDAL



%MG

N= 63
MIN= .02
MAX= 1.10
X̄ = .17

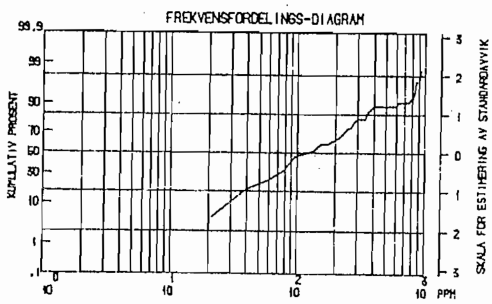
HURDAL



%MN

N= 63
MIN= 1.8
MAX= 22.0
X̄ = 11.2

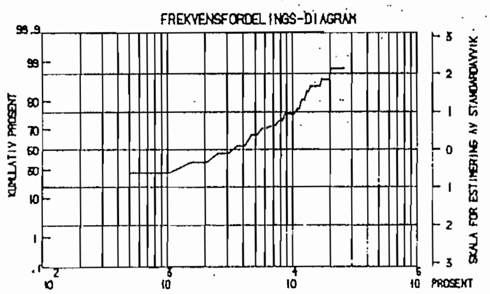
HURDAL



PPMMO

N= 63
MIN= 2
MAX= 940
X̄ = 212

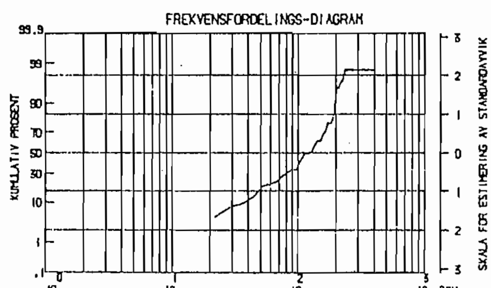
HURDAL



% NA

N= 63
MIN= .000
MAX= .025
X̄ = .004

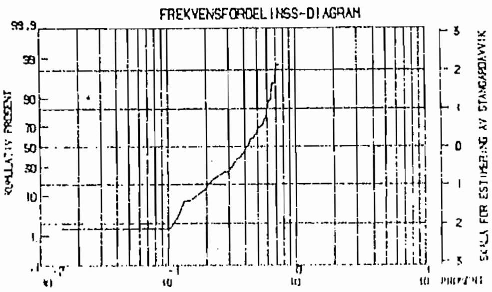
HURDAL



PPMNI

N= 63
MIN= 14
MAX= 390
X̄ = 122

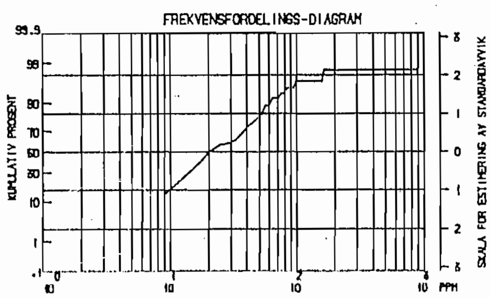
HURDAL



%P

N= 65
MIN= .02
MAX= .74
X̄ = .41

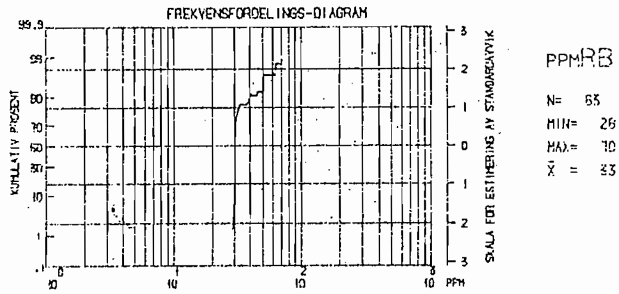
HURDAL



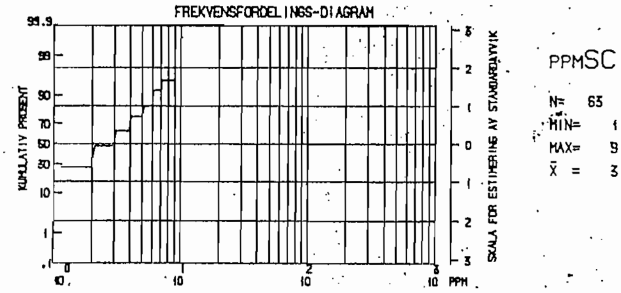
PPMPB

N= 63
MIN= 5
MAX= 900
X̄ = 43

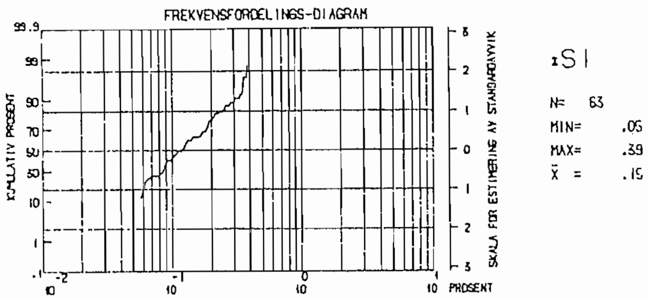
HURDAL



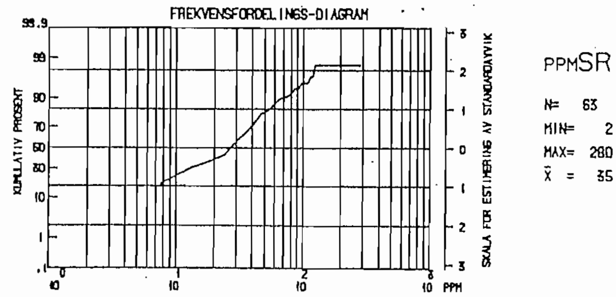
HURDAL



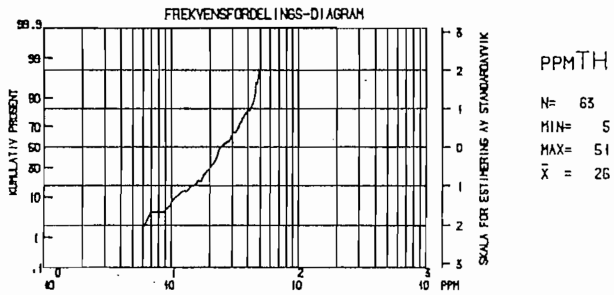
HURDAL



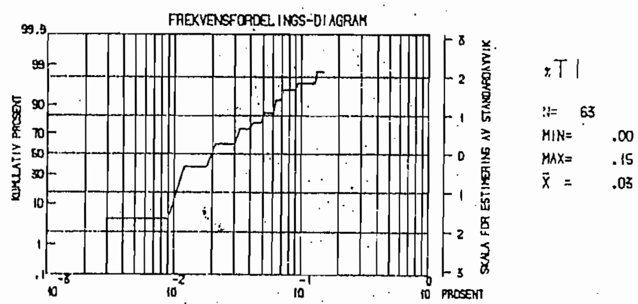
HURDAL



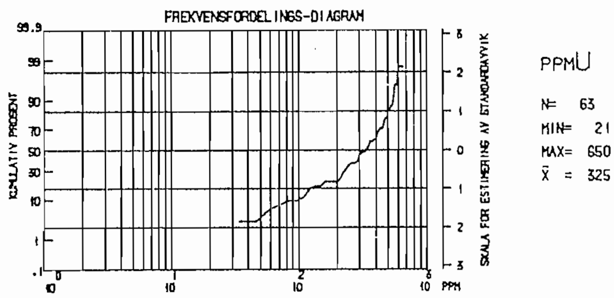
HURDAL



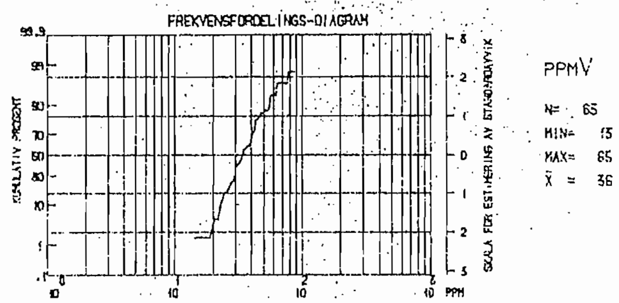
HURDAL



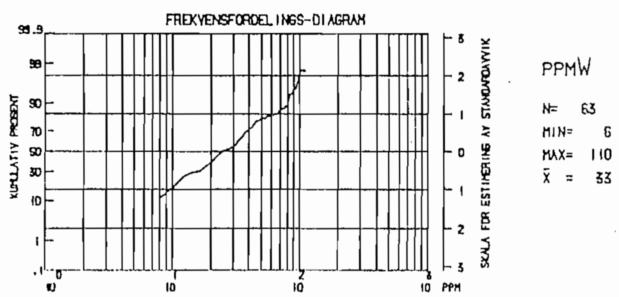
HURDAL



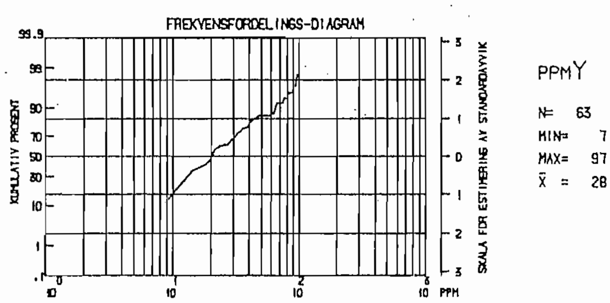
HURDAL



HURDAL



HURDAL



F I L B E S K R I V E L S E

Filnavn på tape — F0000313 . DATA . NGU (8 / 8 / 8)

Tape nr. — (20)

Brukerens filnavn — NODX 2 . GEOKJ . ARCO (8 / 8 / 8)

Prosjektnr. — 2249 (20)

Oppdragsnr. — (12)

Variable — P.nr,x-og y-koord. (km), Si,Al,Fe,Mn,Ti,Mg,Ca,Na,K,P (%) Ba,Be,Co,Cr,Cu,La,Li,Mo, Ni,Pb,Rb,Sc,Sr,V,Zn,Zr,Y,Ag,W,Sn,Sb,As,U,Th,Cd (ppm) (100)

Prosjektnavn — Oksydater som geokjemisk prospekteringsmedium (34)

Oppdragsgiver — EF (34)

Format — I3,.6X,2F10.2,3X,10(A1,F6.3)25(A1,F7.1) (100)

Saksbehandler — Siv Kjeldsen (34)

Ant.prøver — 120 (8)

Prøvenr. fra/til — 701/ 820 (14)

Kartbladnr. — (5)

Kartbladnavn — (20)

Prøvetype — Oksydater (20)

Kommune — (20)

Fylke — (20)

Fraksjon — (20)

Sted — Sør-øst Norge (20)

Forekomst-navn — (20)

Analysemetode — ICP, HCl-løselig (SGAB,Sverige) (20)

Prøvetaking år — 84/85 (4)

Analyse/arb.nr. — (20)

Analysering år — 85 (4)

Lager prøve — 11 C II

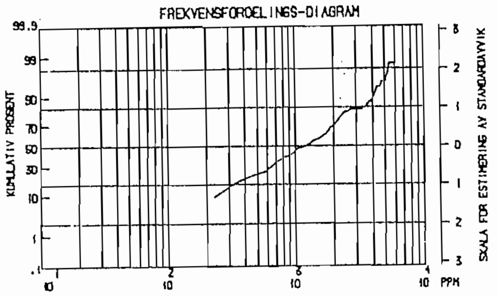
Rapport år — 86 (4)

Rapport nr. — 86.169 (8)

DIV: 6 duplikatprøver: 726,779,817,818,819,820 svarer til 717,761,704,768,775,788

NGU-report 86.169. FIGURE 16.1

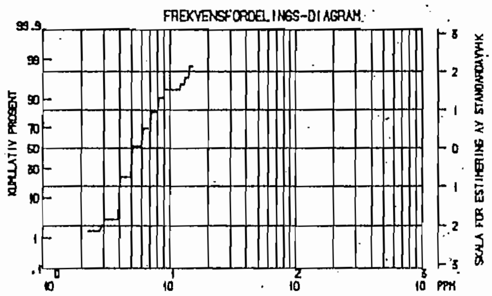
HURDAL



PPMZN

N= 63
MIN= 110
MAX= 5960
X̄ = 1630

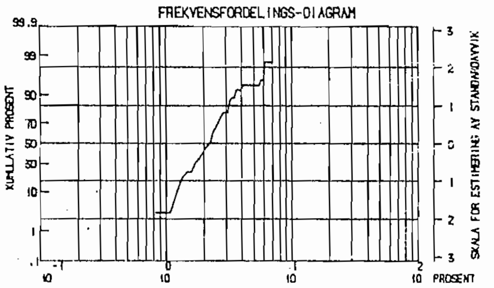
HURDAL



PPMZR

N= 63
MIN= 2
MAX= 15
X̄ = 6

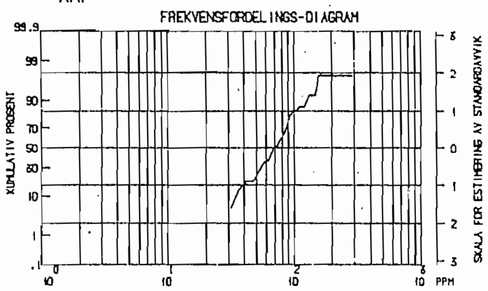
HURDAL



%C

N= 63
MIN= .70
MAX= 7.00
X̄ = 2.37

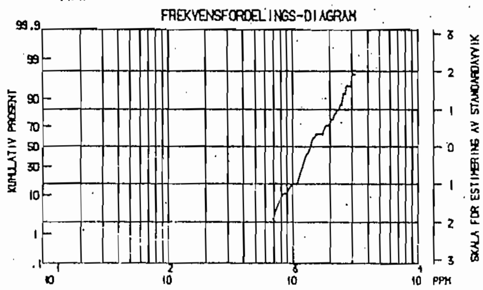
HURDAL
XRF



PPM CL

N= 38
MIN= 26.0
MAX= 286.0
X̄ = 78.2

HURDAL
XRF



PPMS

N= 38
MIN= 635.0
MAX= 3132.0
X̄ = 1569.2

F I L B E S K R I V E L S E

Filnavn på tape: F0000314 . DATA . NGU (8, 8, 8)

Tape nr.:

Brukerens filnavn: LNASTAB . GEOKJ . ARCO (8, 8, 8)

Prosjektnr.: 2249 (20)

Oppdragsnr.: (12)

Variable: Pr.nr., X- og Y-koord. (km), Fe,Na, (%), Br,Cs,Hf,Sb,Se,Ta,La,Ce, Nd,Sm,Eu,Tb,Yb,Lu,As,Ba,Co,Cr,Mo,Ni,Rb,Sc,Th,U,W,Zn,(ppm),Au(ppb) (100)

Prosjektnavn: Oksydater som geokjemisk prospekteringsmedium (34)

Format: I3,2F10.2,29F8.2 (100)

Oppdragsgiver: EF (34)

Saksbehandler: Siv Kjeldsen (34)

Ant.prøver: 90 (8)

Prøvenr. fra/til: 701/816 (14)

Kartbladnr.: (5)

Kartbladnavn: (20)

Prøvetype: Oksydater (20)

Kommune: (20)

Fylke: (20)

Fraksjon: (20)

Sted: Sør-øst Norge (20)

Forekomst-navn: (20)

Analysemetode: INAA (NAS Canada) (20)
RNAA for Au

Prøvetaking år: 84/85 (4)

Analyse/arb.nr.: (20)

Analysering år: 86 (4)

Lager prøve: 11 C II

Rapport år: 86 (4)

Rapport nr.: 86.169 (8)

DIV:

NGU-report 86.169. FIGURE 16.2

F I L B E S K R I V E L S E

Filnavn på tape: F0000315 . DATA . NGU (8 / 8 / 8)

Tape nr.:

Brukerens filnavn: LKARB . GEOKJ . ARCO (8 / 8 / 8)

Variable: Rand.nr. P.nr. C (%) (100)

Format: A5, I4,F6.1 (100)

Ant.prøver: 120 (8)

Prøvenr. fra/til: 701/ 820 (14)

Prøvetype: Oksydater (20)

Fraksjon: (20)

Analysemetode: Forbrenning (Statens jordundersøkelse) (20)

Analyse/arb.nr.: (20)

Lager prøve: 11 C II

Prosjektnr.: 2249 (20)

Oppdragsnr.: (12)

Prosjektnavn: Oksydater som geokjemisk prospekteringsmedium (34)

Oppdragsgiver: EF (34)

Saksbehandler: Siv Kjeldsen (34)

Kartbladnr.: (5)

Kartbladnavn: (20)

Kommune: (20)

Fylke: (20)

Sted: Sør-øst Norge (20)

Forekomst-navn: (20)

Prøvetaking år: 84/85 (4)

Analysering år: 86 (4)

Rapport år: 86 (4)

Rapport nr.: 86.169 (8)

DIV: 6 duplikatprøver: 726,779,817,818,819,820 svarer til 717,761,704,768,775,788

NGU-report 86.169. FIGURE 16.3

F I L B E S K R I V E L S E

Filnavn på tape: F0000316 (8) . DATA (8) . NGU (8)

Tape nr.:

Brukerens filnavn: LPLASKHS (8) . GEOKJ (8) . ARCO (8)

Variable (100):
P.nr,Rand.nr.,x-og y-koord. (km), Si,Al,Fe,Ti,Mg,Ca,Na,K,Mn,P (%)
Cu,Zn,Pb,Ni,Co,V,Mo,Cd,Cr,Ba,Sr,Zr,Ag,B,Be,Li,Sc,Ce,La (ppm)

Format (100):
I3,2X,A4,2F10.2,3X,10(A1,F6.3),19(A1,F7.1)

Ant.prøver (8): 86

Prøvenr. fra/til (14): 701/816

Prøvetype (20): Oksydater

Fraksjon (20):

Analysemetode (20): ICP,HNO_3 - løselig

Analyse/arb.nr. (20): 194/85

Lager prøve: 11 C II

Prosjektnr. (20): 2249

Oppdragsnr. (12):

Prosjektnavn (34): Oksydater som geokjemisk prospekteringsmedium

Oppdragsgiver (34): EF

Saksbehandler (34): Siv Kjeldsen

Kartbladnr. (5):

Kartbladnavn (20):

Kommune (20):

Fylke (20):

Sted (20): Sør-øst Norge

Forekomst-navn (20):

Prøvetaking år (4): 84/85

Analysering år (4): 85

Rapport år (4): 86

Rapport nr. (8): 86.169

DIV:

NGU-report 86.169. FIGURE 16.4

F I L B E S K R I V E L S E

Filnavn på tape

F0000317 . DATA . NGU (8, 8, 8)

Tape nr.

Brukerens filnavn

LMESA . GEOKJ . ARCO (8, 8, 8)

Variable

P.nr. Cl (ppm), S (ppm) (100)

Format

I3,F10.0,F11.0 (100)

Ant.prøver: 71 (8)

Prøvenr. fra/til: 701/816 (14)

Prøvetype: Oksydater (20)

Fraksjon: (20)

Analysemetode: XRF (MESA, England) (20)

Analyse/arb.nr.: (20)

Lager prøve: 11 C II

Prosjektnr.: 2249 (20)

Oppdragsnr.: (12)

Prosjektnavn: Oksydater som geokjemisk prospekteringsmedium (34)

Oppdragsgiver: EF (34)

Saksbehandler: Siv Kjeldsen (34)

Kartbladnr.: (5)

Kartbladnavn: (20)

Kommune: (20)

Fylke: (20)

Sted: Sør-øst Norge (20)

Forekomst-navn: (20)

Prøvetaking år: 84/85 (4)

Analysering år: 86 (4)

Rapport år: 86 (4)

Rapport nr.: 86.169 (8)

DIV:

NGU-report 86.169. FIGURE 16.5

NGU-report no. 86.169.

OXIDATES AS A GEOCHEMICAL SAMPLING MEDIUM IN GRANITIC TERRAIN.

APPENDIX III.

Project no. 2249.

Norges geologiske undersøkelse

Leiv Eirikssons vei 39, Postboks 3006, 7001 Trondheim - Tlf. (07) 92 16 11

Oslokontor, Drammensveien 230, Oslo 2 - Tlf. (02) 50 25 00

Rapport nr. 86.169	ISSN 0800–3416	Åpen/~~Fortrolig~~ til

Tittel:
Oxidates as a geochemical sampling medium in granitic terrain.

APPENDIX III.

Forfatter:	Oppdragsgiver:
Siv Kjeldsen	EF
Fylke: Akershus, Oppland, Hedmark	**Kommune:**
Kartbladnavn (M. 1:250 000) Hamar	**Kartbladnr. og -navn (M. 1:50 000)** 1915 IV Hurdal, 2015 IV Odalen
Forekomstens navn og koordinater:	**Sidetall:** **Pris:** **Kartbilag:**

Feltarbeid utført:	Rapportdato:	Prosjektnr.:	Prosjektleder:
1984/1985	February 1987	2249	Rolf Tore Ottesen

Sammendrag:

The main objective for the project is to develope a geochemical method for exploration of ores associated with granitic rocks.

Oxidates were sampled in streambeds and lakes from 114 localities in Southeastern Norway. 65 of these localities are situated in the northern Oslo Graben. The samples were examined mineralogically and chemically by a variety of methods. Geochemical maps of the element content in oxidates show regional distribution patterns for several elements.

Sampling and analysis of oxidates can be used in exploration for mineralizations such as the Skrukkelia Mo-deposit in the northern Oslo Graben. New anomalies (especially for Zn and W) have been detected.

Appendix I contain description of samples, chemical and mineralogical determinations performed on the samples, backscattered electron image-, X-ray image- and scanning electron image pictures of the oxidate preparates.

Appendix II contain spectral plots, point analysis with the microprobe, X-ray diffractograms, analytical results, correlation coefficient matrix, scatterplots, frequency distributions and information on data storage.

Appendix III contain maps of the element content in oxidates.

Emneord	Metode	Jern
Geokjemi	Geologisk undersøkelse	Mangan
Fagrapport	Noduler	Kjemisk analyse

CONTENT, APPENDIX 3.

FIGURES:

Maps of the HCl-soluble content in oxidates, Southeastern Norway:

Maps of the HNO_3-soluble content in oxidates, Southeastern Norway:

18.15 Geochemical map of Mg
18.16 Geochemical map of Mn
18.17 Geochemical map of Mo
18.18 Geochemical map of Na
18.19 Geochemical map of Ni
18.20 Geochemical map of P
18.21 Geochemical map of Pb
18.22 Geochemical map of Sc
18.23 Geochemical map of Si
18.24 Geochemical map of Sr
18.25 Geochemical map of Ti
18.26 Geochemical map of V
18.27 Geochemical map of Zn
18.28 Geochemical map of Zr

Maps of the total content in oxidates, Southeastern Norway:

86.169-19.1 Geochemical map of As
19.2 Geochemical map of Au
19.3 Geochemical map of Ba
19.4 Geochemical map of Br
19.5 Geochemical map of Ce
19.6 Geochemical map of Co
19.7 Geochemical map of Cr
19.8 Geochemical map of Cs
19.9 Geochemical map of Eu
19.10 Geochemical map of Fe
19.11 Geochemical map of Hf
19.12 Geochemical map of La
19.13 Geochemical map of Lu
19.14 Geochemical map of Mo
19.15 Geochemical map of Na
19.16 Geochemical map of Nd
19.17 Geochemical map of Ni
19.18 Geochemical map of Rb
19.19 Geochemical map of Sb
19.20 Geochemical map of Sc
19.21 Geochemical map of Se
19.22 Geochemical map of Sm
19.23 Geochemical map of Ta
19.24 Geochemical map of Tb
19.25 Geochemical map of Th
19.26 Geochemical map of U
19.27 Geochemical map of W
19.28 Geochemical map of Yb
19.29 Geochemical map of Zn
19.30 Geochemical map of C
19.31 Geochemical map of Cl
19.32 Geochemical map of S

Maps of the HCl-soluble content in oxidates, Hurdal:

86.169-20.1 Geochemical map of Al
20.2 Geochemical map of As
20.3 Geochemical map of Ba

21.26 Geochemical map of V
21.27 Geochemical map of Zn
21.28 Geochemical map of Zr

Maps of the total content in oxidates, Hurdal:

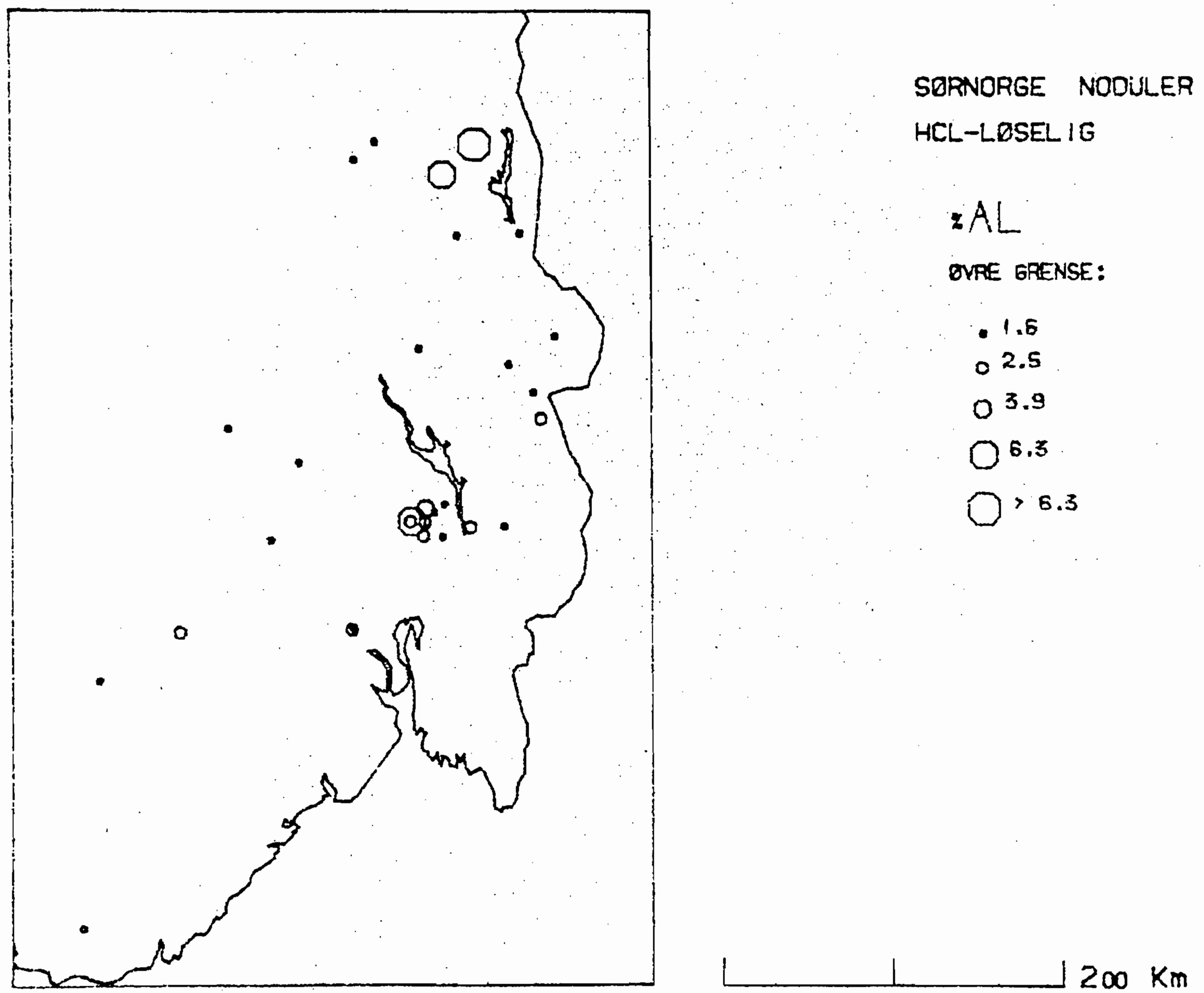
86.169-22.1 Geochemical map of As
22.2 Geochemical map of Au
22.3 Geochemical map of Ba
22.4 Geochemical map of Br
22.5 Geochemical map of Ce
22.6 Geochemical map of Co
22.7 Geochemical map of Cr
22.8 Geochemical map of Cs
22.9 Geochemical map of Eu
22.10 Geochemical map of Fe
22.11 Geochemical map of Hf
22.12 Geochemical map of La
22.13 Geochemical map of Lu
22.14 Geochemical map of Mo
22.15 Geochemical map of Na
22.16 Geochemical map of Nd
22.17 Geochemical map of Ni
22.18 Geochemical map of Rb
22.19 Geochemical map of Sb
22.20 Geochemical map of Sc
22.21 Geochemical map of Se
22.22 Geochemical map of Sm
22.23 Geochemical map of Ta
22.24 Geochemical map of Tb
22.25 Geochemical map of Th
22.26 Geochemical map of U
22.27 Geochemical map of W
22.28 Geochemical map of Yb
22.29 Geochemical map of Zn
22.30 Geochemical map of C
22.31 Geochemical map of Cl
22.32 Geochemical map of S

Anomaly maps of the HCl-soluble content in oxidates, Southeastern Norway:

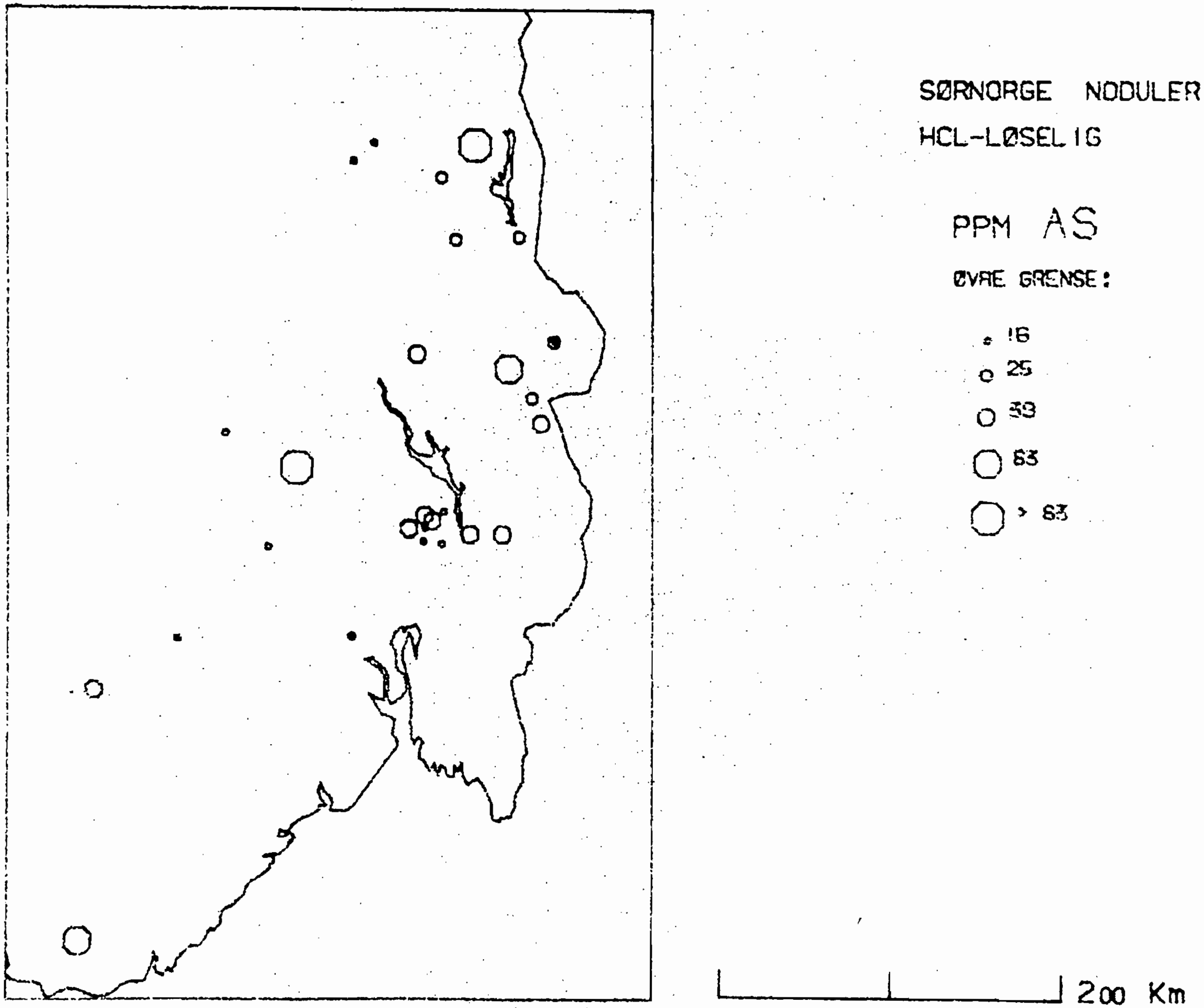
86.169-23.1 Map of Fe+Mn+Al
23.2 Map of Ba/Fe+Mn+Al
23.3 Map of Mo/Fe+Mn+Al
23.4 Map of Pb/Fe+Mn+Al
23.5 Map of U/Fe+Mn+Al
23.6 Map of W/Fe+Mn+Al
23.7 Map of Zn/Fe+Mn+Al

Anomaly maps of the HCl-soluble content in oxidates, Hurdal:

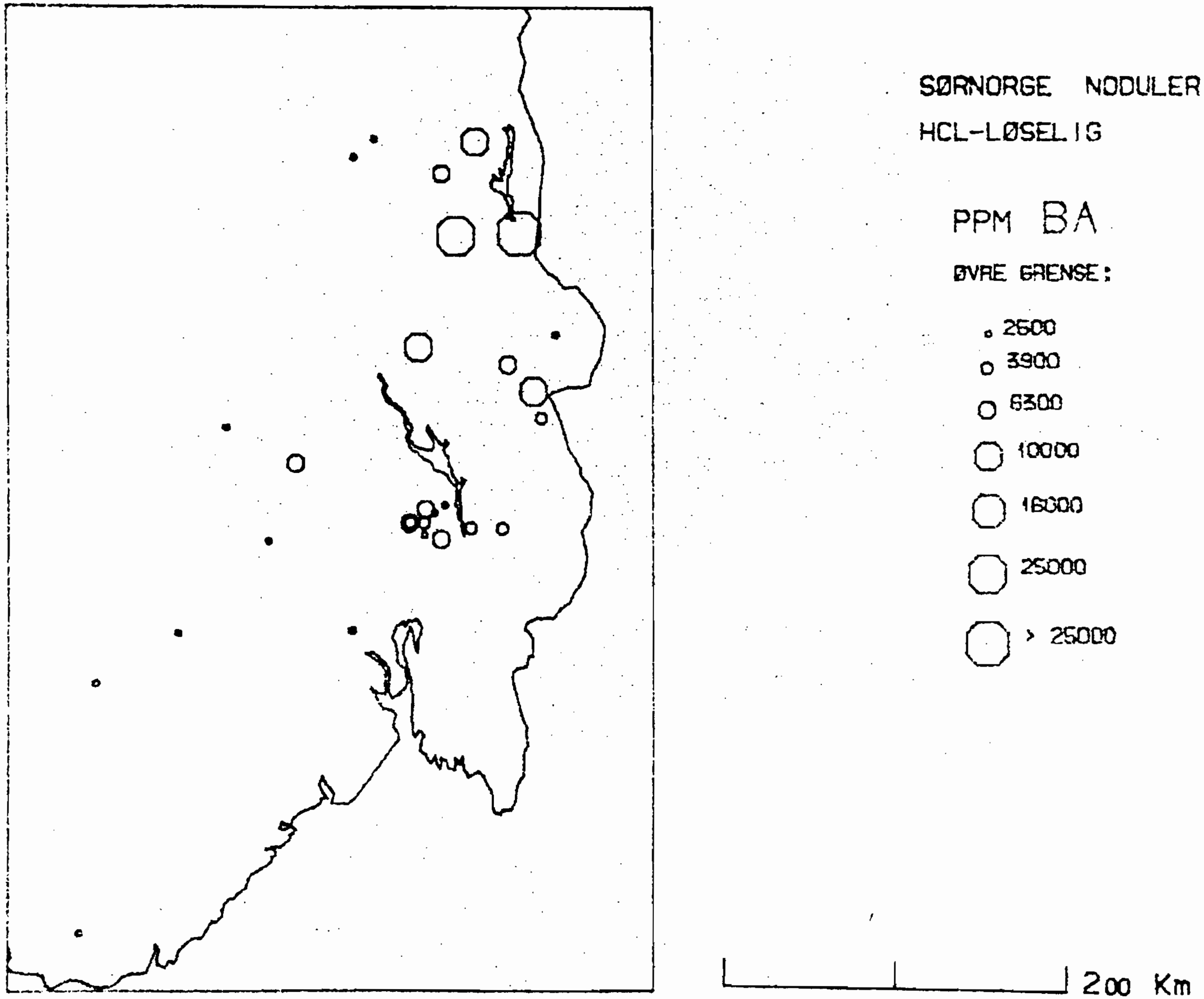
86.169-24.1 Map of Fe+Mn+Al
24.2 Map of Ba/Fe+Mn+Al
24.3 Map of Be/Fe+Mn+Al
24.4 Map of Co/Fe+Mn+Al



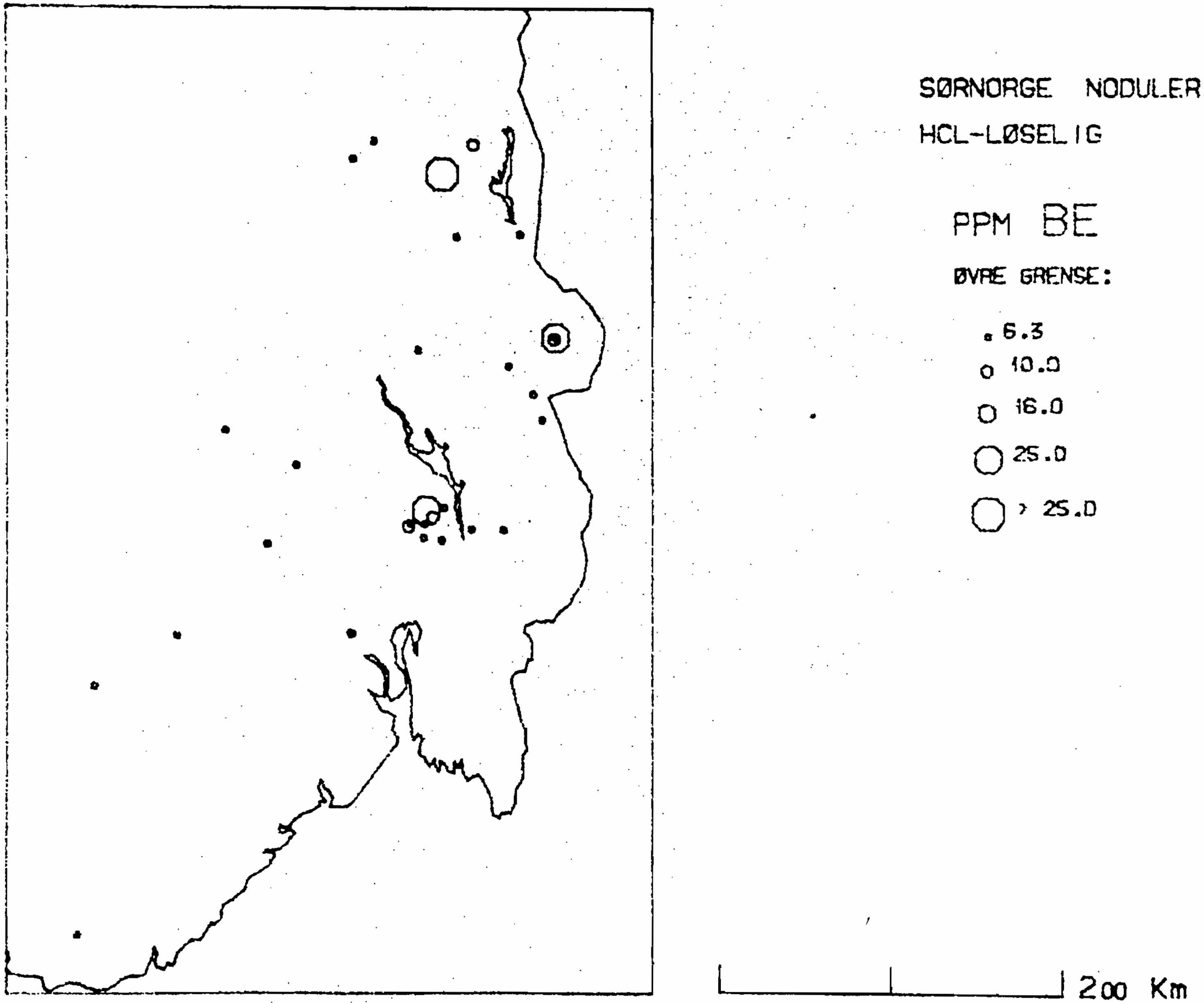
NGU-report 86.169. FIGURE 17.1



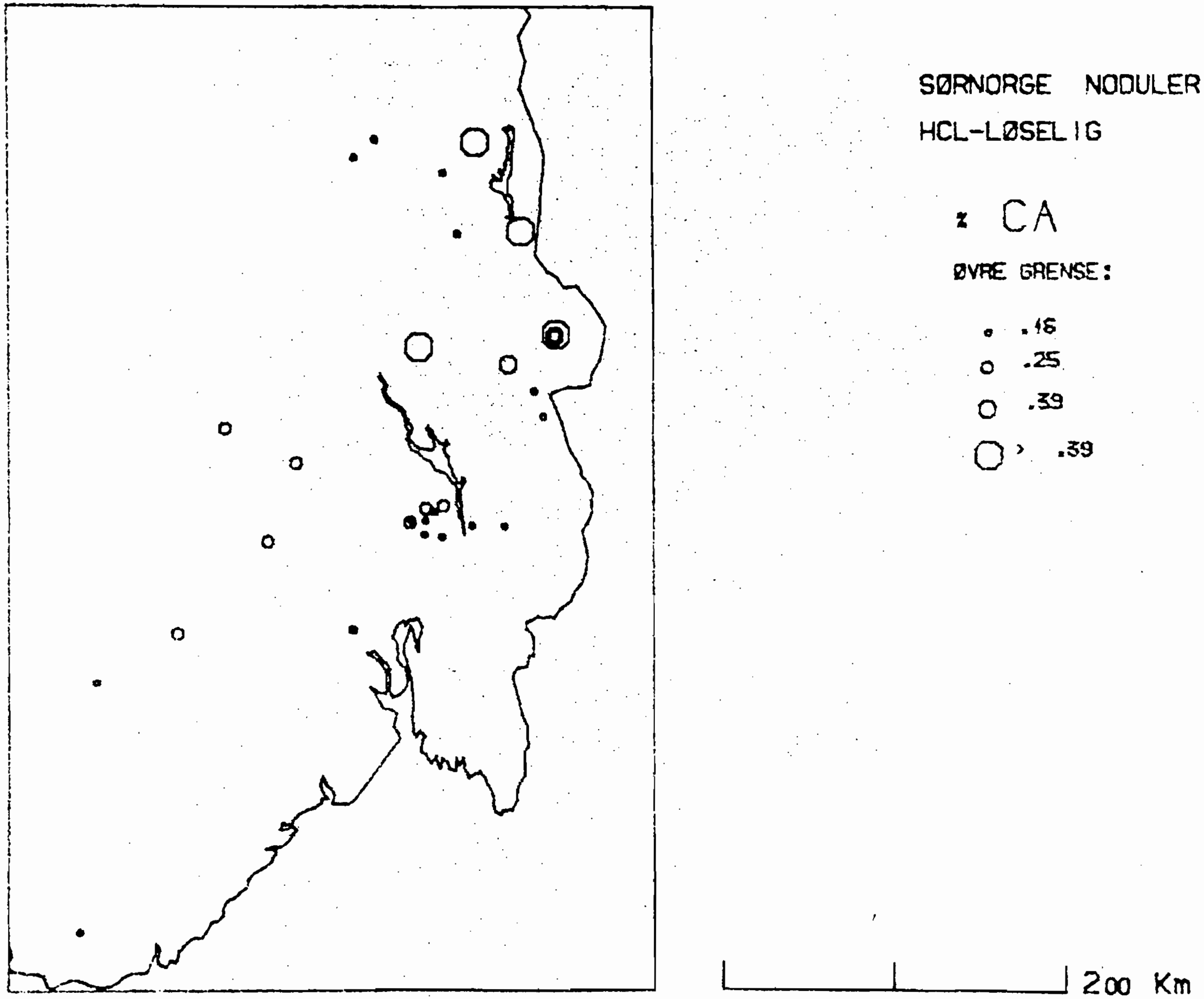
NGU-report 86.169. FIGURE 17.2



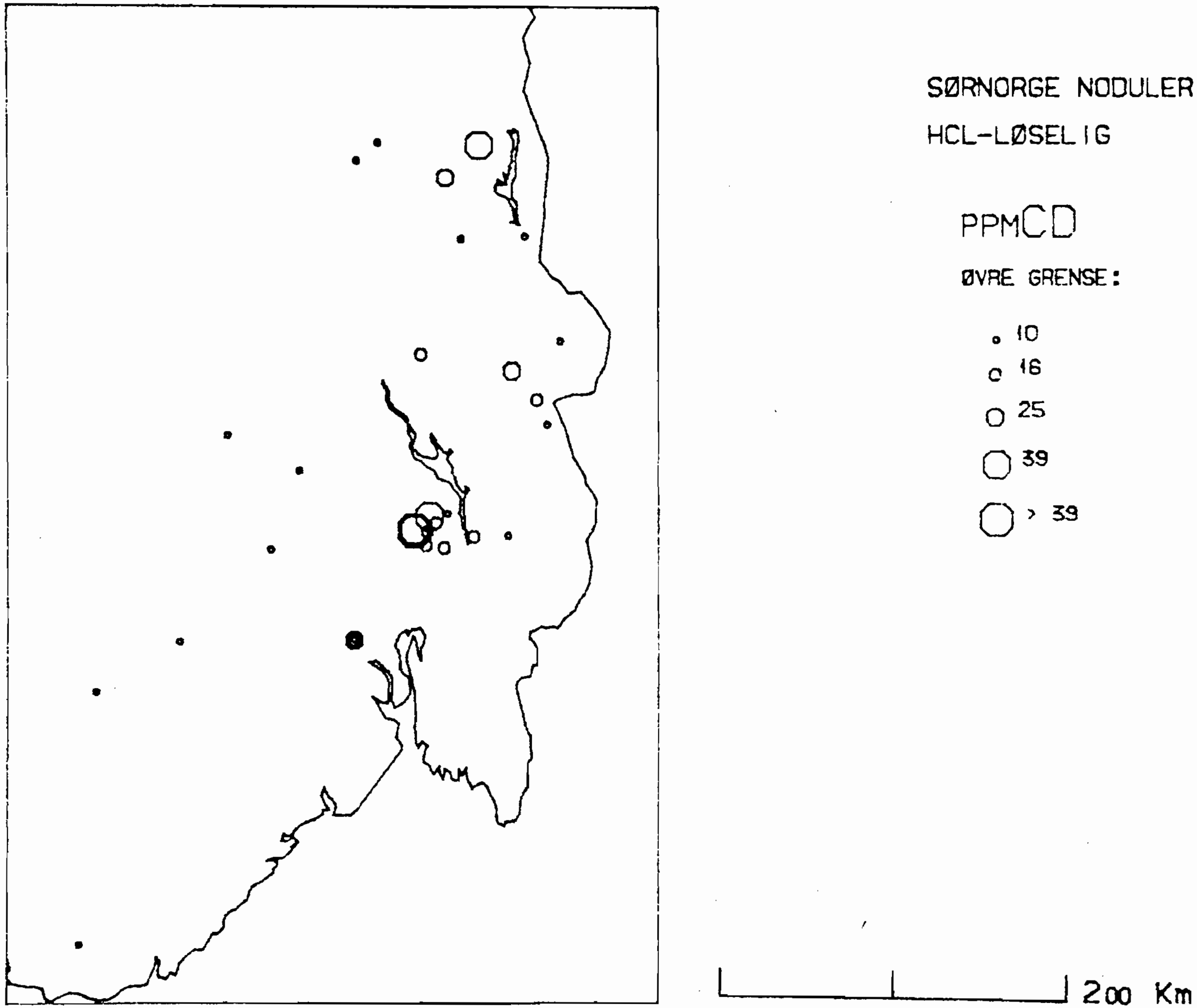
NGU-report 86.169. FIGURE 17.3



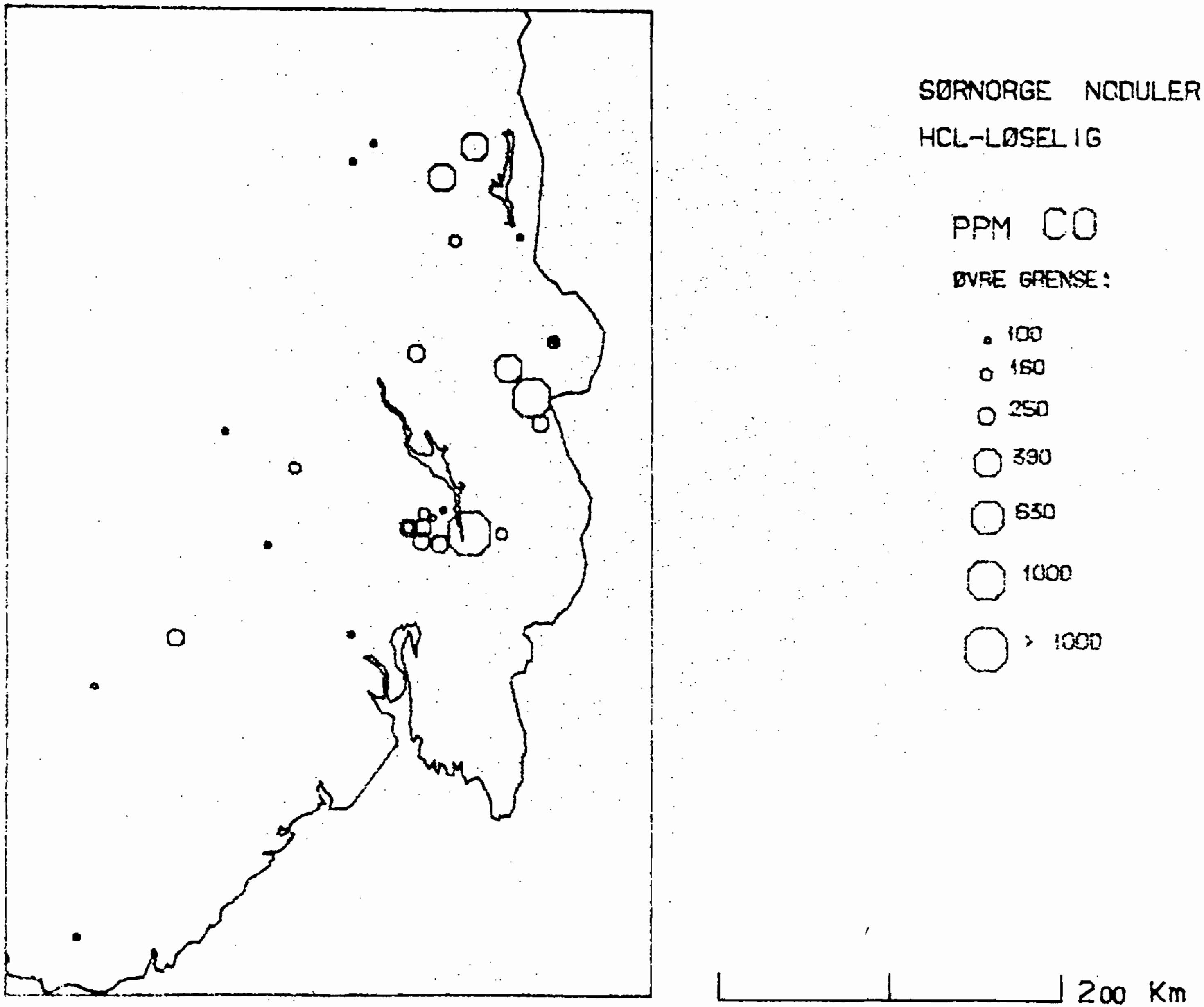
NGU-report 86.169. FIGURE 17.4



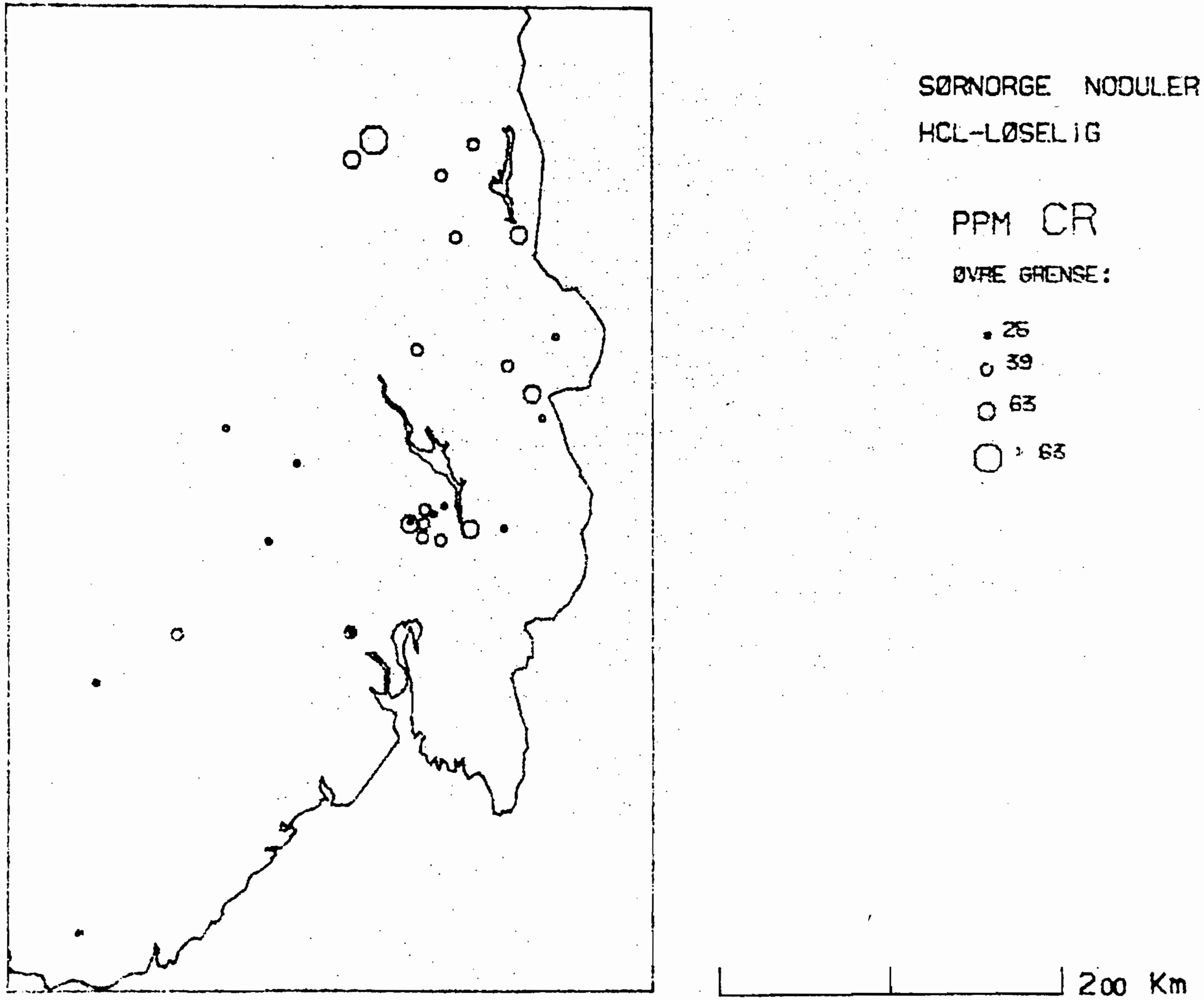
NGU-report 86.169. FIGURE 17.5



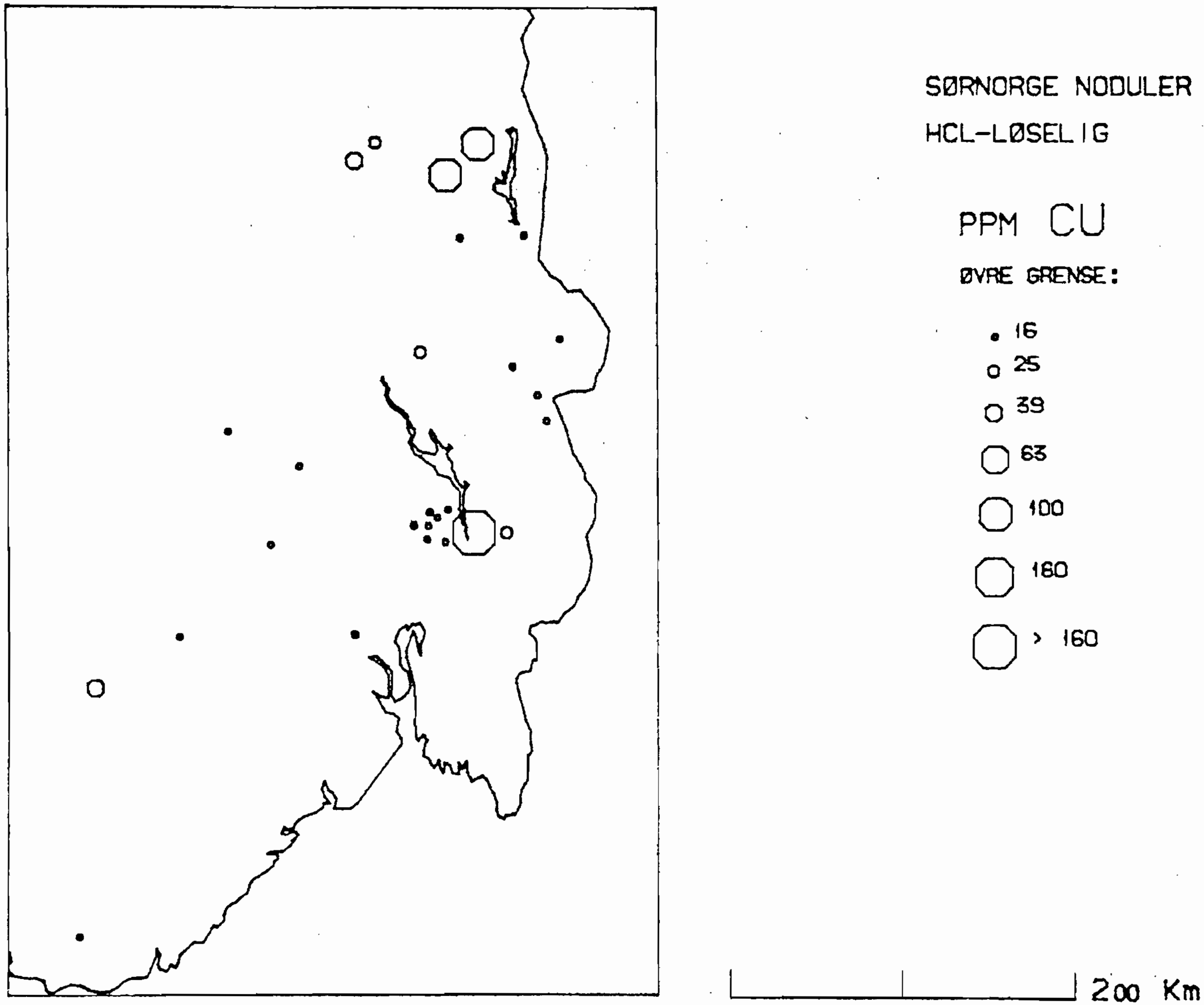
NGU-report 86.169. FIGURE 17.6



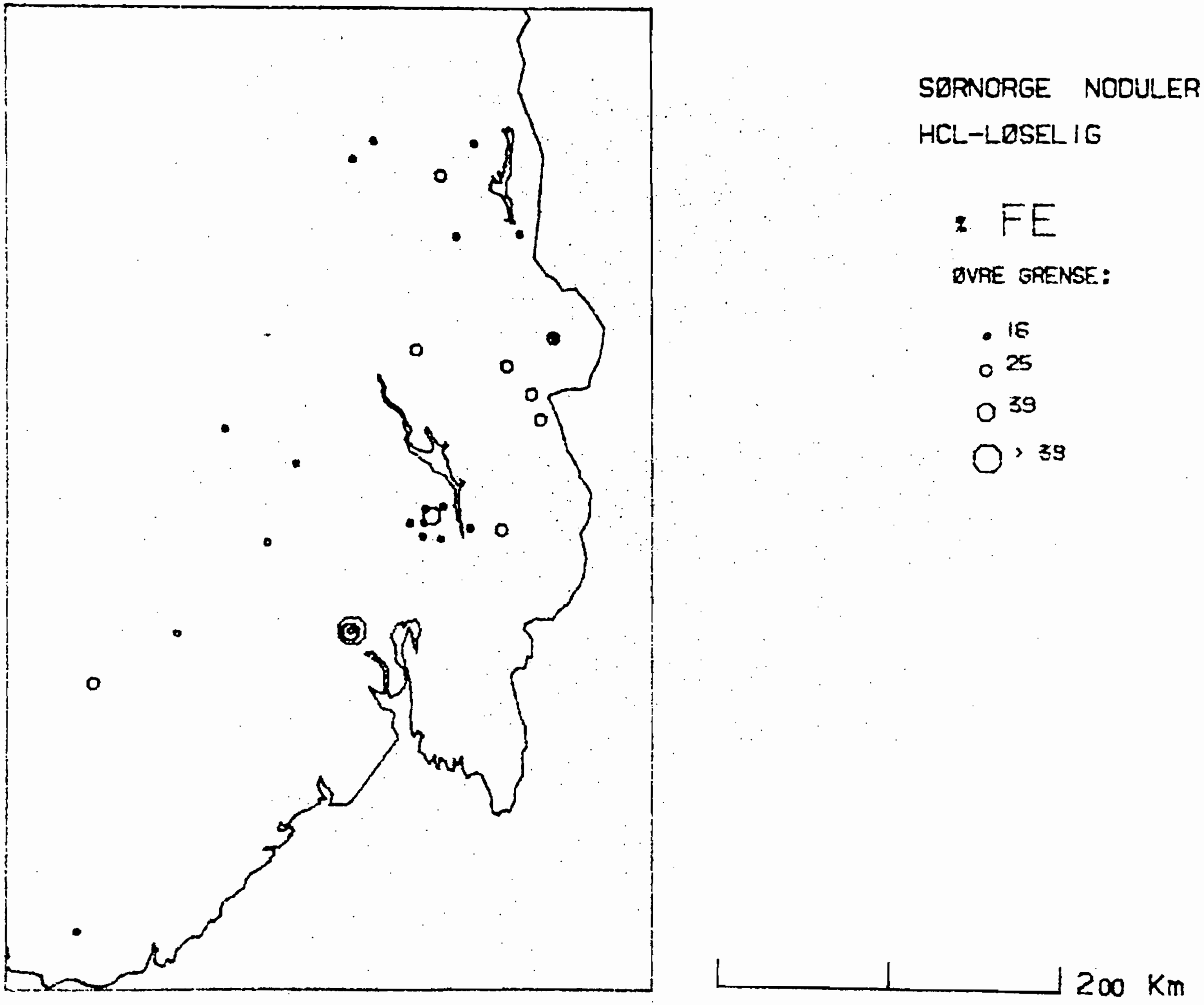
NGU-report 86.169. FIGURE 17.7



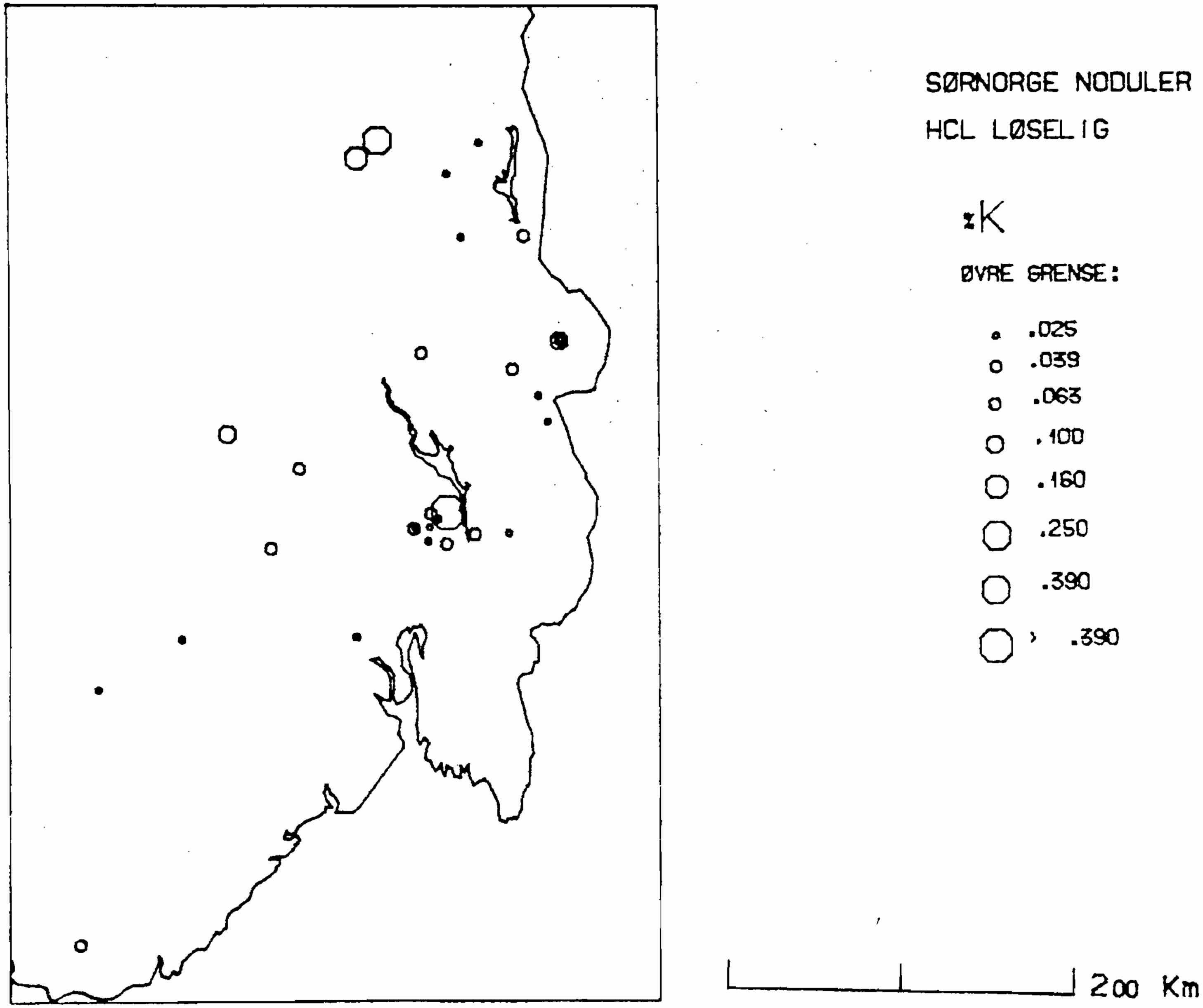
NGU-report 86.169. FIGURE 17.8



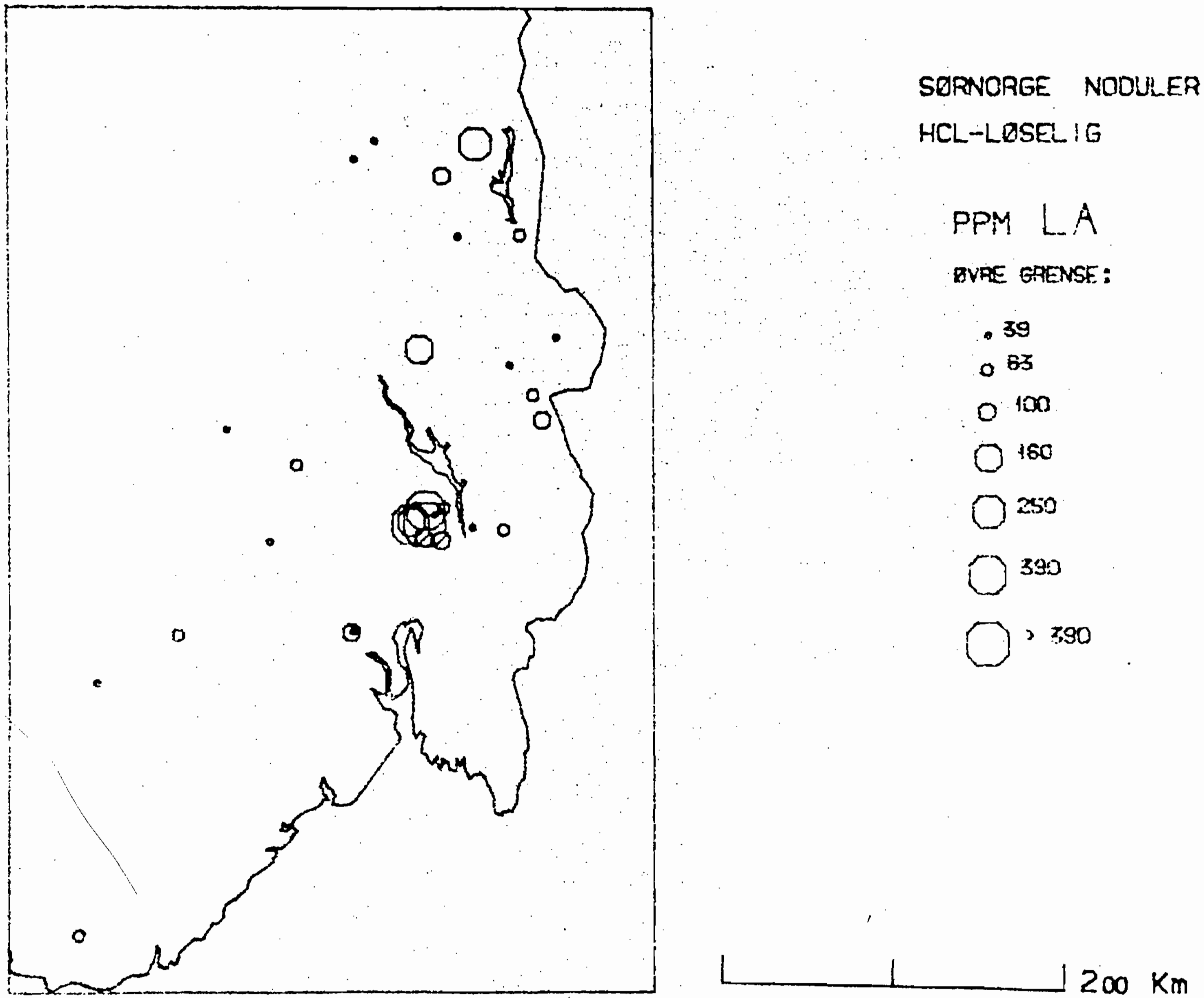
NGU-report 86.169. FIGURE 17.9



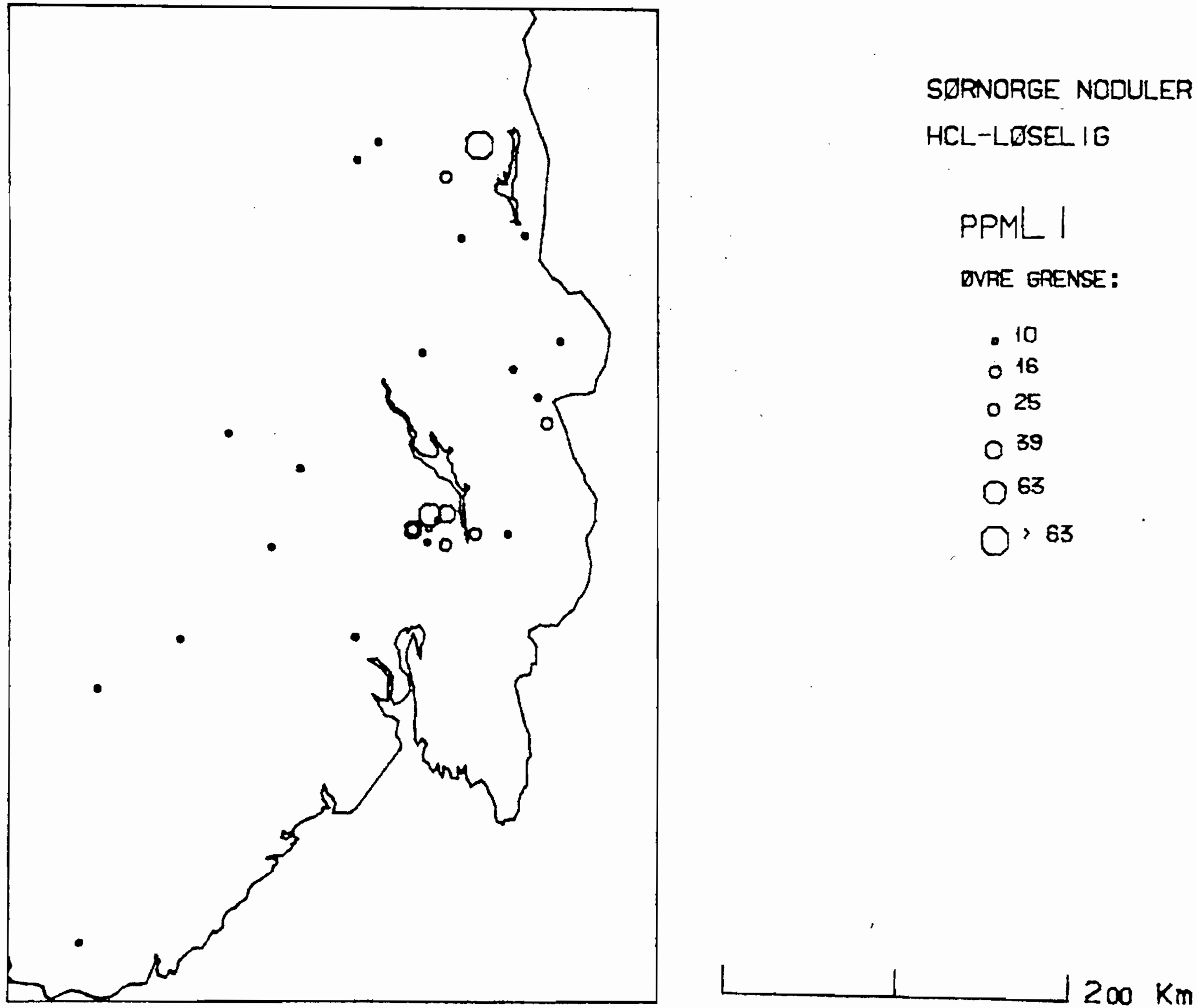
NGU-report 86.169. FIGURE 17.10



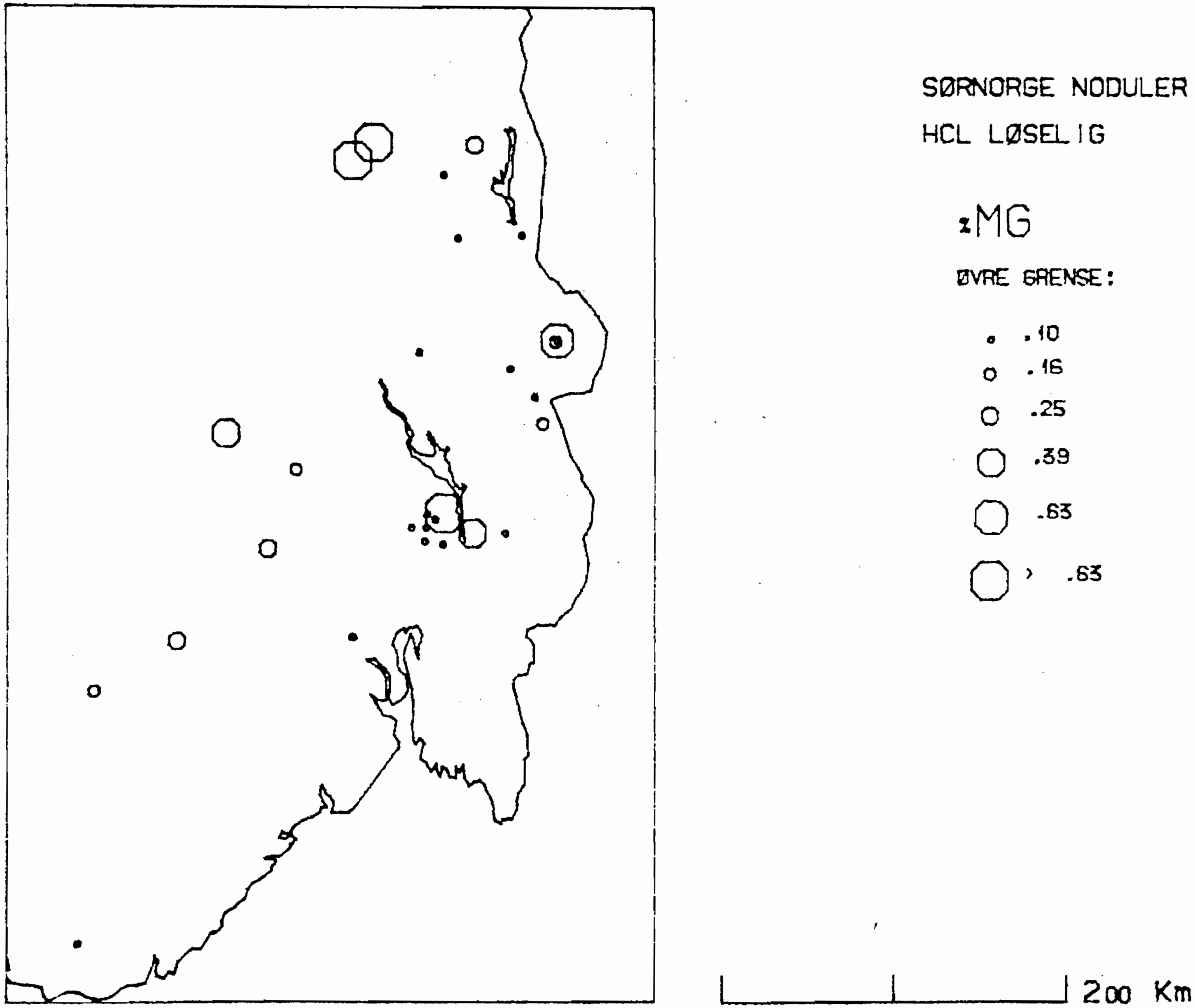
NGU-report 86.169. FIGURE 17.11



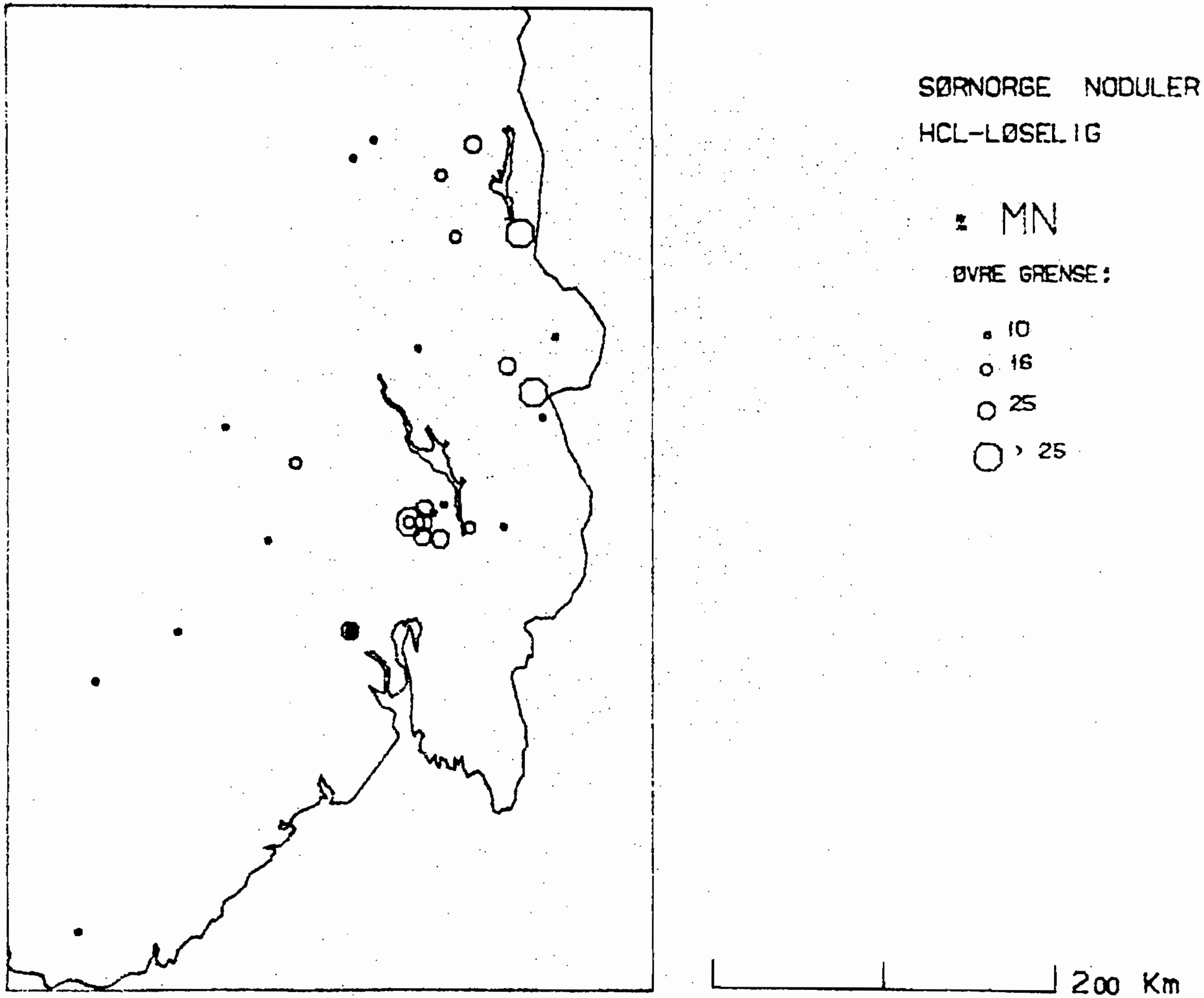
NGU-report 86.169. FIGURE 17.12



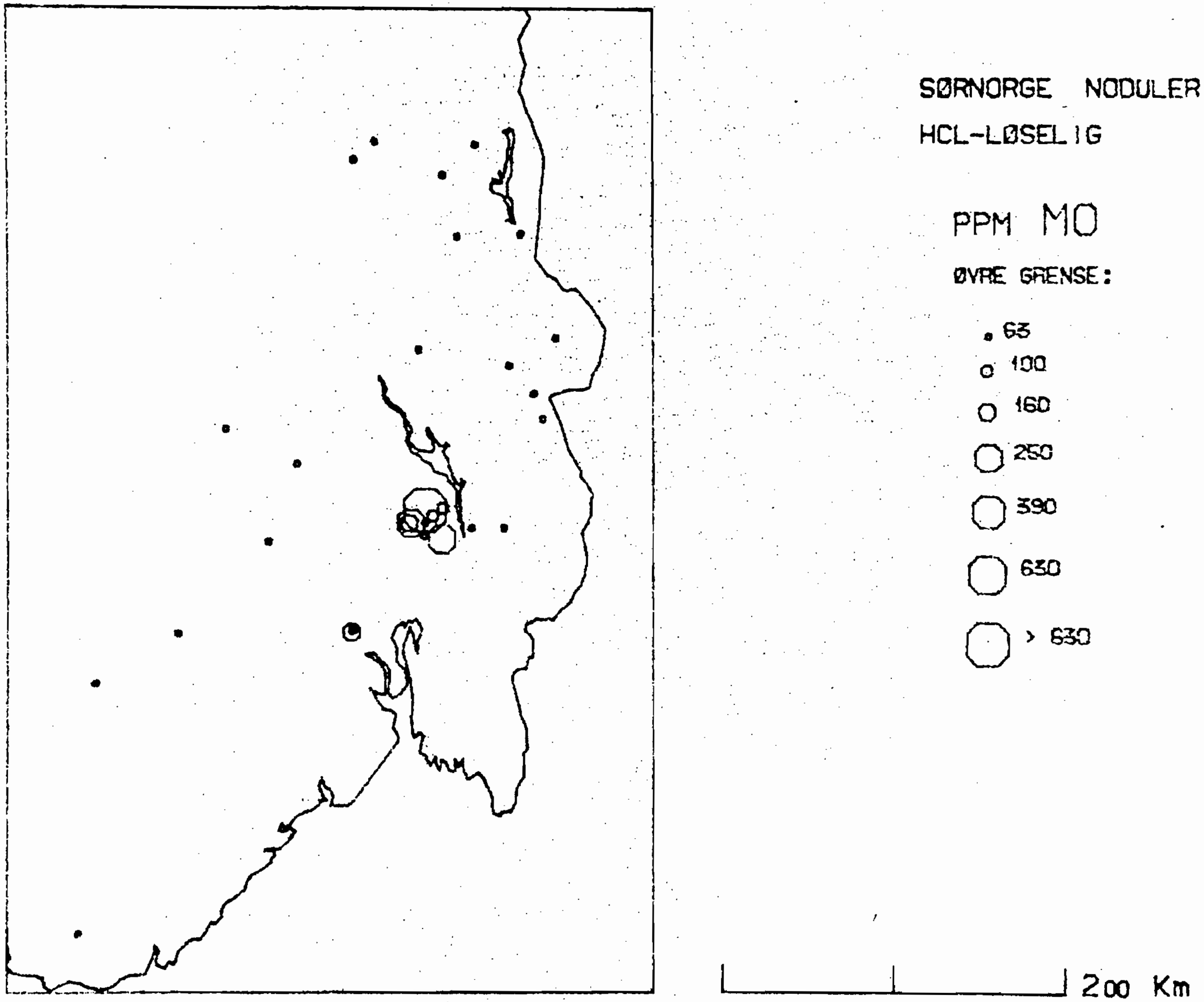
NGU-report 86.169. FIGURE 17.13



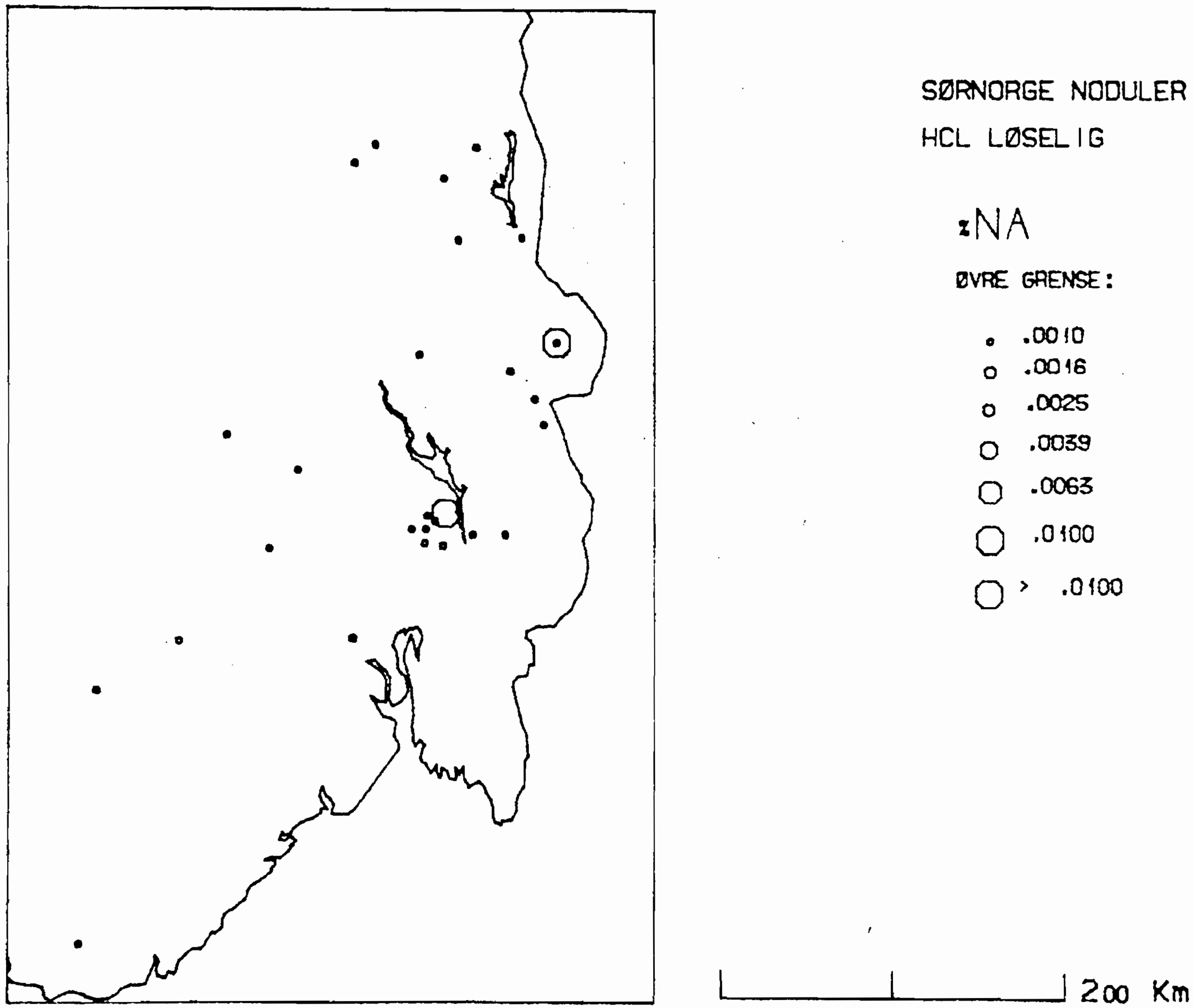
NGU-report 86.169. FIGURE 17.14



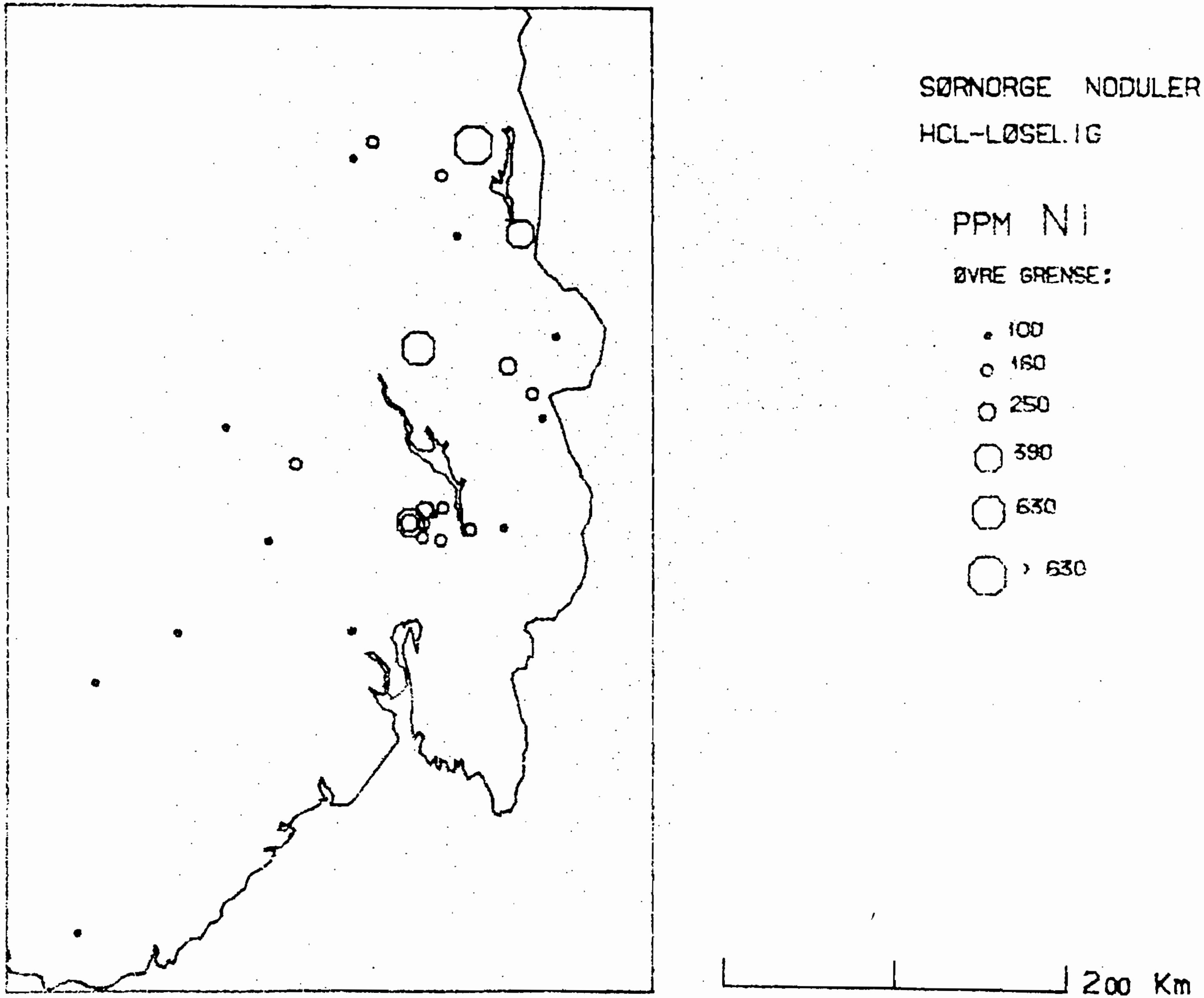
NGU-report 86.169. FIGURE 17.15



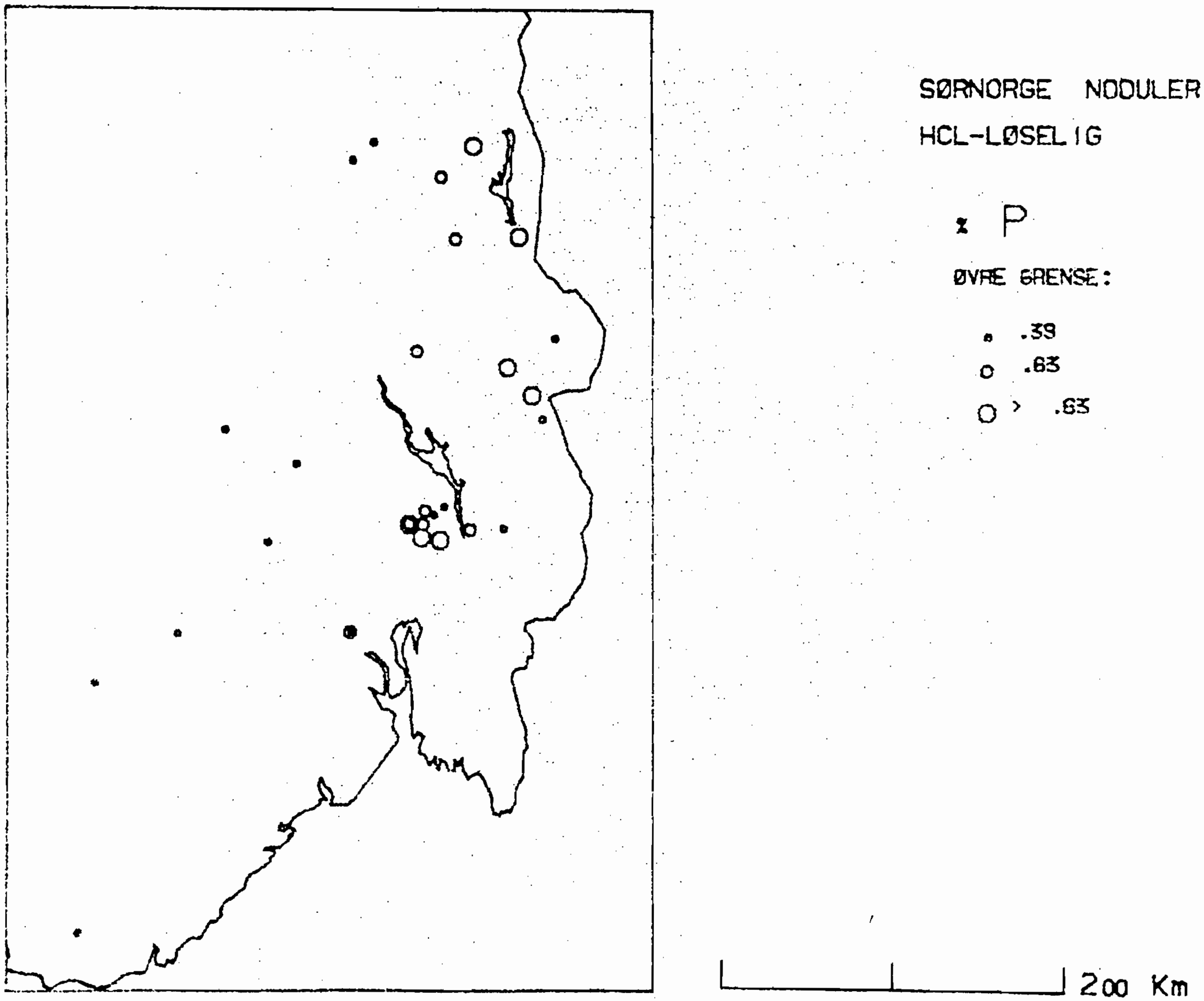
NGU-report 86.169. FIGURE 17.16



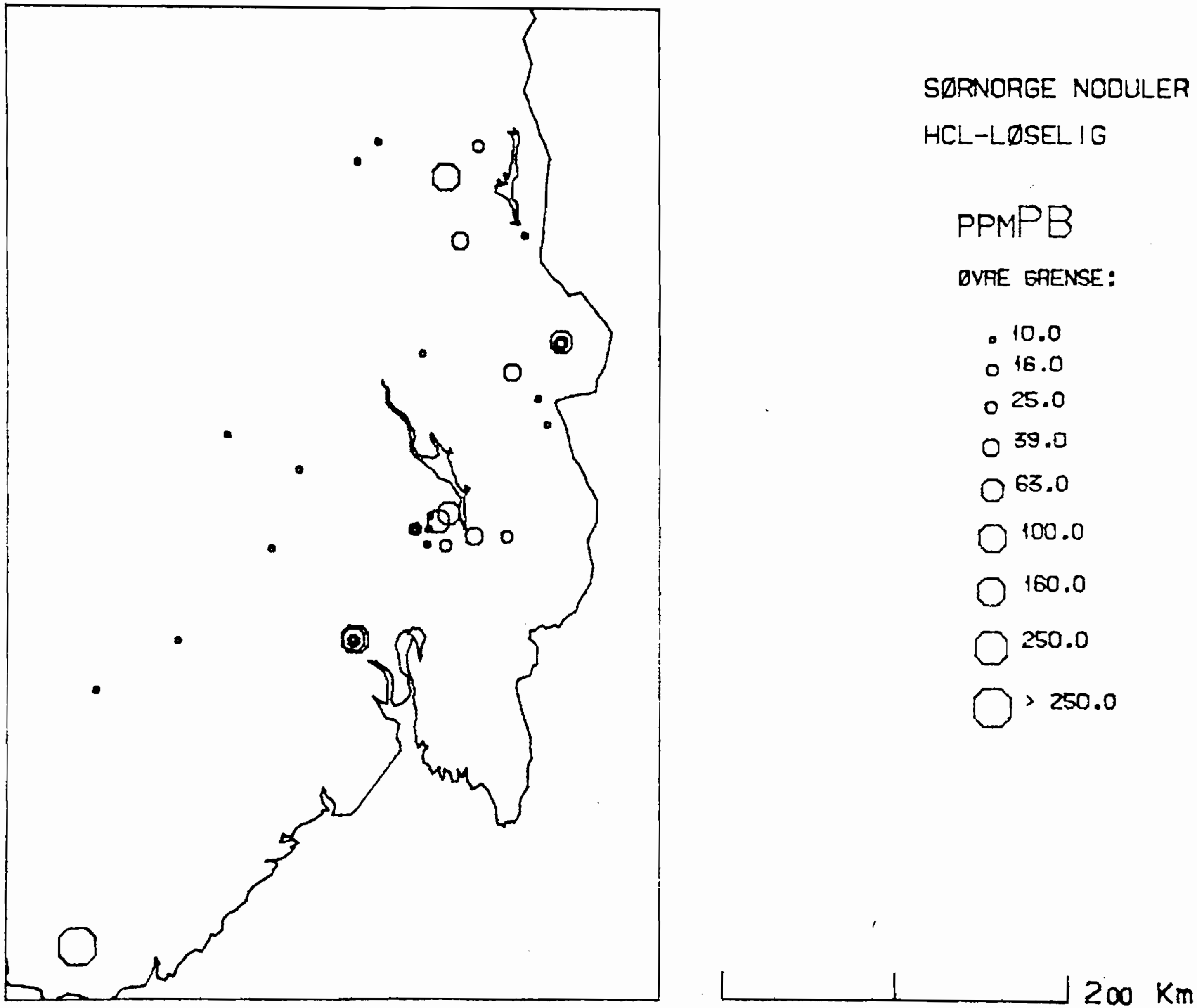
NGU-report 86.169. FIGURE 17.17



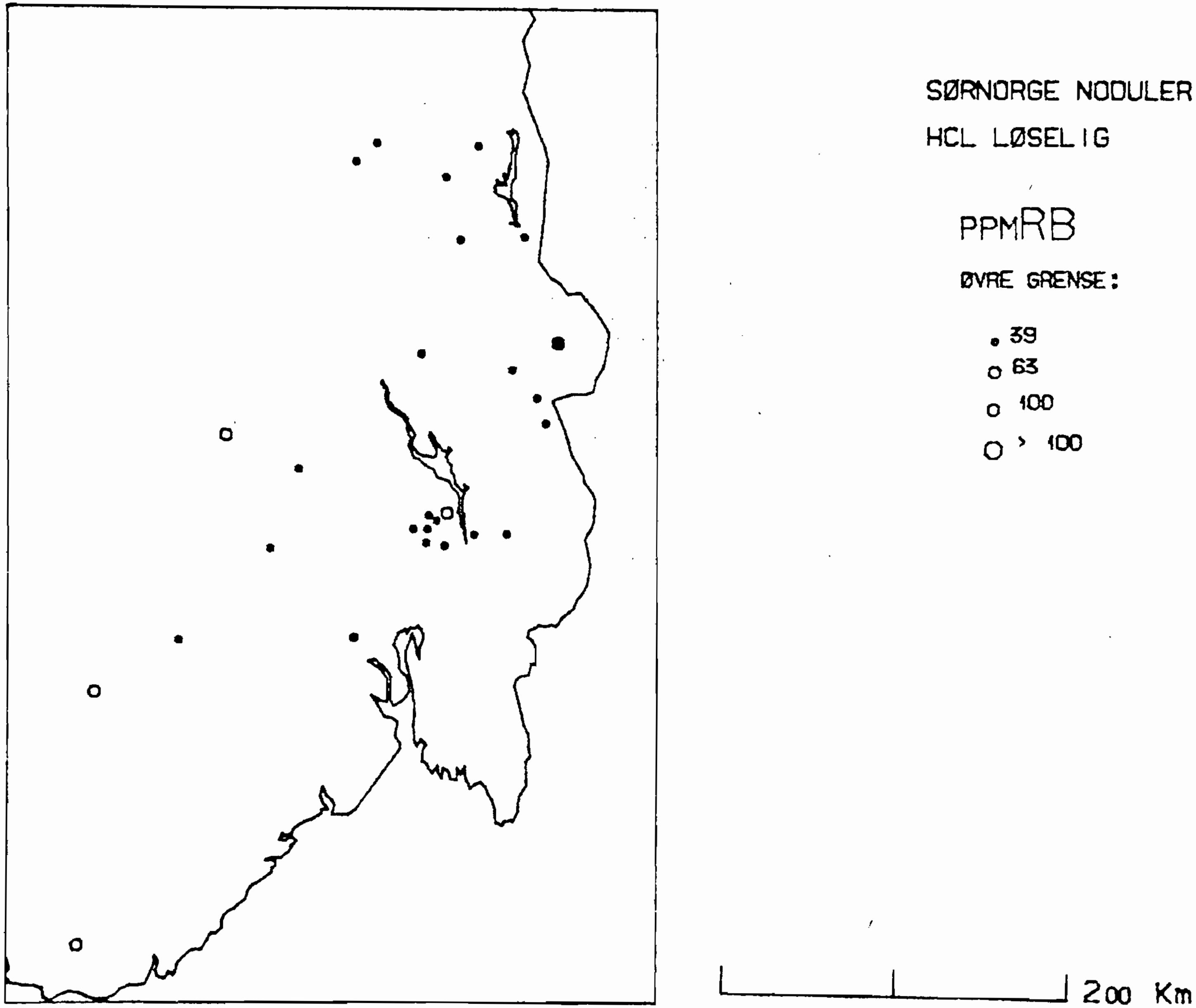
NGU-report 86.169. FIGURE 17.18



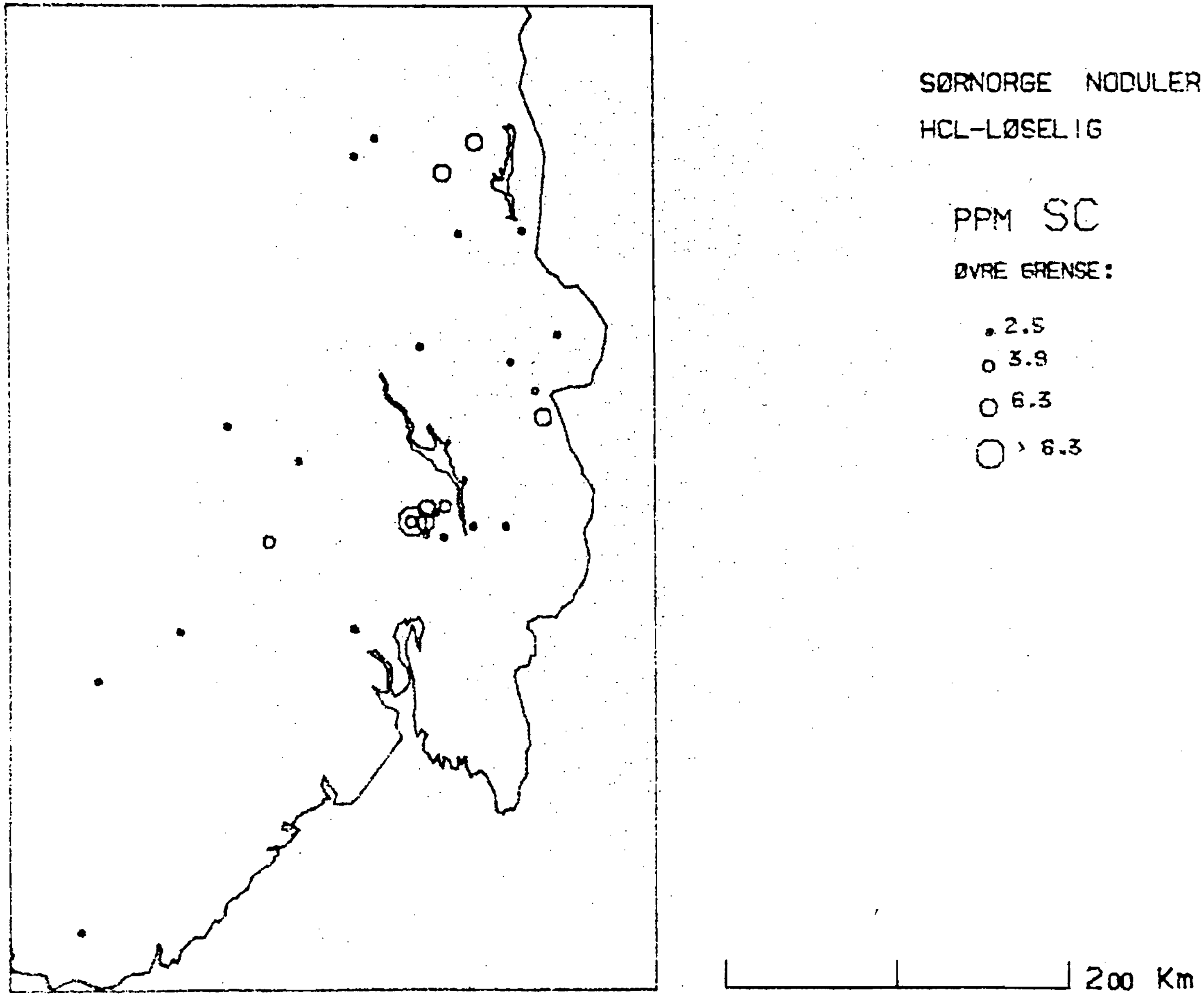
NGU-report 86.169. FIGURE 17.19



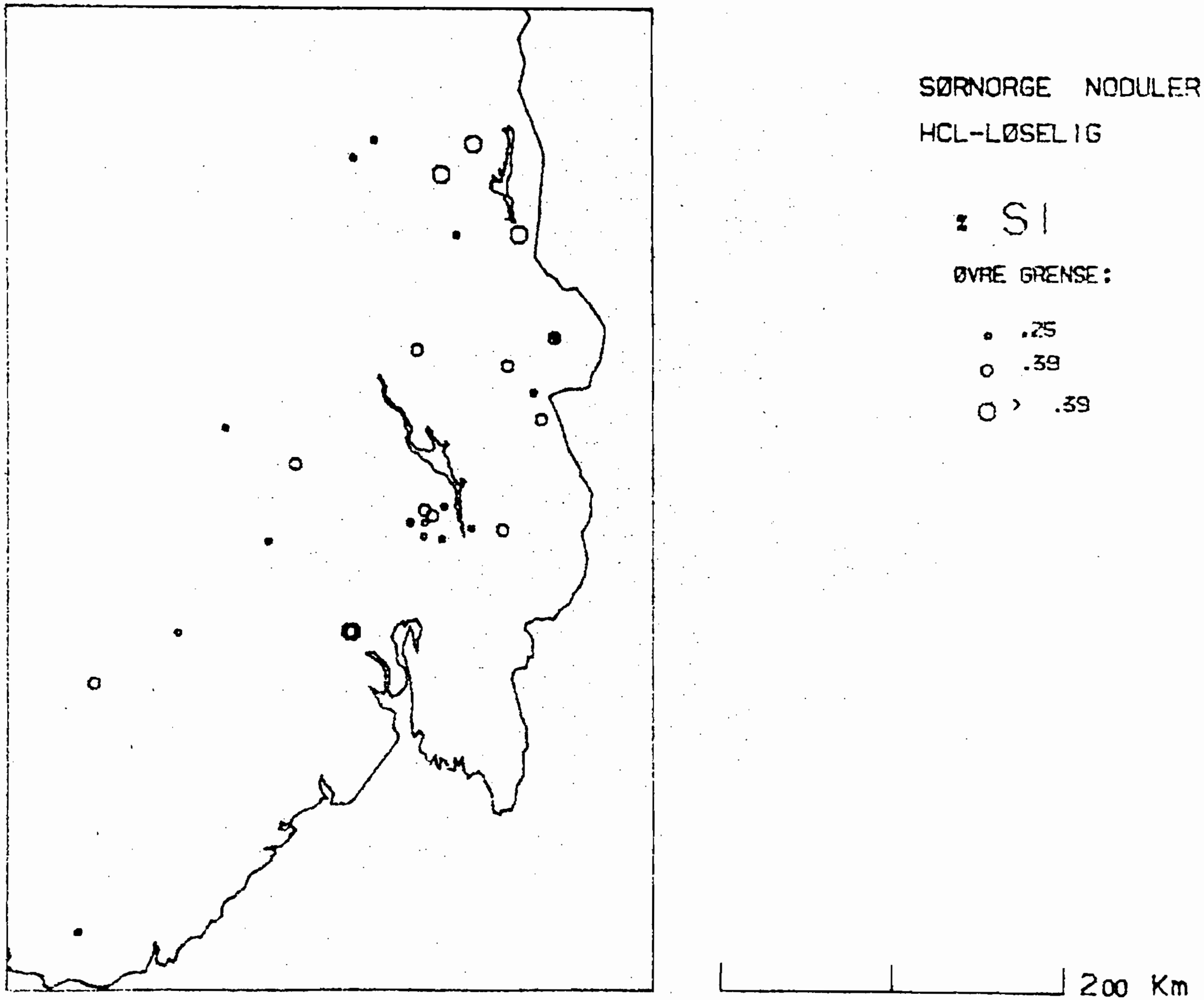
NGU-report 86.169. FIGURE 17.20

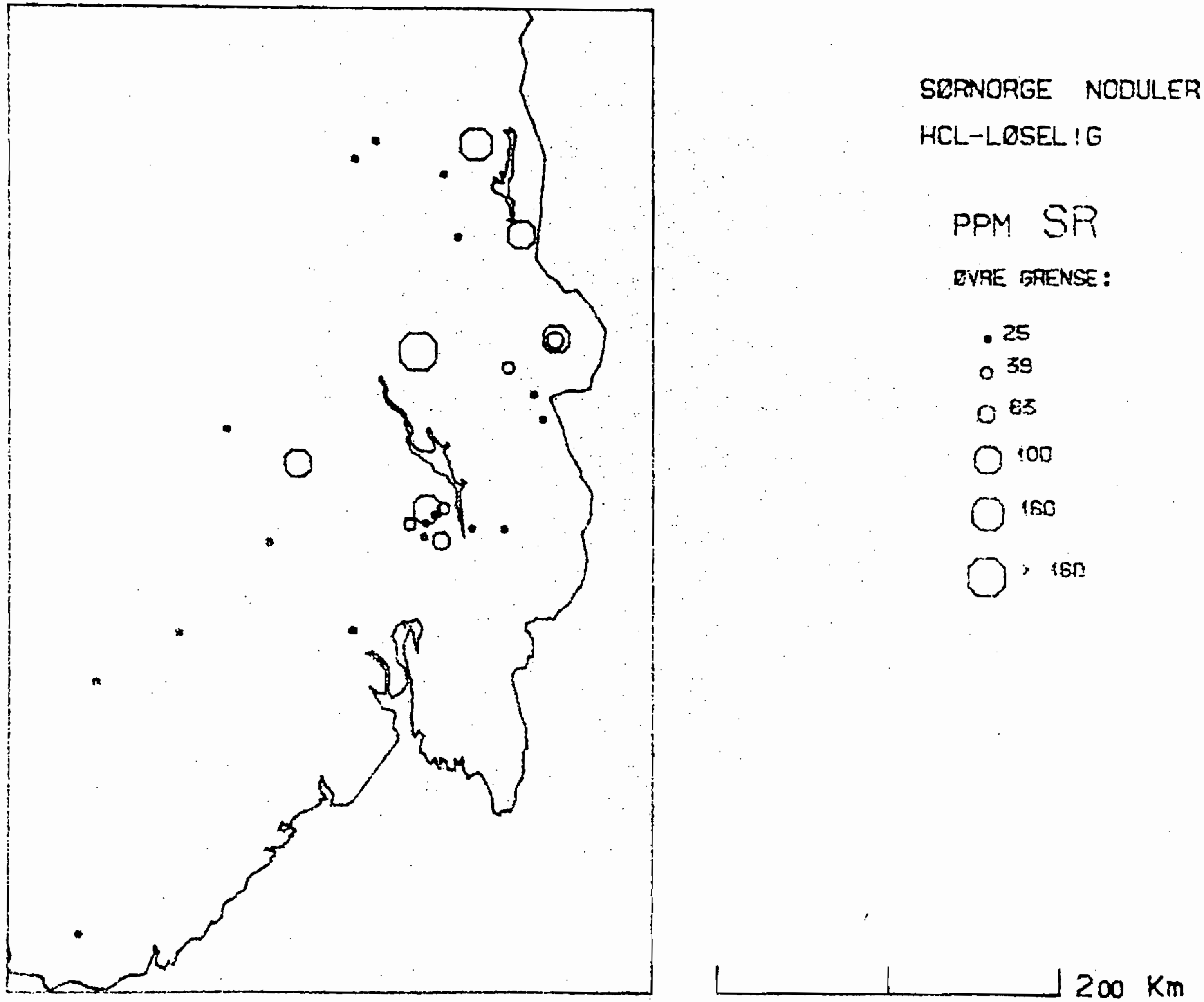


NGU-report 86.169. FIGURE 17.21

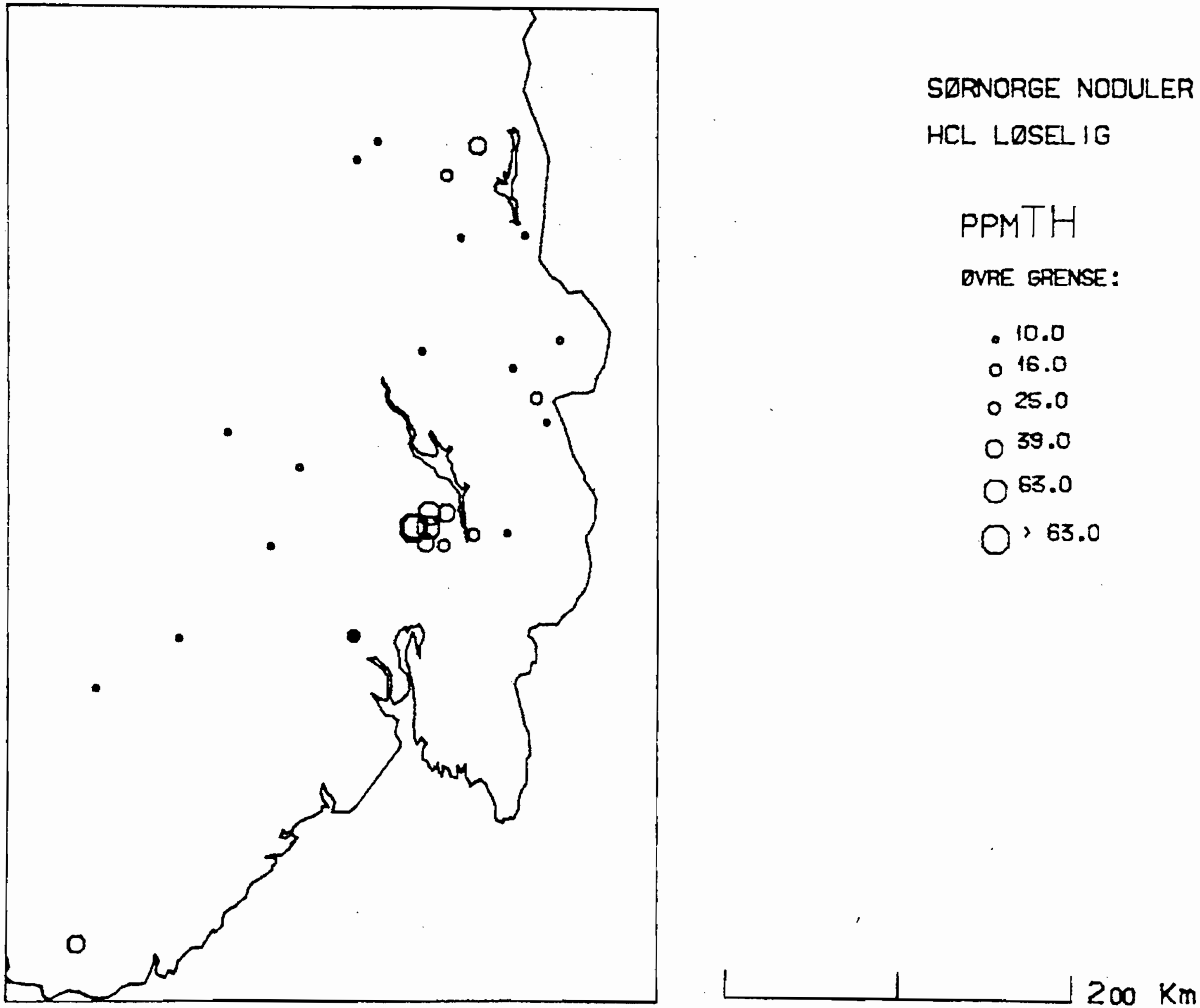


NGU-report 86.169. FIGURE 17.22

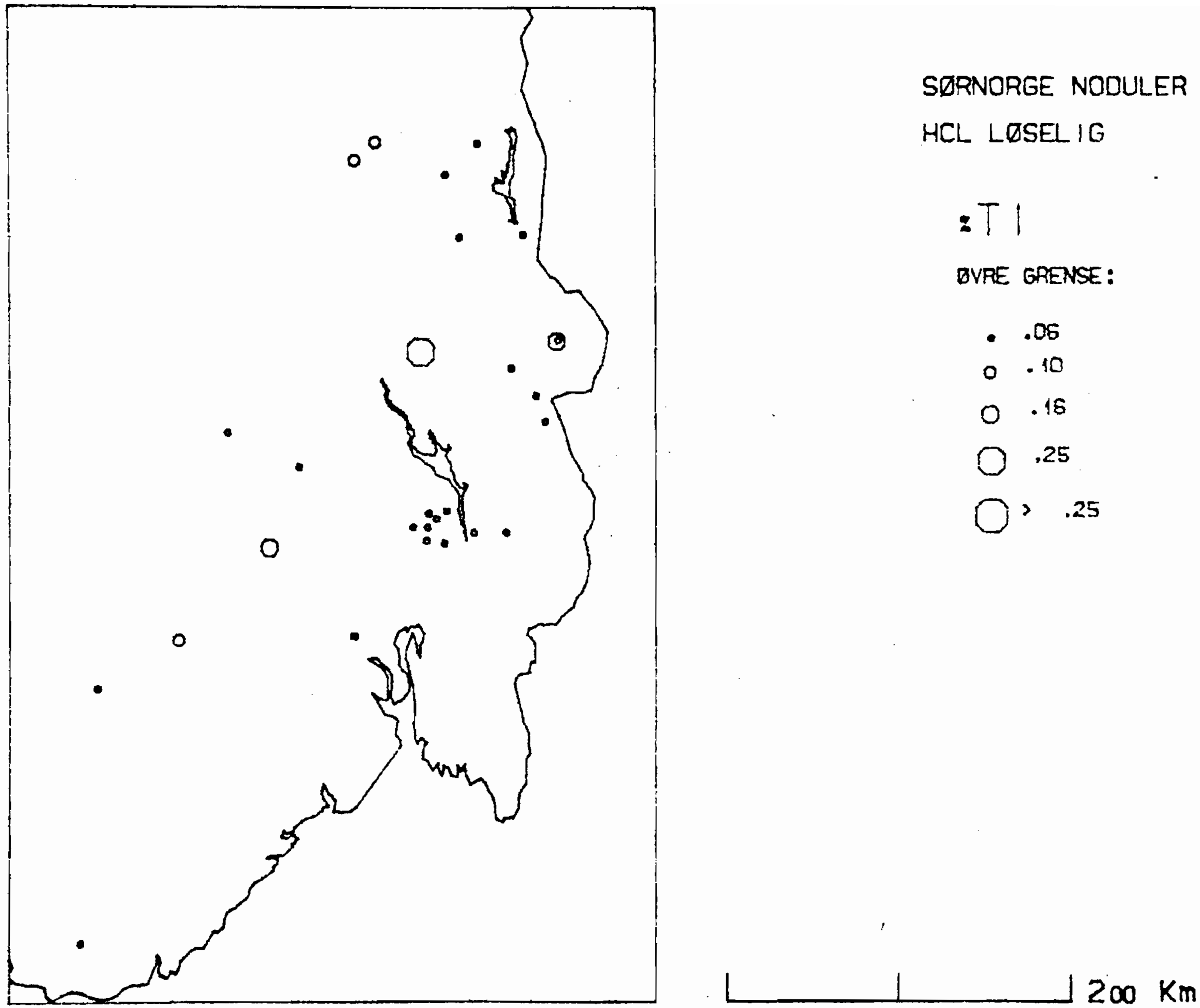

SØRNORGE NODULER
HCL-LØSELIG
% SI
ØVRE GRENSE:
.25
.39
> .39
200 Km



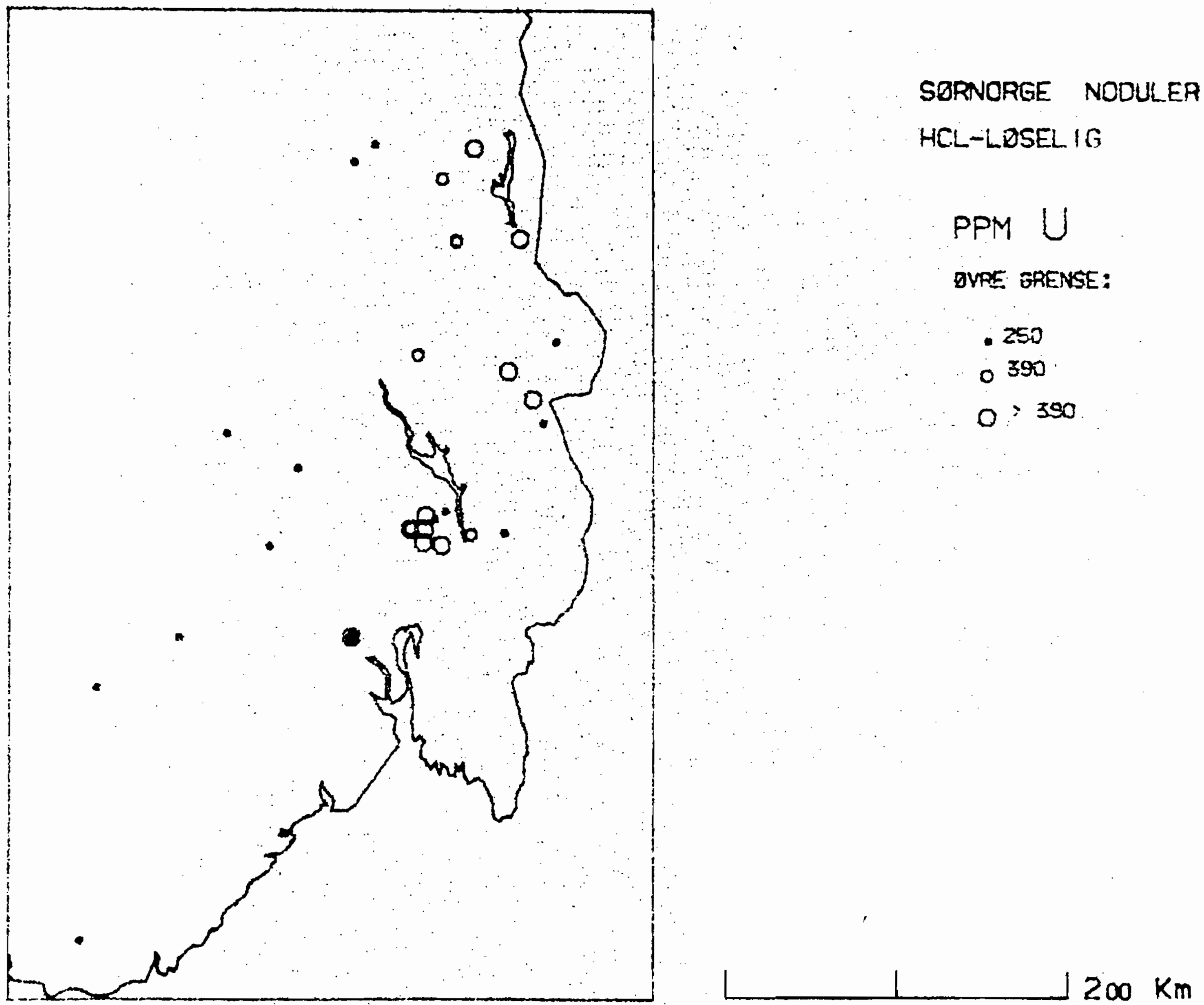
NGU-report 86.169. FIGURE 17.24



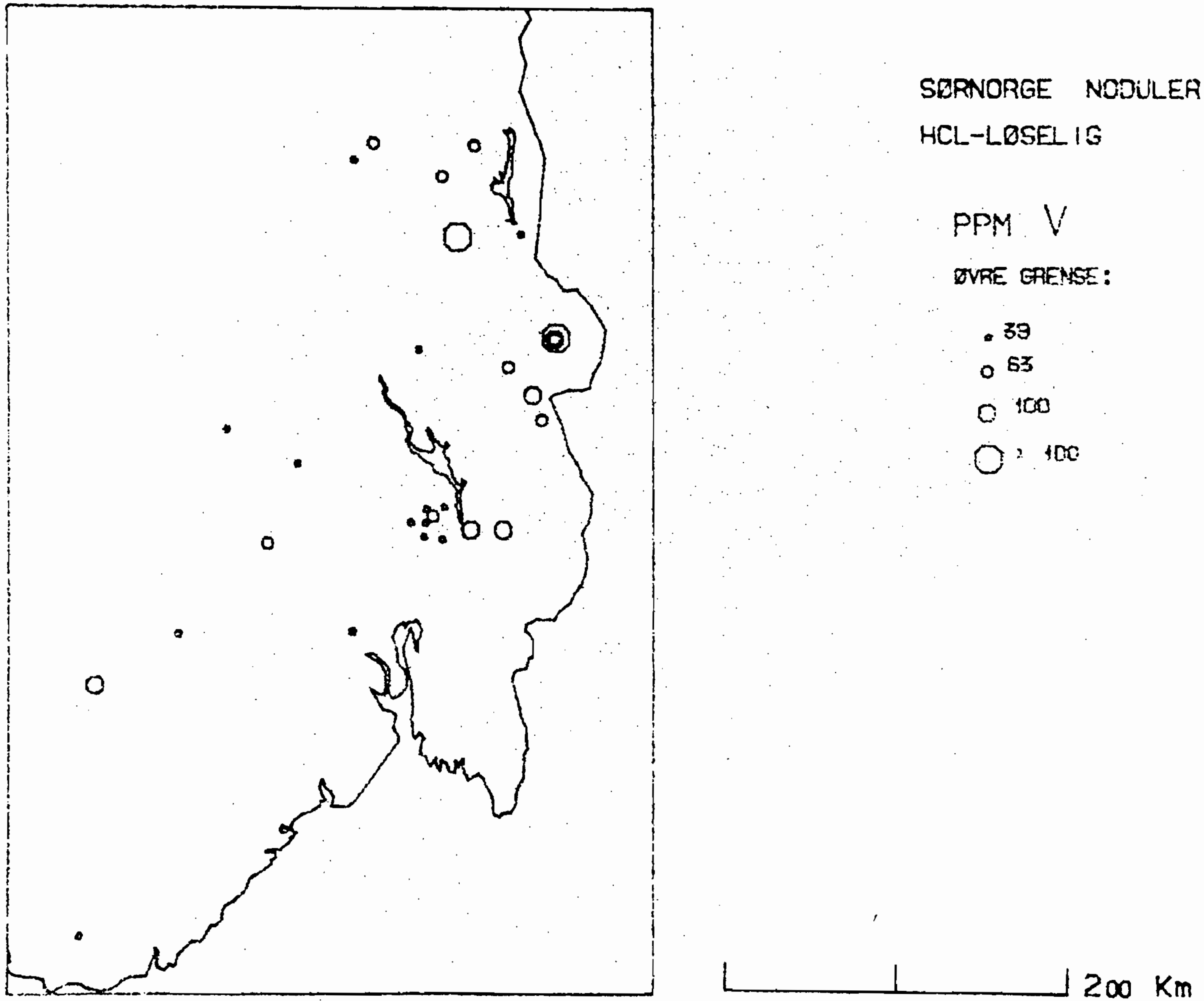
NGU-report 86.169. FIGURE 17.25



NGU-report 86.169. FIGURE 17.26



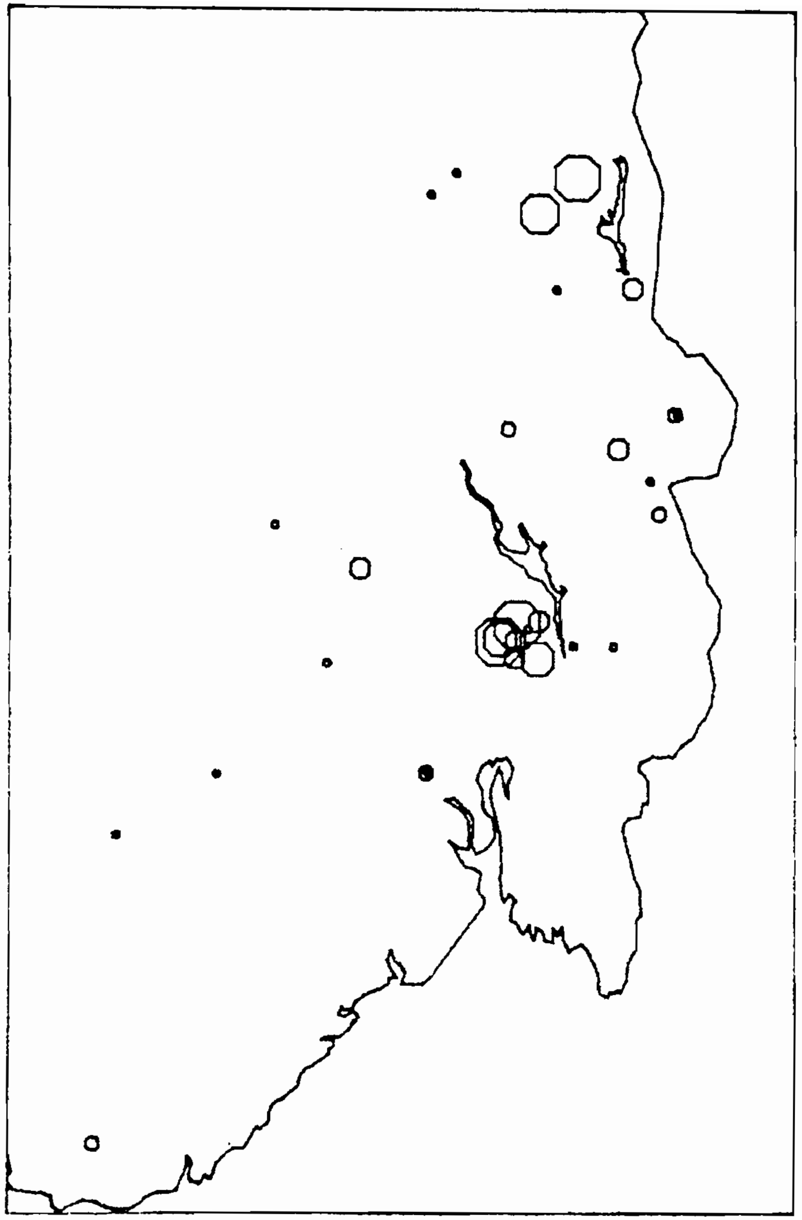
NGU-report 86.169. FIGURE 17.27



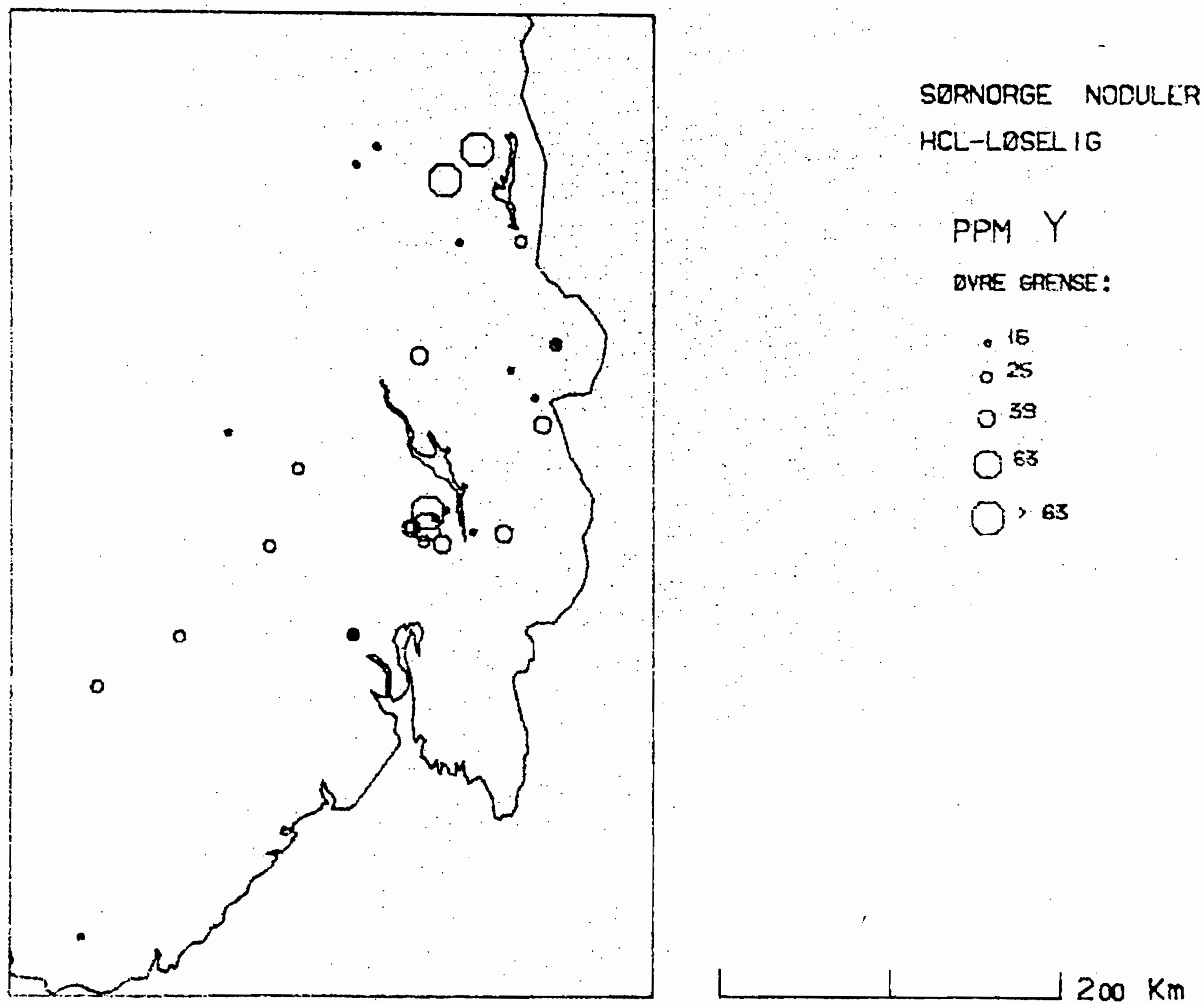
NGU-report 86.169. FIGURE 17.28

SØRNORGE NODULER

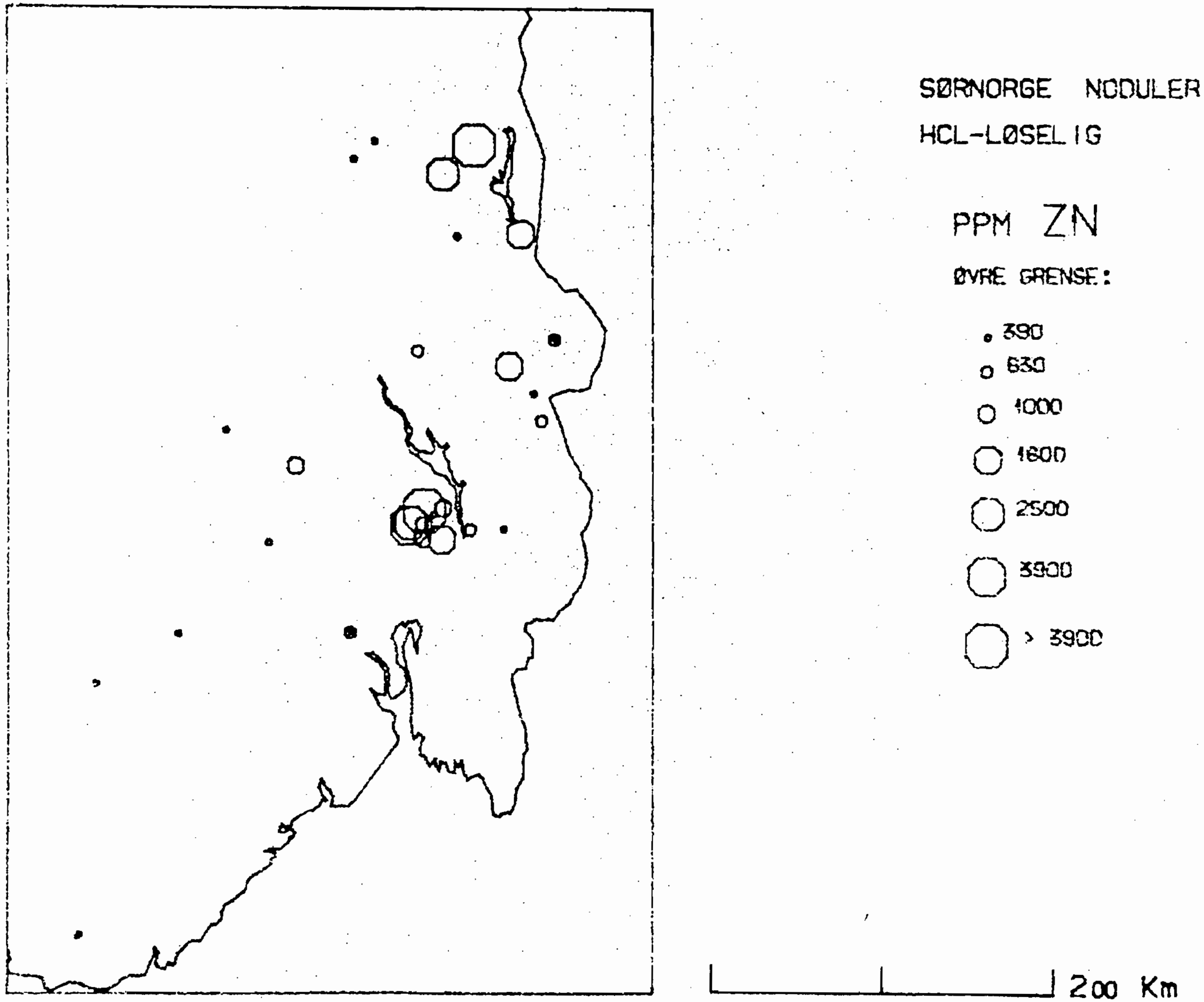
HCL-LØSELIG



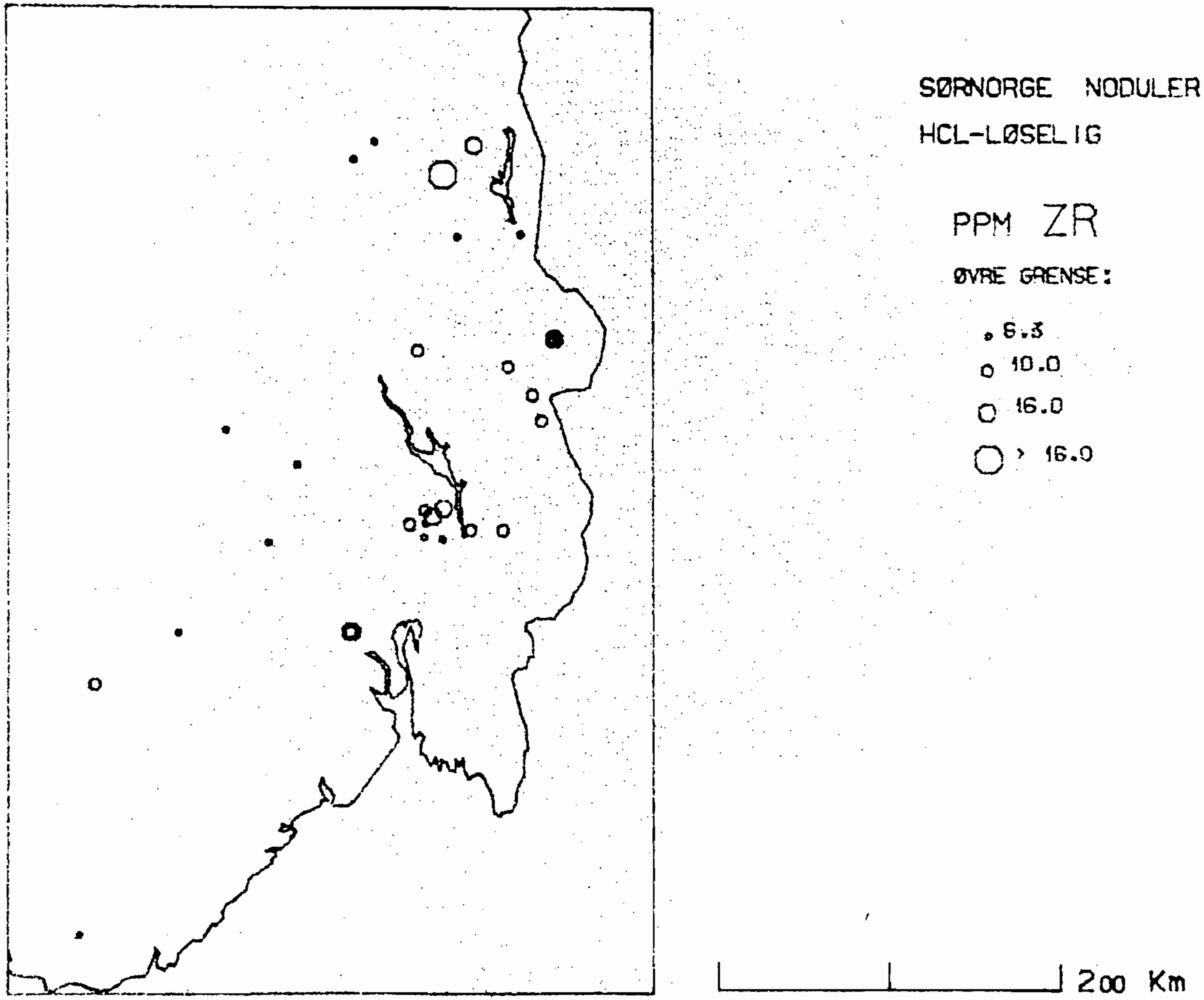
NGU-report 86.169. FIGURE 17.29



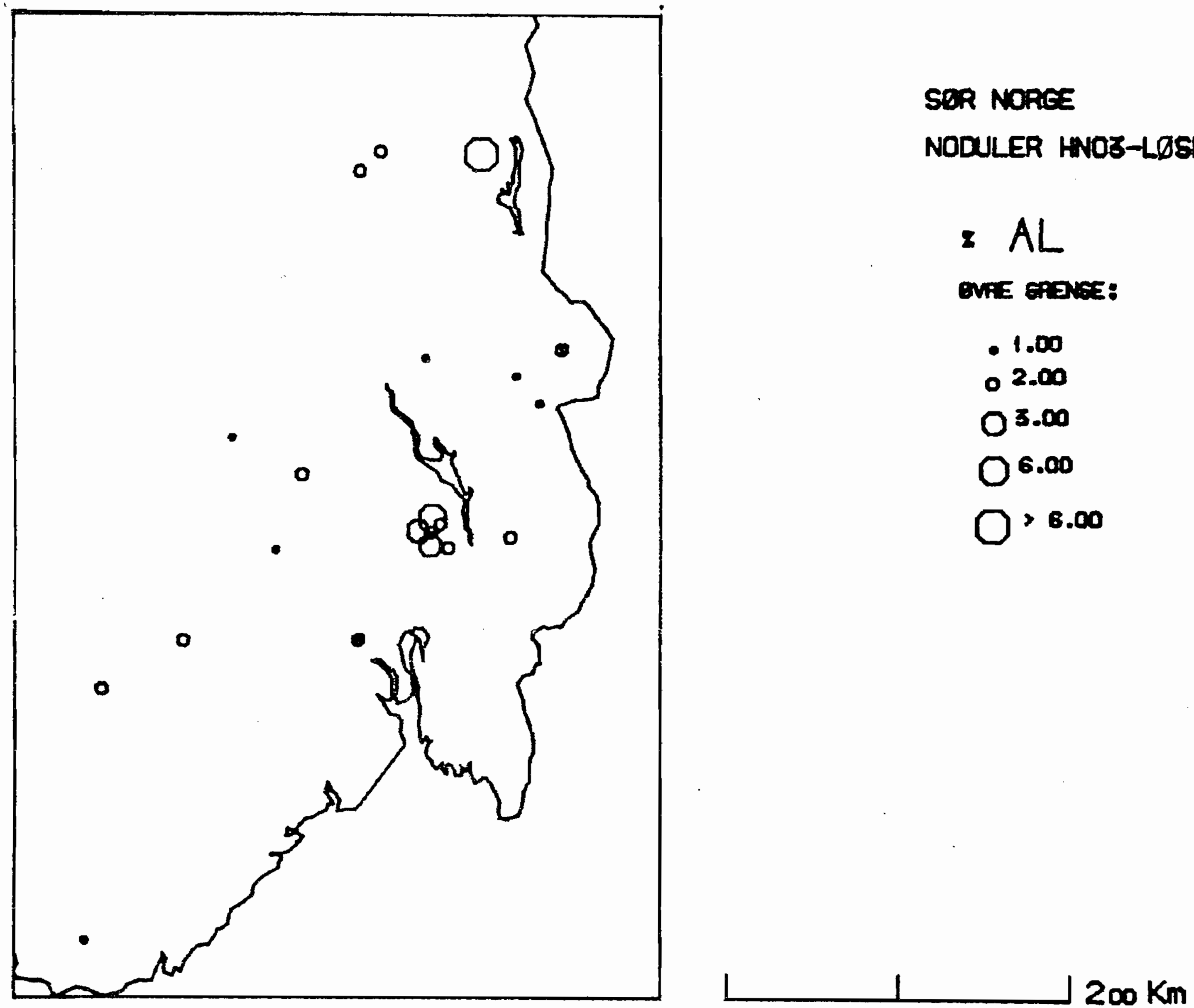
NGU-report 86.169. FIGURE 17.30



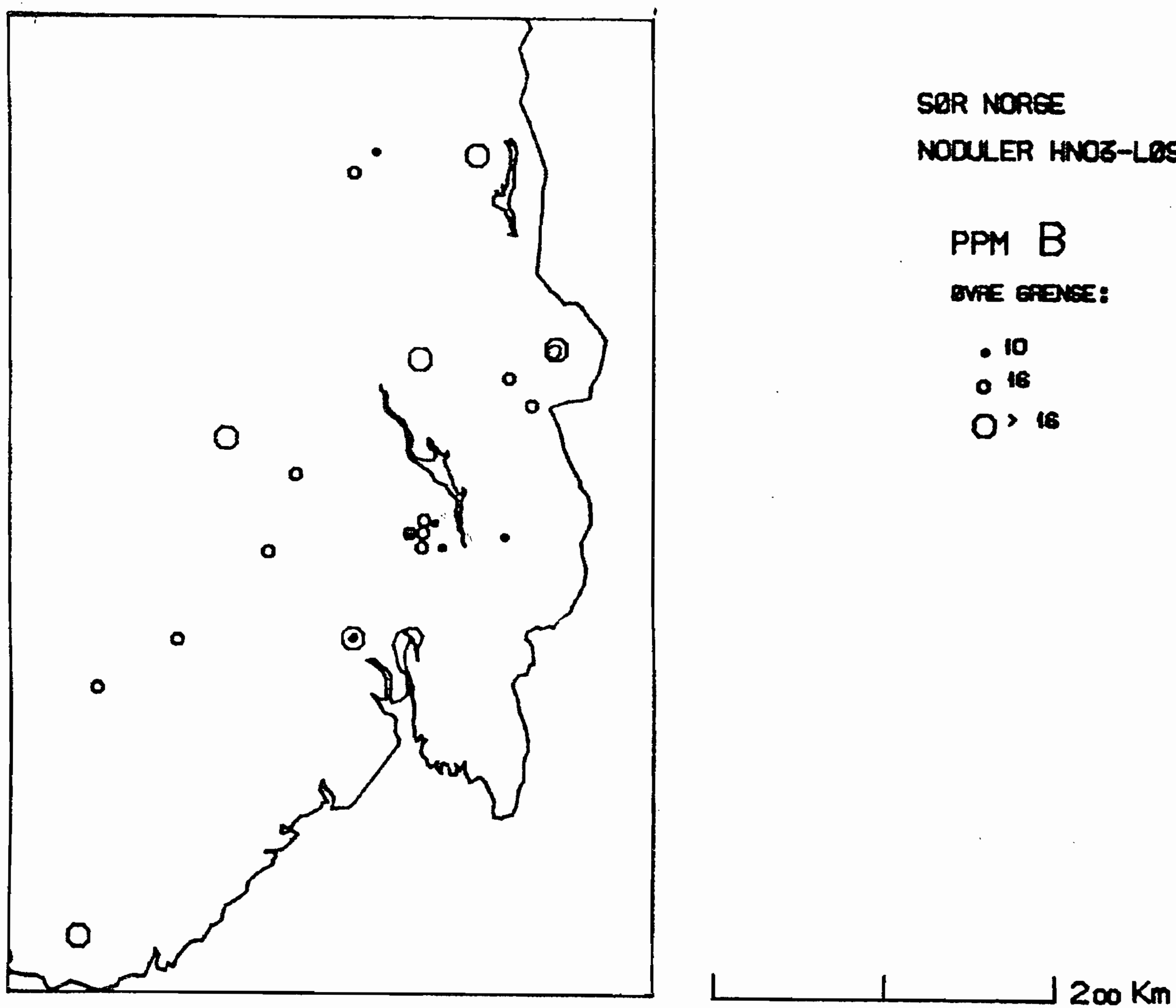
NGU-report 86.169. FIGURE 17.31

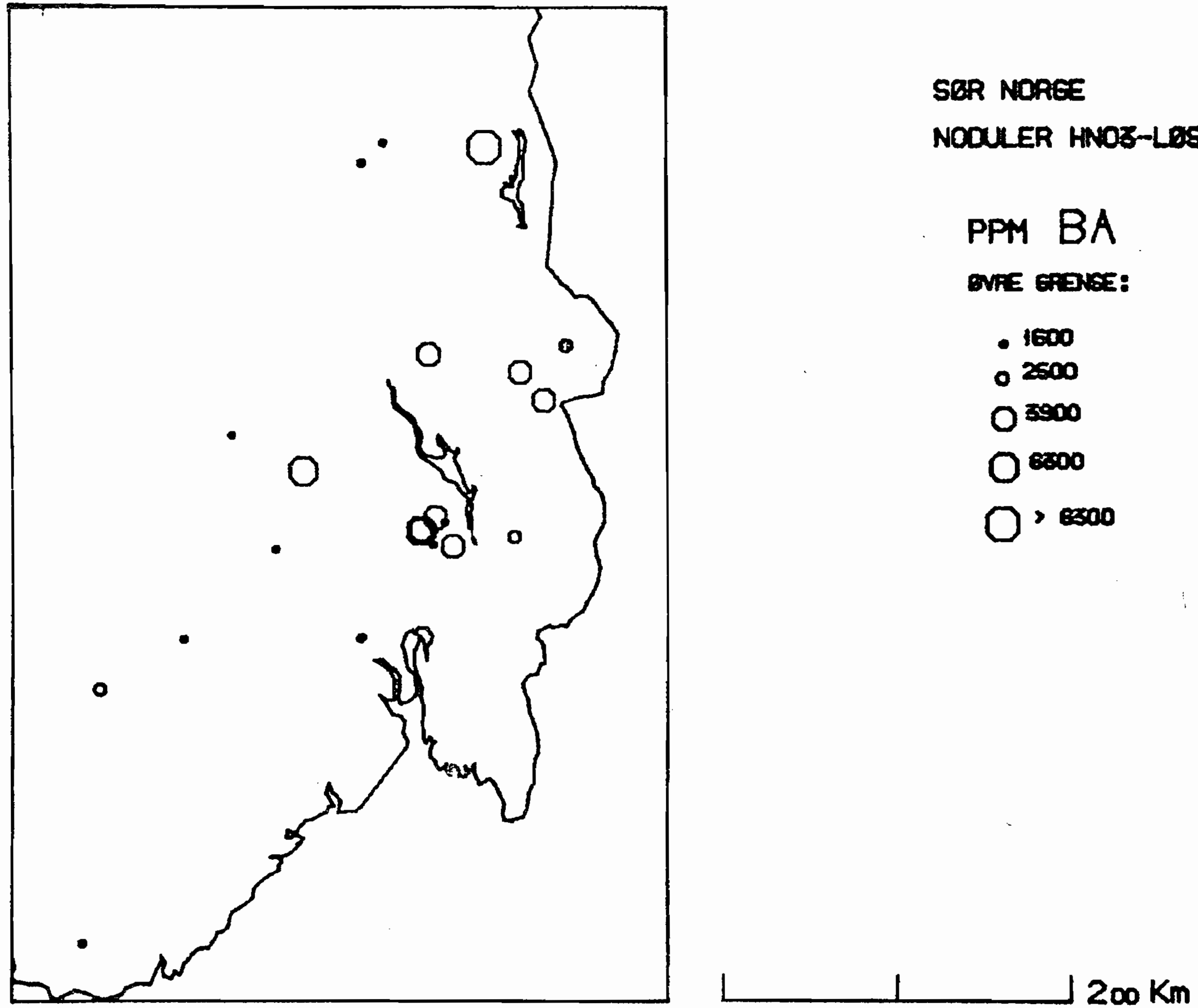


NGU-report 86.169. FIGURE 17.32

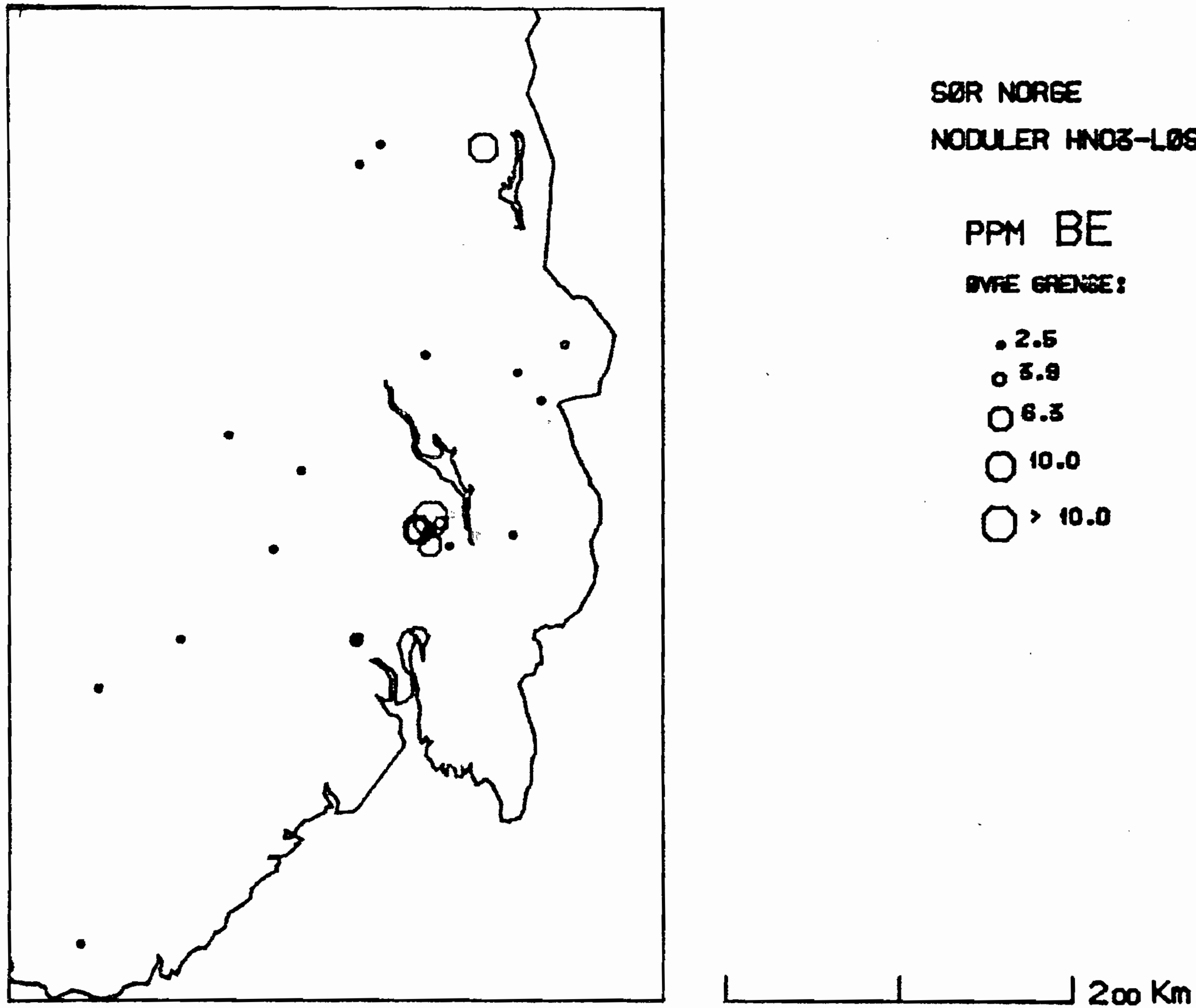


NGU-report 86.169. FIGURE 18.1

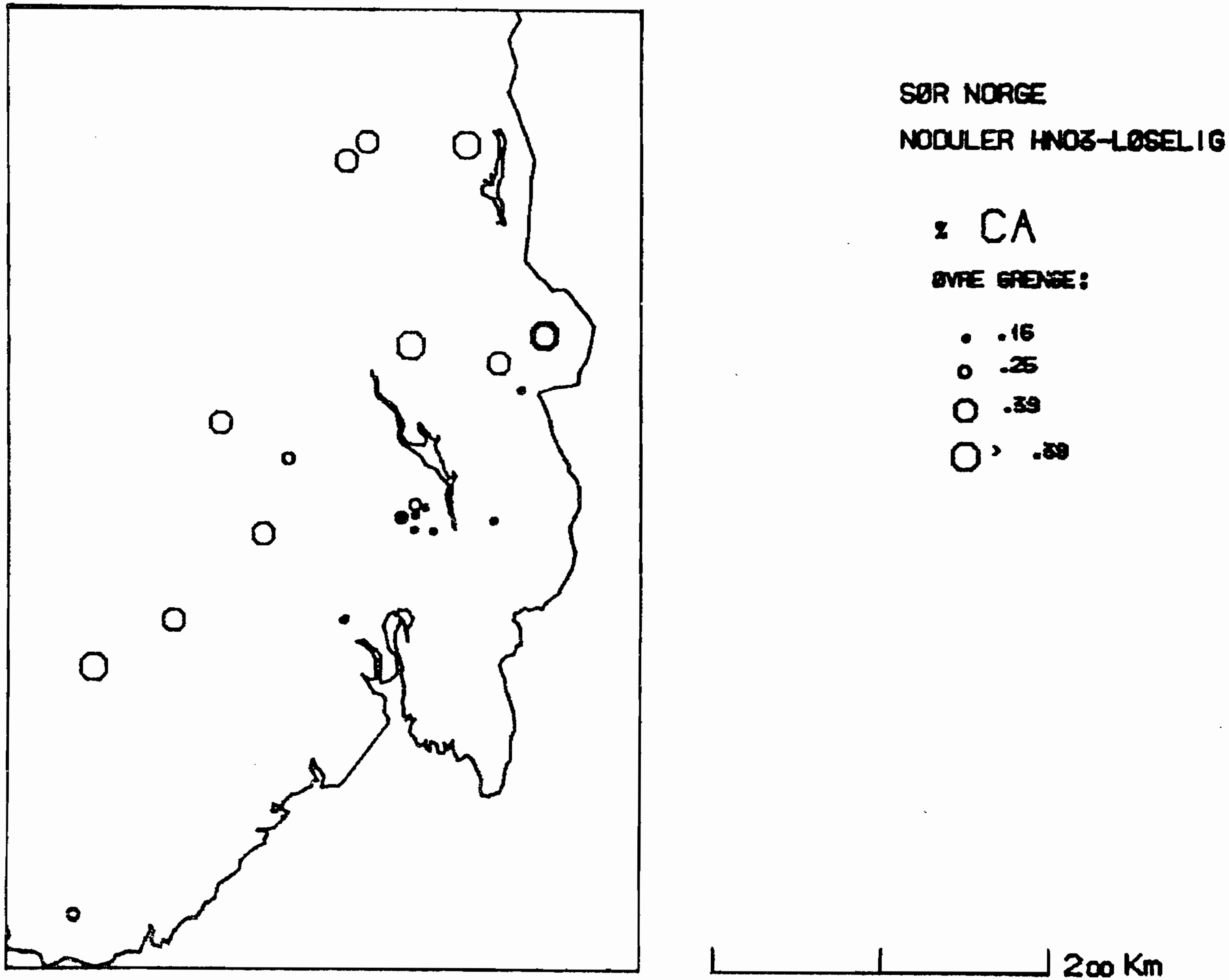

SØR NORGE
NODULER HNO3-LØSELIG
PPM B
ØVRE GRENSE:
10
16
> 16
200 Km



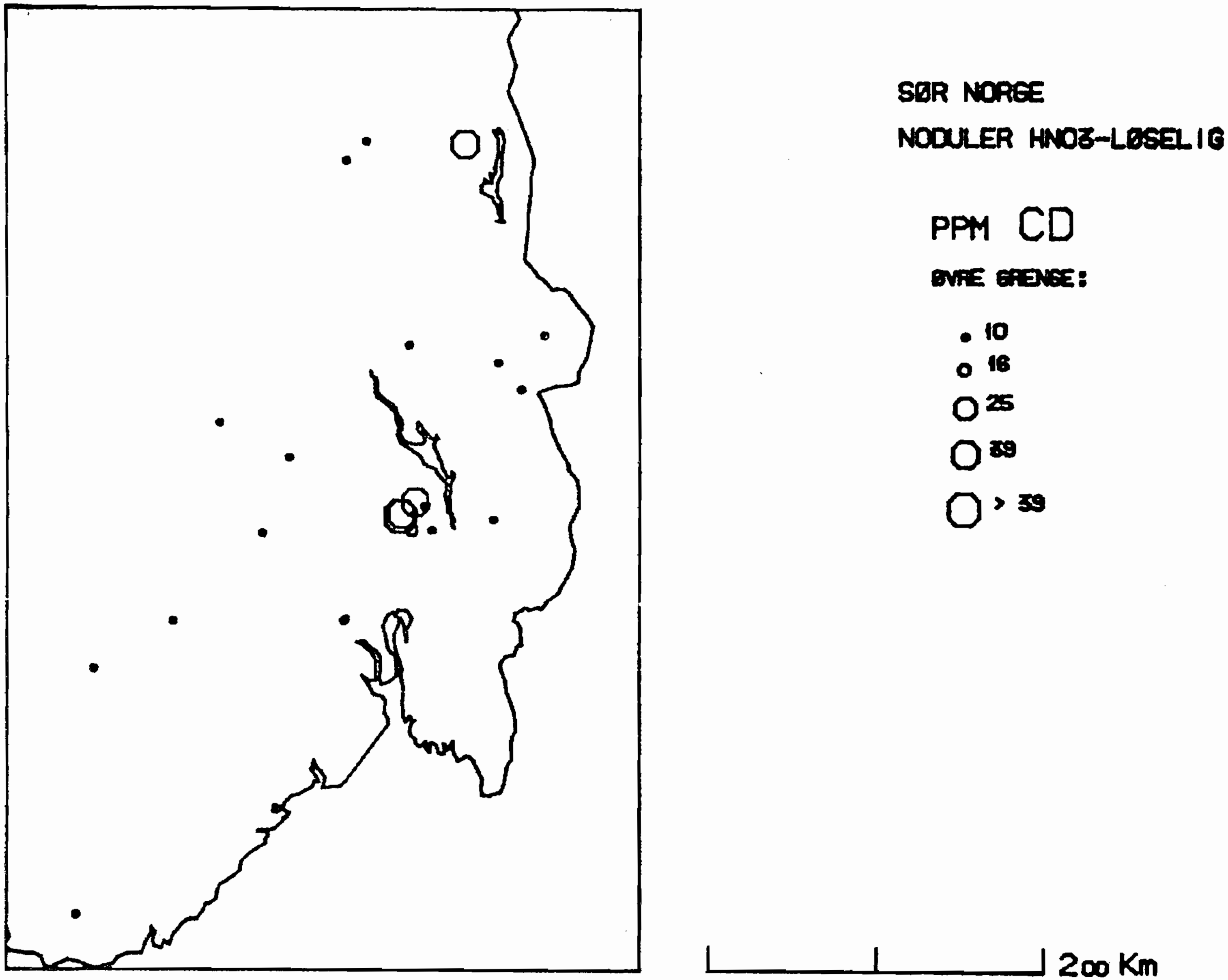
NGU-report 86.169. FIGURE 18.3



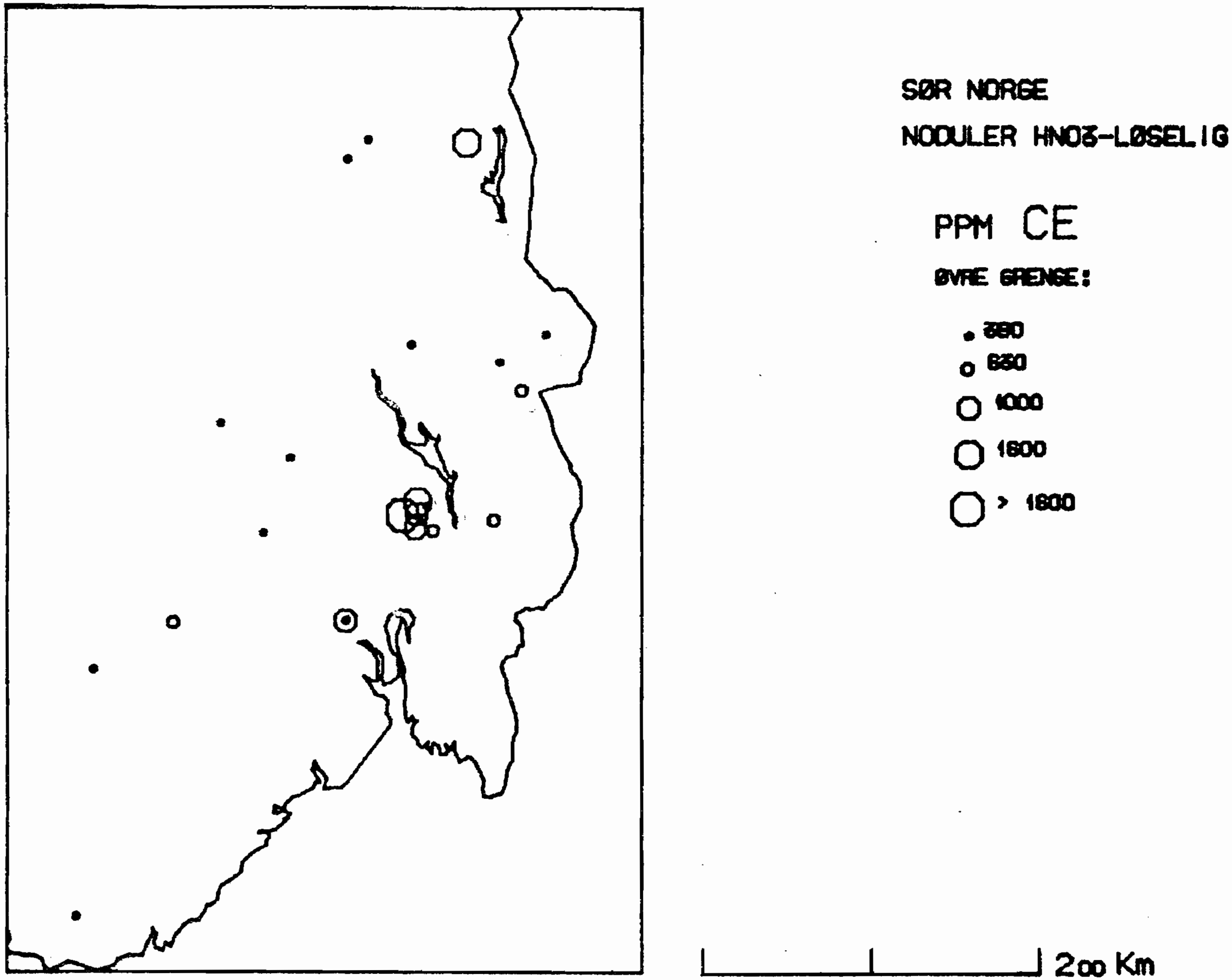
NGU-report 86.169. FIGURE 18.4



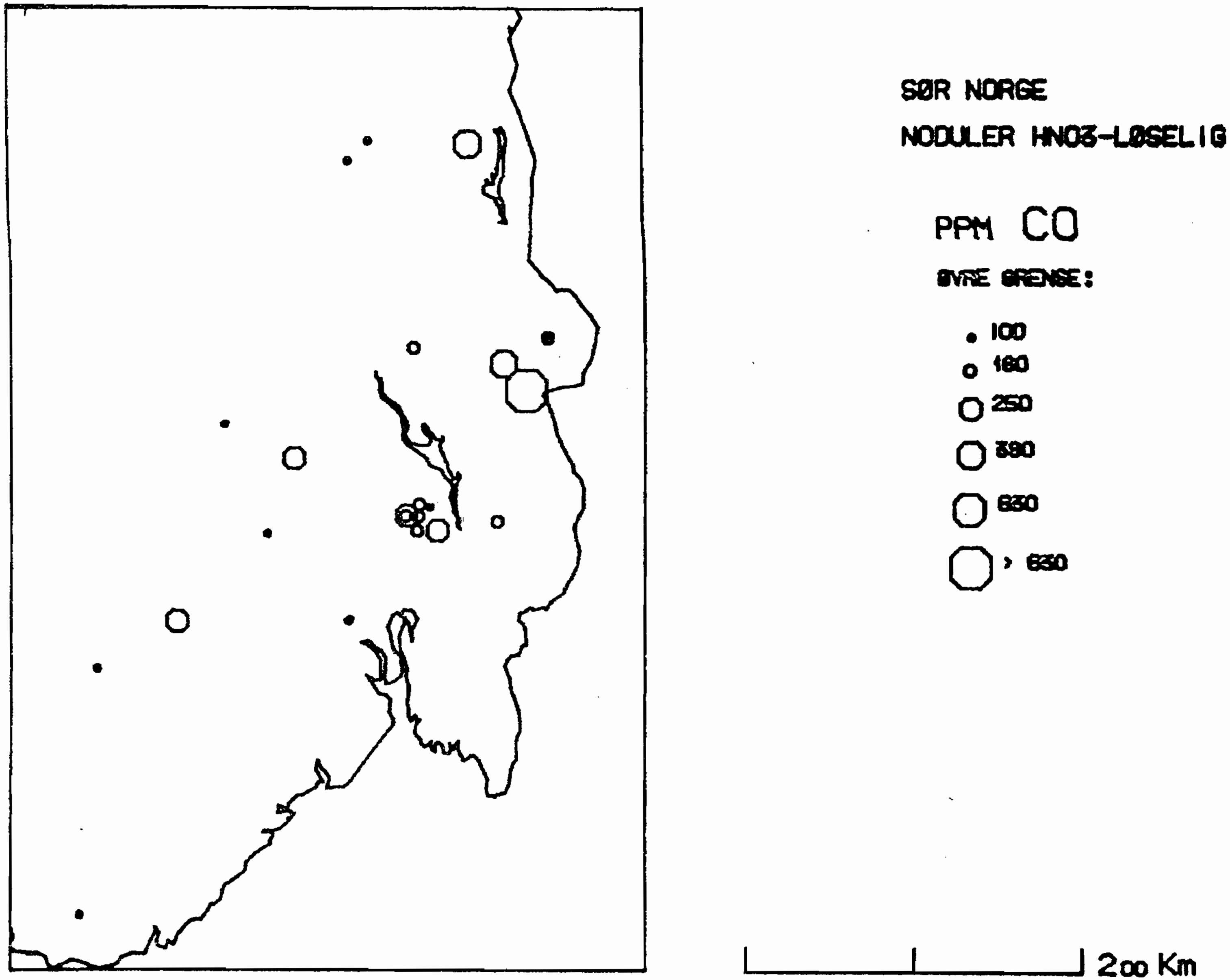
NGU-report 86.169. FIGURE 18.5



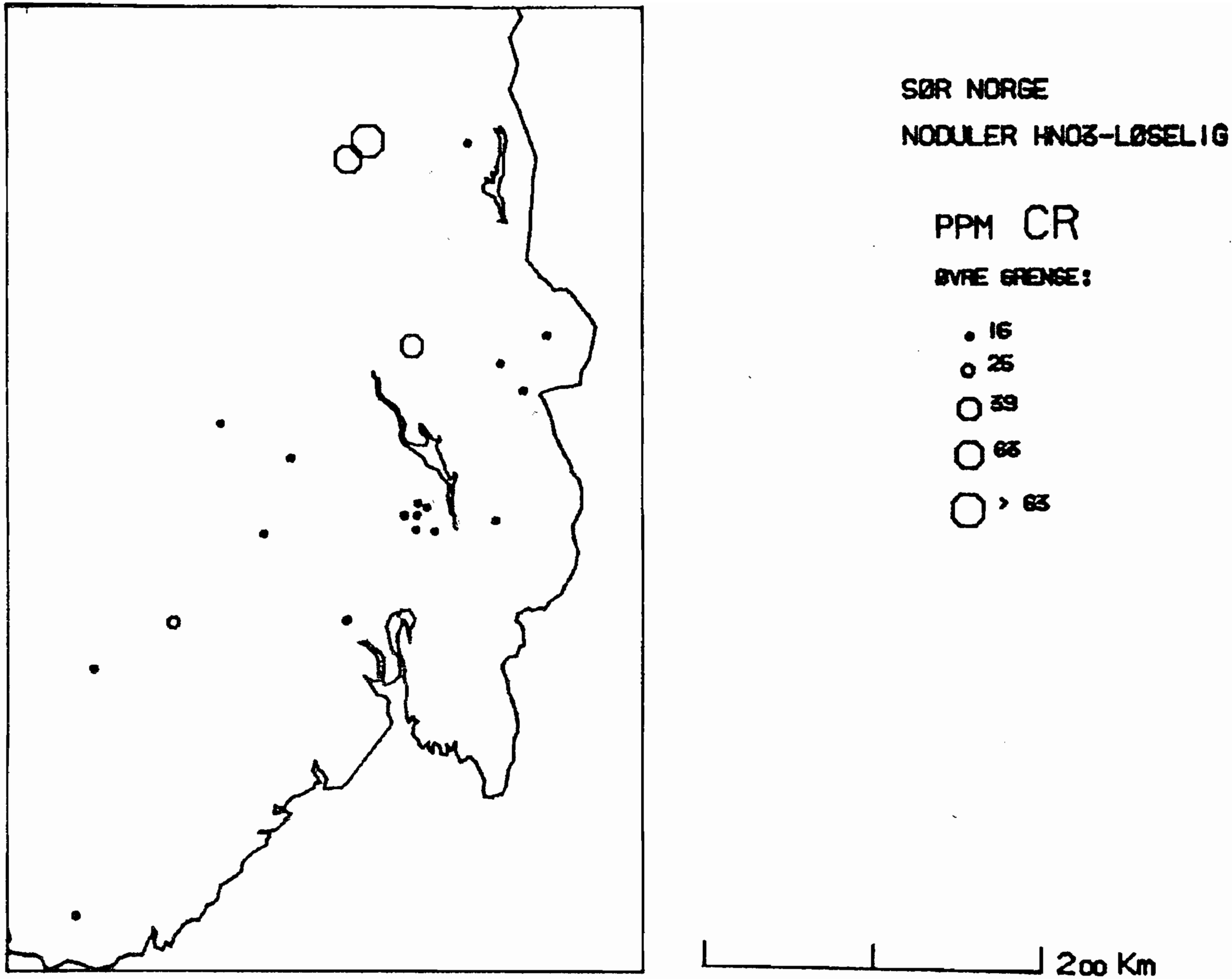
NGU-report 86.169. FIGURE 18.6



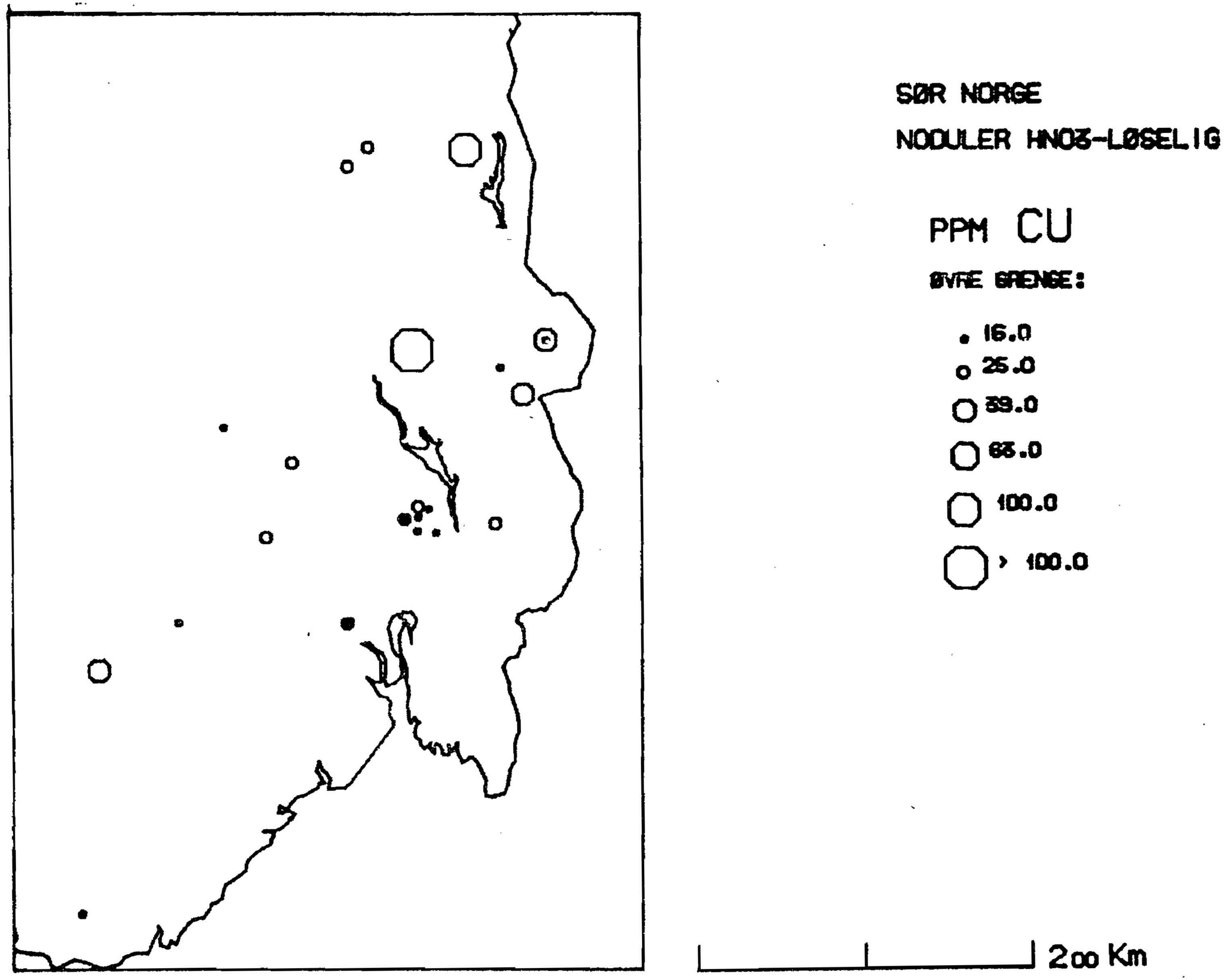
NGU-report 86.169. FIGURE 18.7



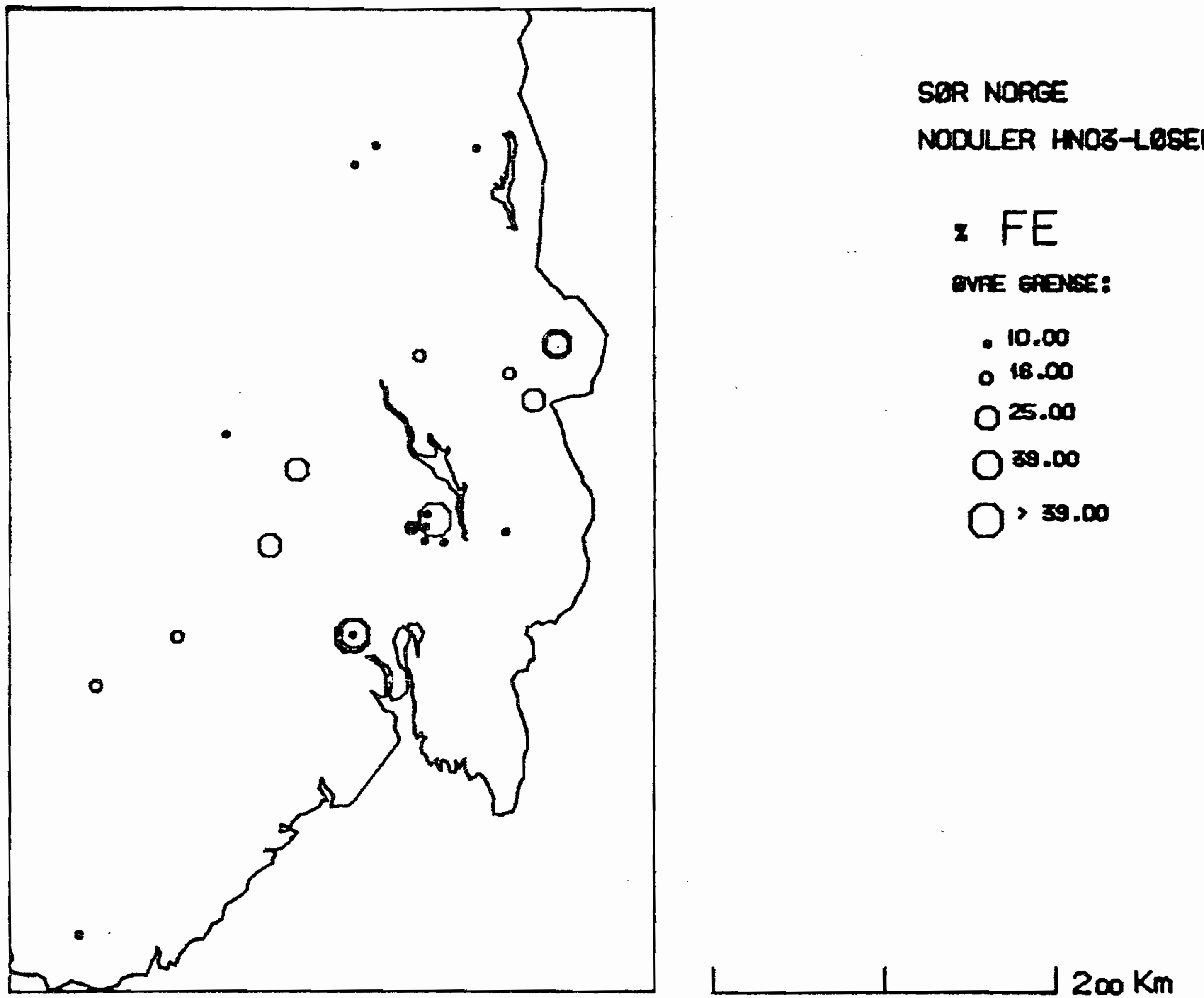
NGU-report 86.169. FIGURE 18.8



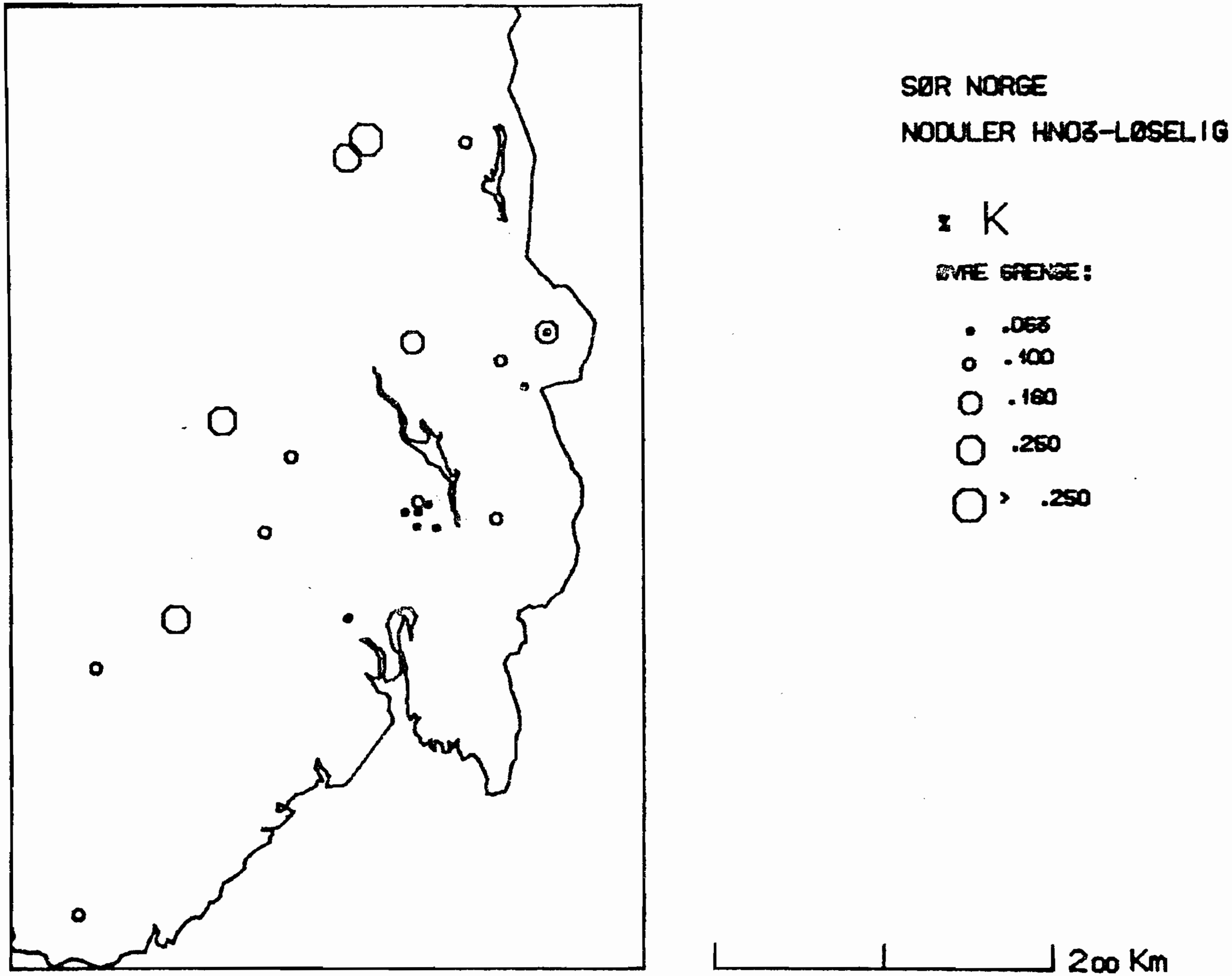
NGU-report 86.169. FIGURE 18.9



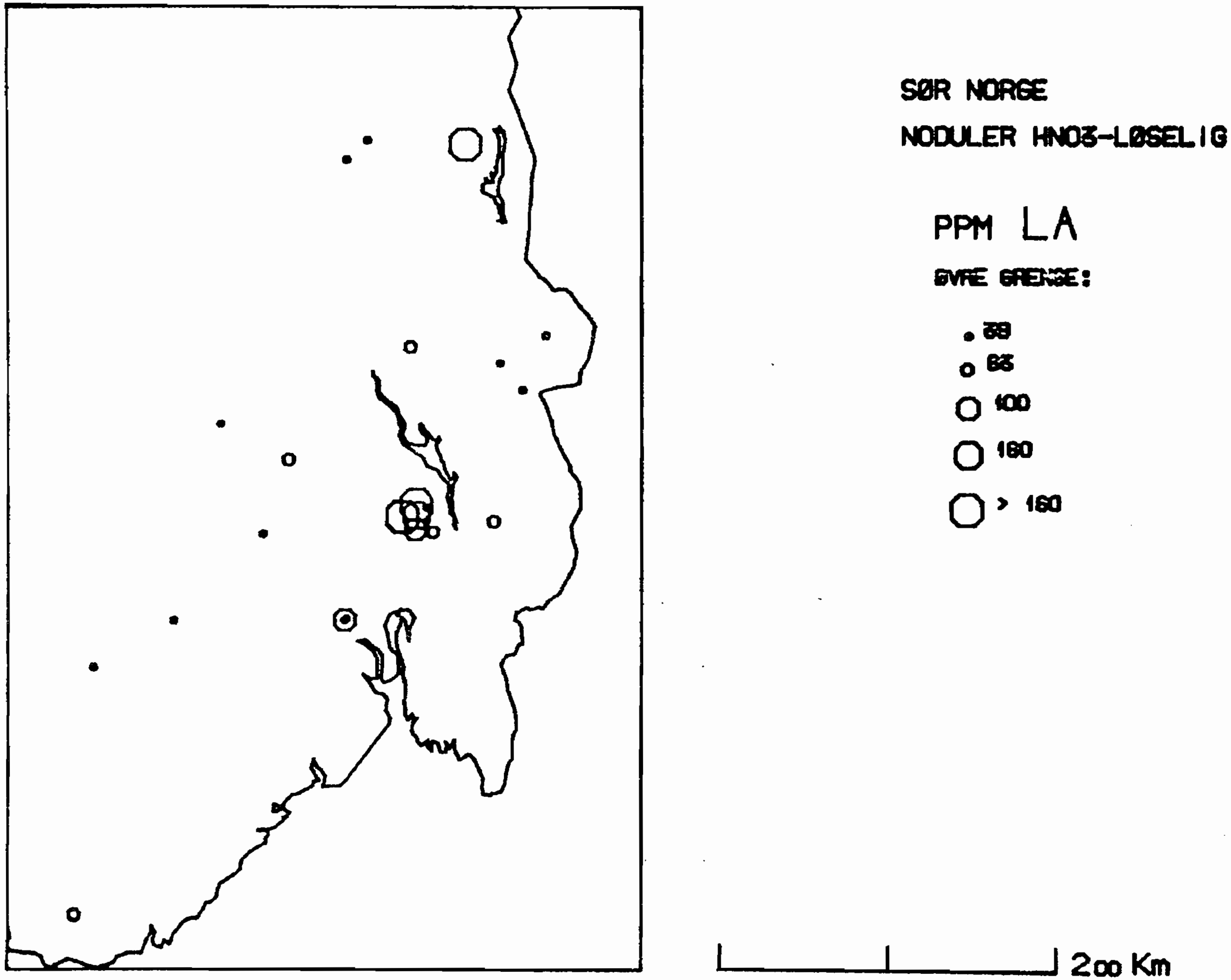
NGU-report 86.169. FIGURE 18.10



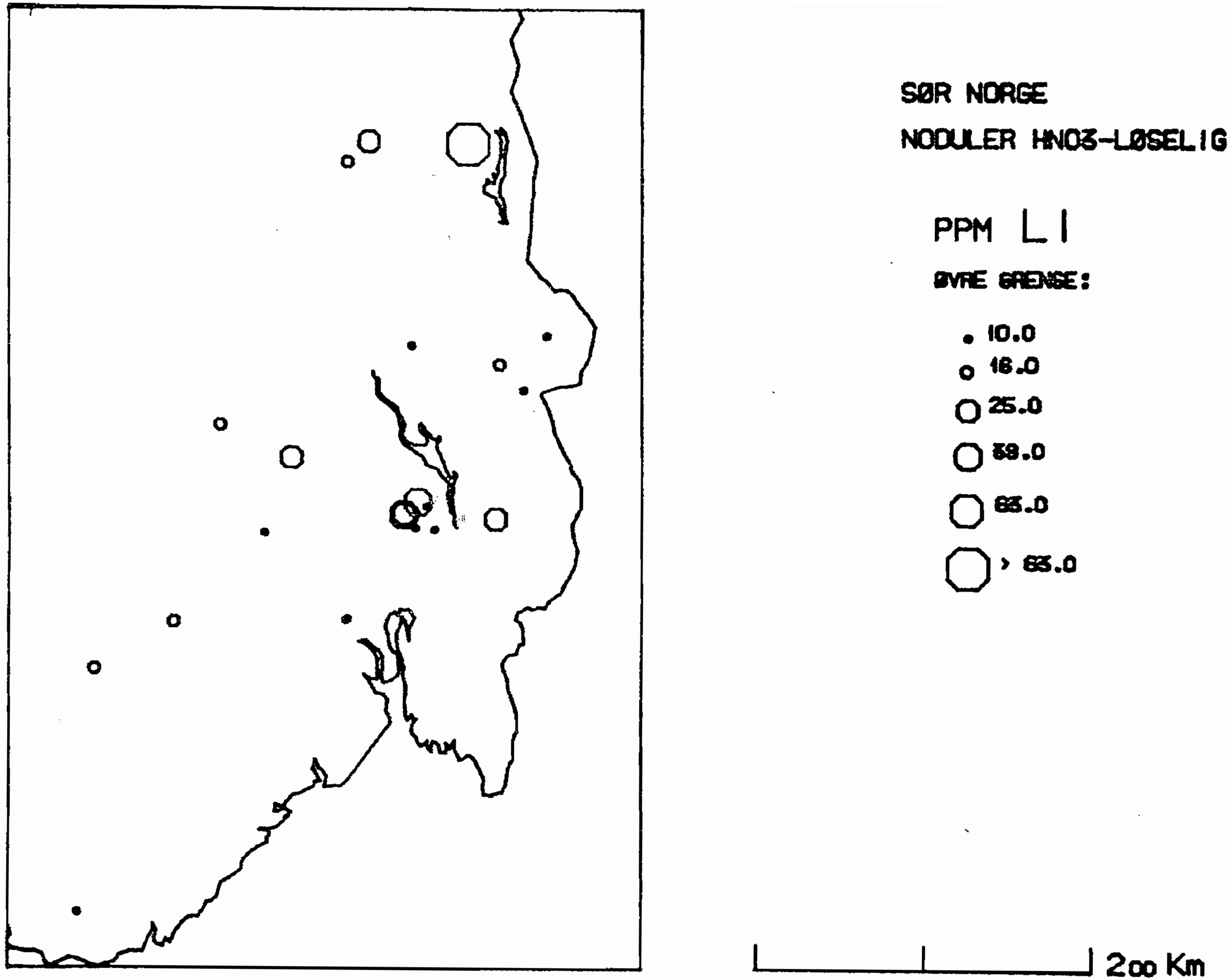
NGU-report 86.169. FIGURE 18.11



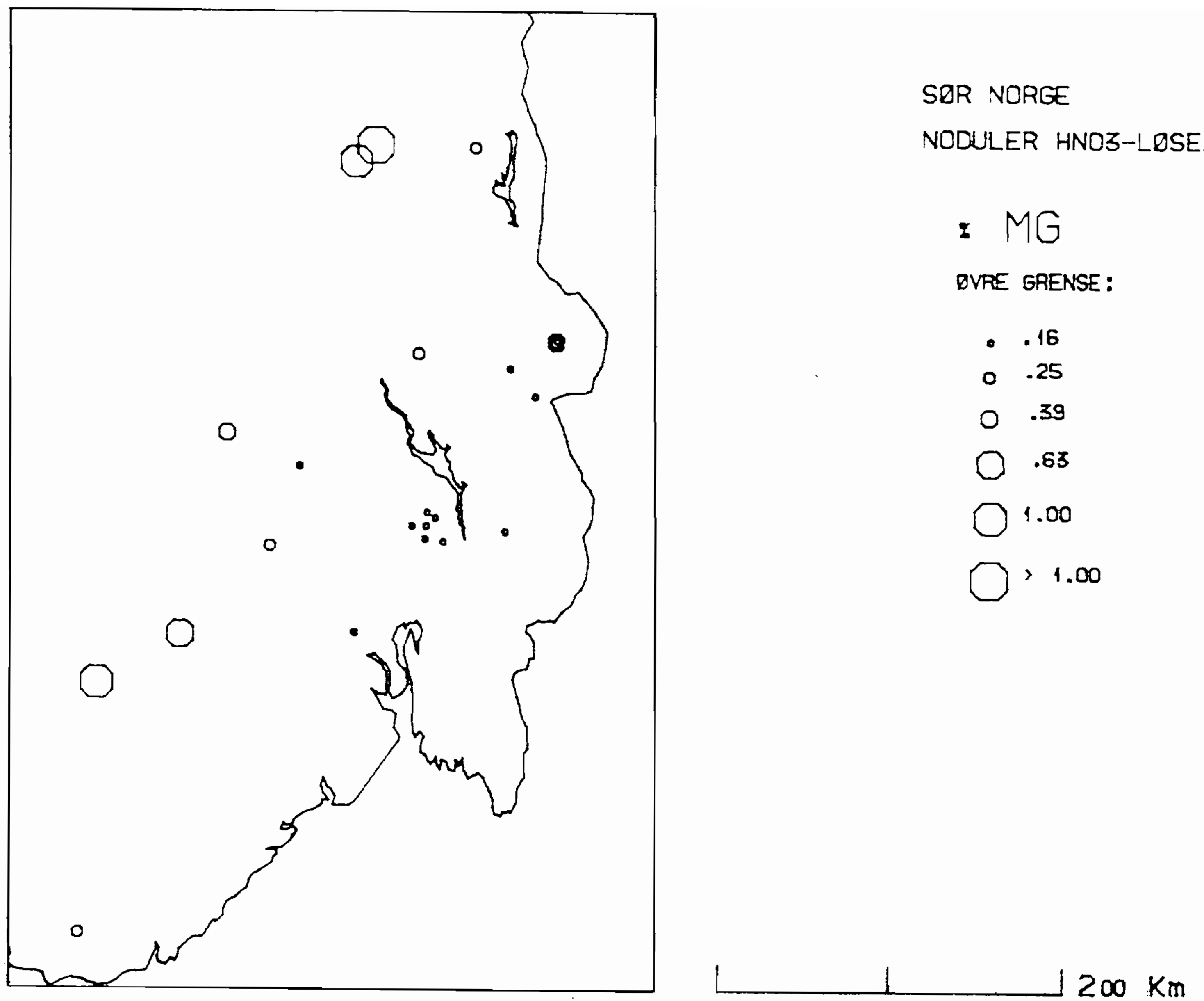
NGU-report 86.169. FIGURE 18.12



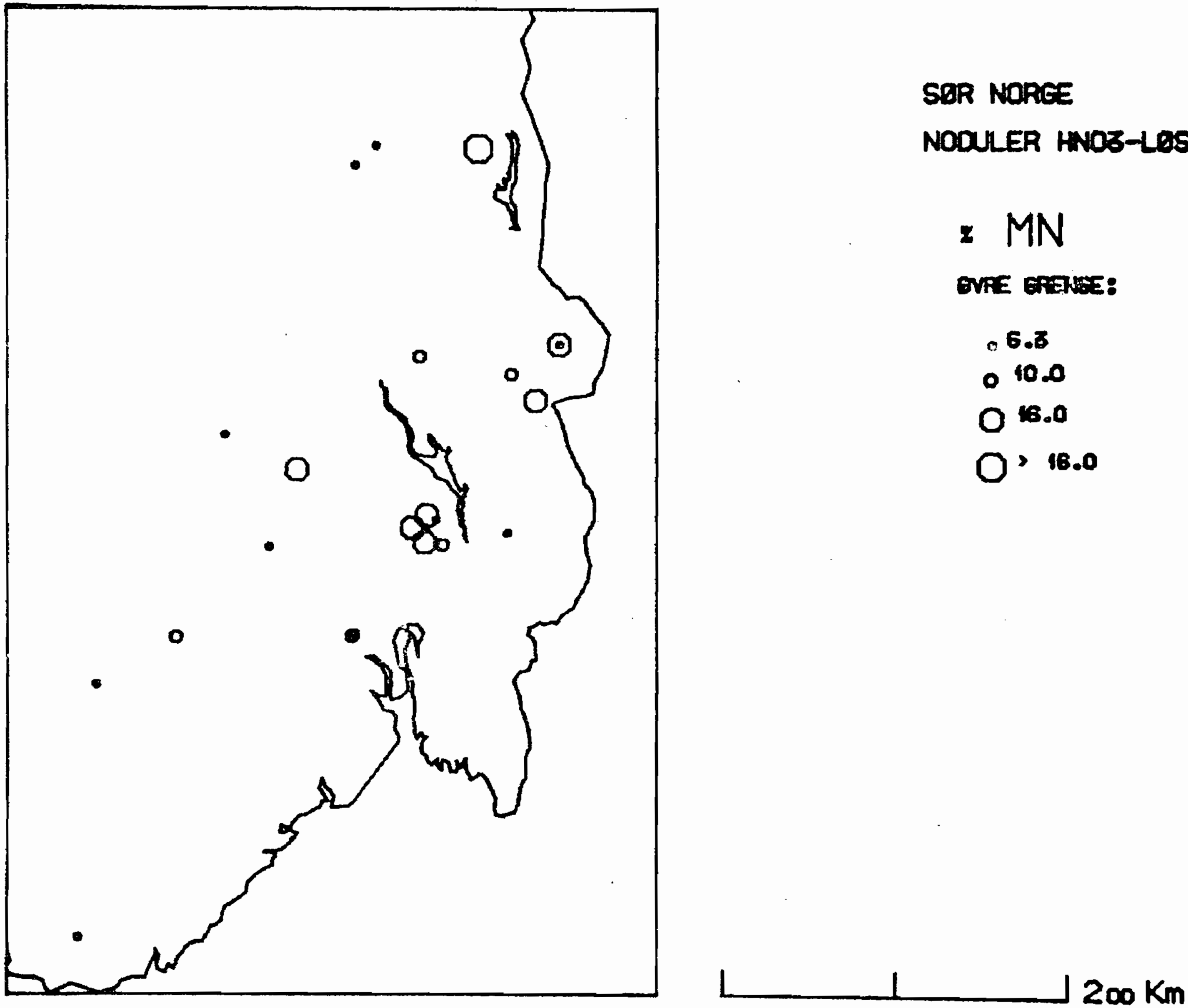
NGU-report 86.169. FIGURE 18.13



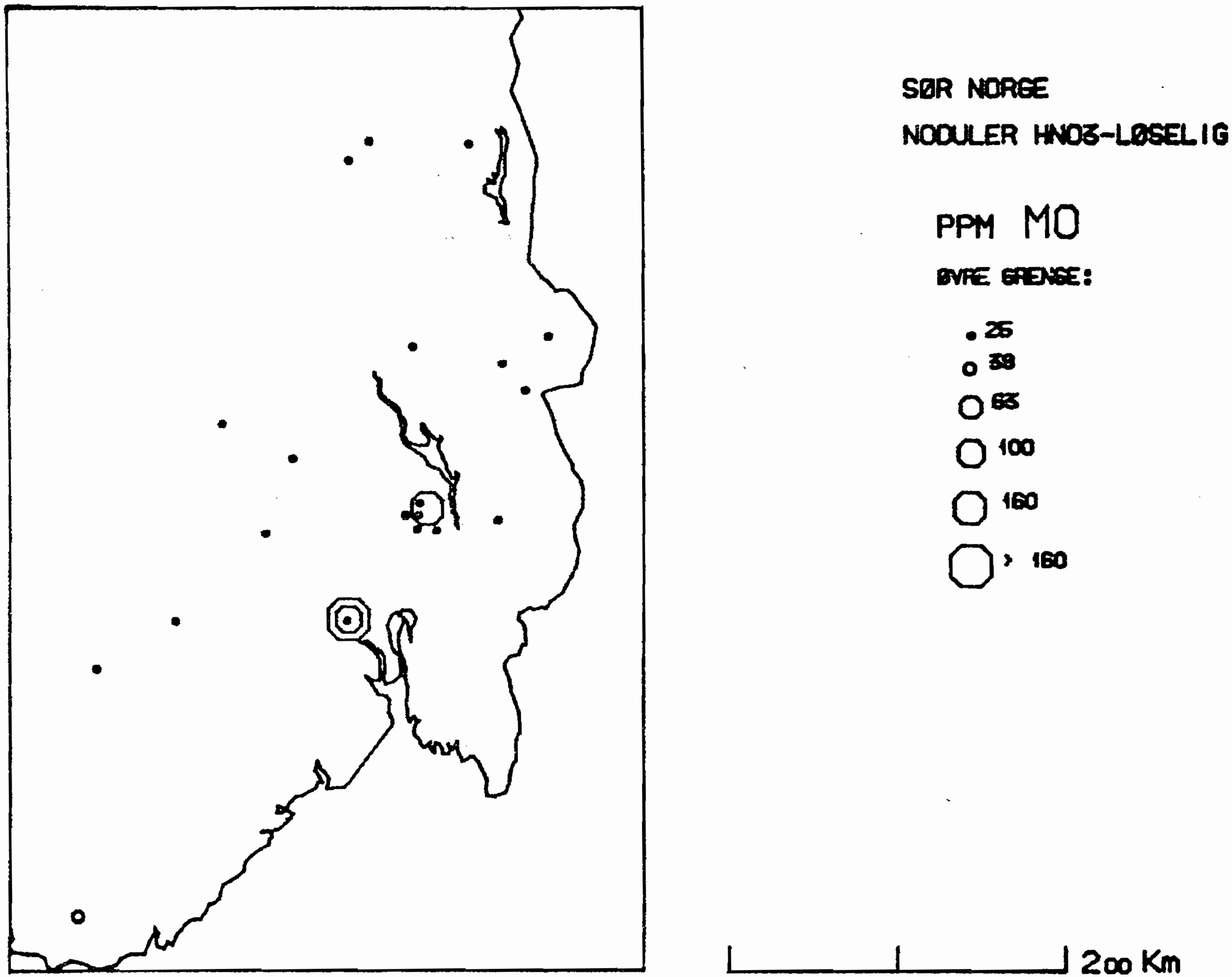
NGU-report 86.169. FIGURE 18.14



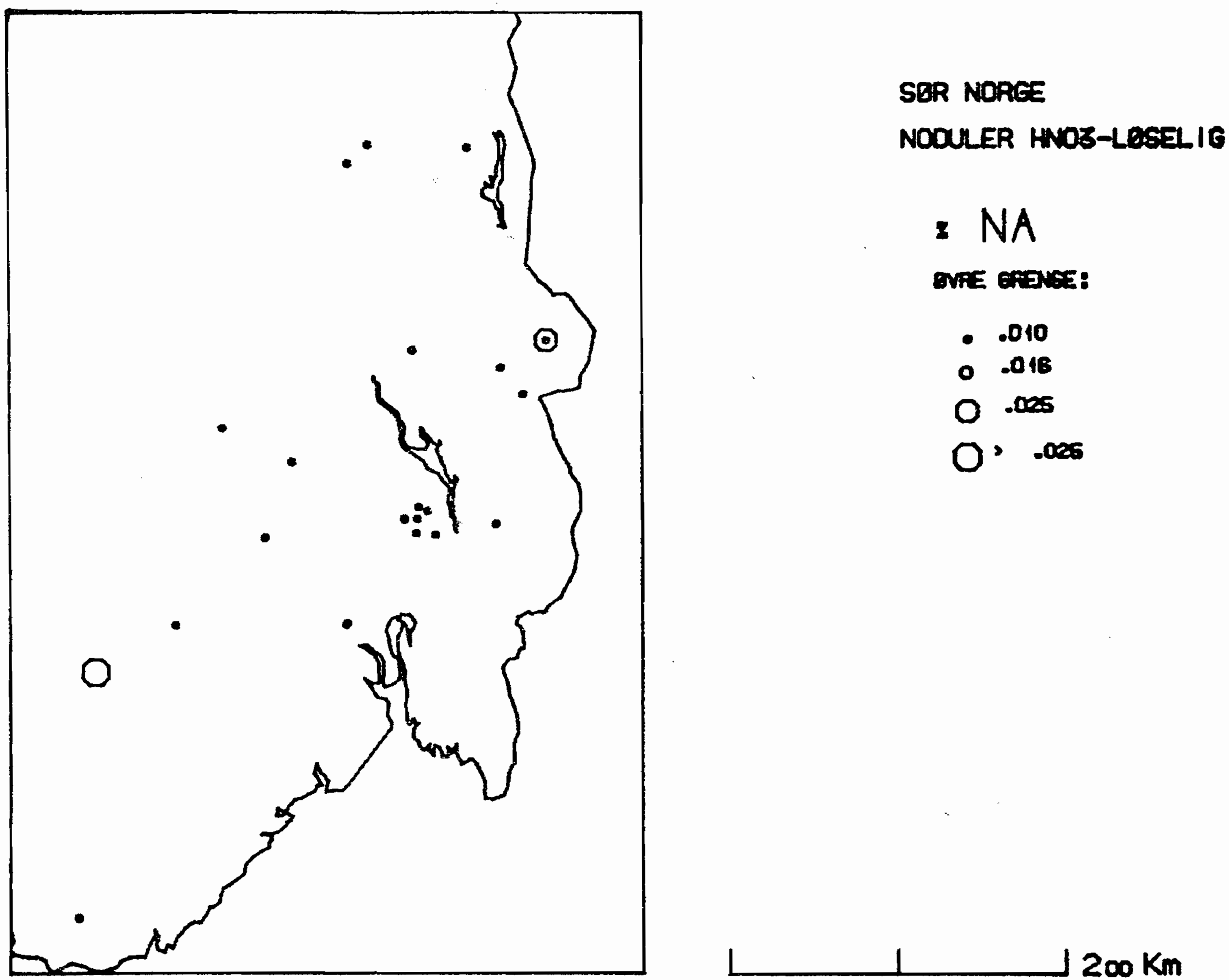
NGU-report 86.169. FIGURE 18.15



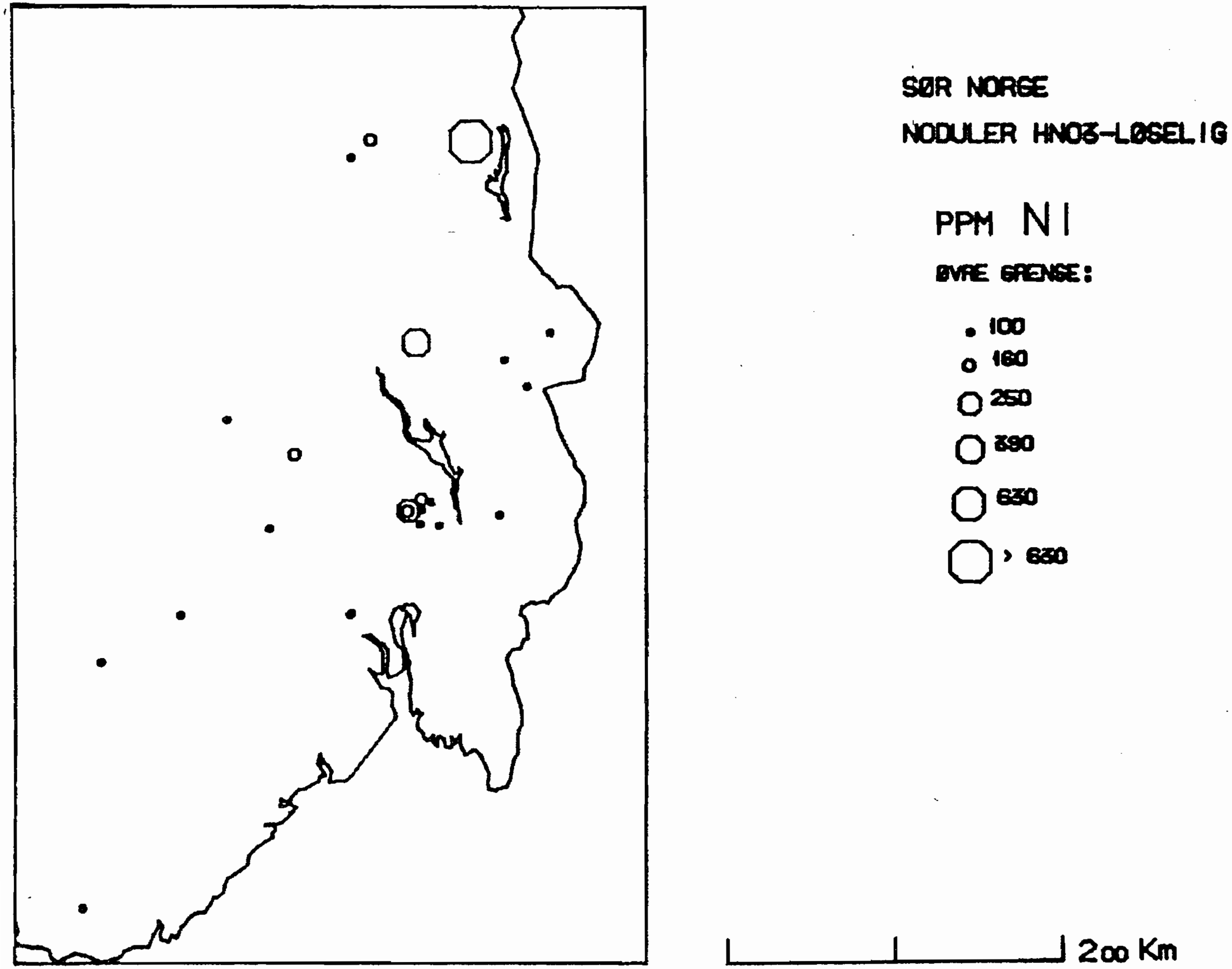
NGU-report 86.169. FIGURE 18.16



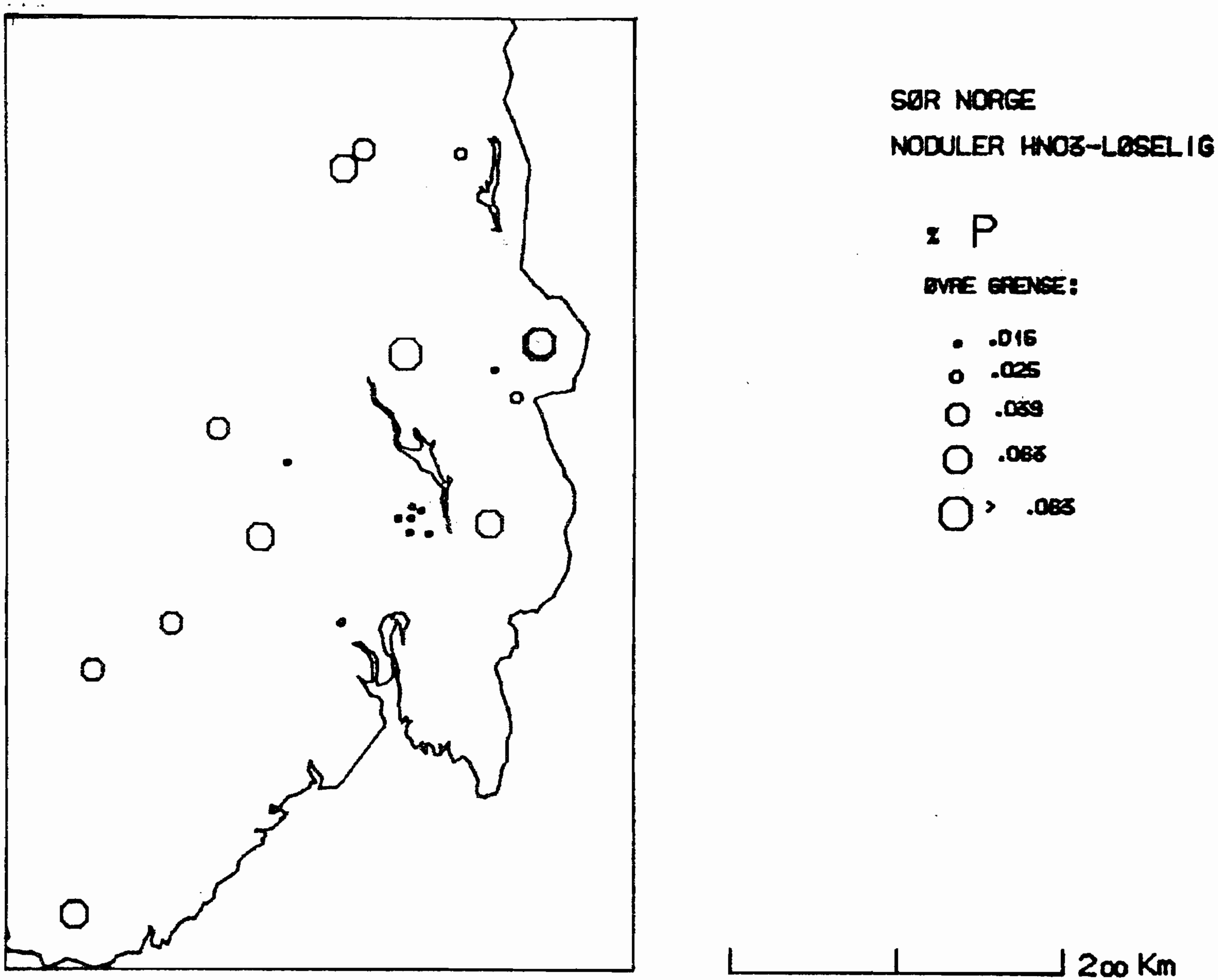
NGU-report 86.169. FIGURE 18.17



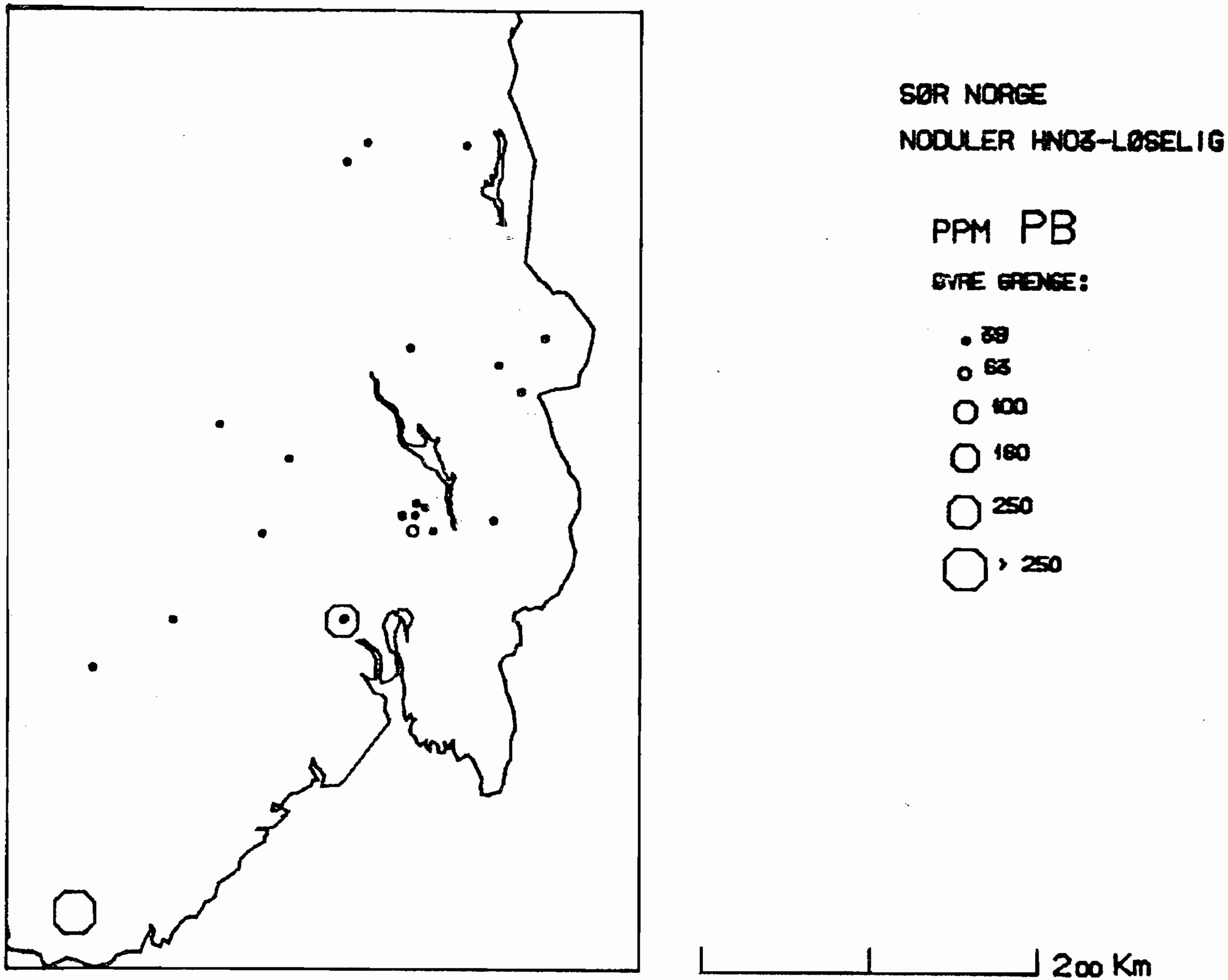
NGU-report 86.169. FIGURE 18.18



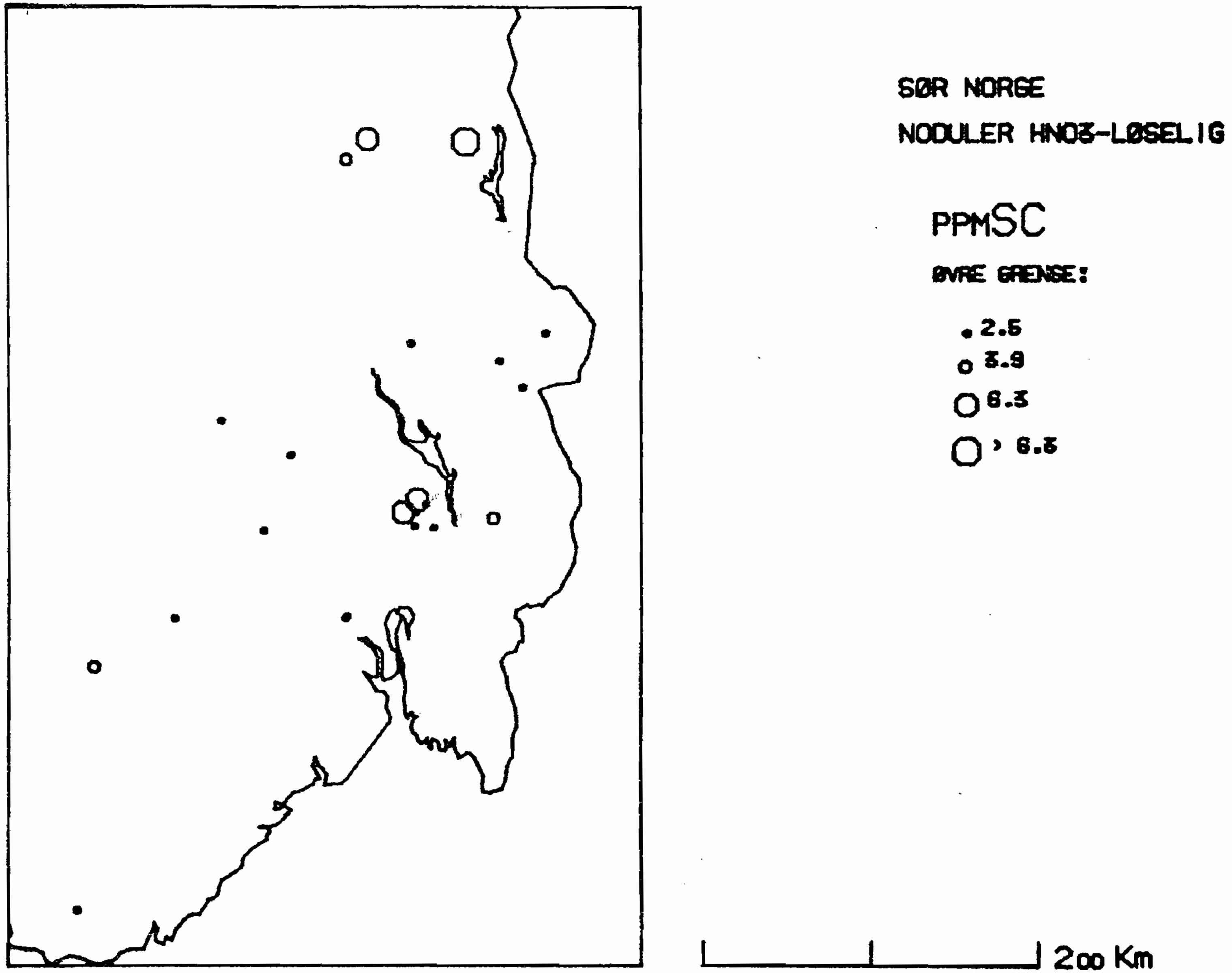
NGU-report 86.169. FIGURE 18.19



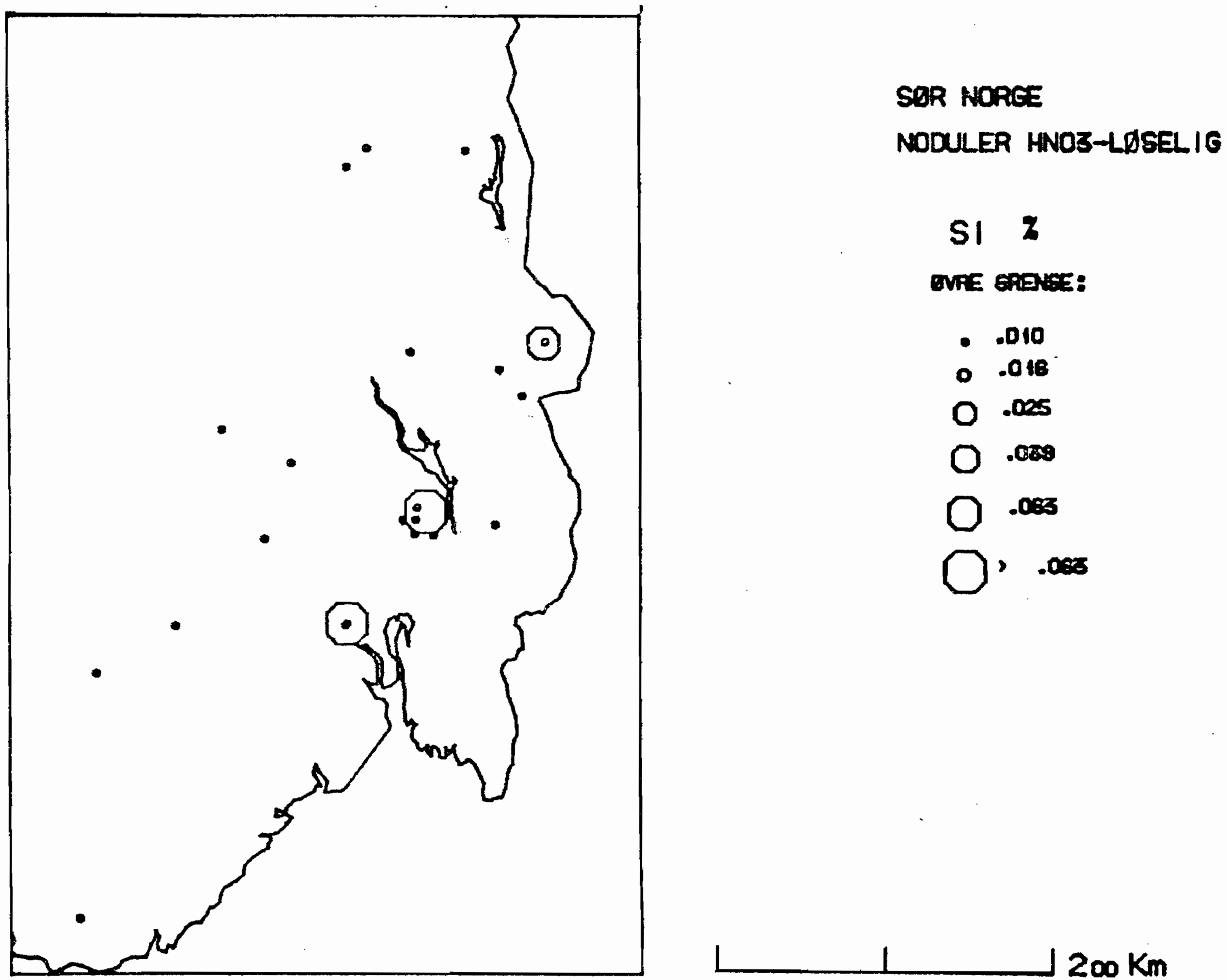
NGU-report 86.169. FIGURE 18.20



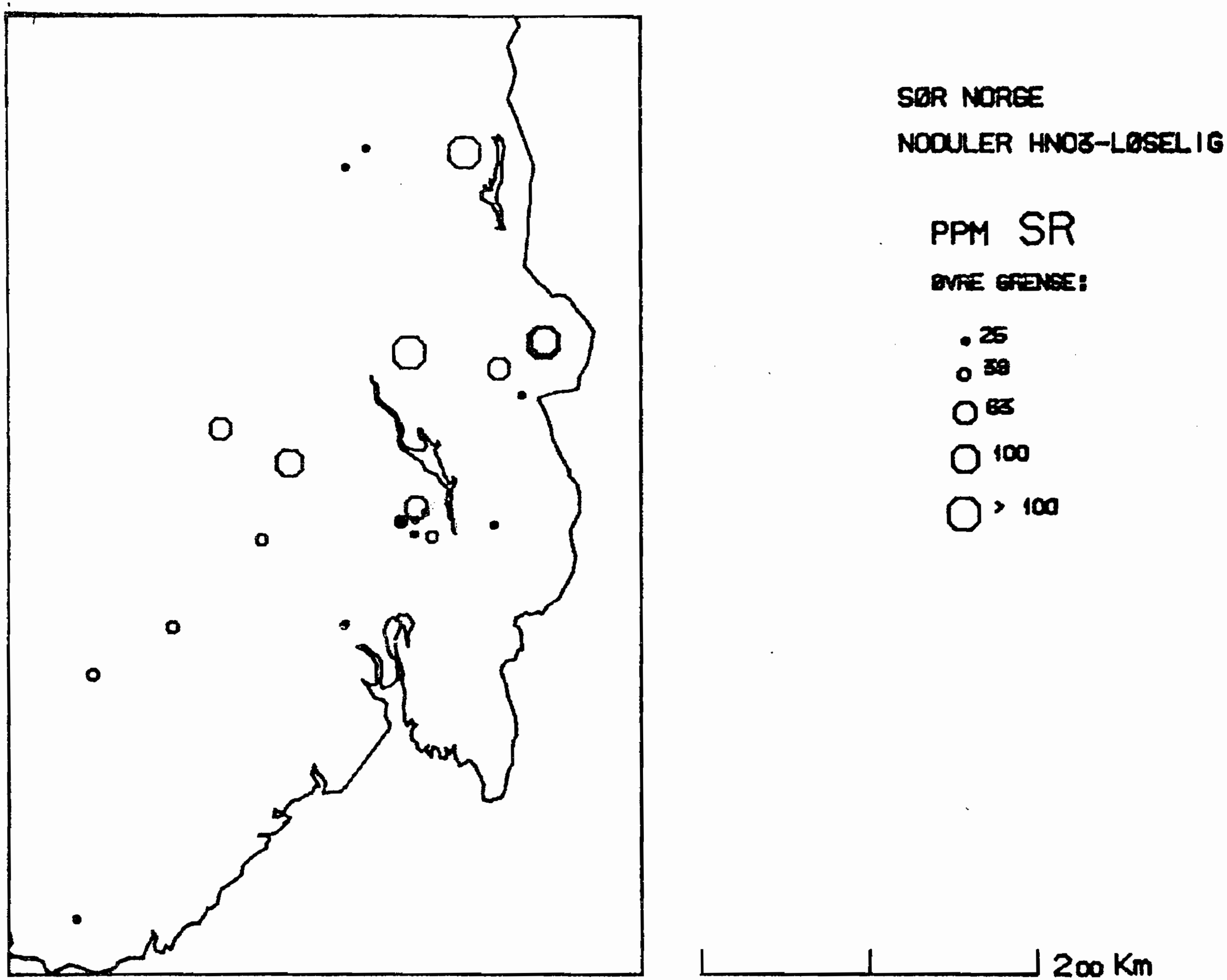
NGU-report 86.169. FIGURE 18.21



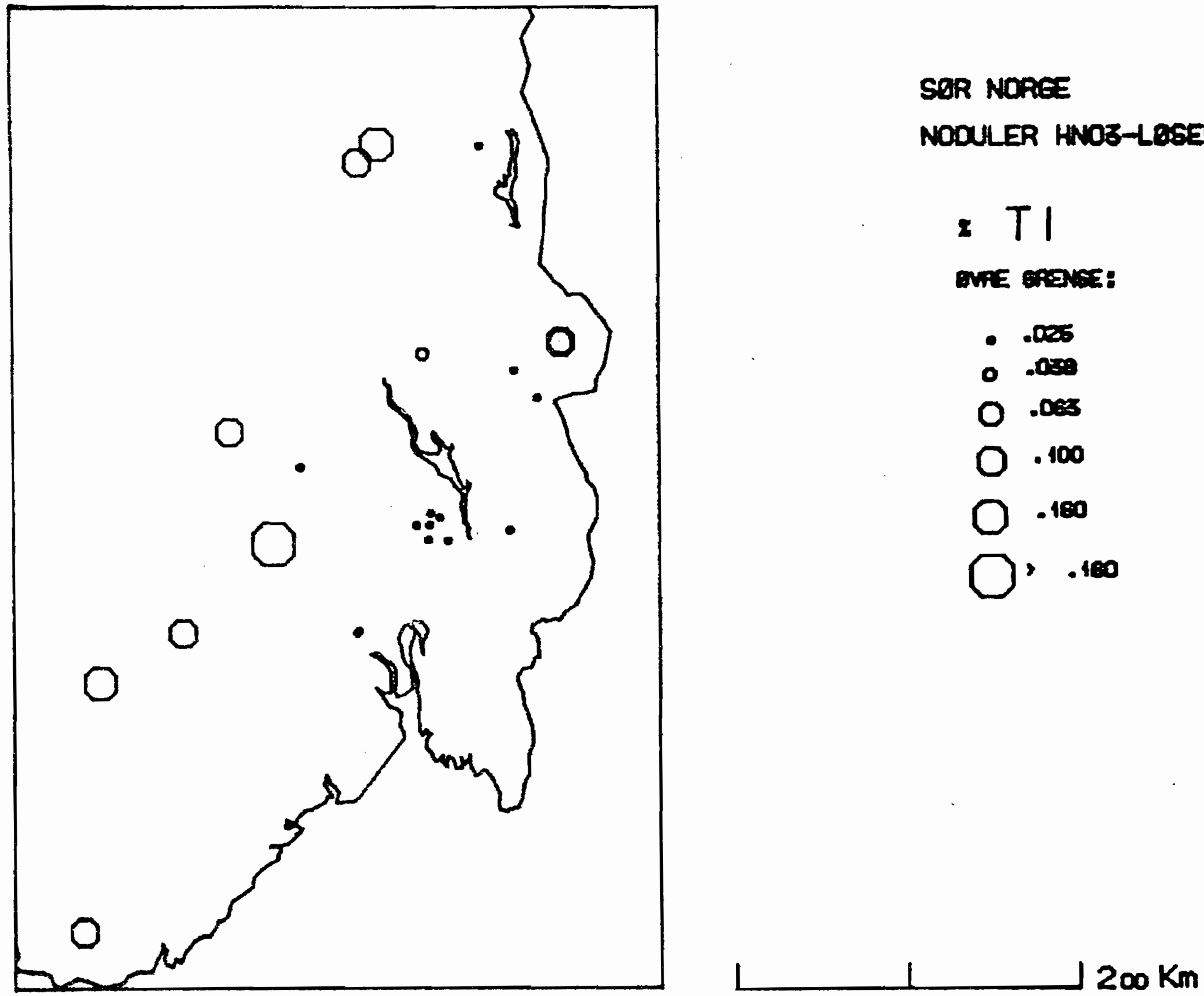
NGU-report 86.169. FIGURE 18.22



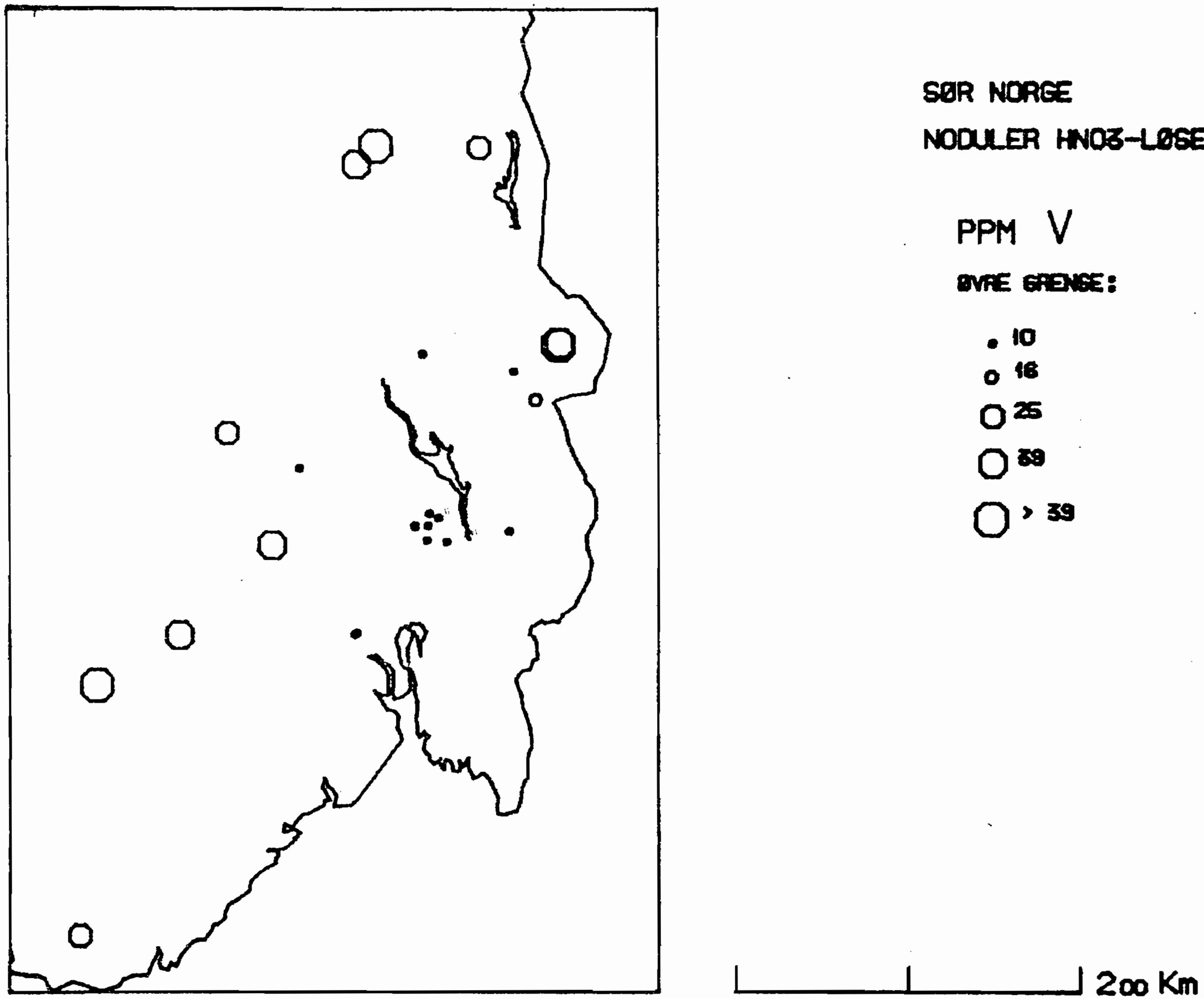
NGU-report 86.169. FIGURE 18.23



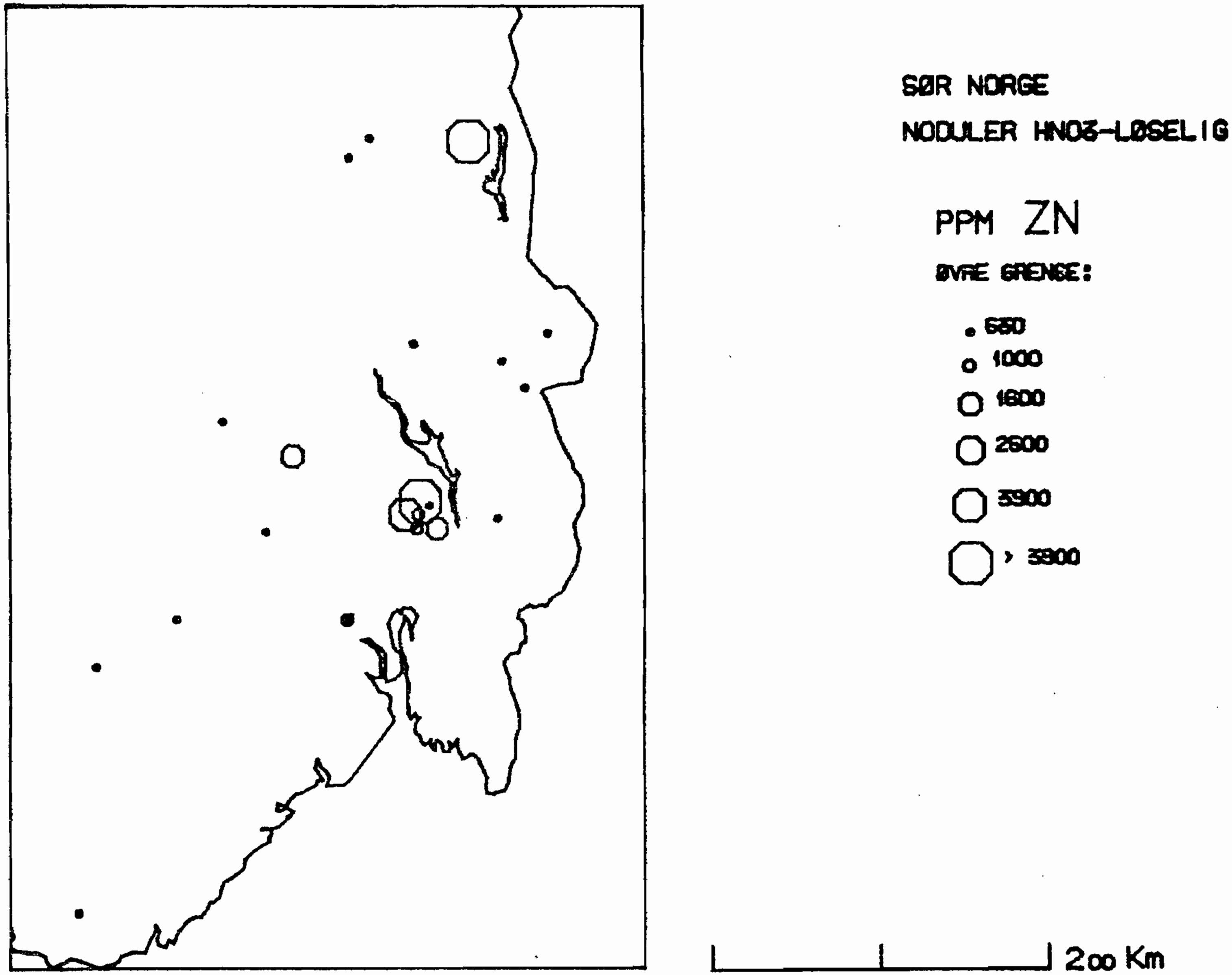
NGU-report 86.169. FIGURE 18.24



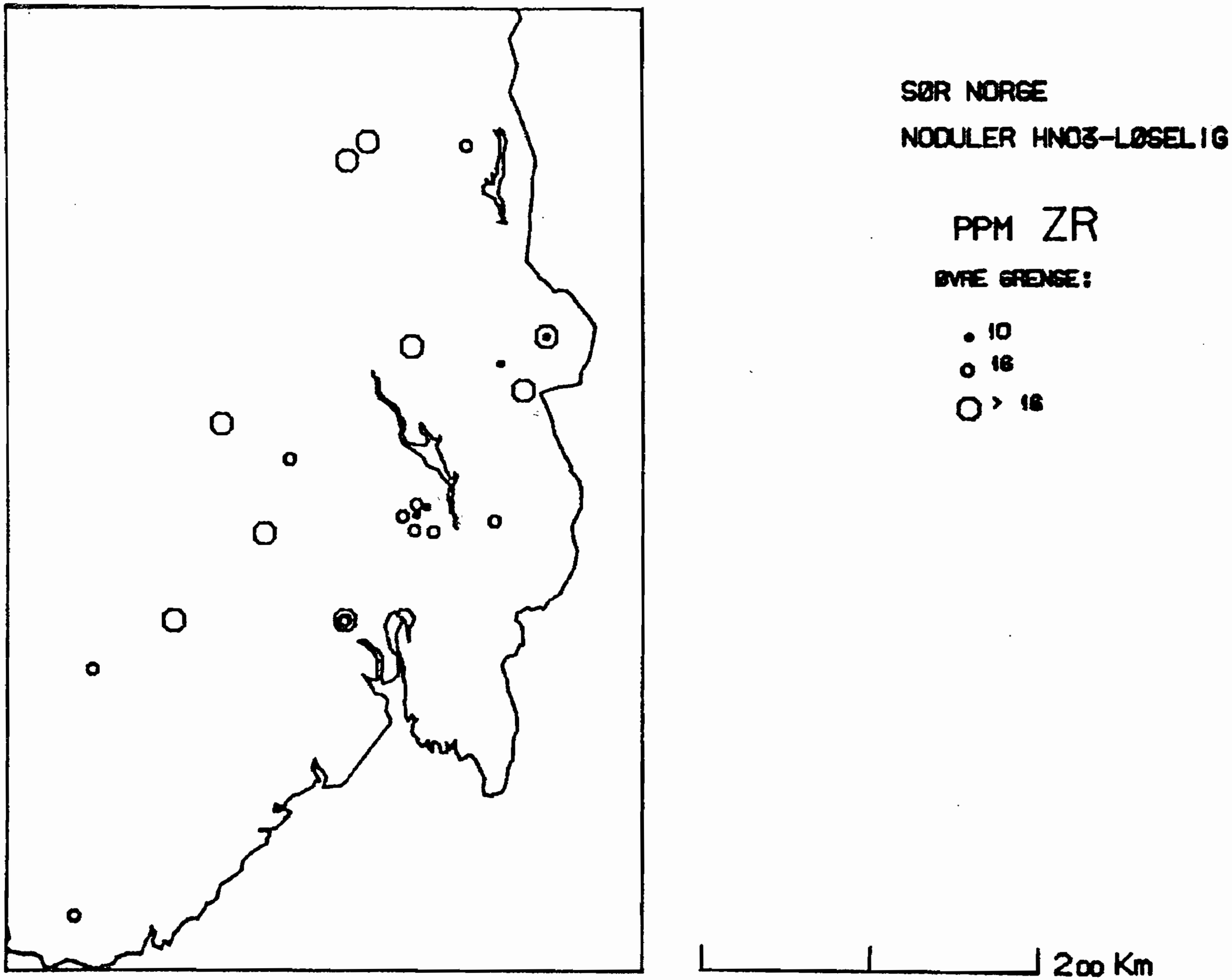
NGU-report 86.169. FIGURE 18.25



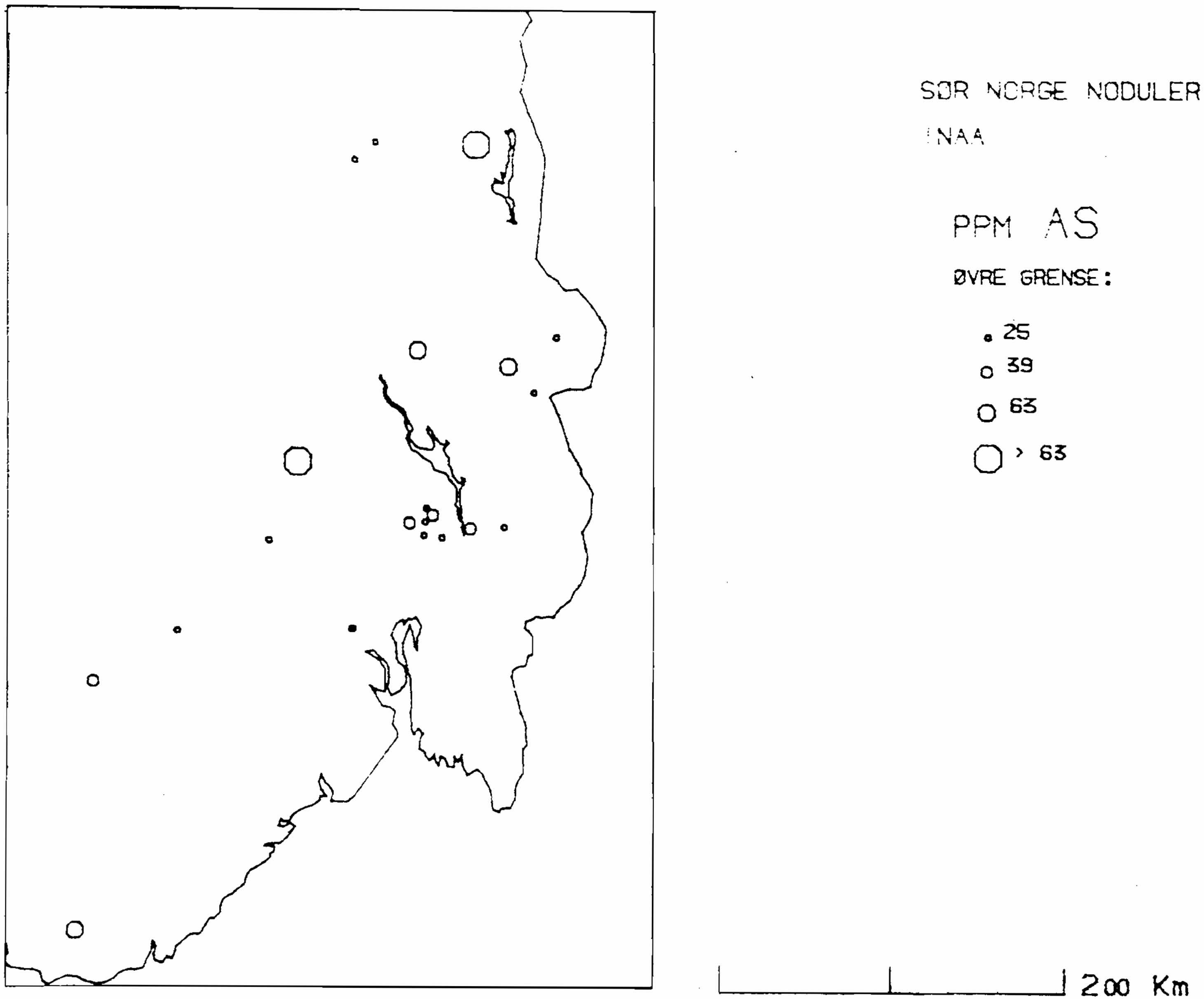
NGU-report 86.169. FIGURE 18.26



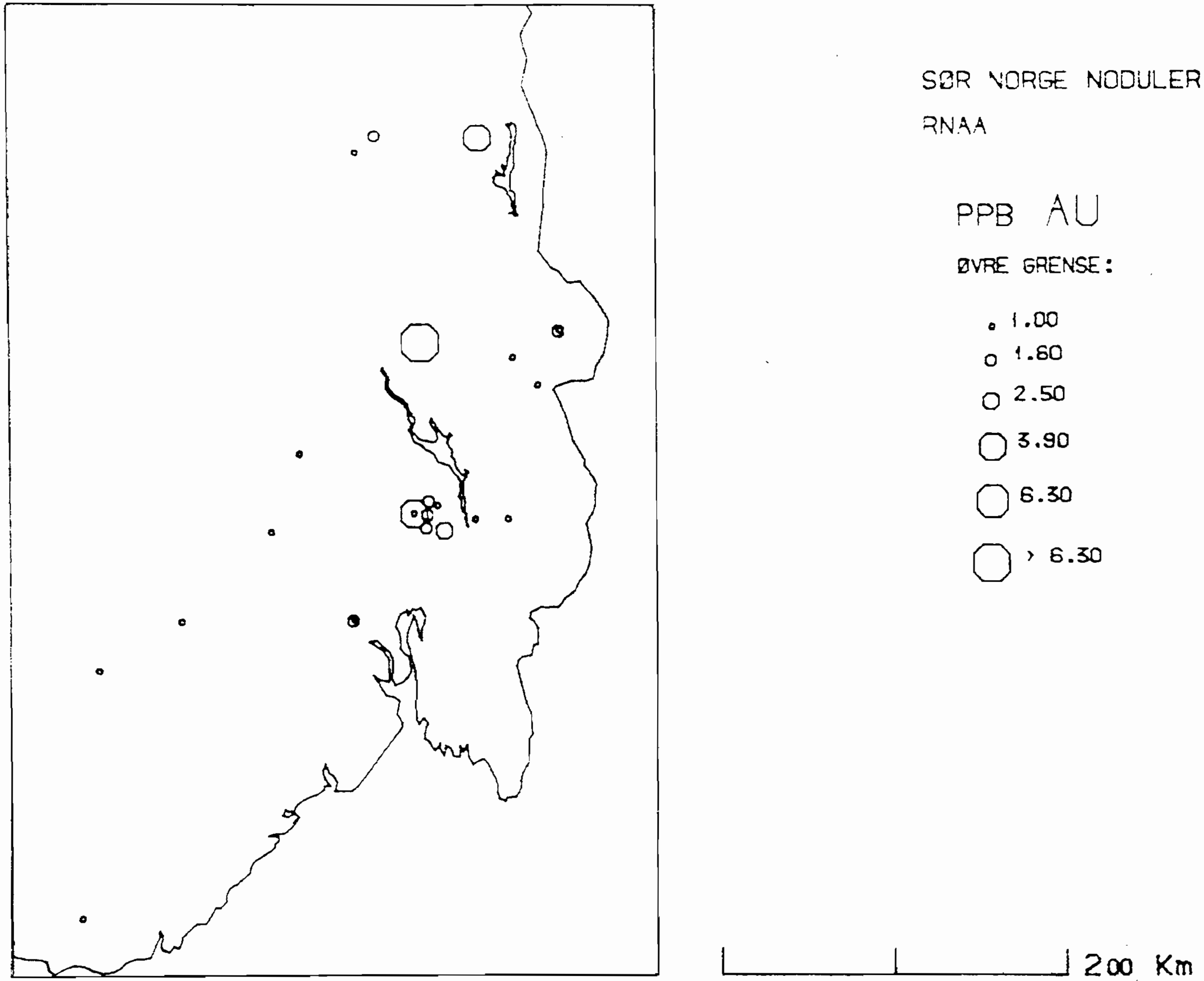
NGU-report 86.169. FIGURE 18.27



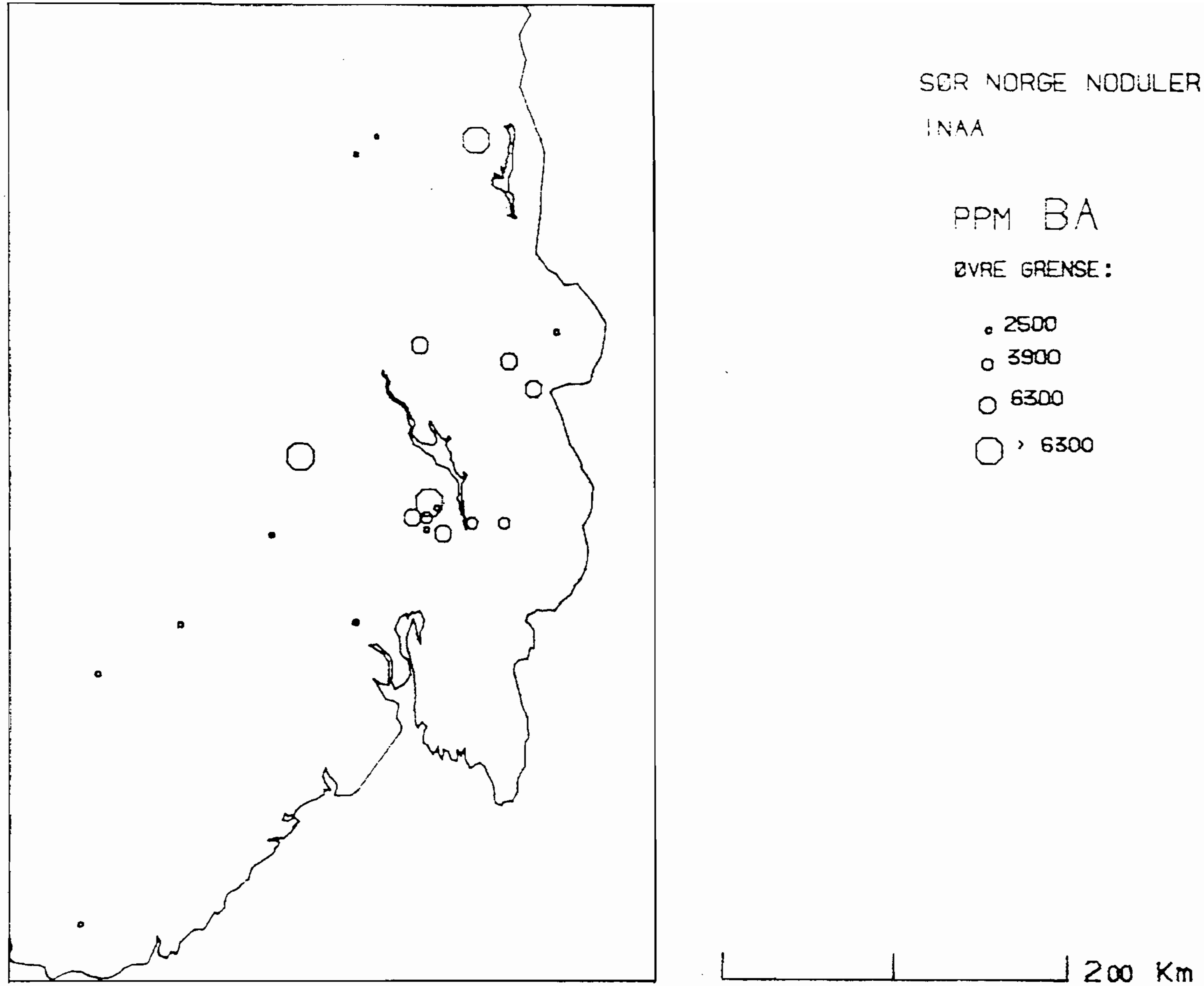
NGU-report 86.169. FIGURE 18.28



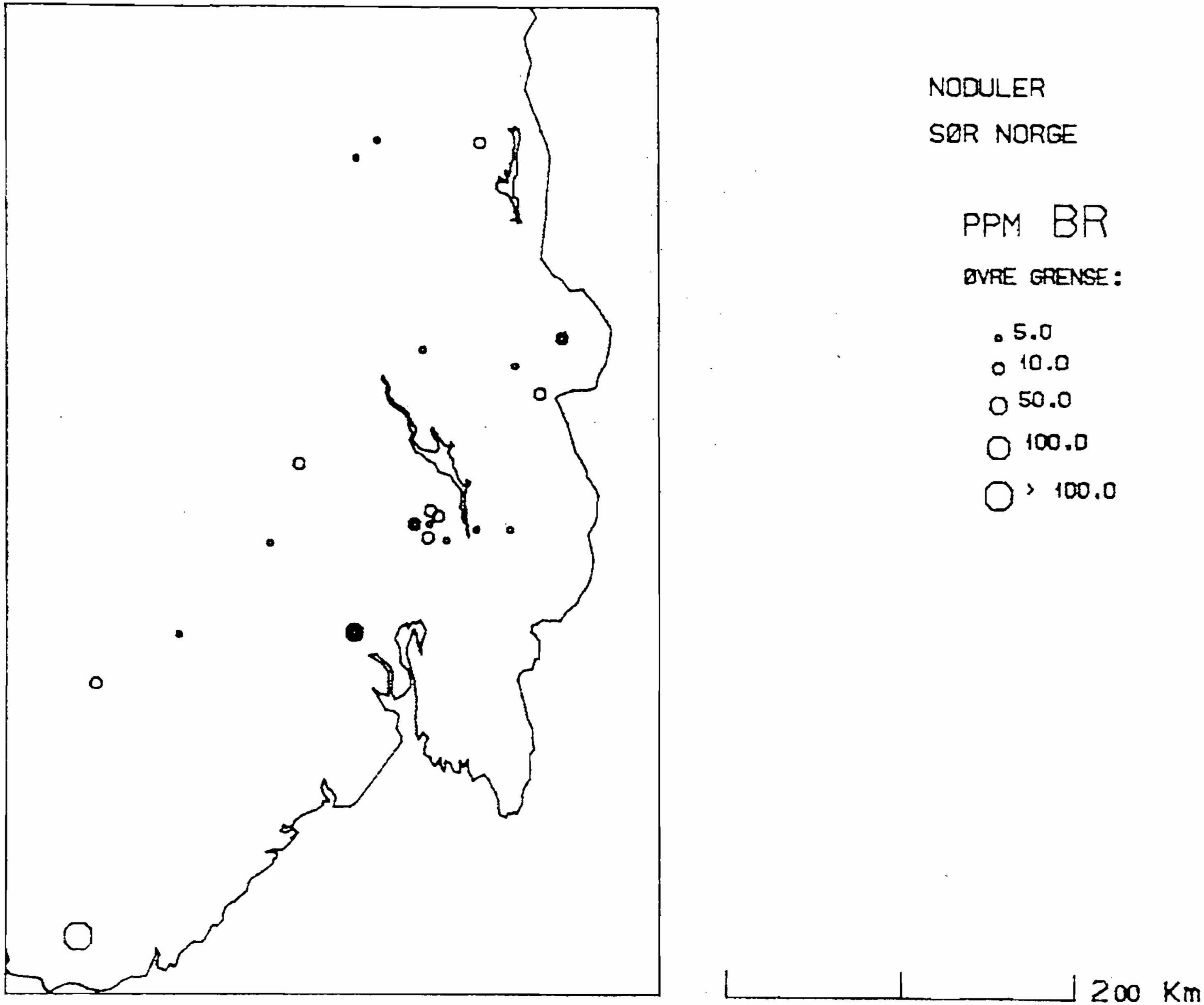
NGU-report 86.169. FIGURE 19.1



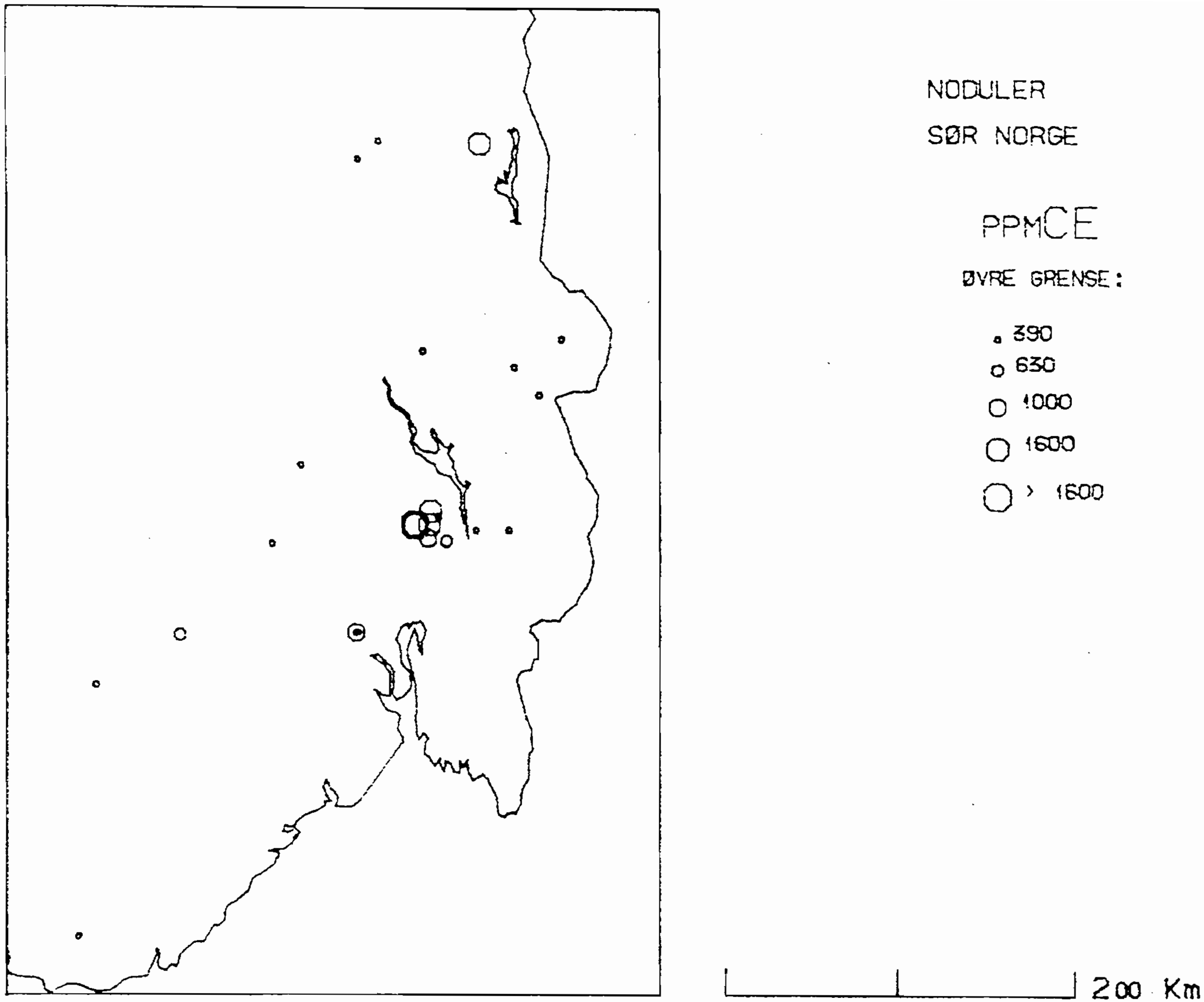
NGU-report 86.169. FIGURE 19.2



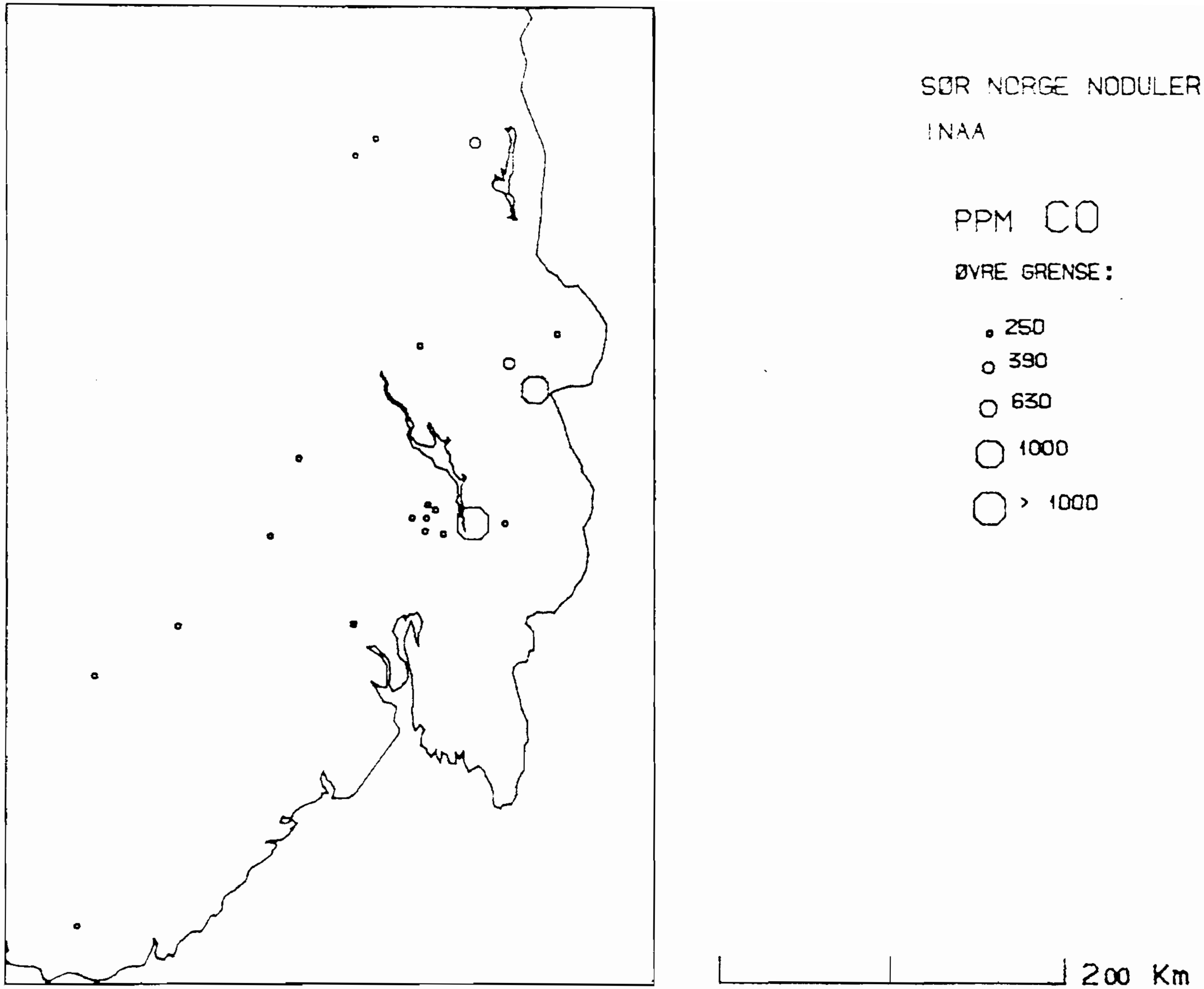
NGU-report 86.169. FIGURE 19.3



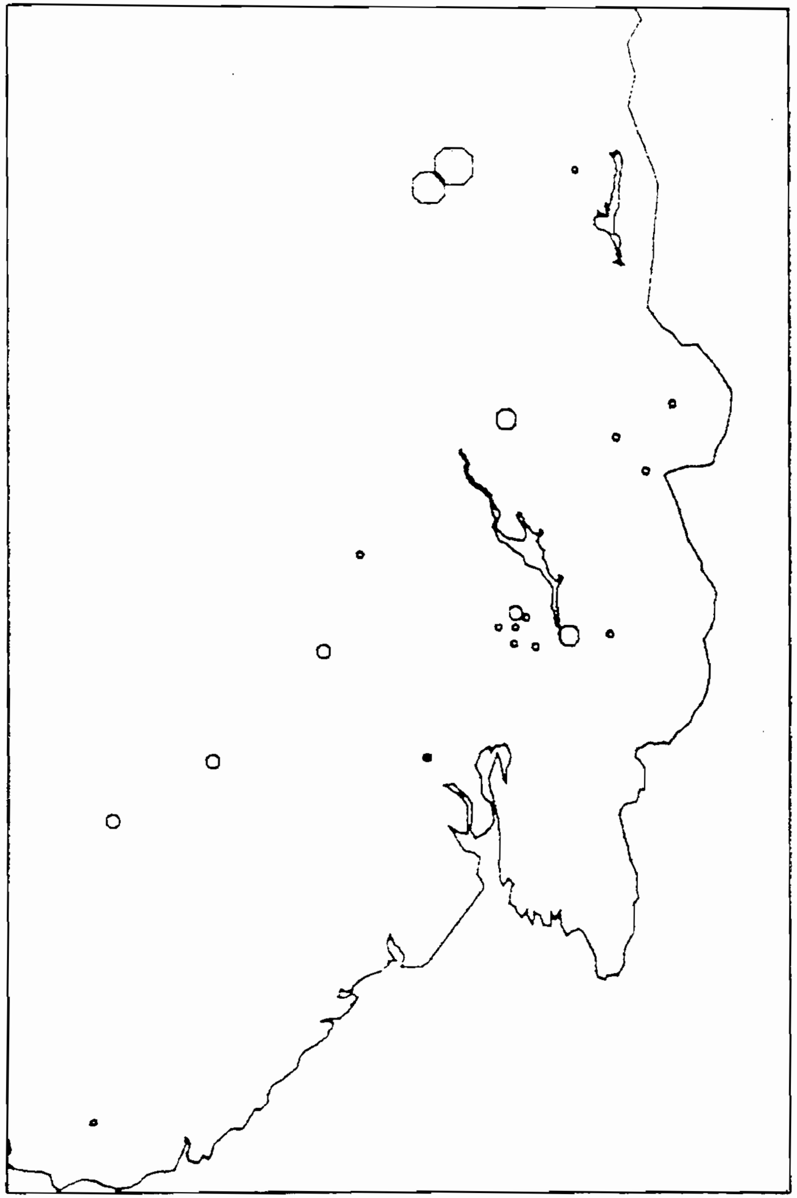
NGU-report 86.169. FIGURE 19.4



NGU-report 86.169. FIGURE 19.5



NGU-report 86.169. FIGURE 19.6



SØR NORGE NODULER

INAA

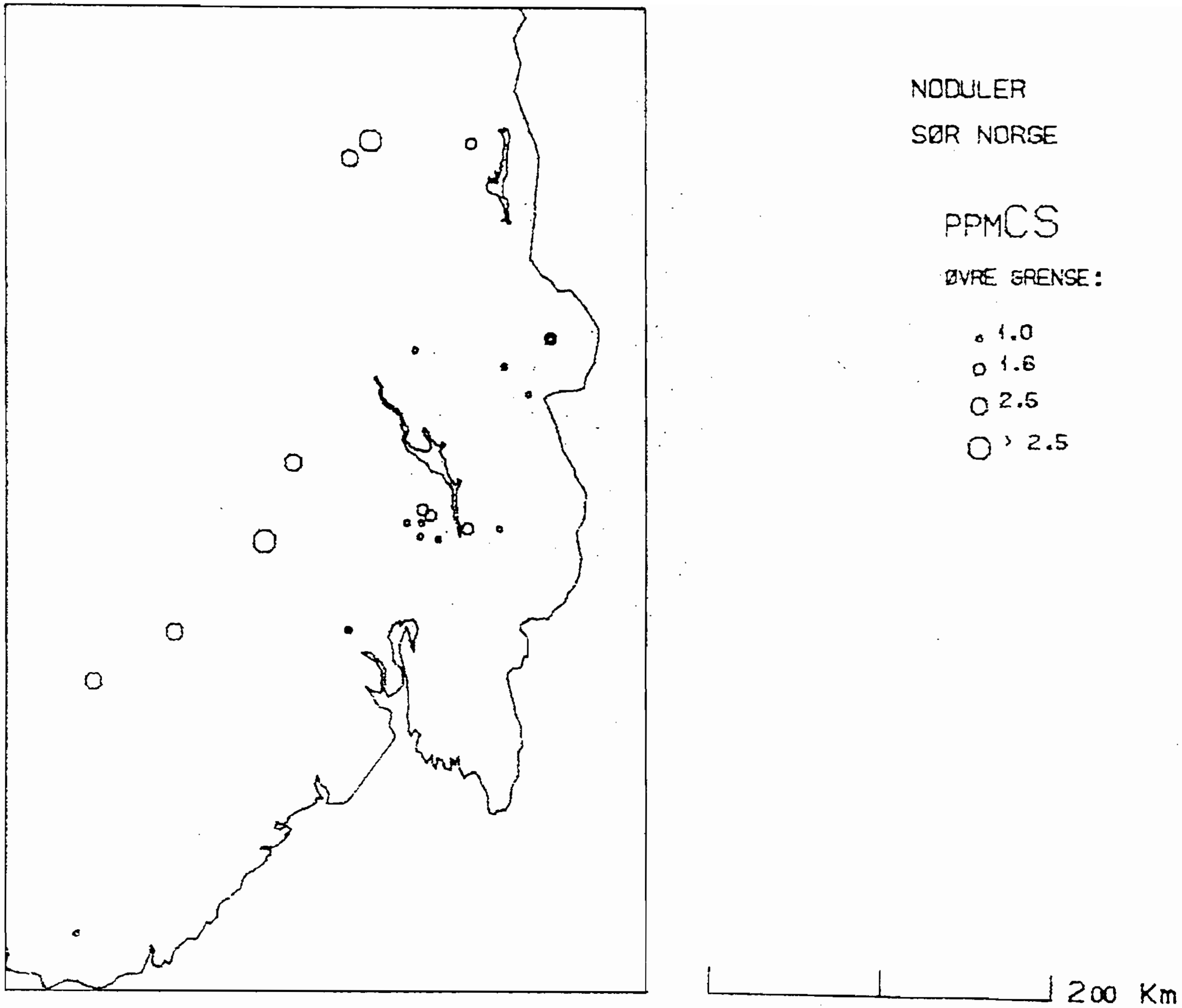
PPM CR

ØVRE GRENSE:

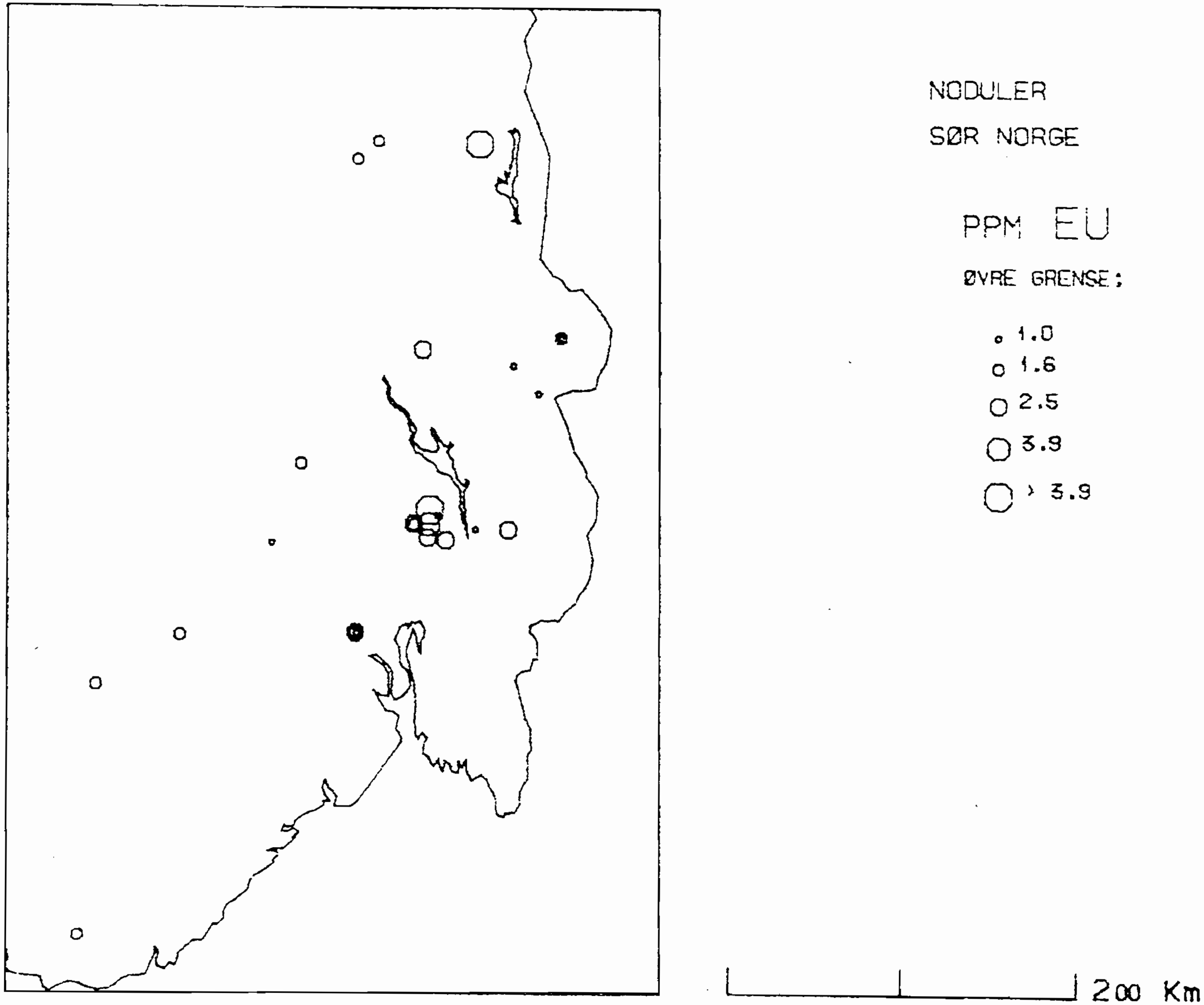
39
63
100
160
> 160

200 Km

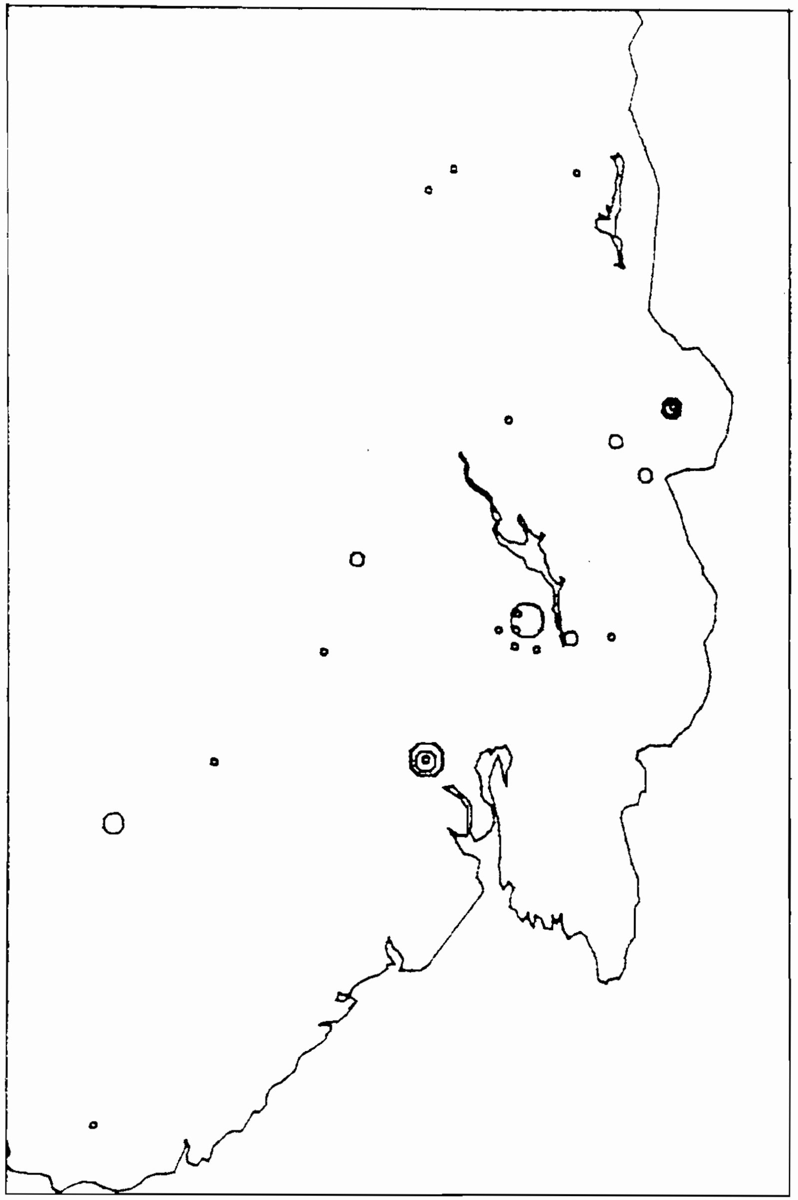
NGU-report 86.169. FIGURE 19.7



NGU-report 86.169. FIGURE 19.8



NGU-report 86.169. FIGURE 19.9



SØR NORGE NODULER

INAA

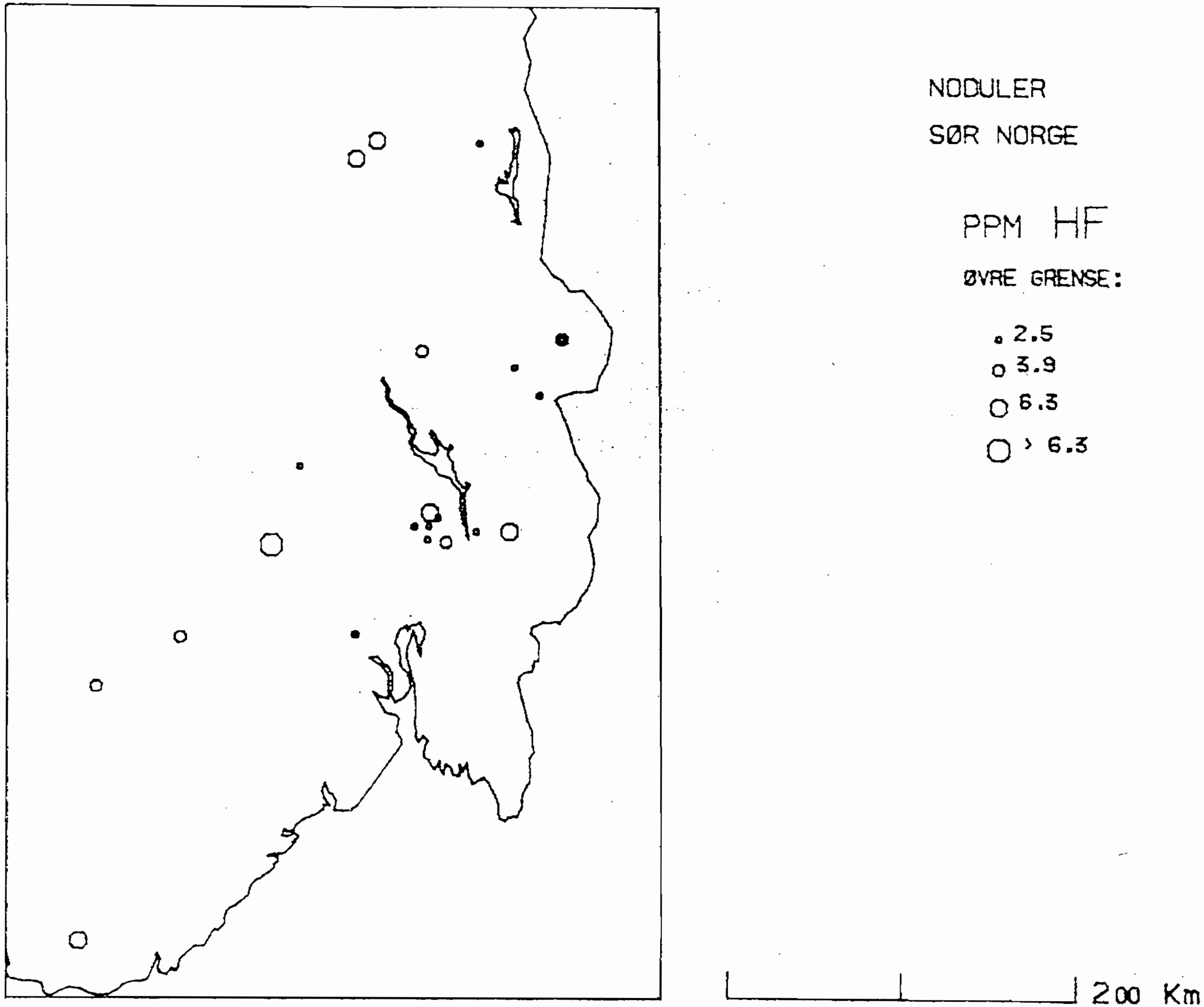
% FE

ØVRE GRENSE:

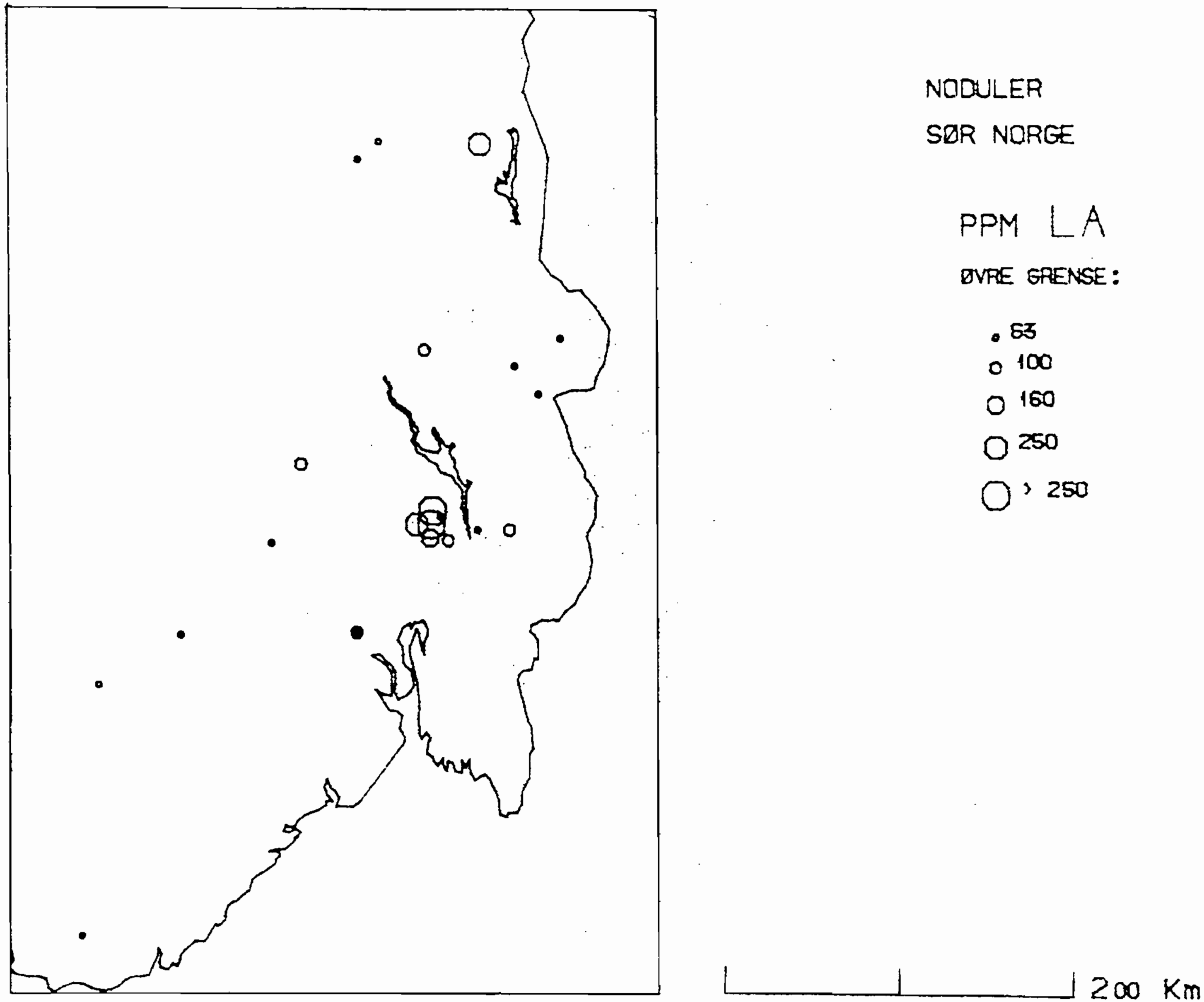
- 16.0
- 25.0
- 39.0
- > 39.0

200 Km

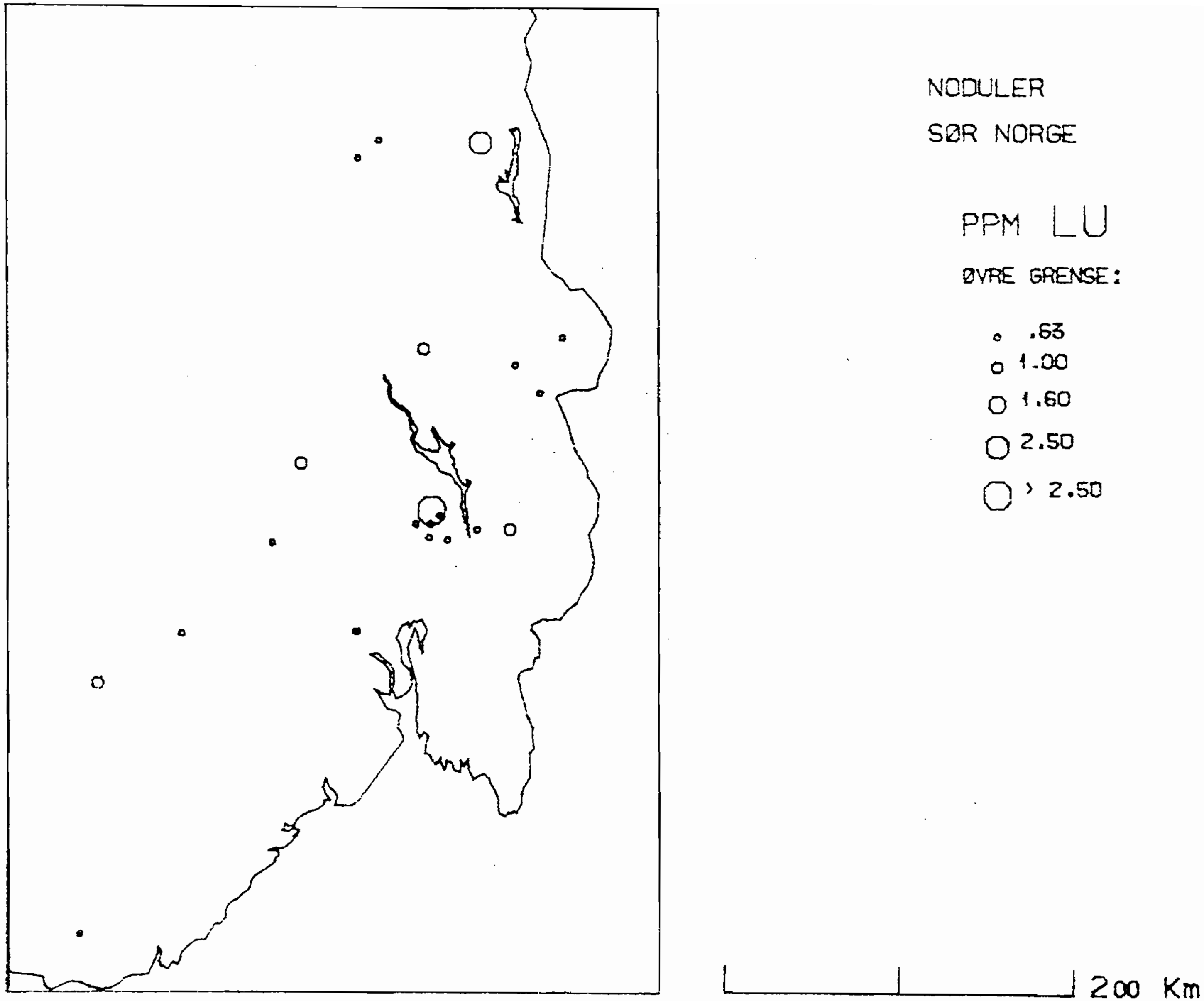
NGU-report 86.169. FIGURE 19.10



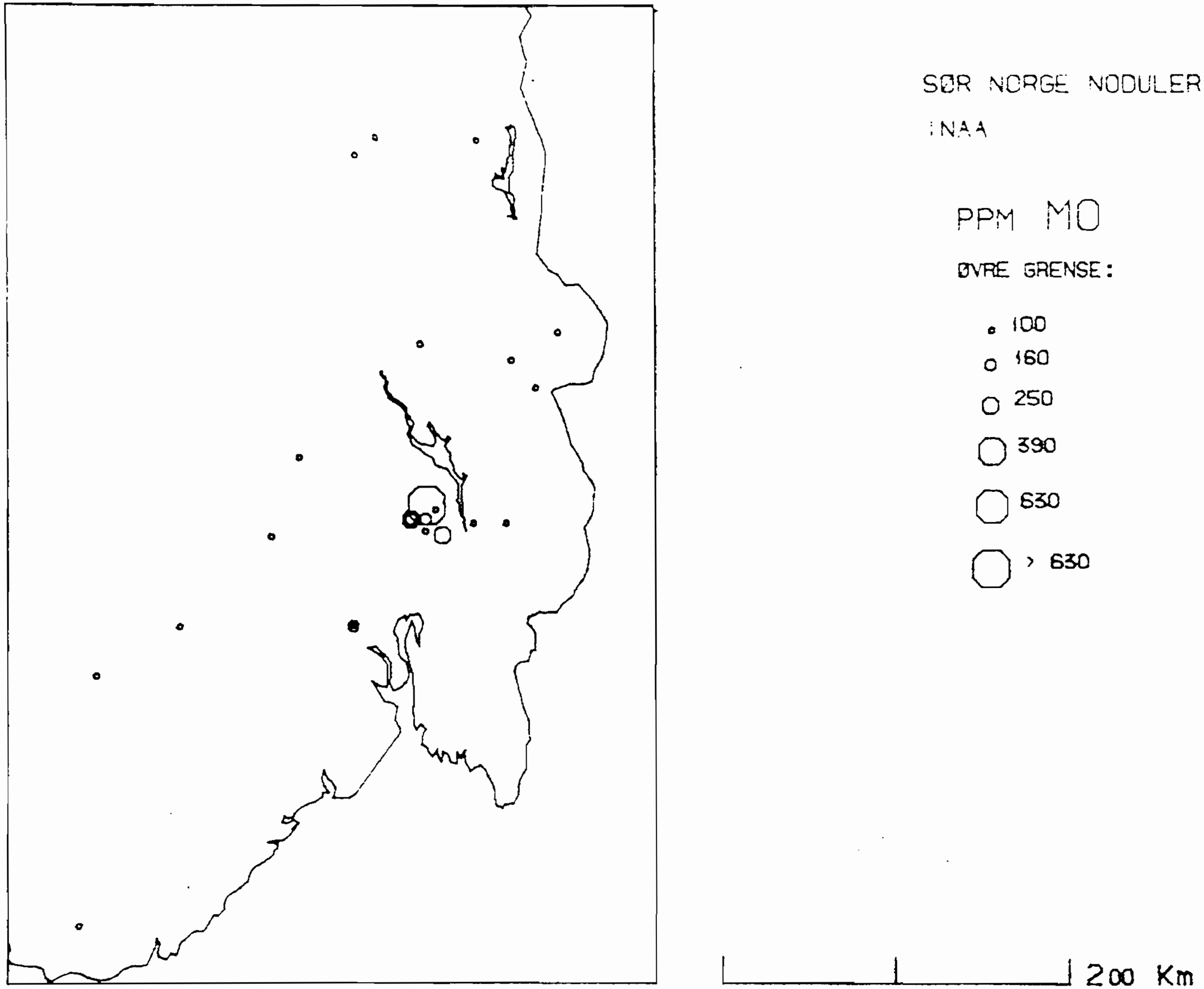
NGU-report 86.169. FIGURE 19.11



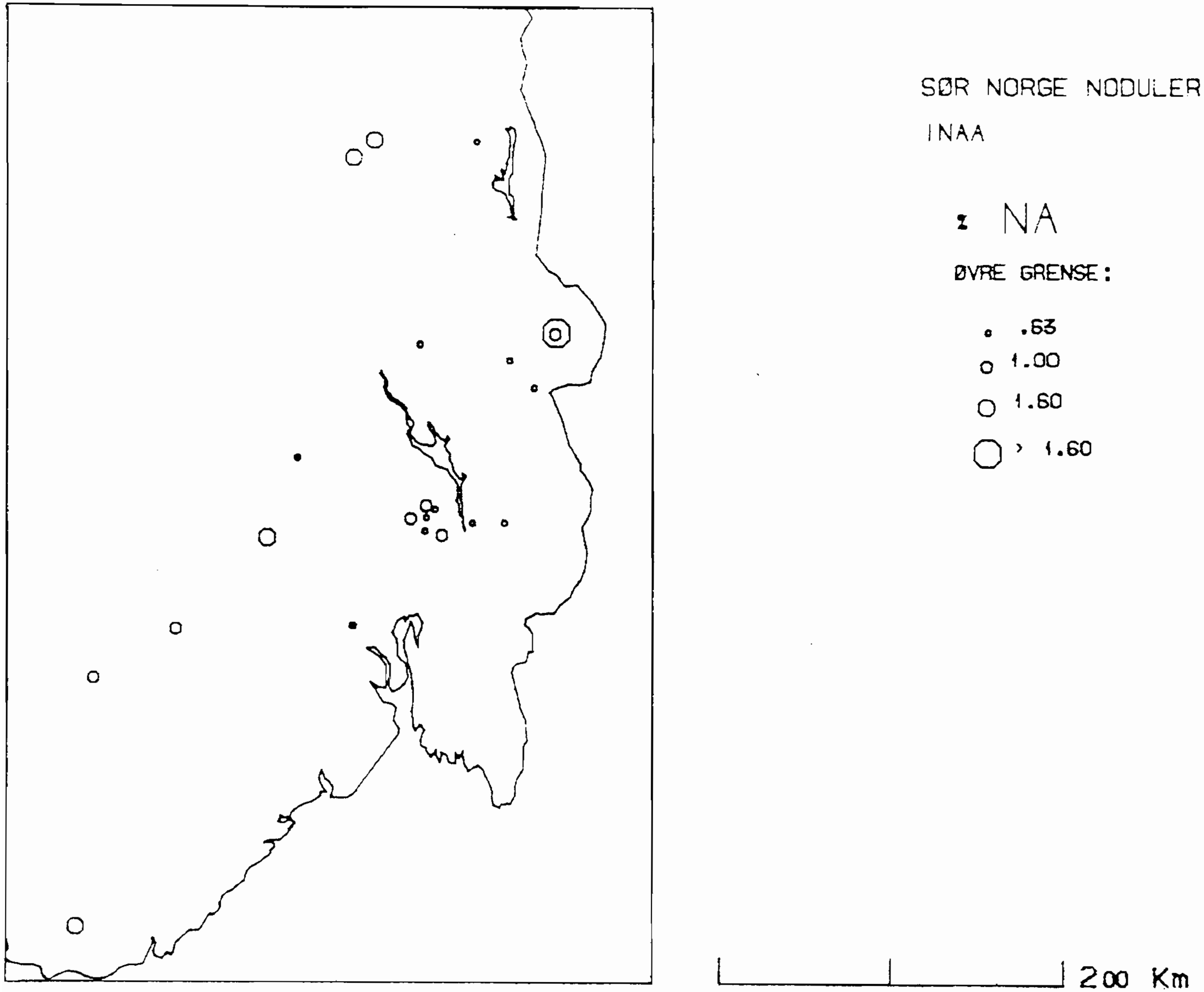
NGU-report 86.169. FIGURE 19.12



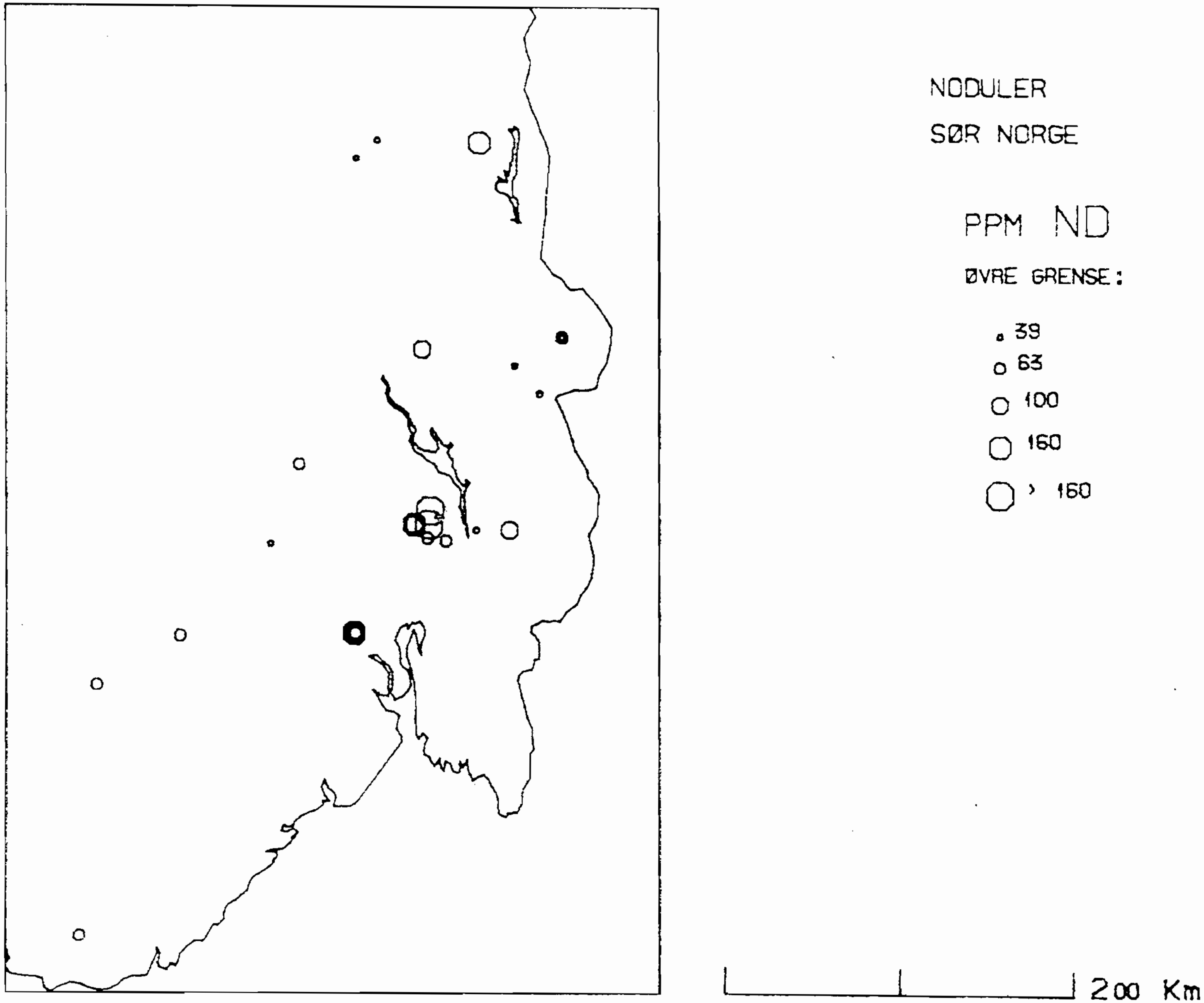
NGU-report 86.169. FIGURE 19.13



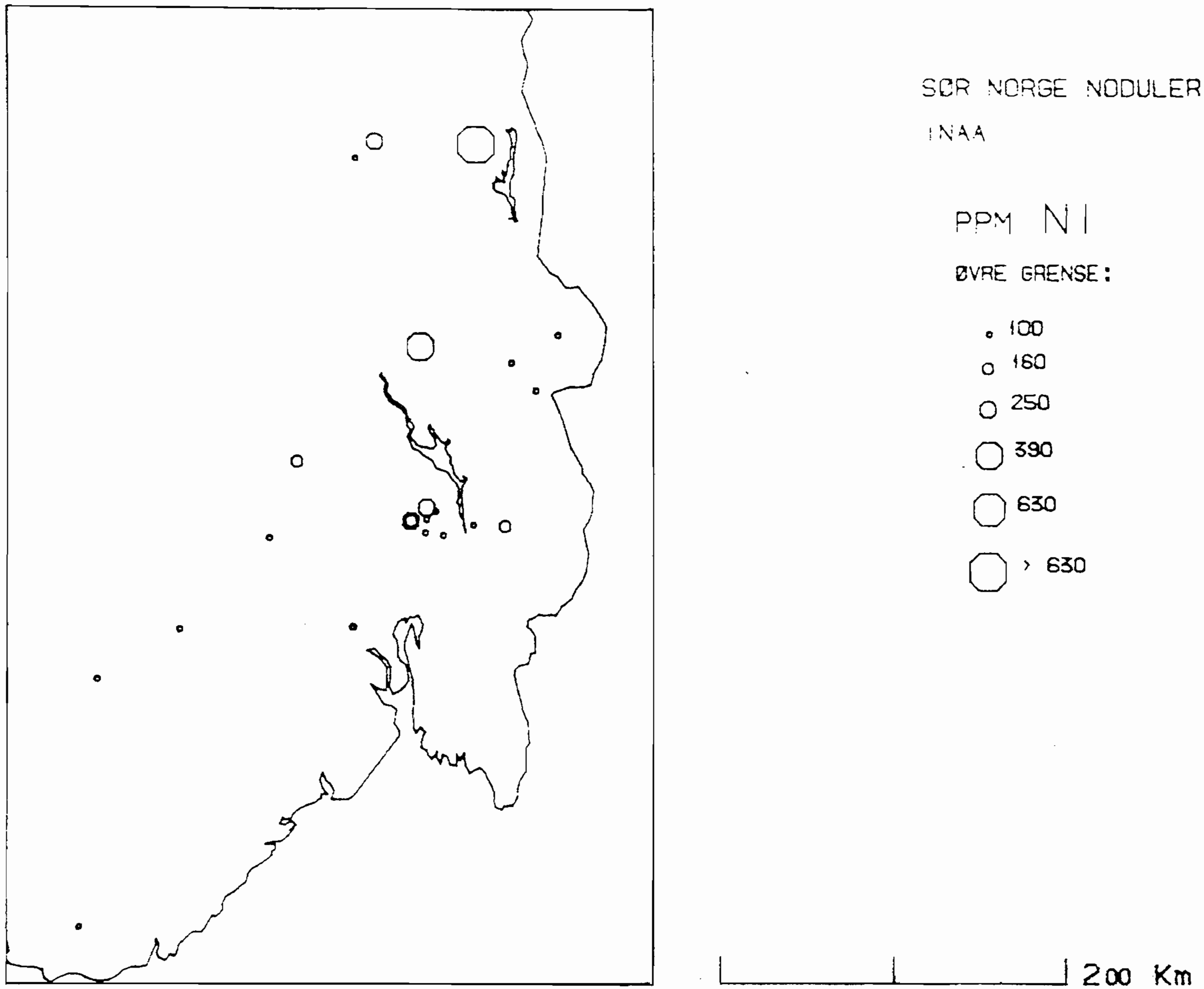
NGU-report 86.169. FIGURE 19.14



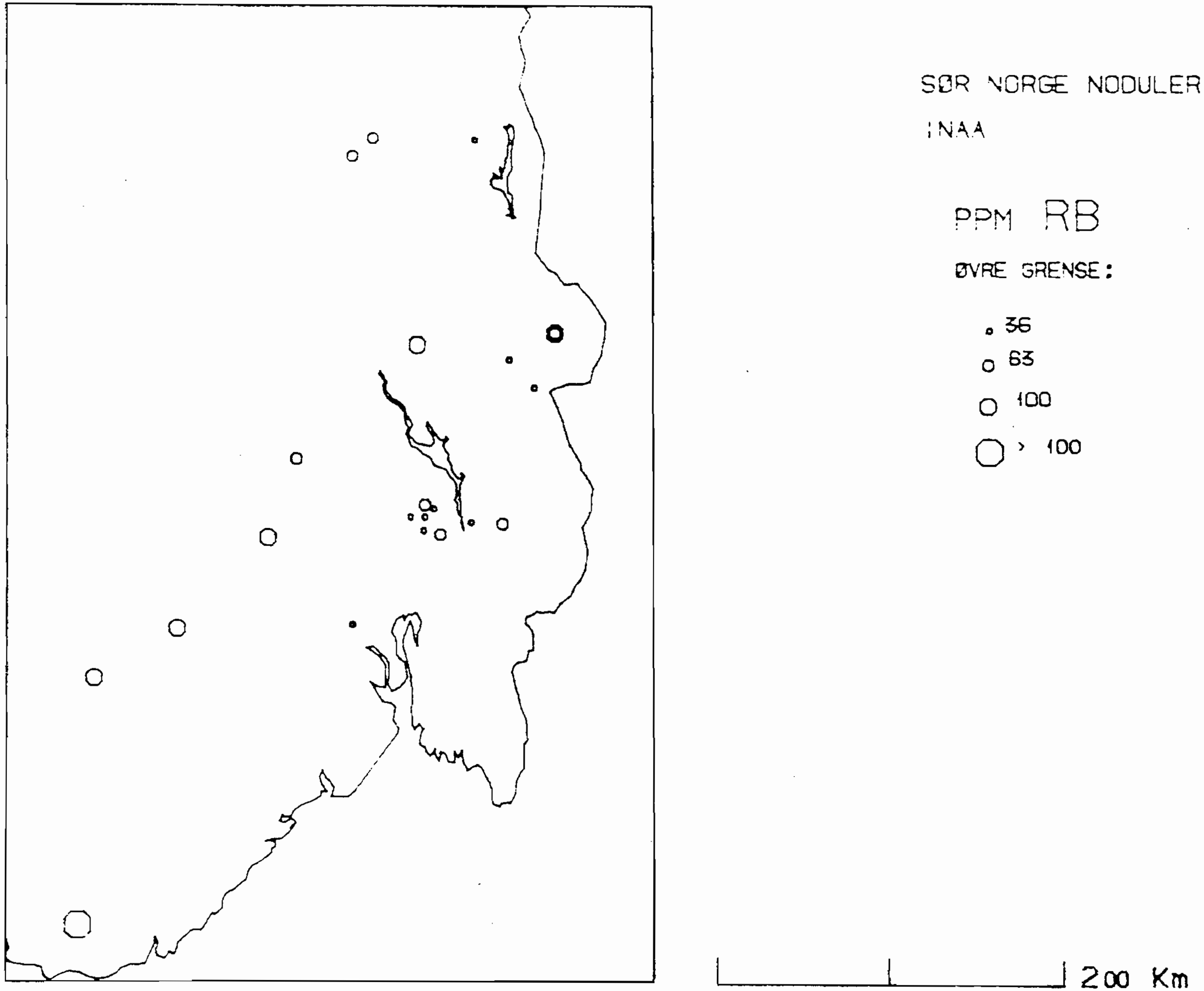
NGU-report 86.169. FIGURE 19.15



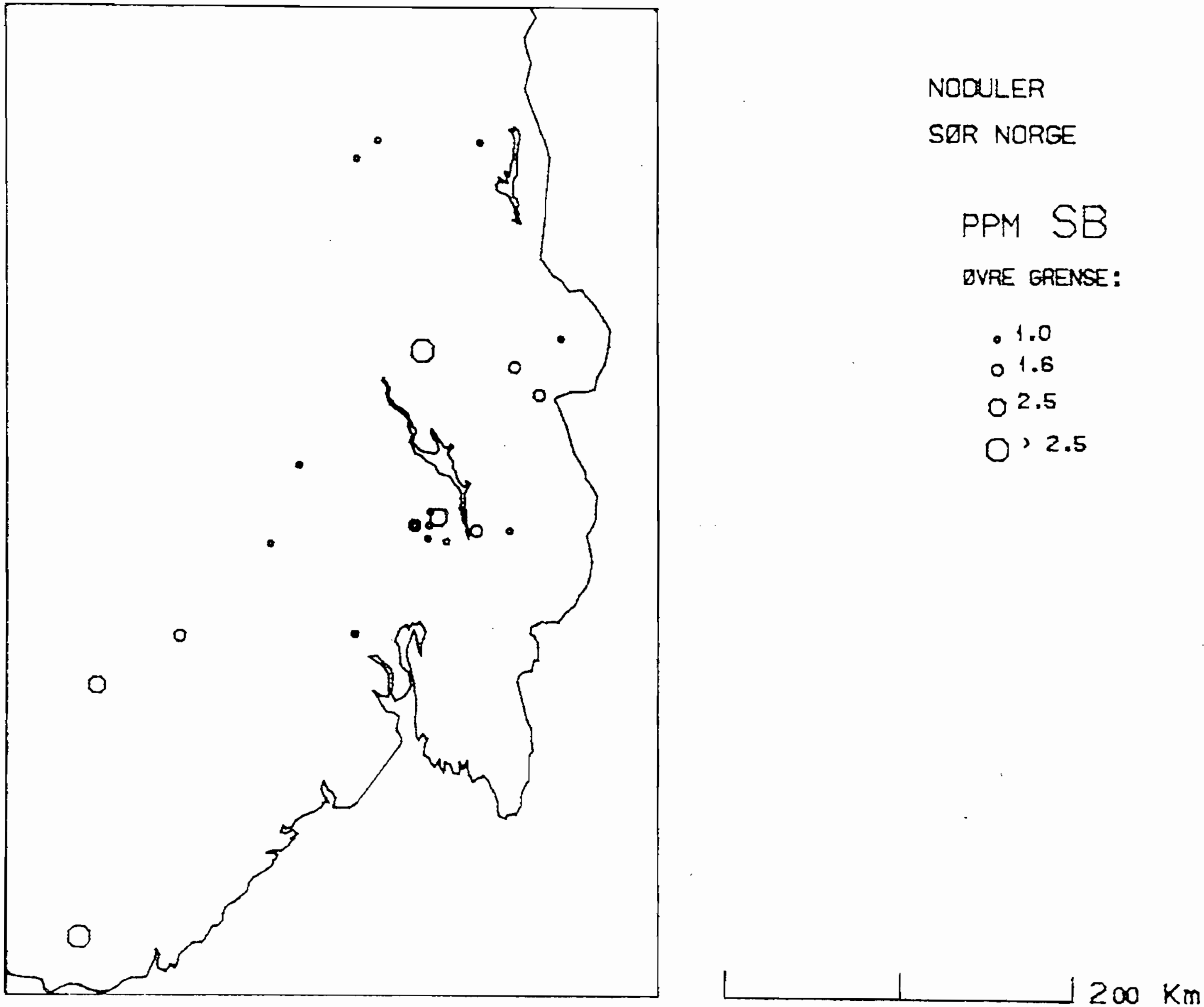
NGU-report 86.169. FIGURE 19.16



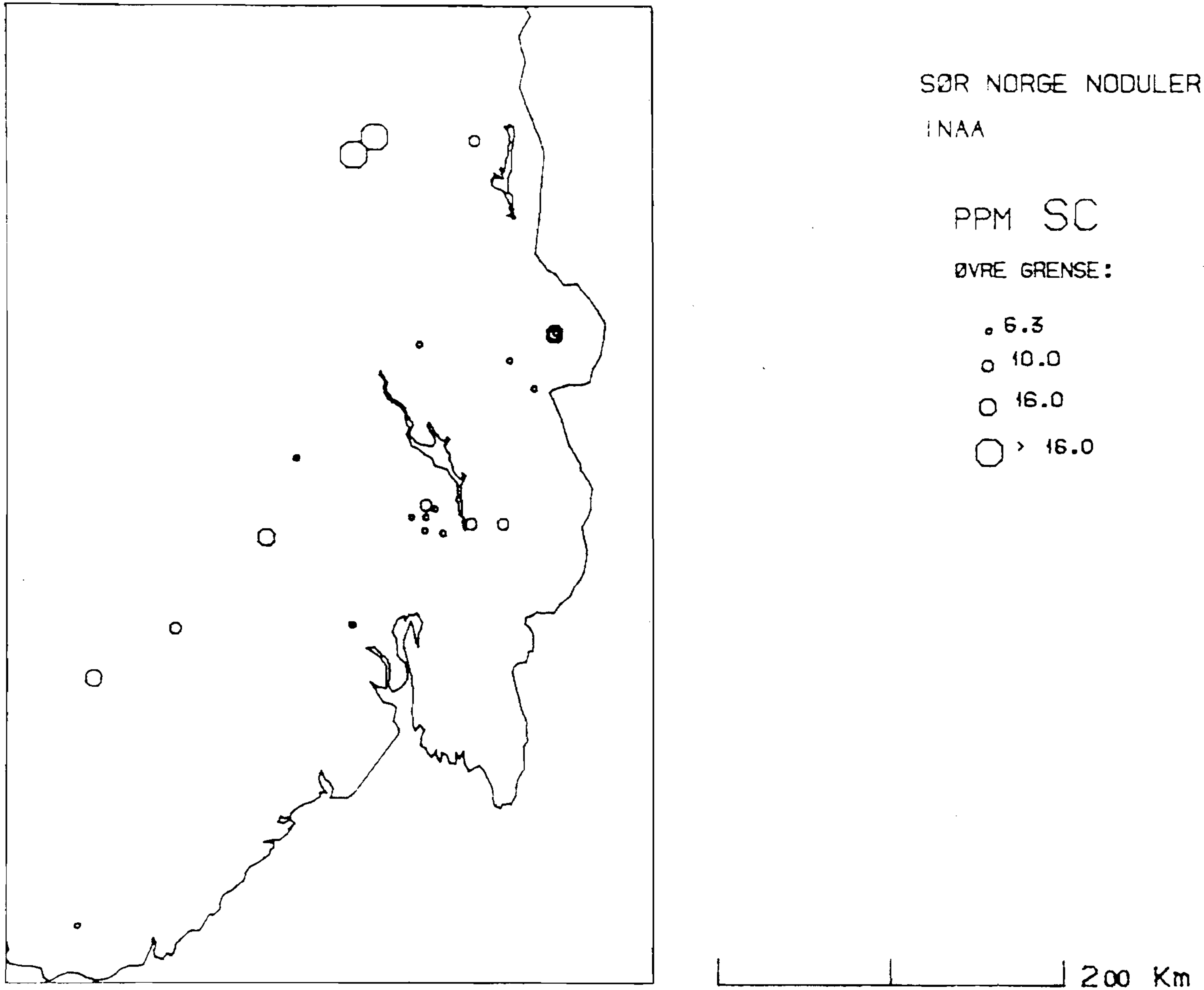
NGU-report 86.169. FIGURE 19.17



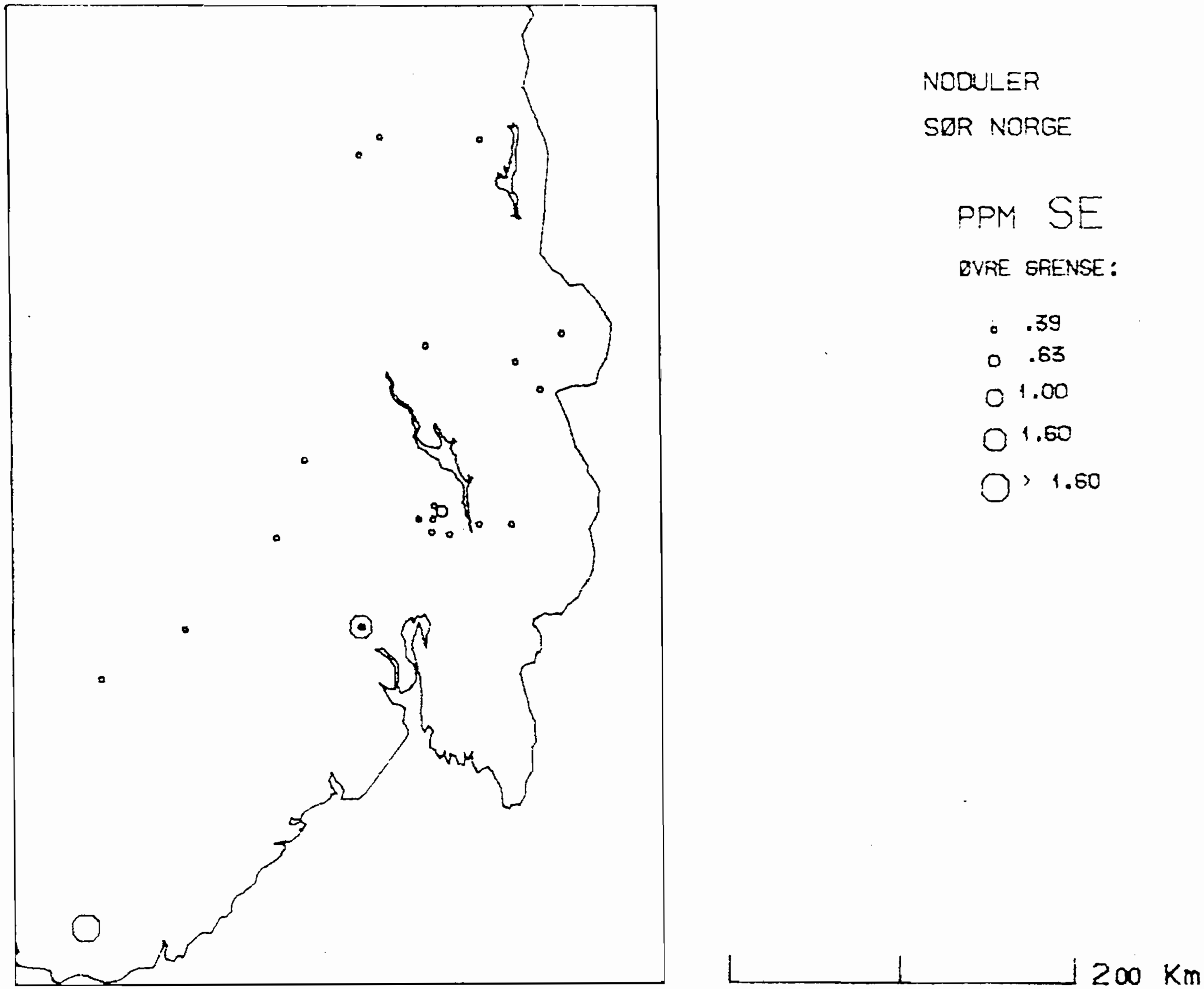
NGU-report 86.169. FIGURE 19.18



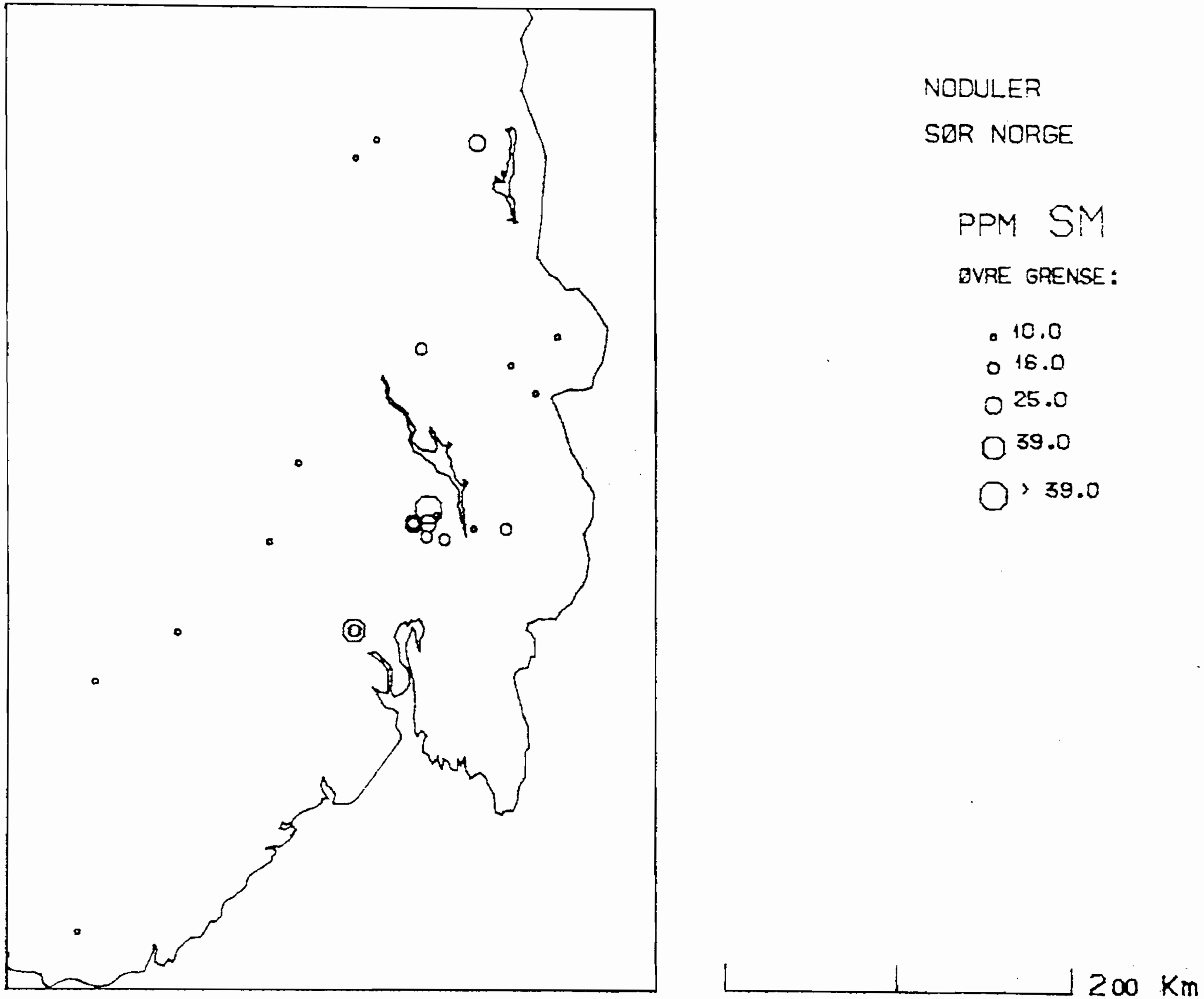
NGU-report 86.169. FIGURE 19.19



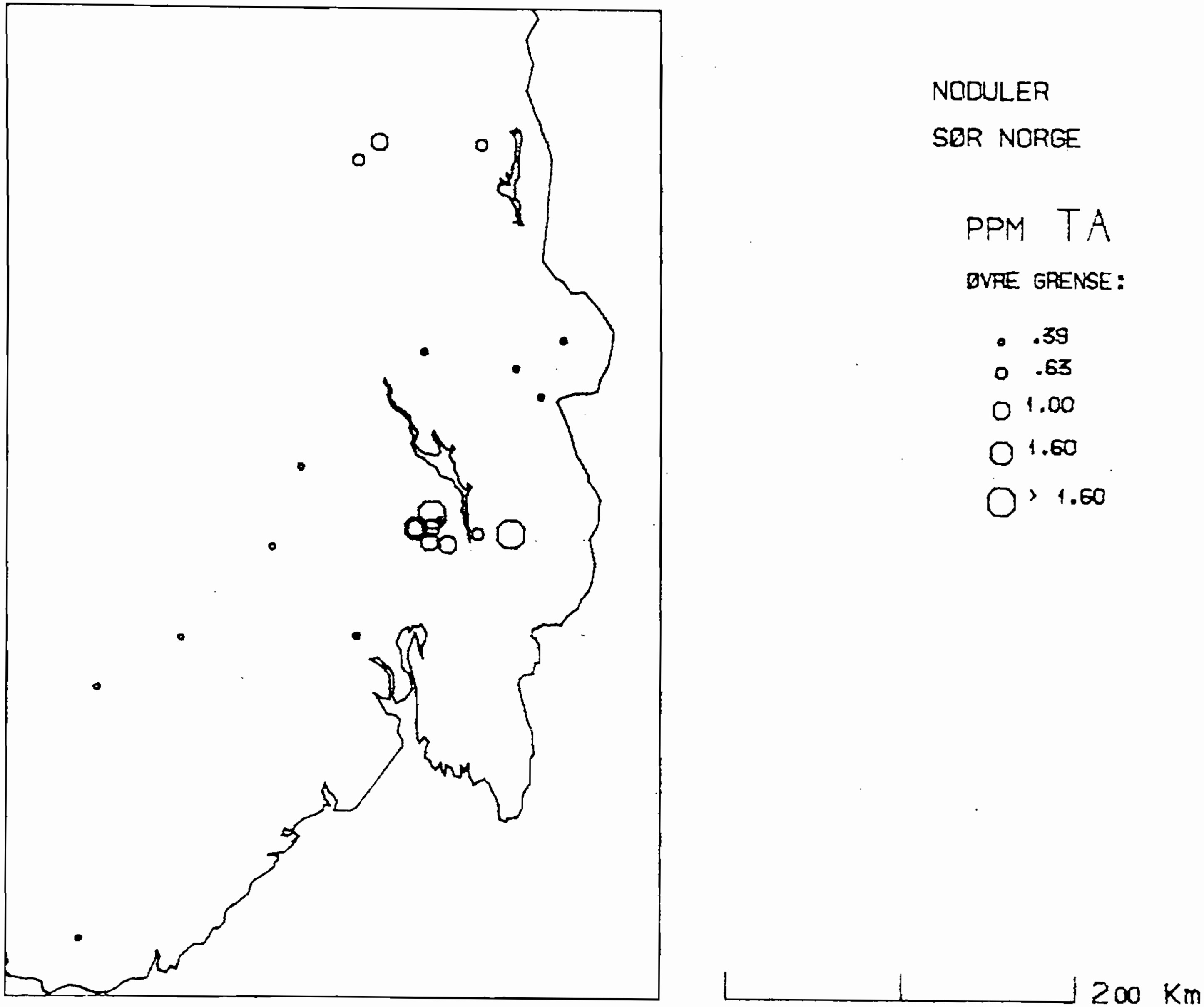
NGU-report 86.169. FIGURE 19.20



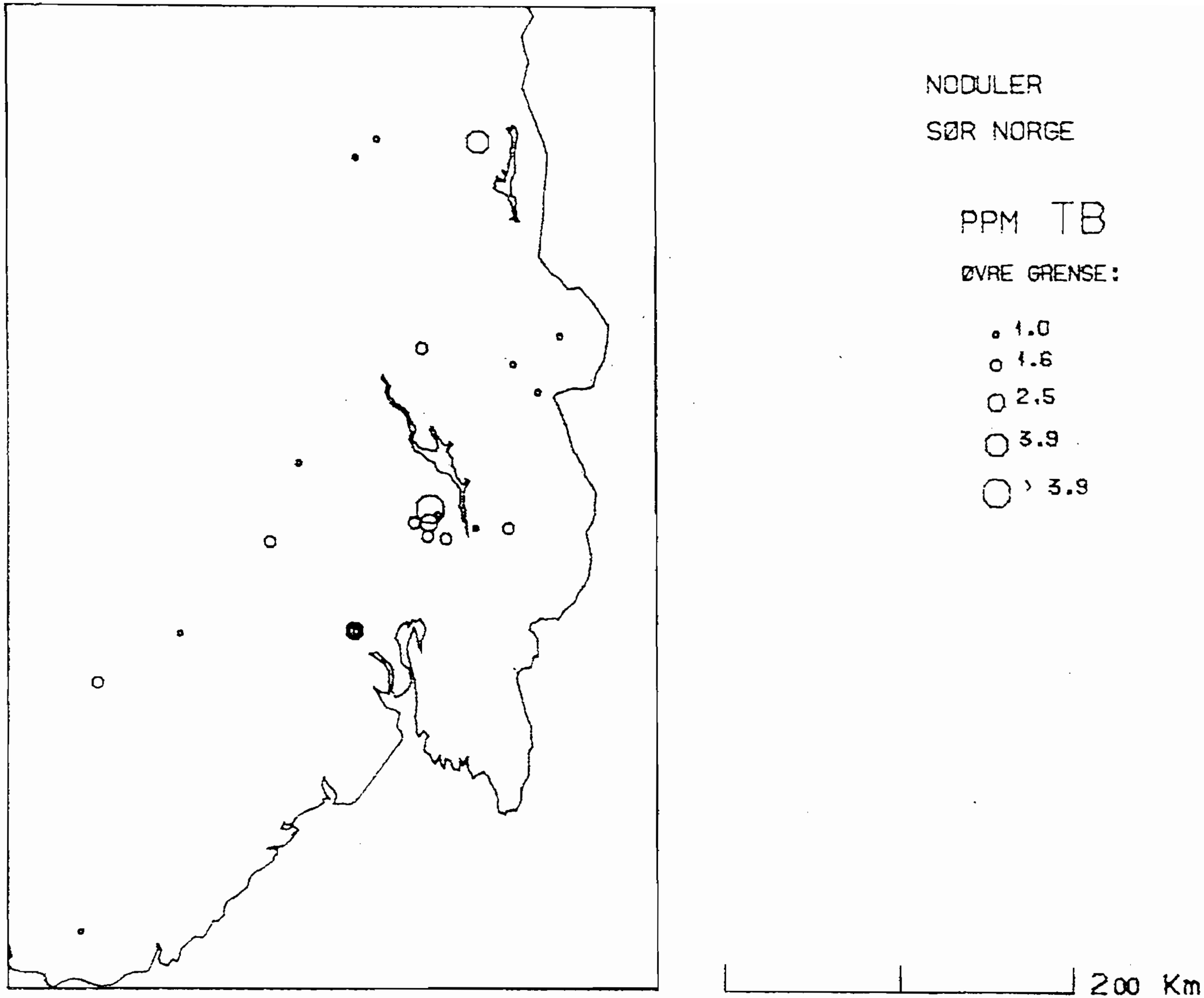
NGU-report 86.169. FIGURE 19.21



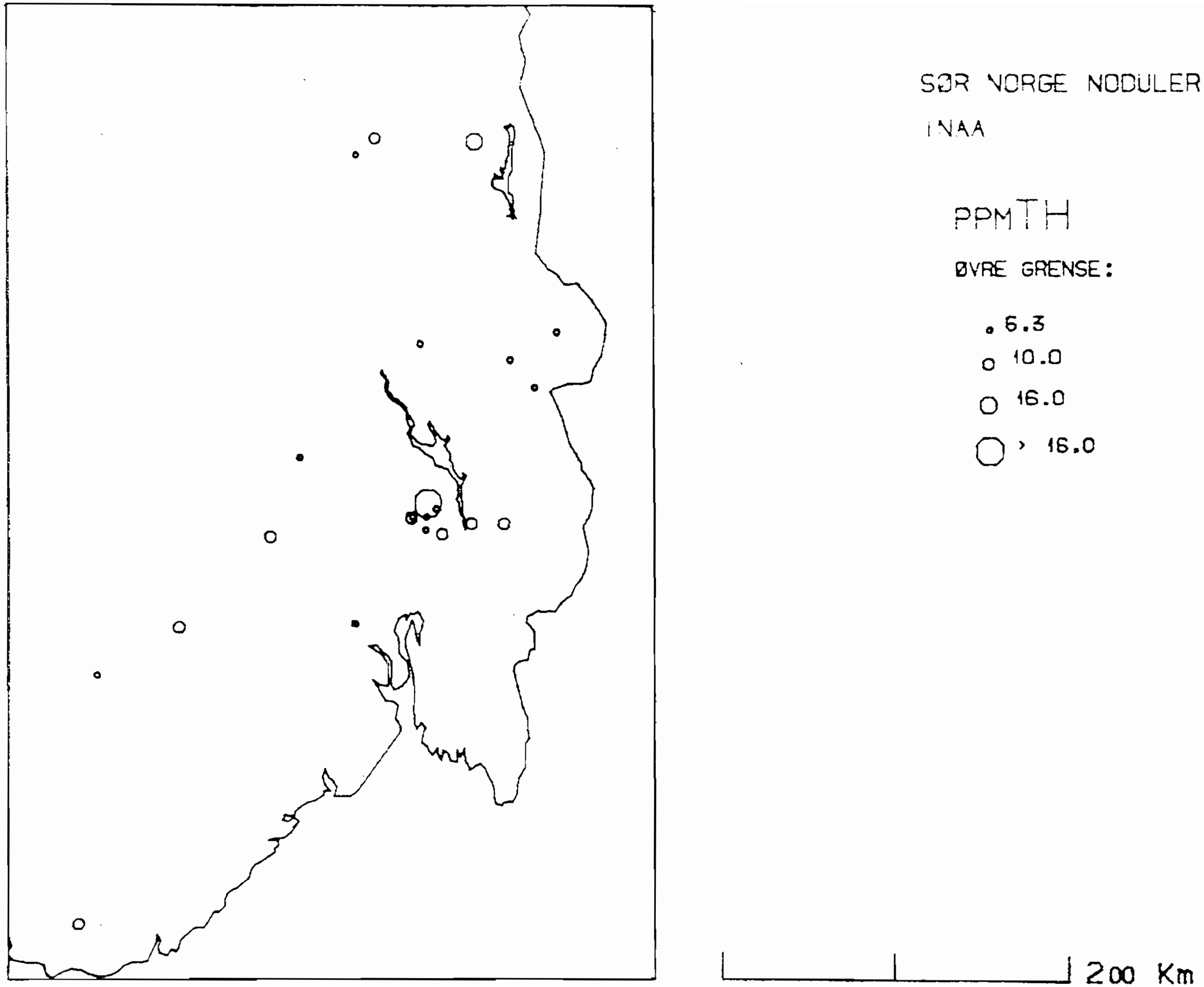
NGU-report 86.169. FIGURE 19.22



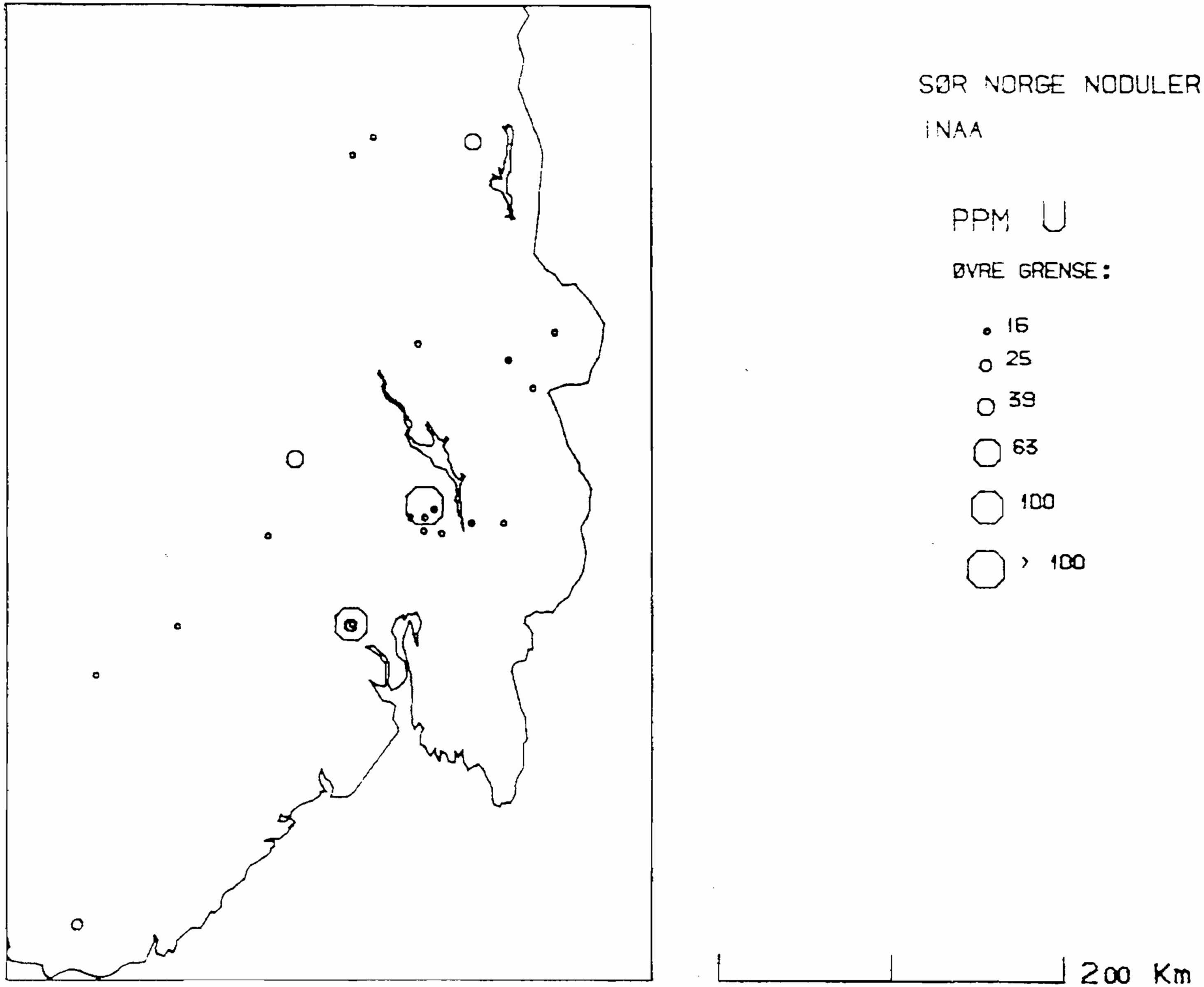
NGU-report 86.169. FIGURE 19.23



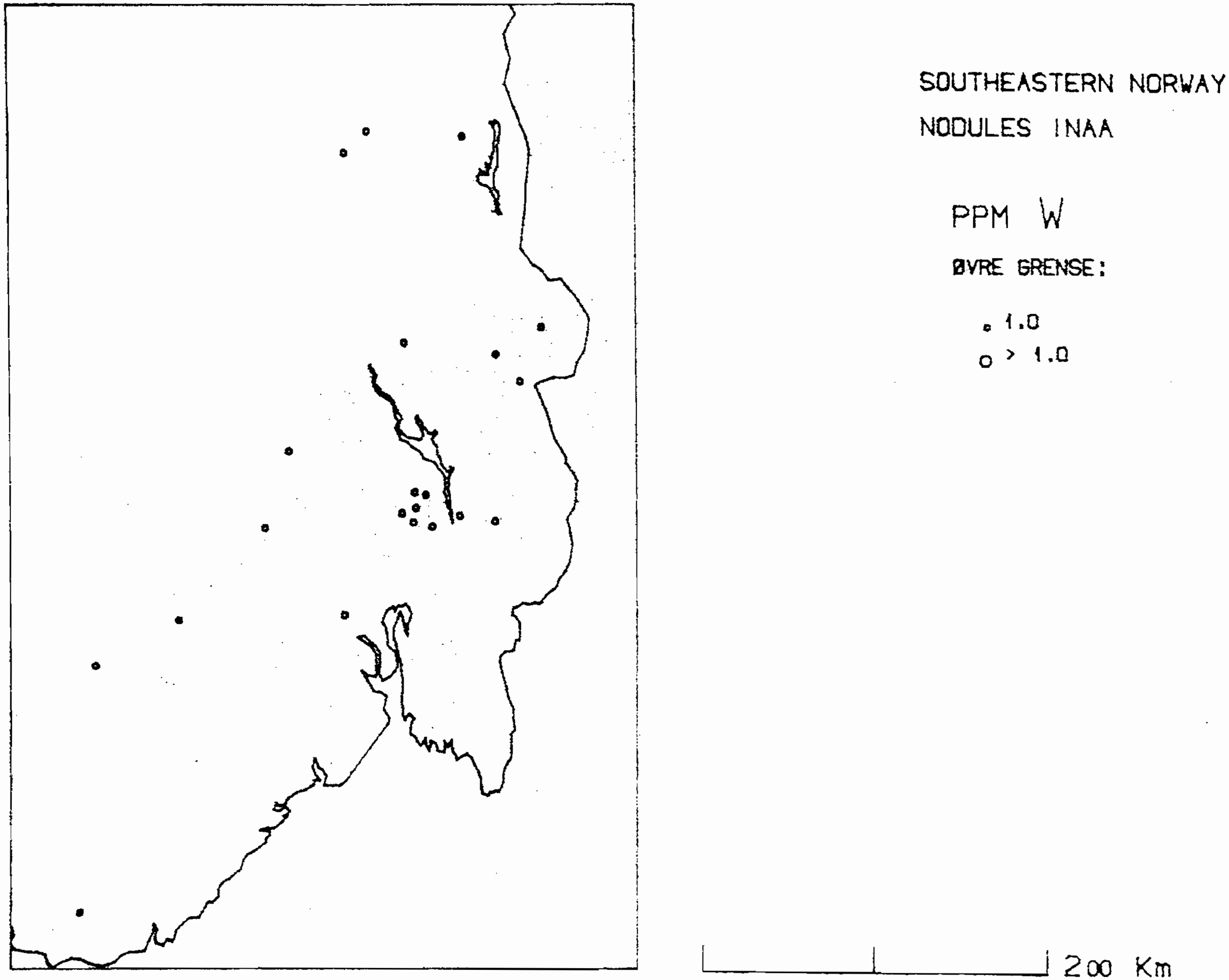
NGU-report 86.169. FIGURE 19.24



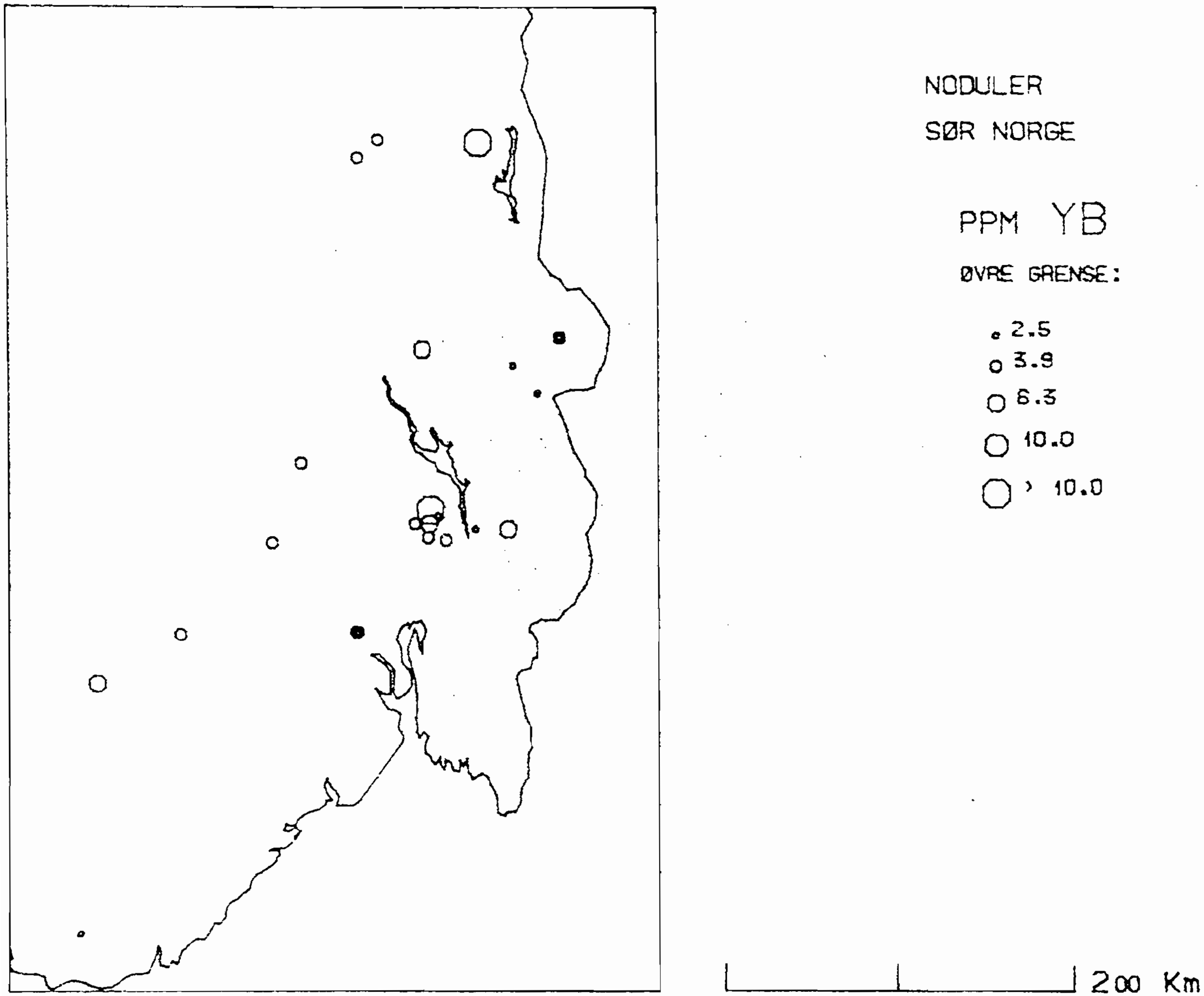
NGU-report 86.169. FIGURE 19.25



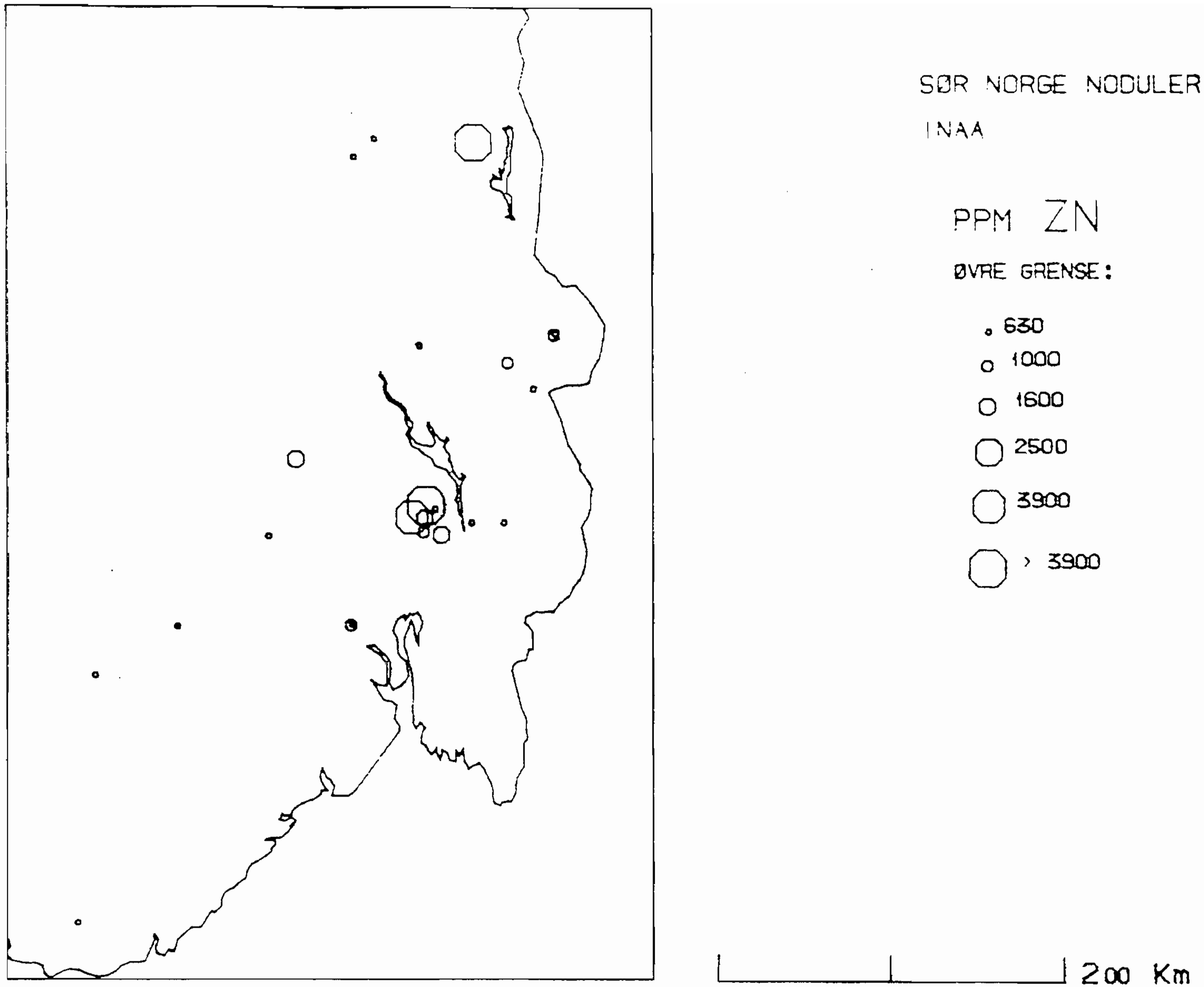
NGU-report 86.169. FIGURE 19.26



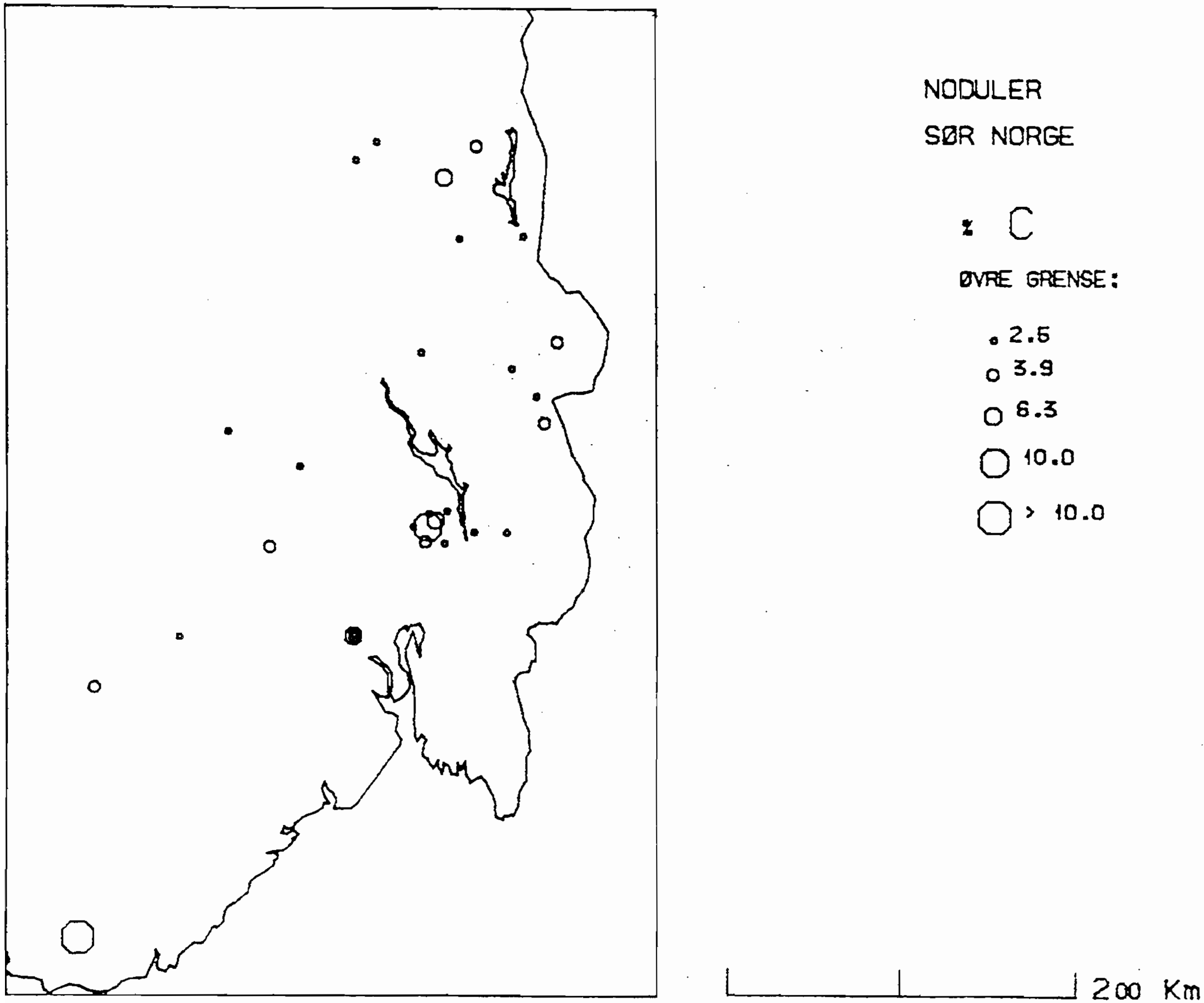
NGU-report 86.169. FIGURE 19.27



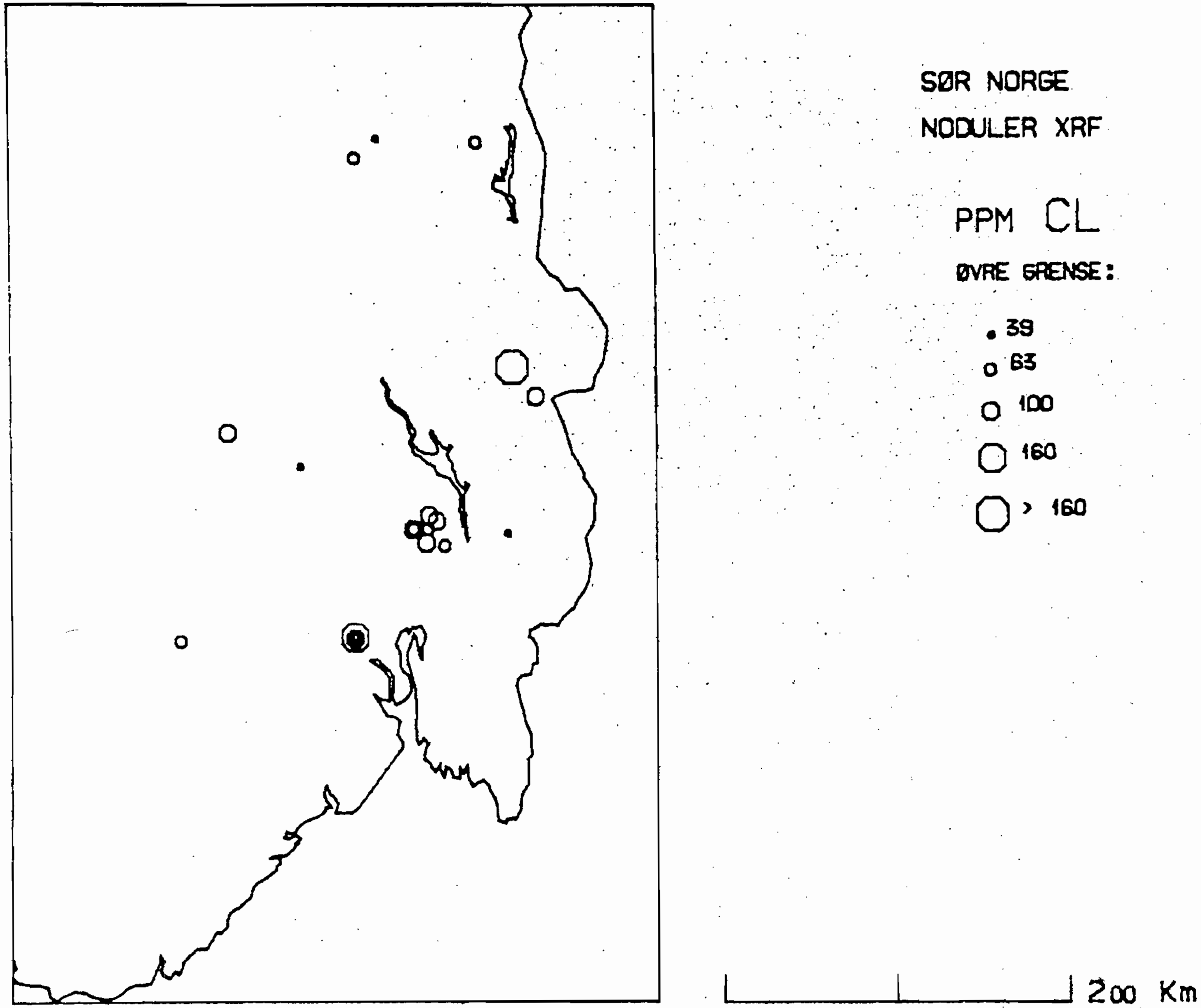
NGU-report 86.169. FIGURE 19.28



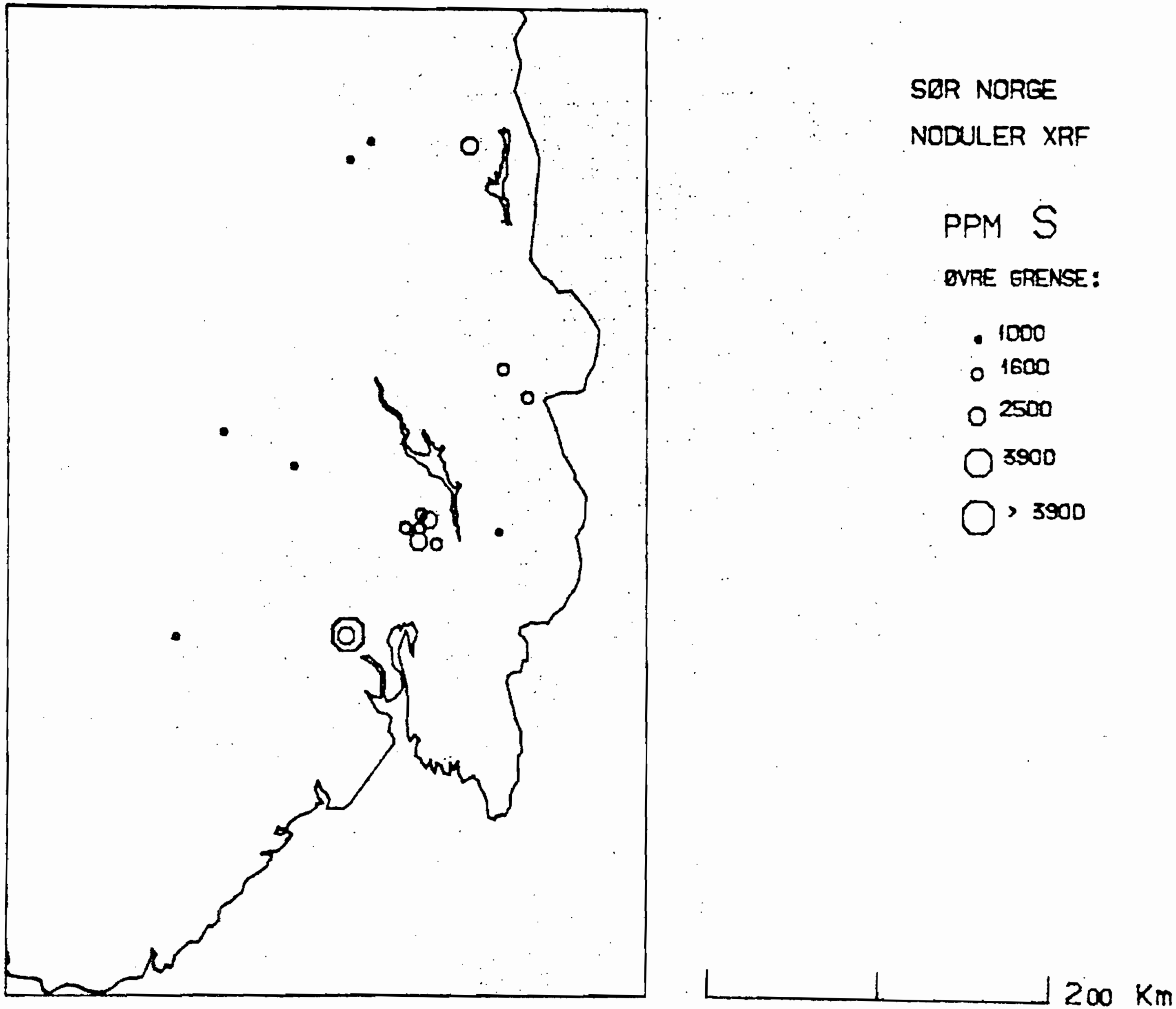
NGU-report 86.169. FIGURE 19.29



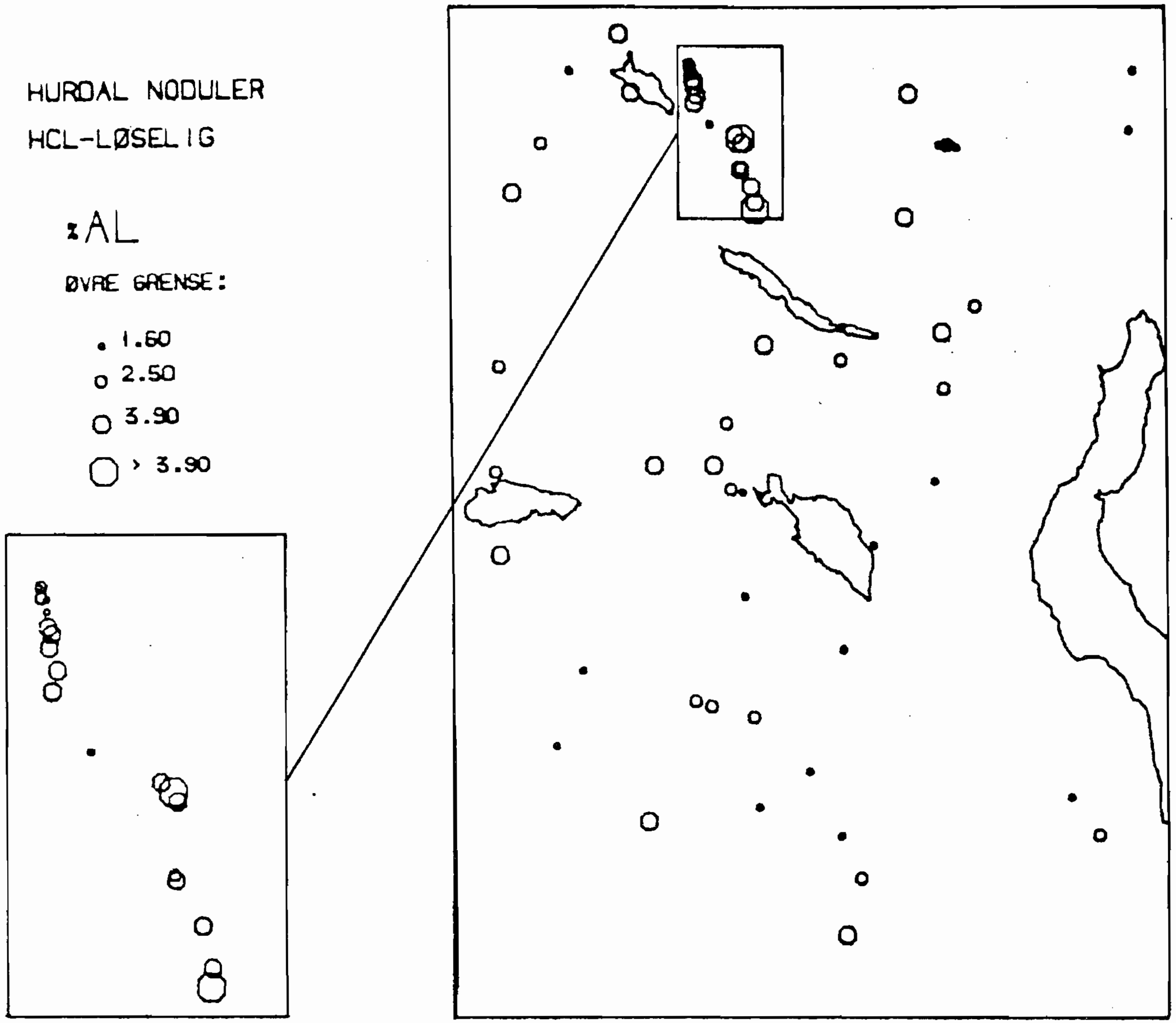
NGU-report 86.169. FIGURE 19.30



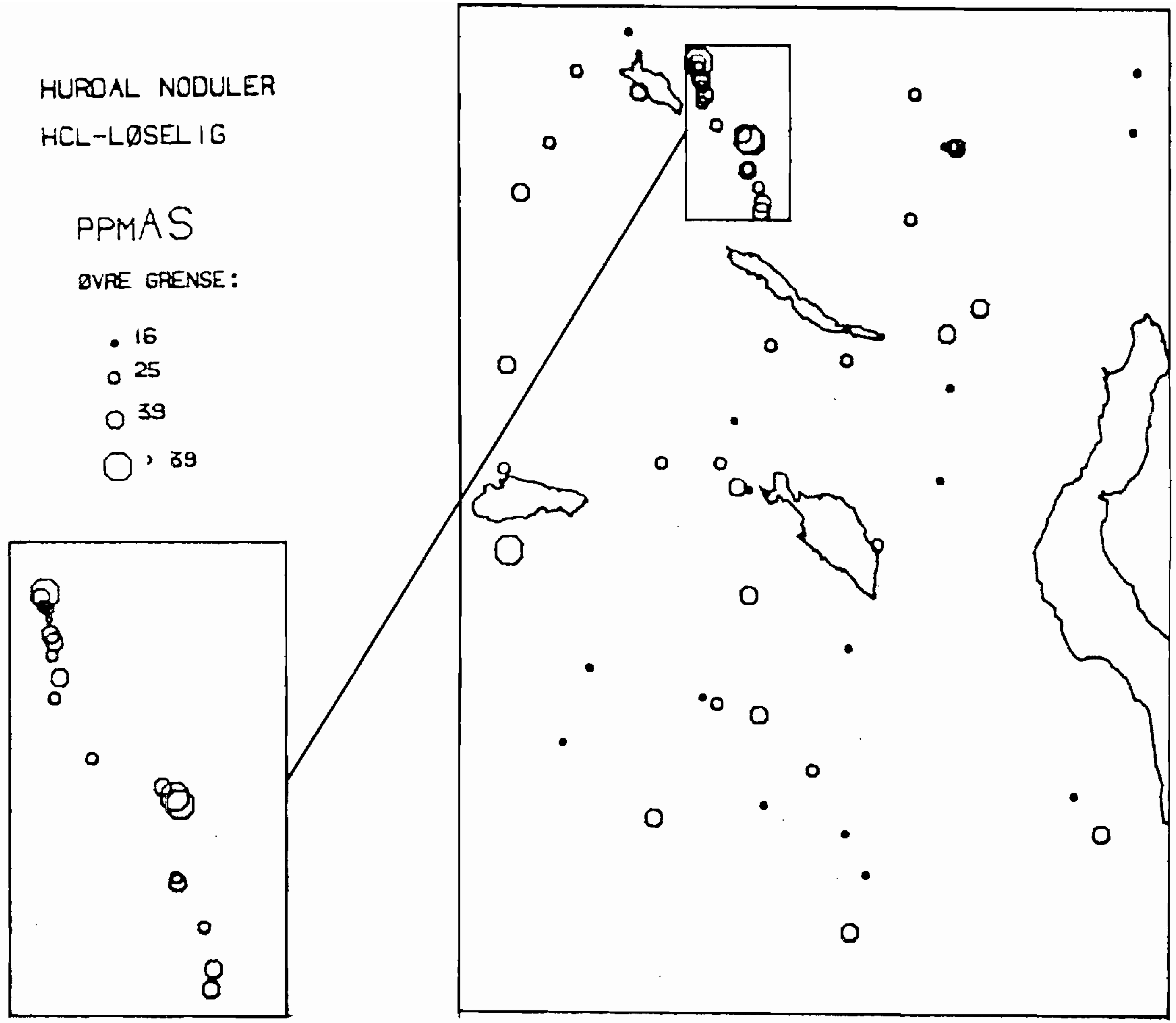
NGU-report 86.169. FIGURE 19.31



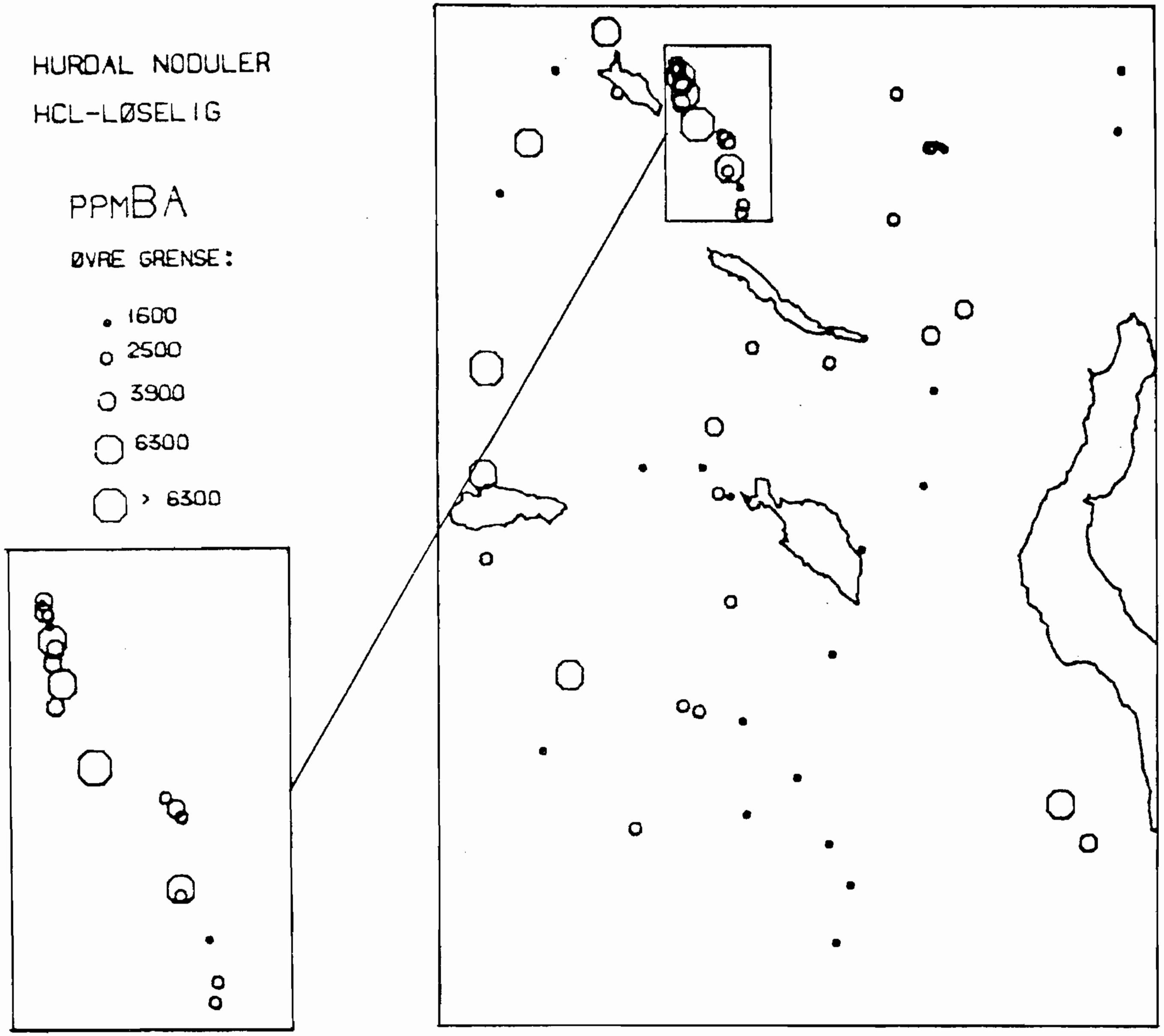
NGU-rapport 86.169. FIGURE 19.32



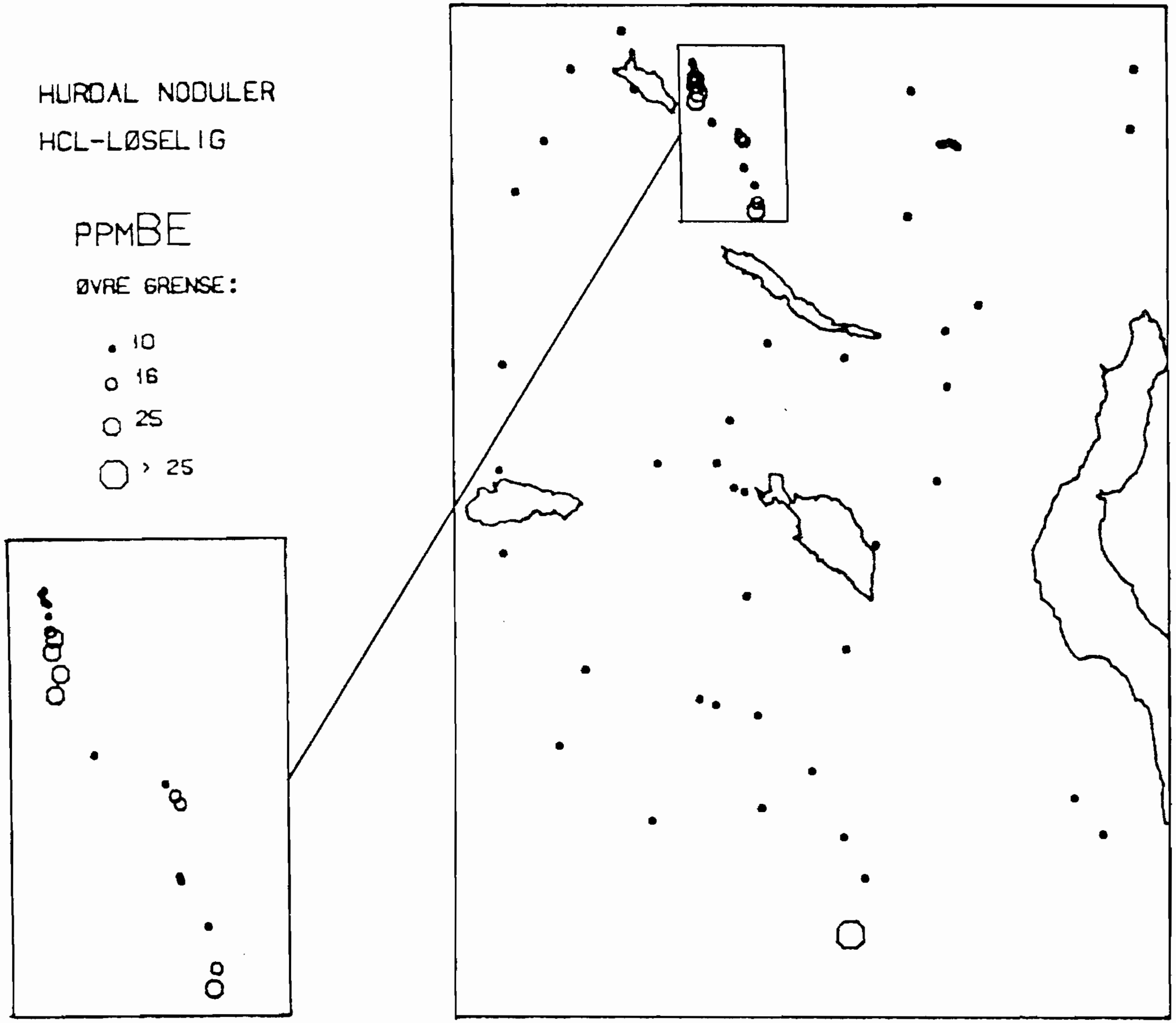
NGU-report 86.169. FIGURE 20.1



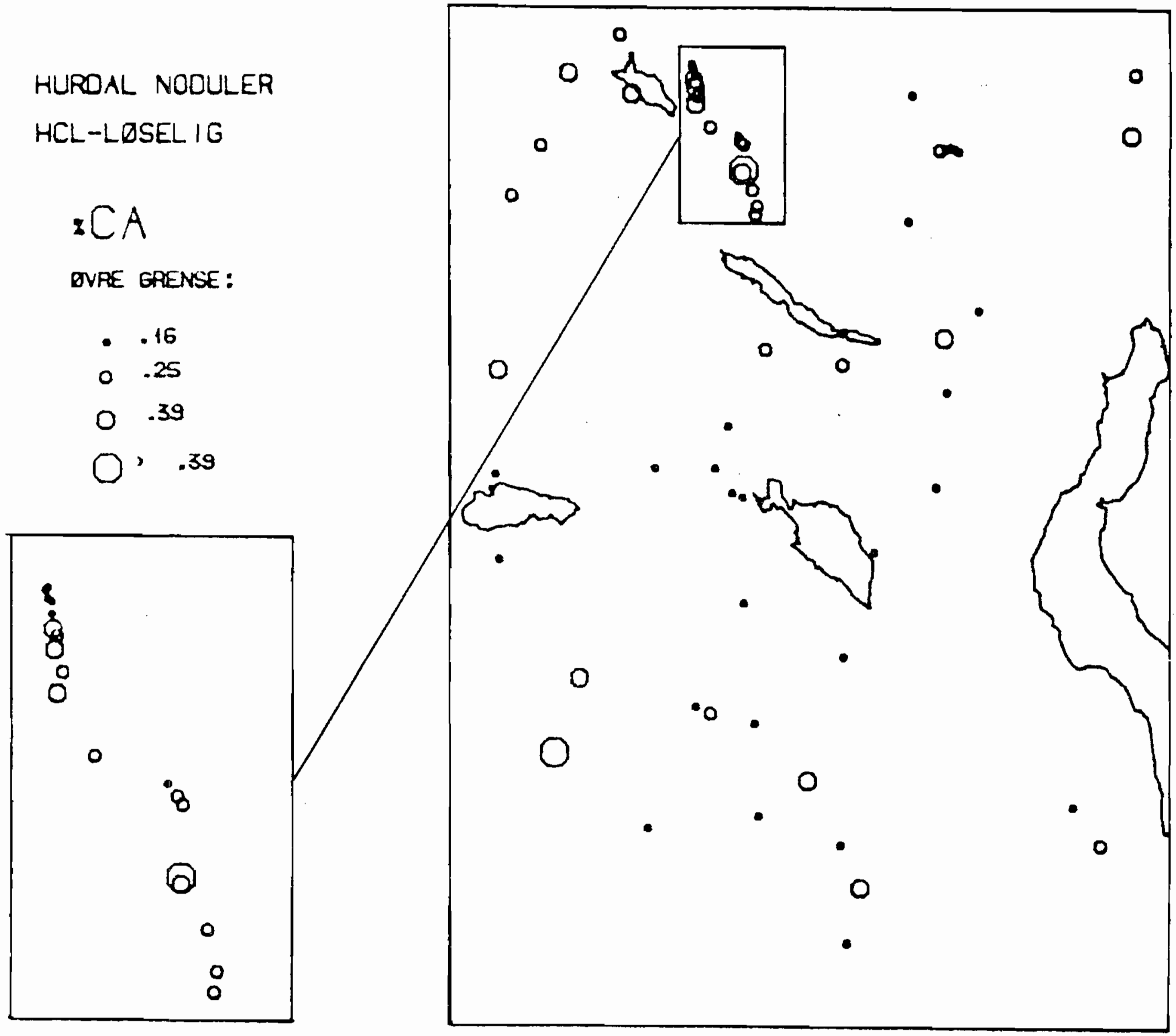
NGU-report 86.169. FIGURE 20.2



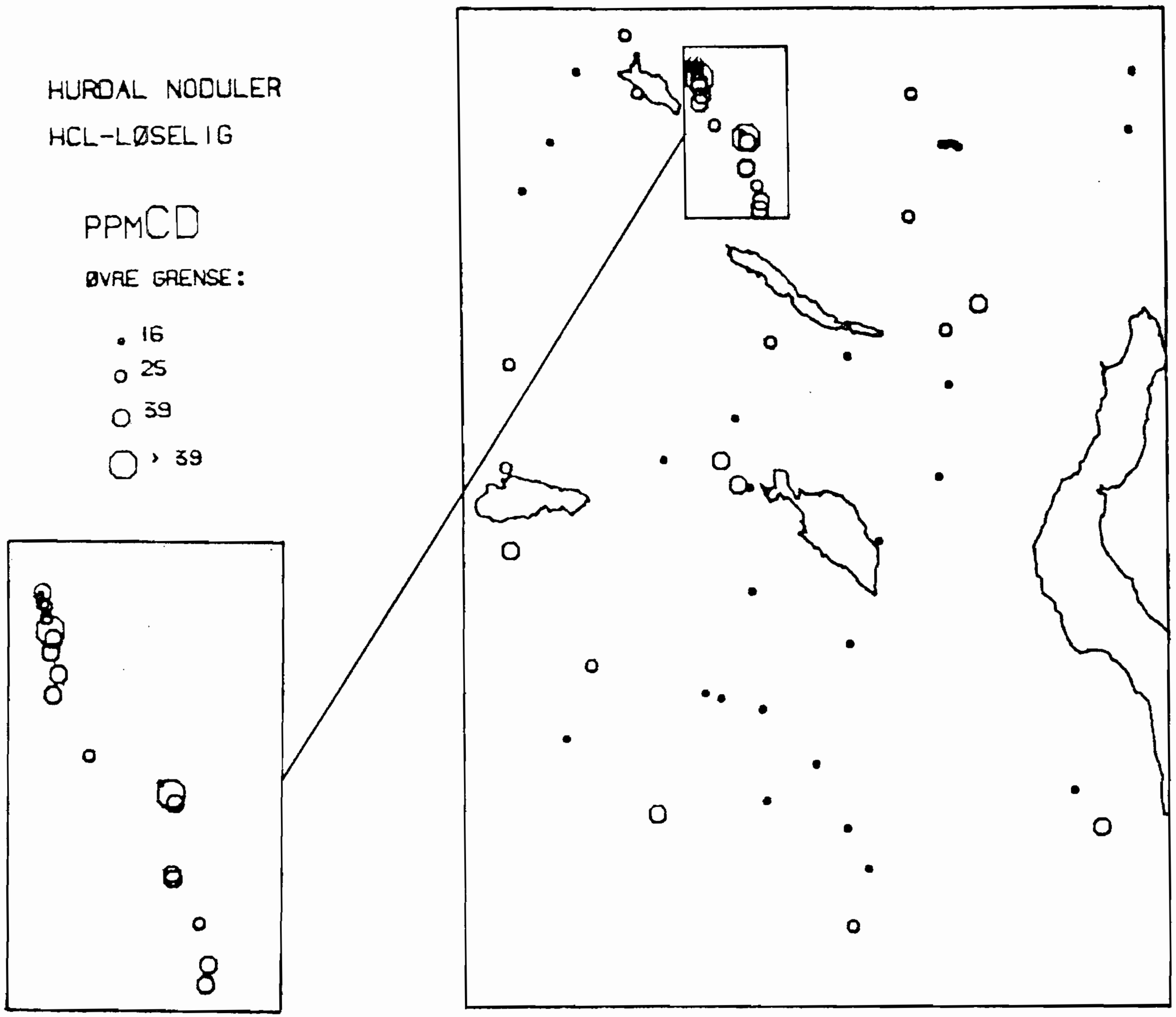
NGU-report 86.169. FIGURE 20.3



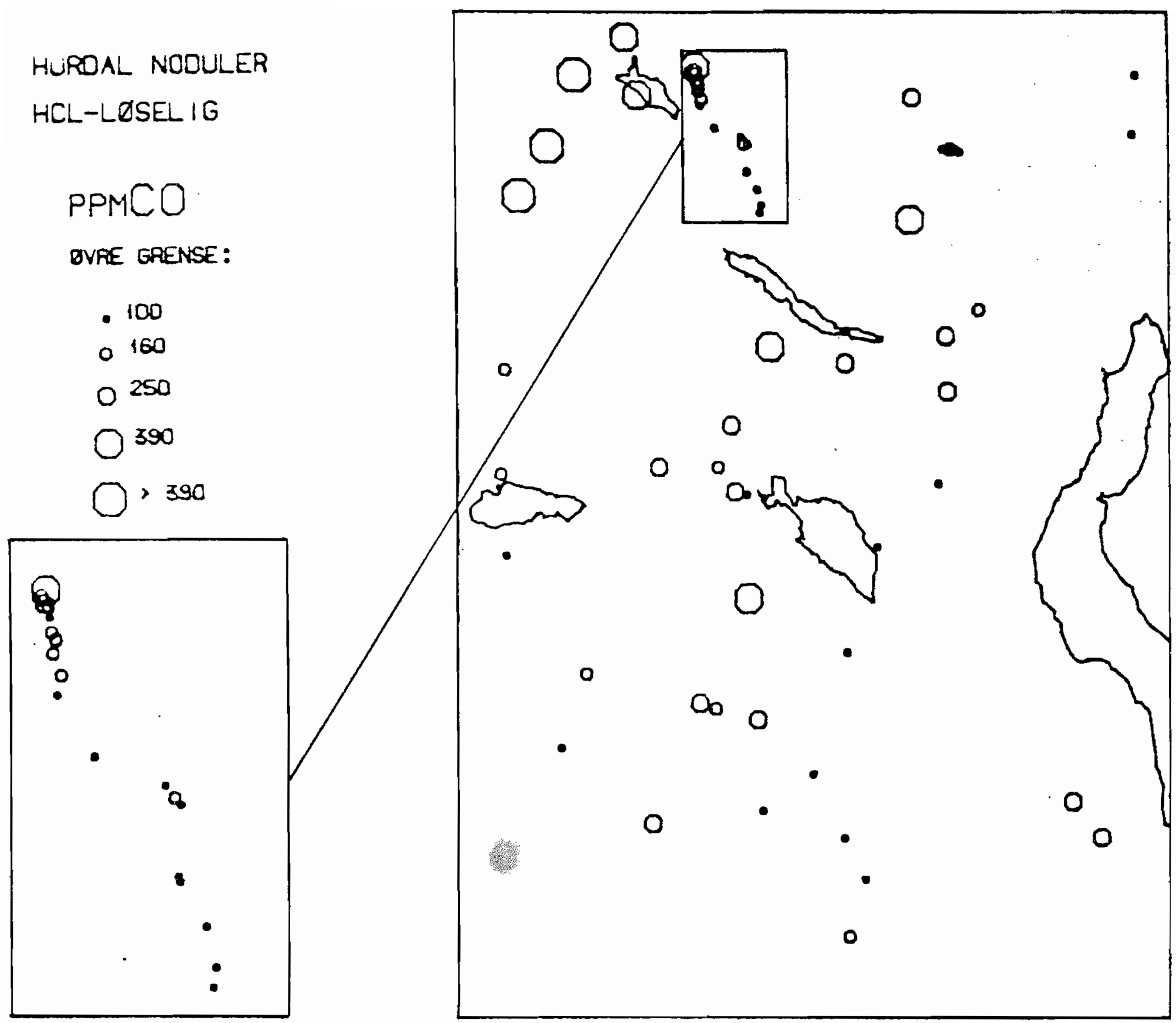
NGU-report 86.169. FIGURE 20.4



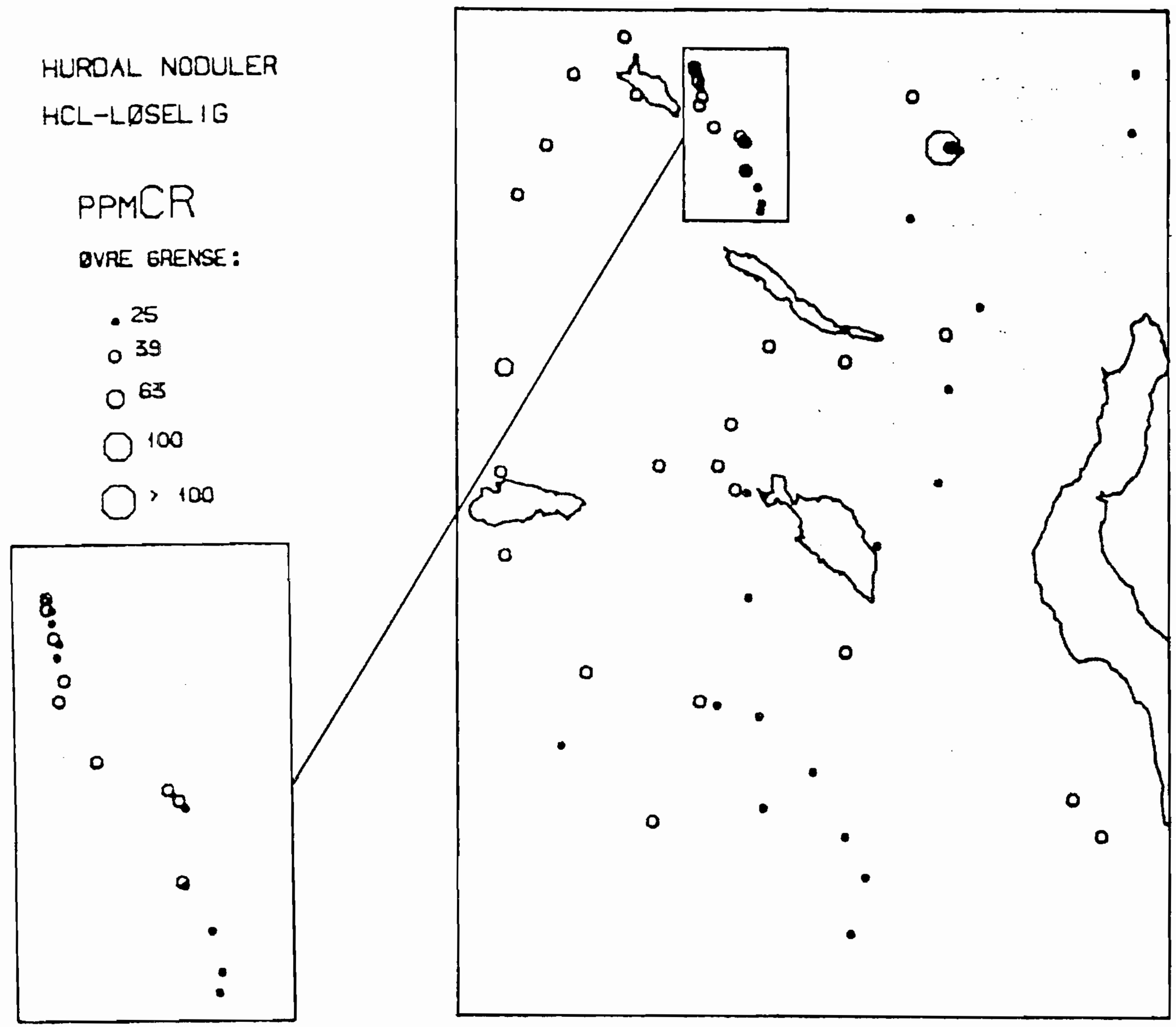
NGU-report 86.169. FIGURE 20.5



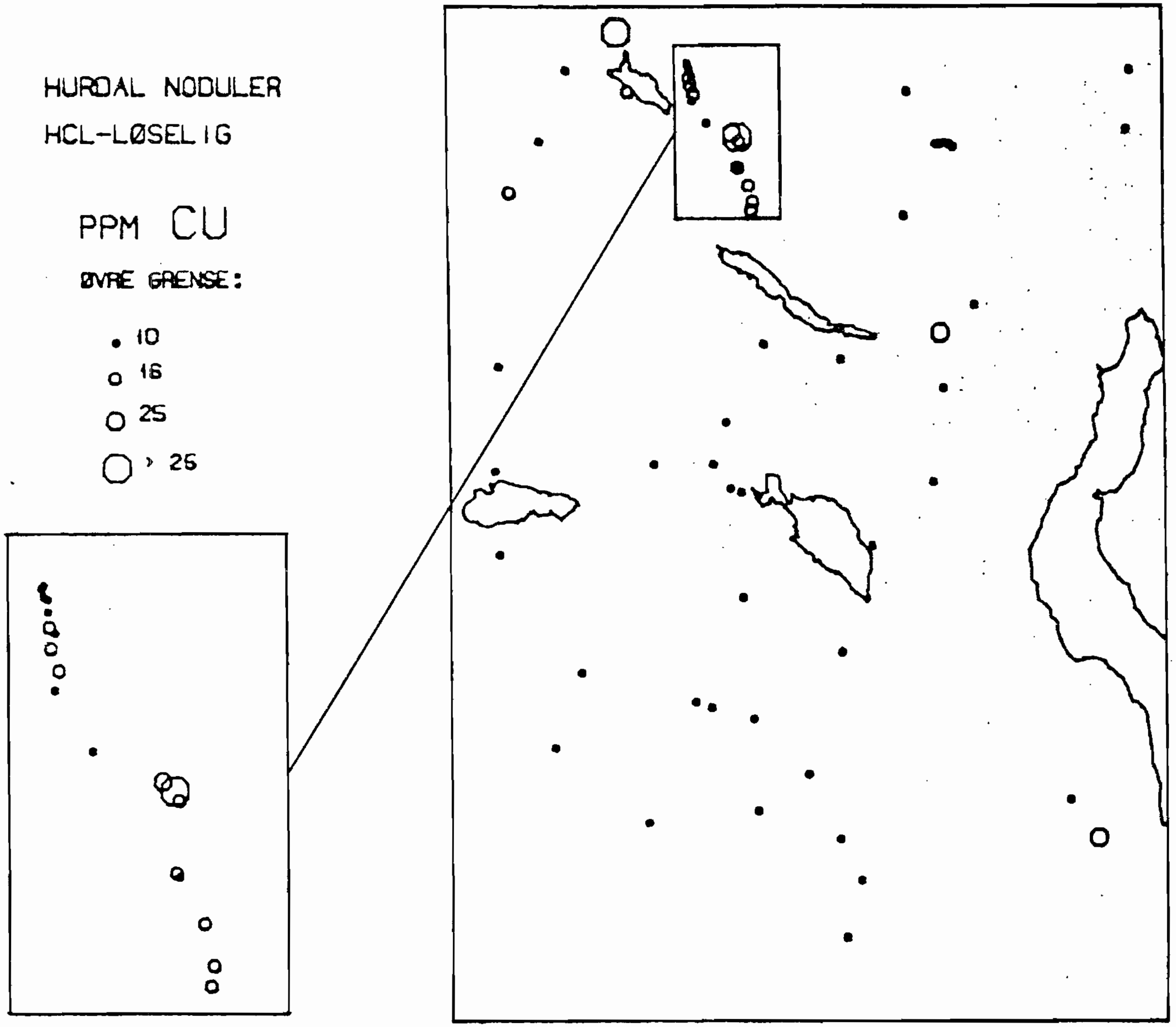
NGU-report 86.169. FIGURE 20.6



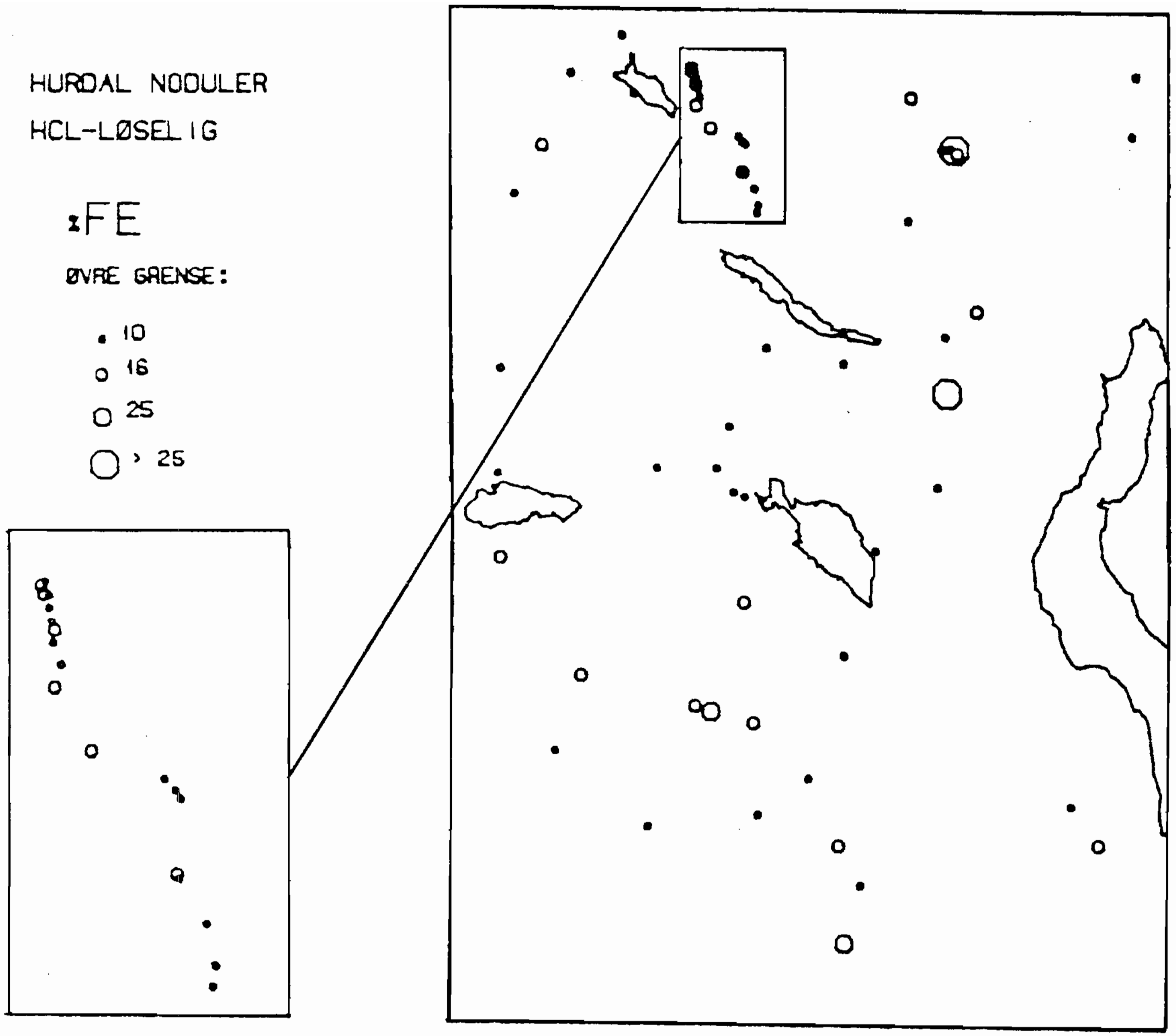
NGU-report 86.169. FIGURE 20.7



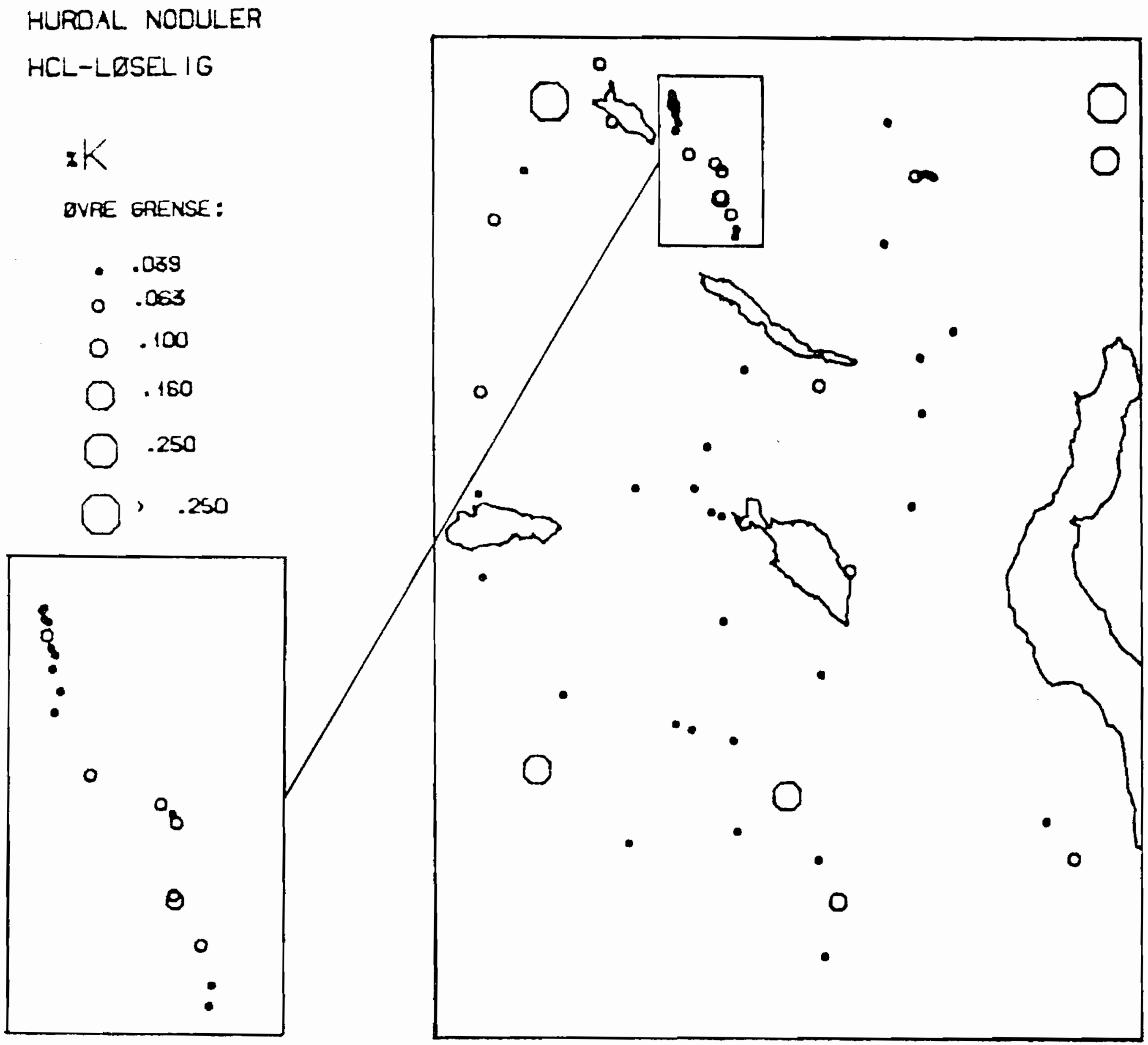
NGU-report 86.169. FIGURE 20.8



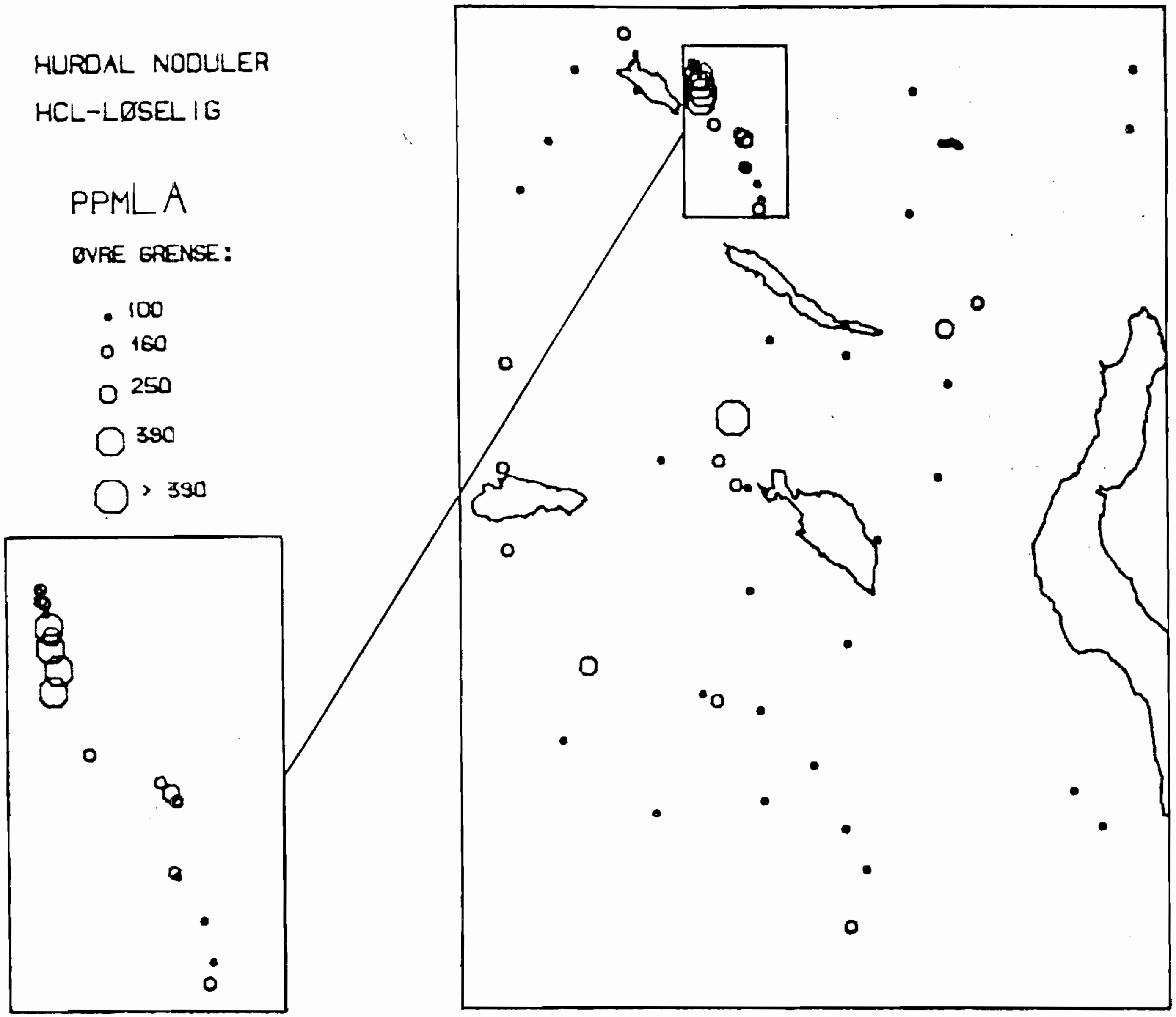
NGU-report 86.169. FIGURE 20.9



NGU-report 86.169. FIGURE 20.10



NGU-report 86.169. FIGURE 20.11



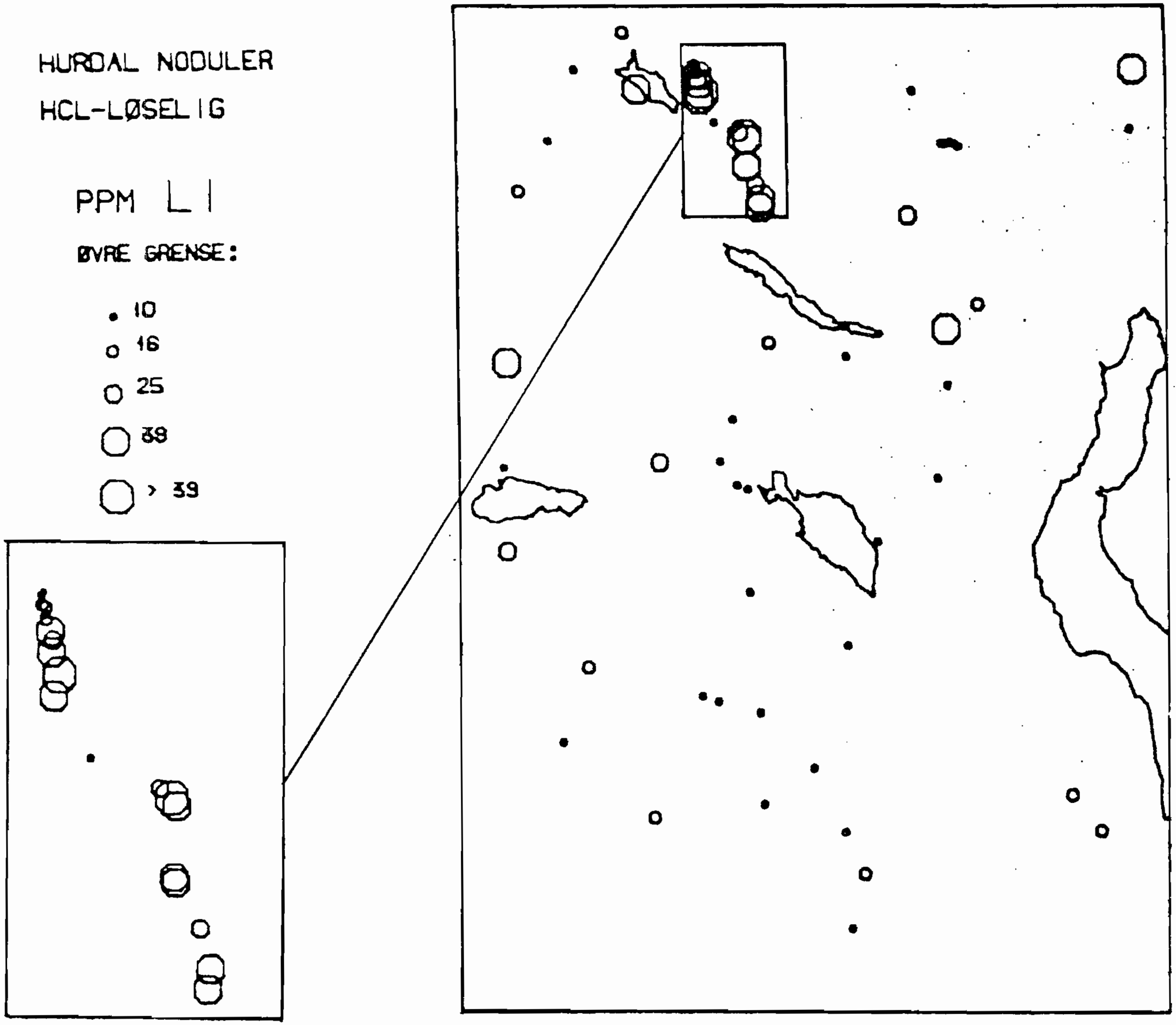
NGU-report 86.169. FIGURE 20.12

HURDAL NODULER

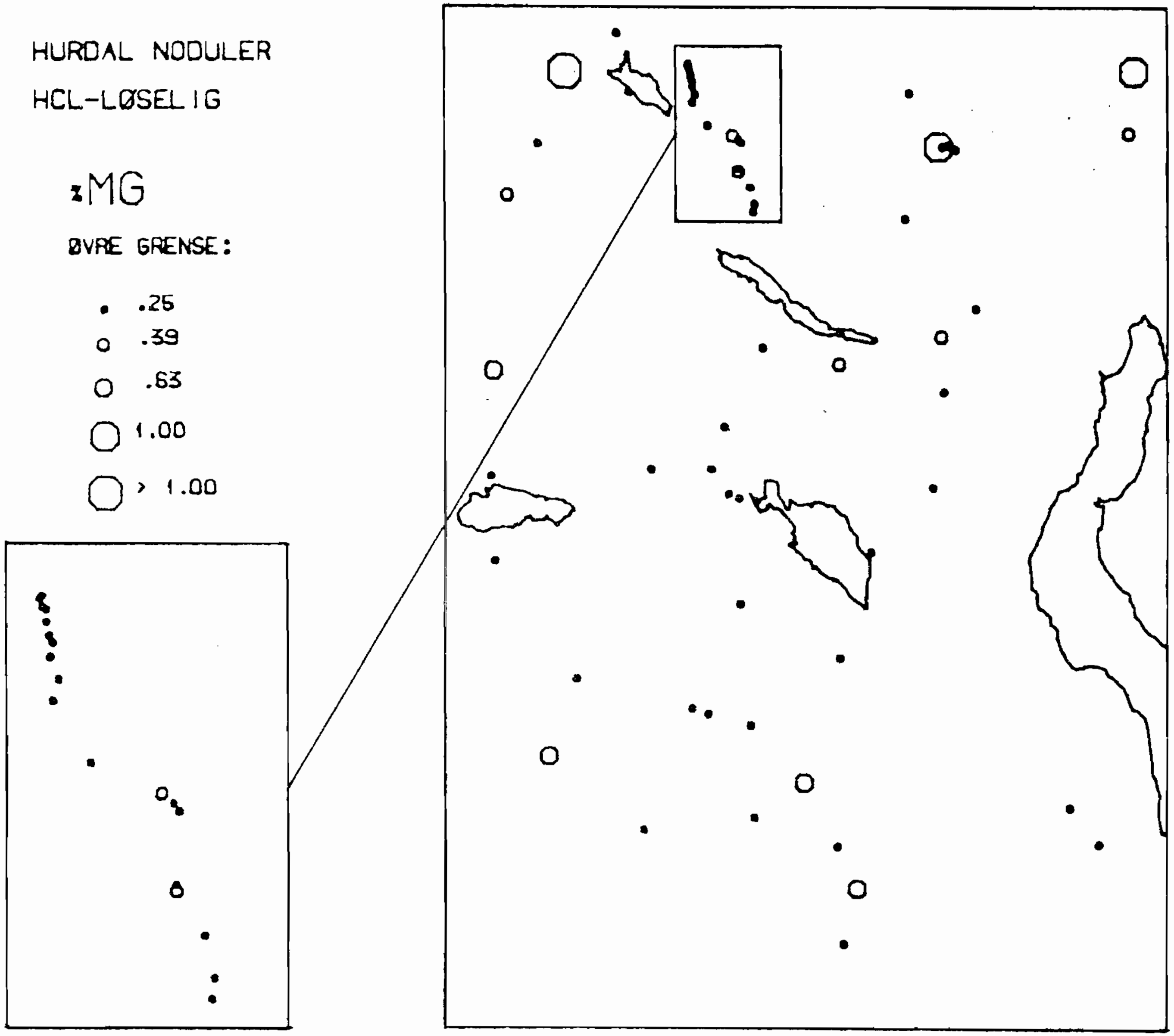
HCL-LØSELIG

PPM LI

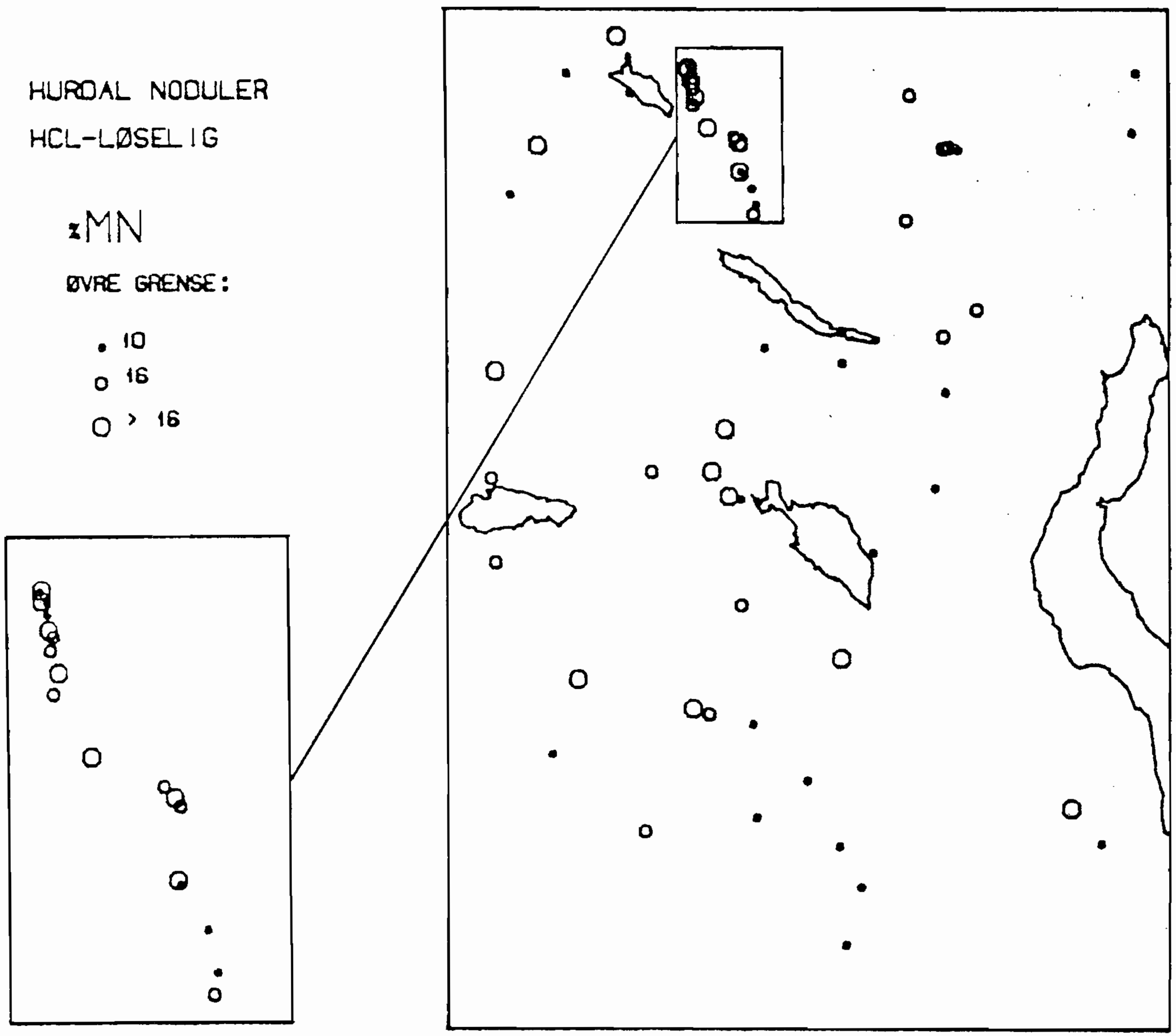
ØVRE GRENSE:



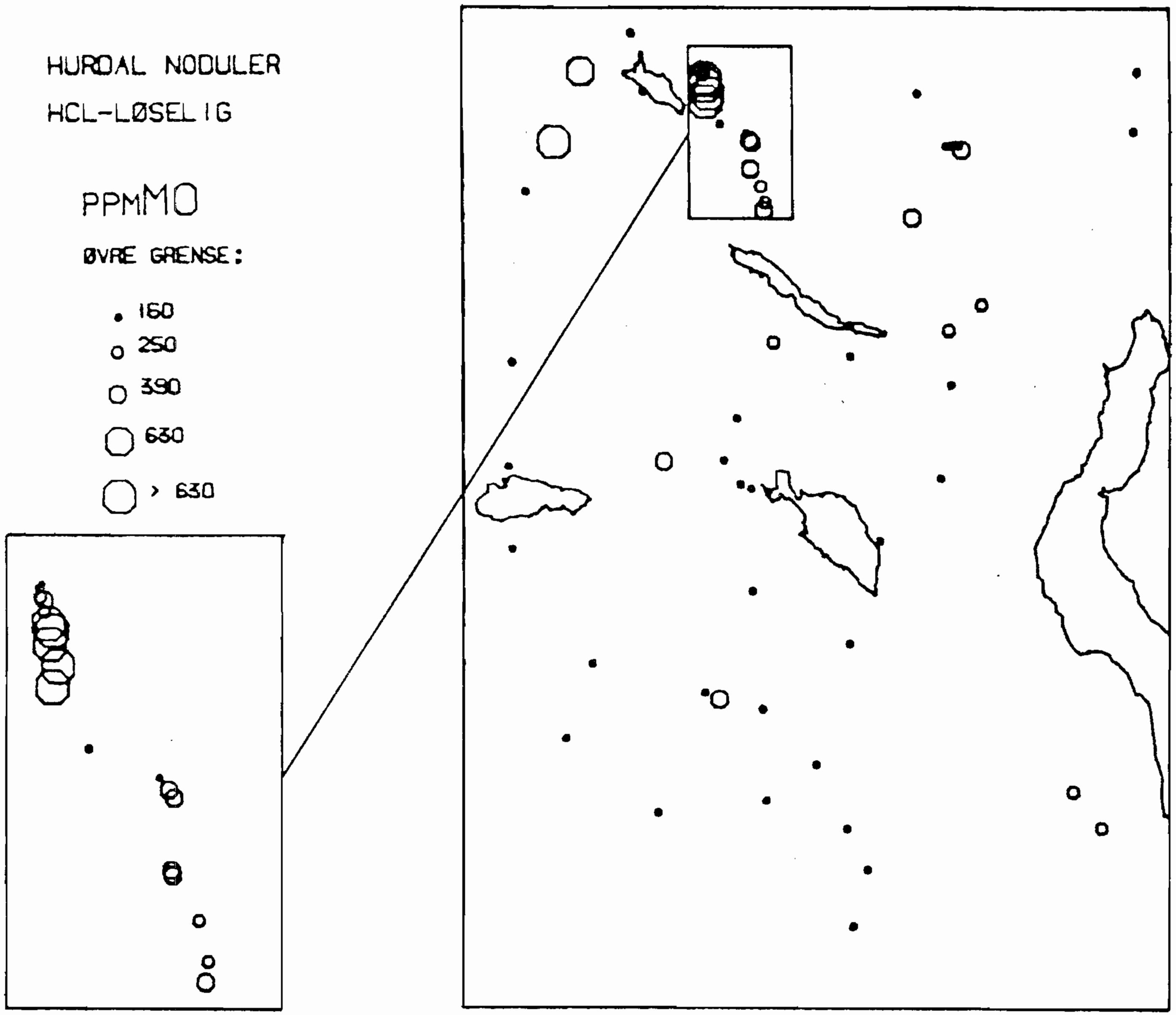
NGU-report 86.169. FIGURE 20.13



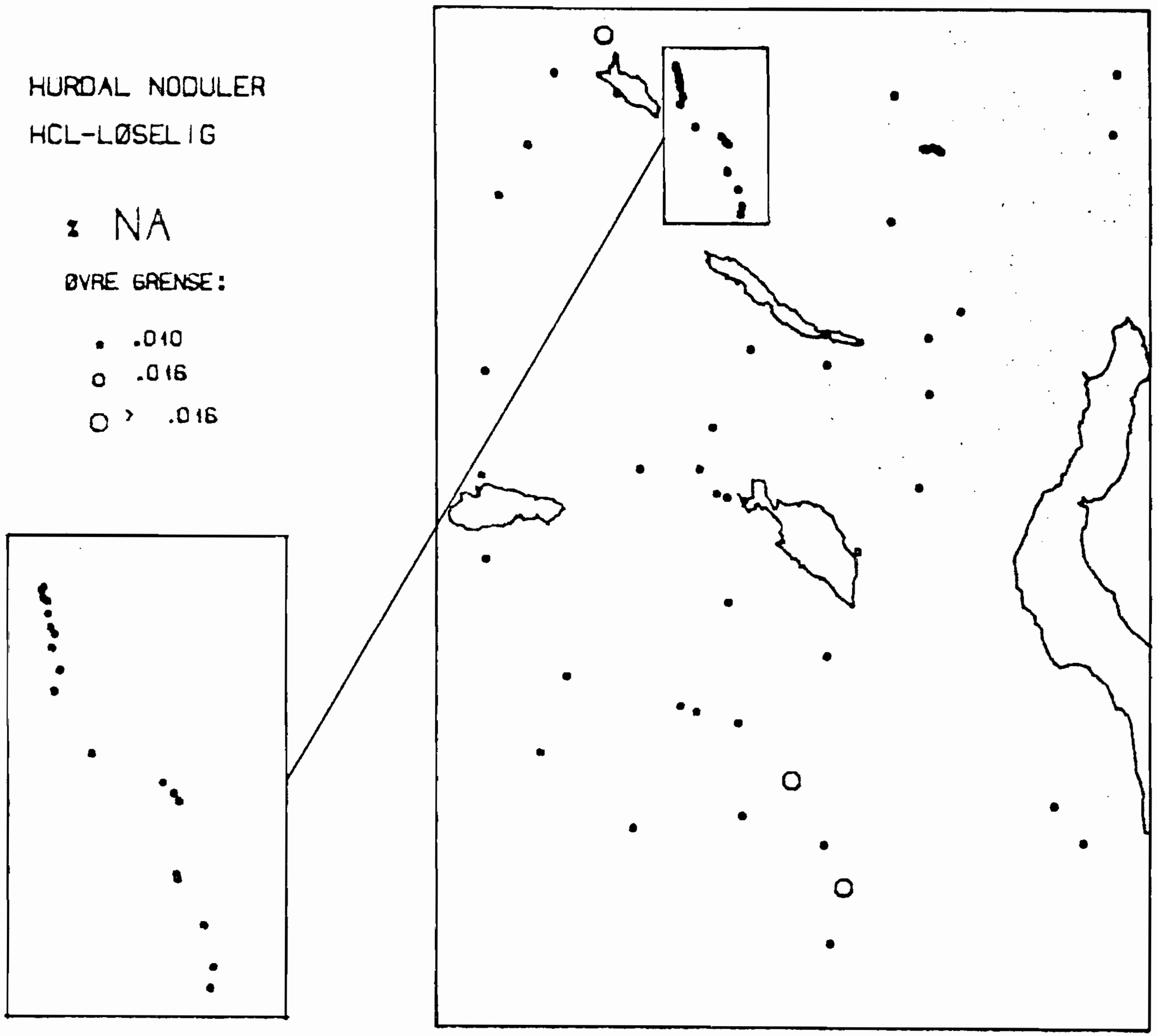
NGU-report 86.169. FIGURE 20.14



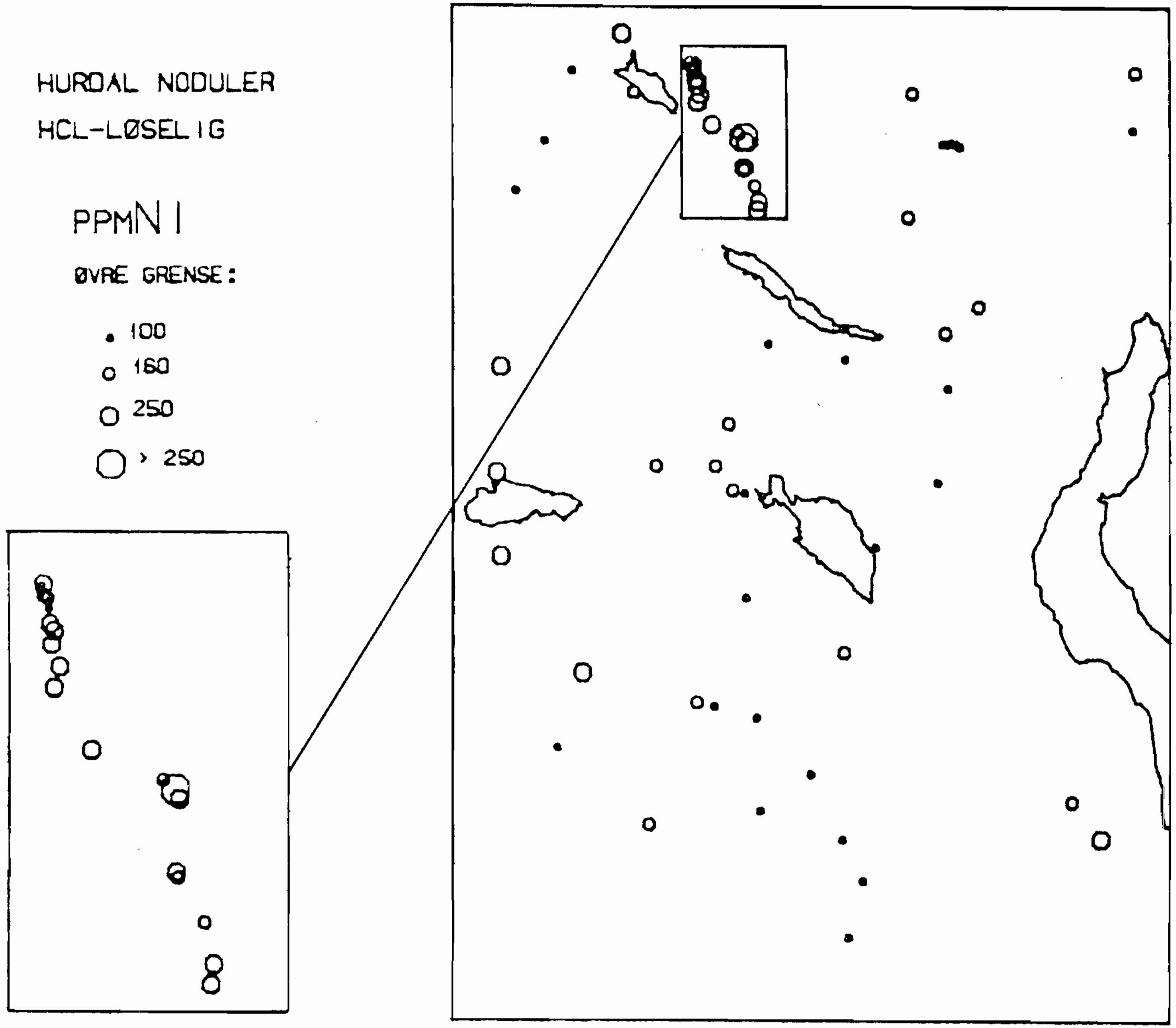
NGU-report 86.169. FIGURE 20.15



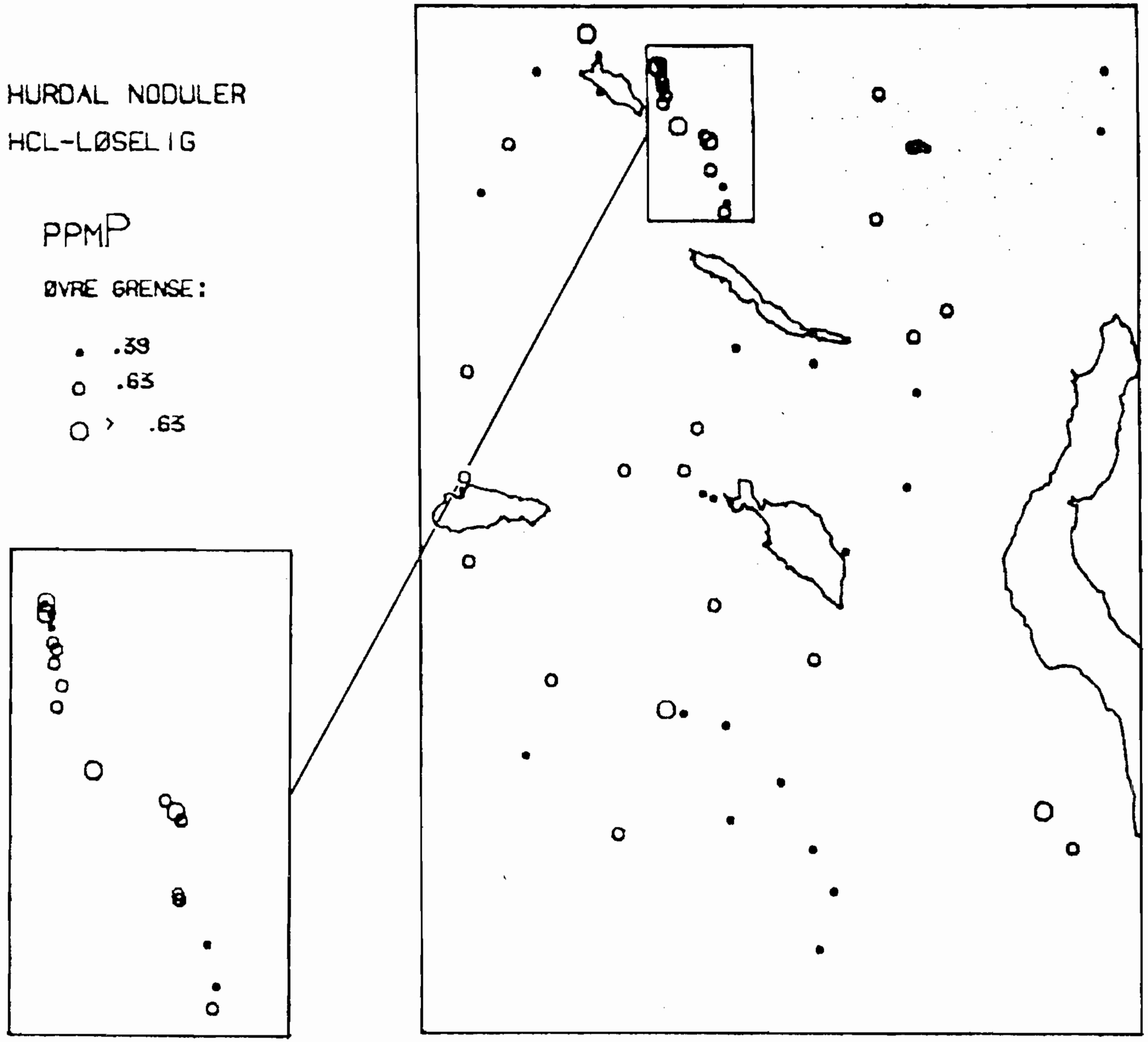
NGU-report 86.169. FIGURE 20.16



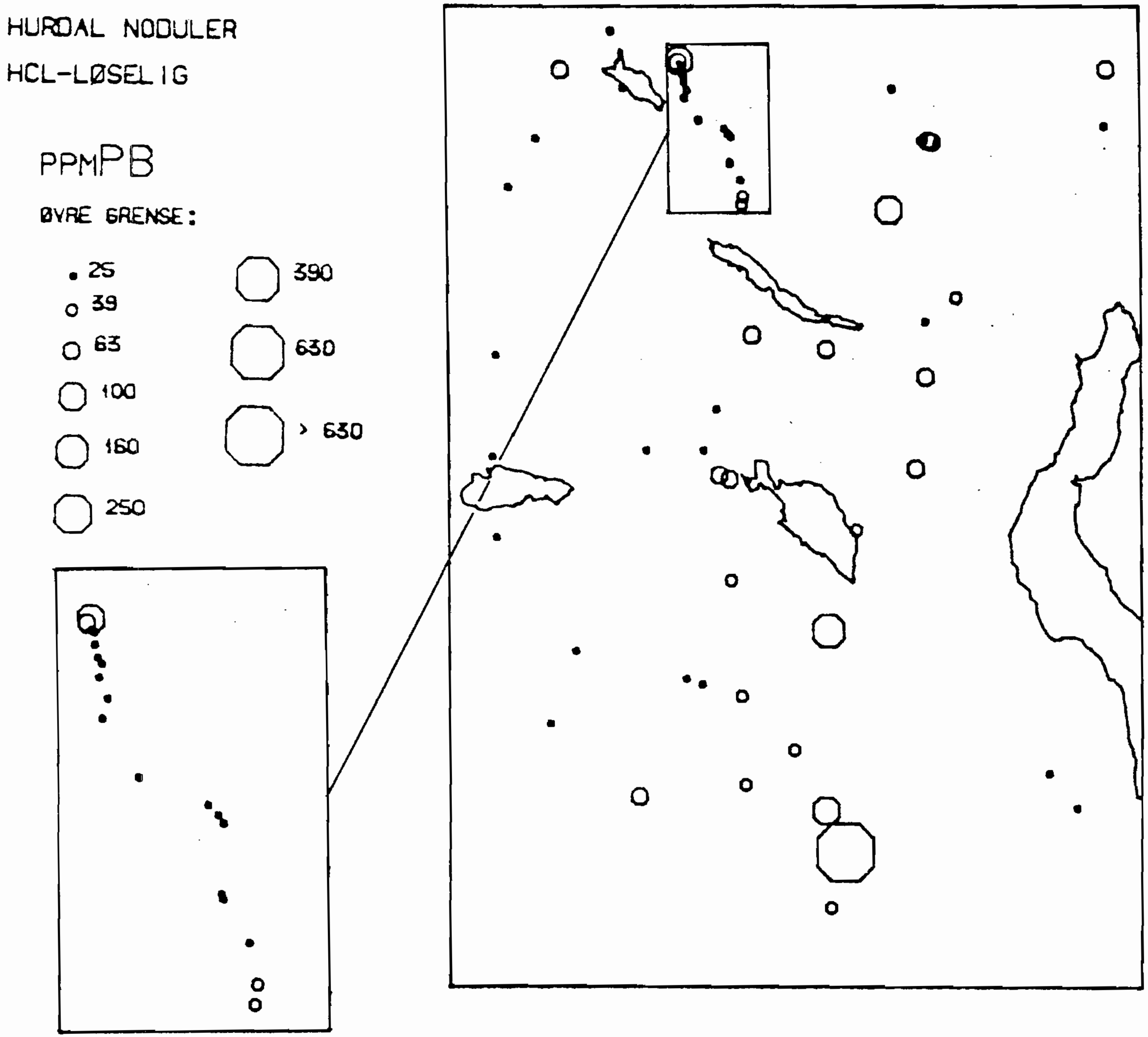
NGU-report 86.169. FIGURE 20.17



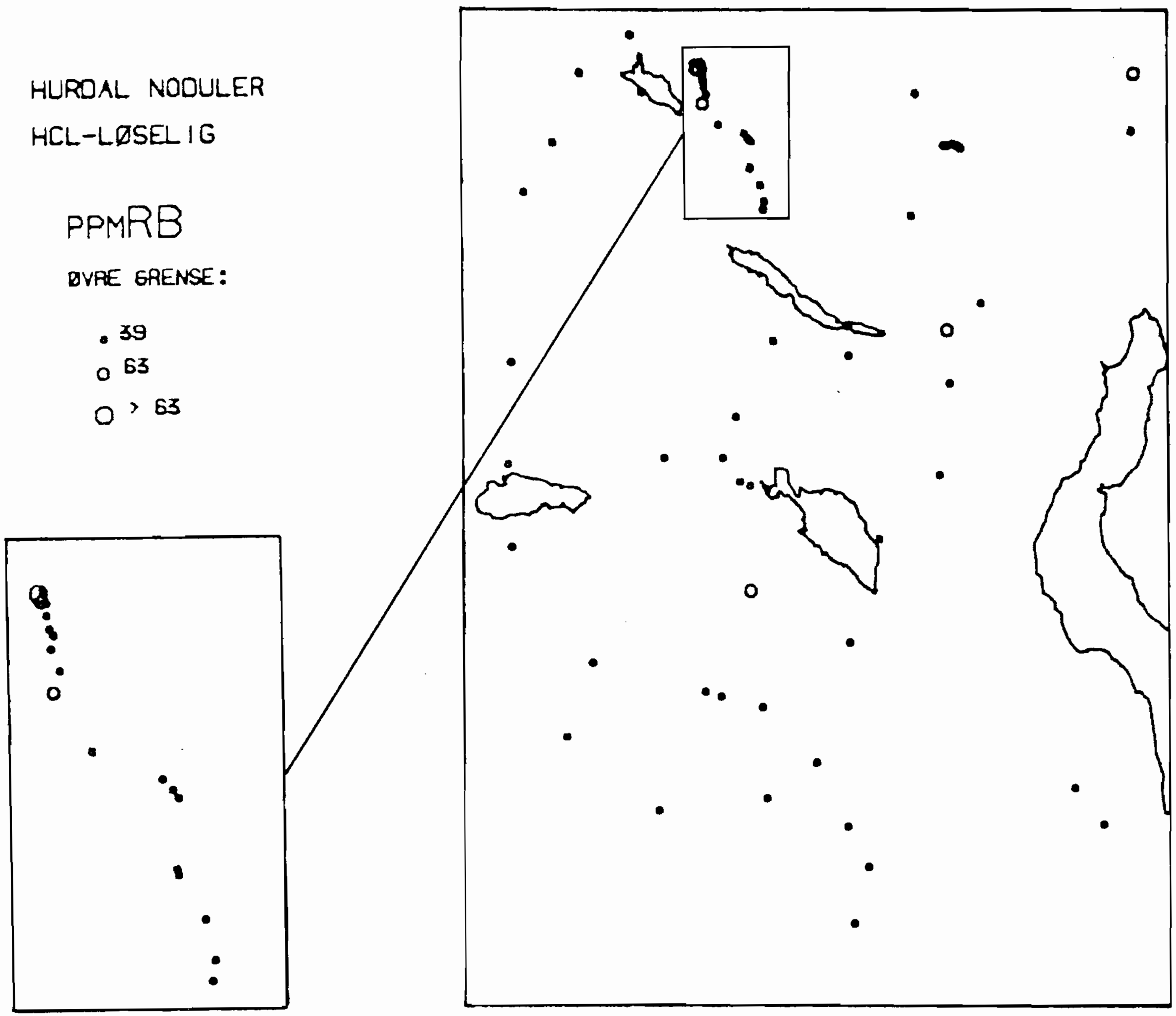
NGU-report 86.169. FIGURE 20.18



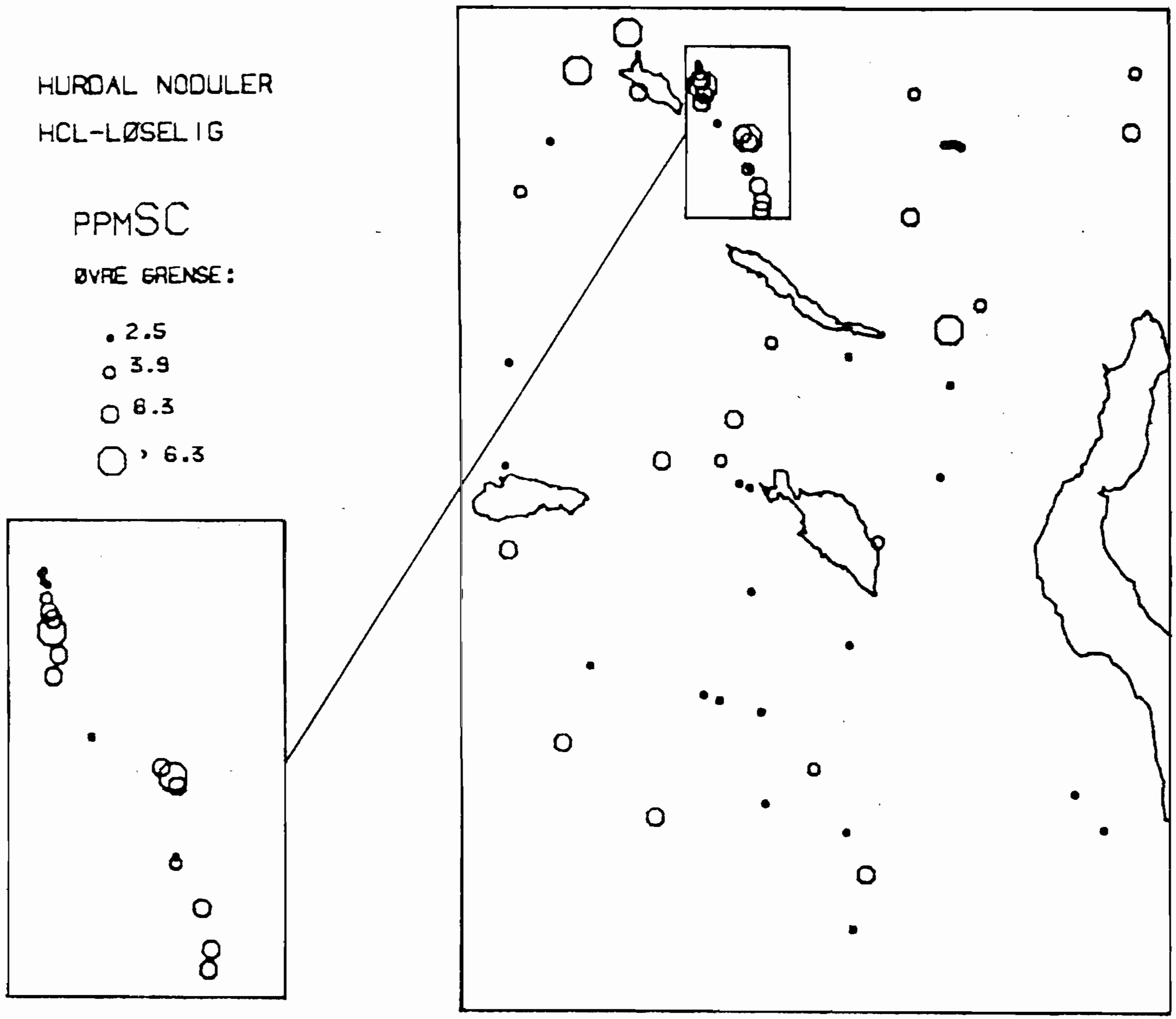
NGU-report 86.169. FIGURE 20.19



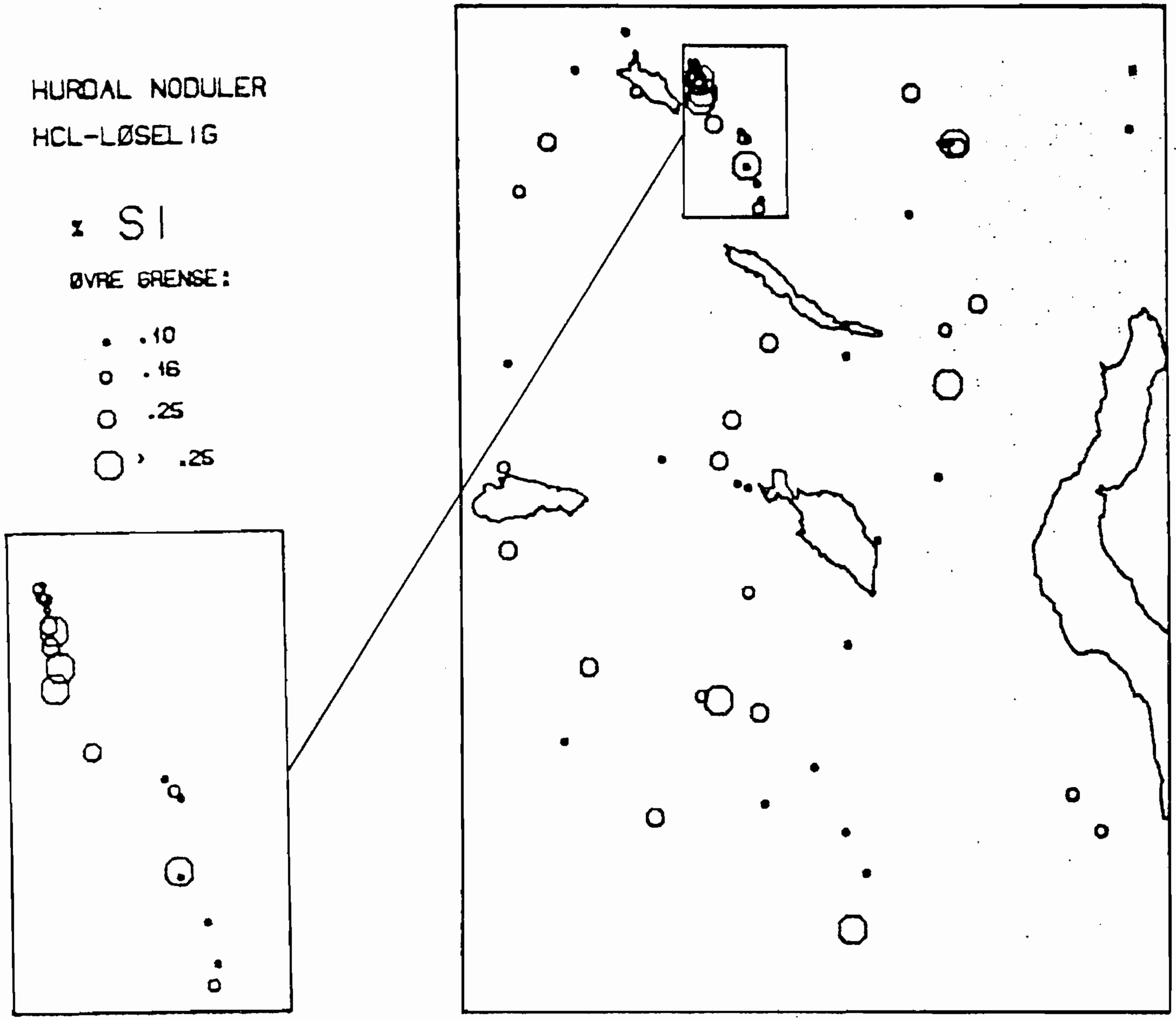
NGU-report 86.169. FIGURE 20.20



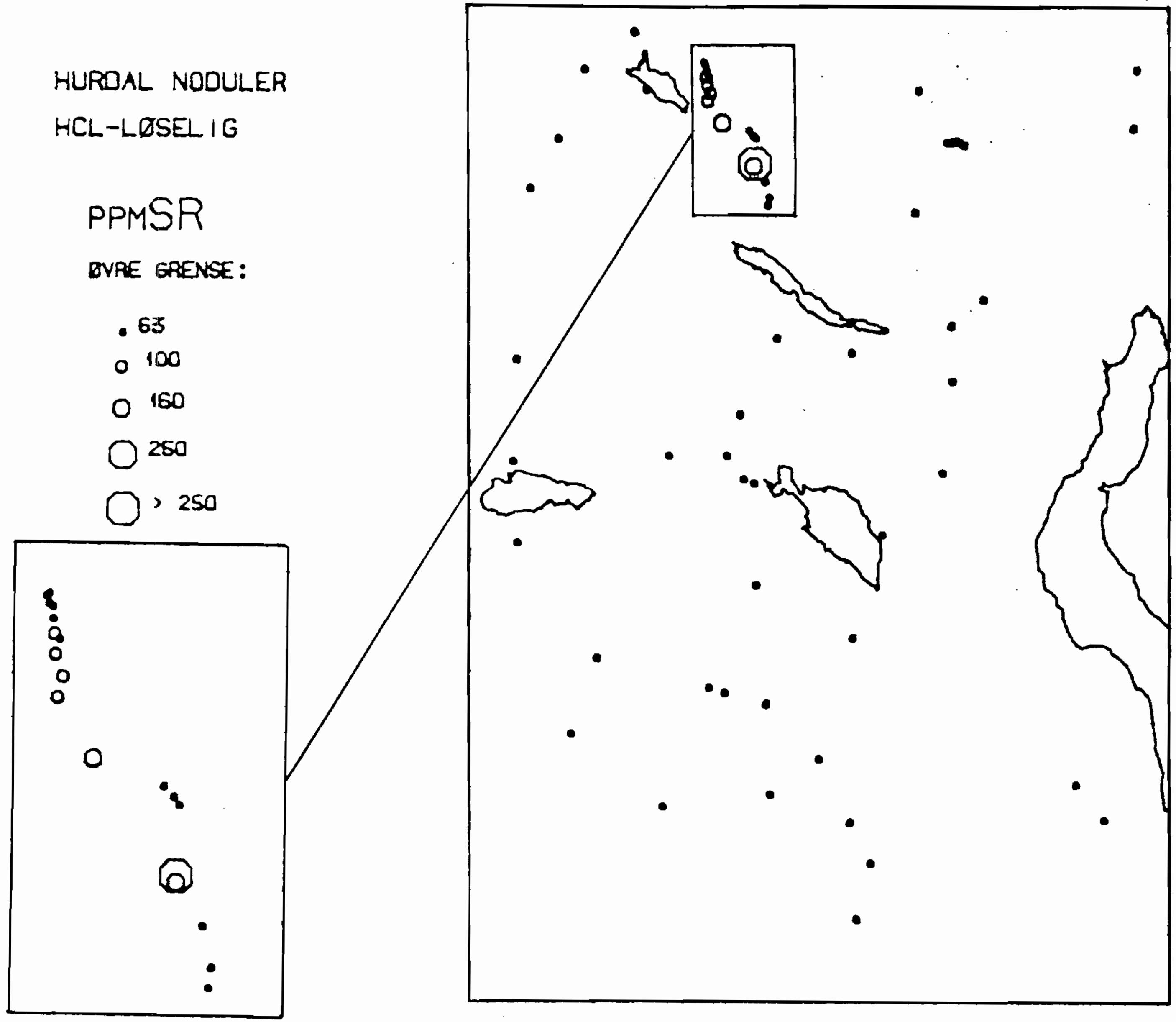
NGU-report 86.169. FIGURE 20.21



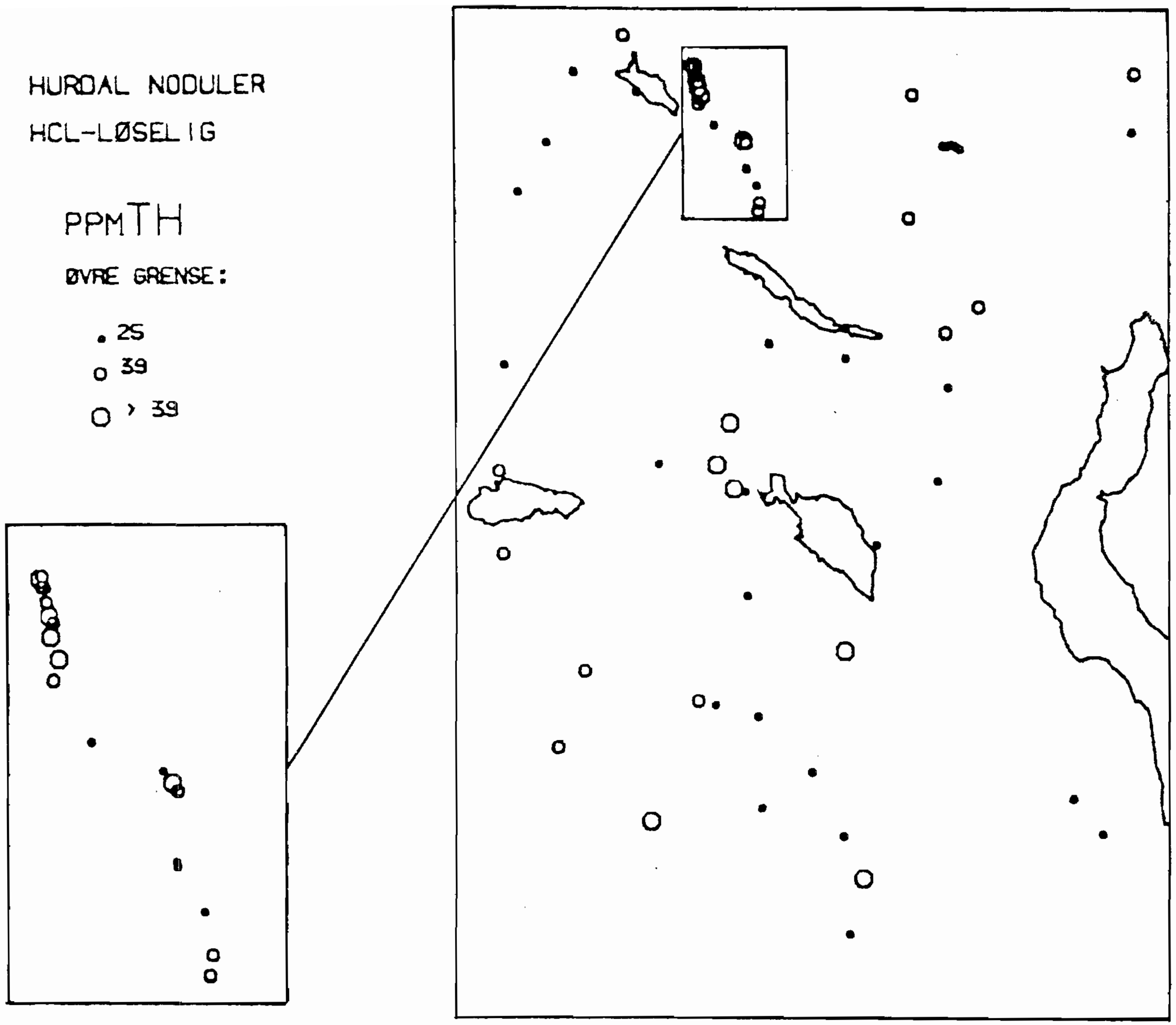
NGU-report 86.169. FIGURE 20.22



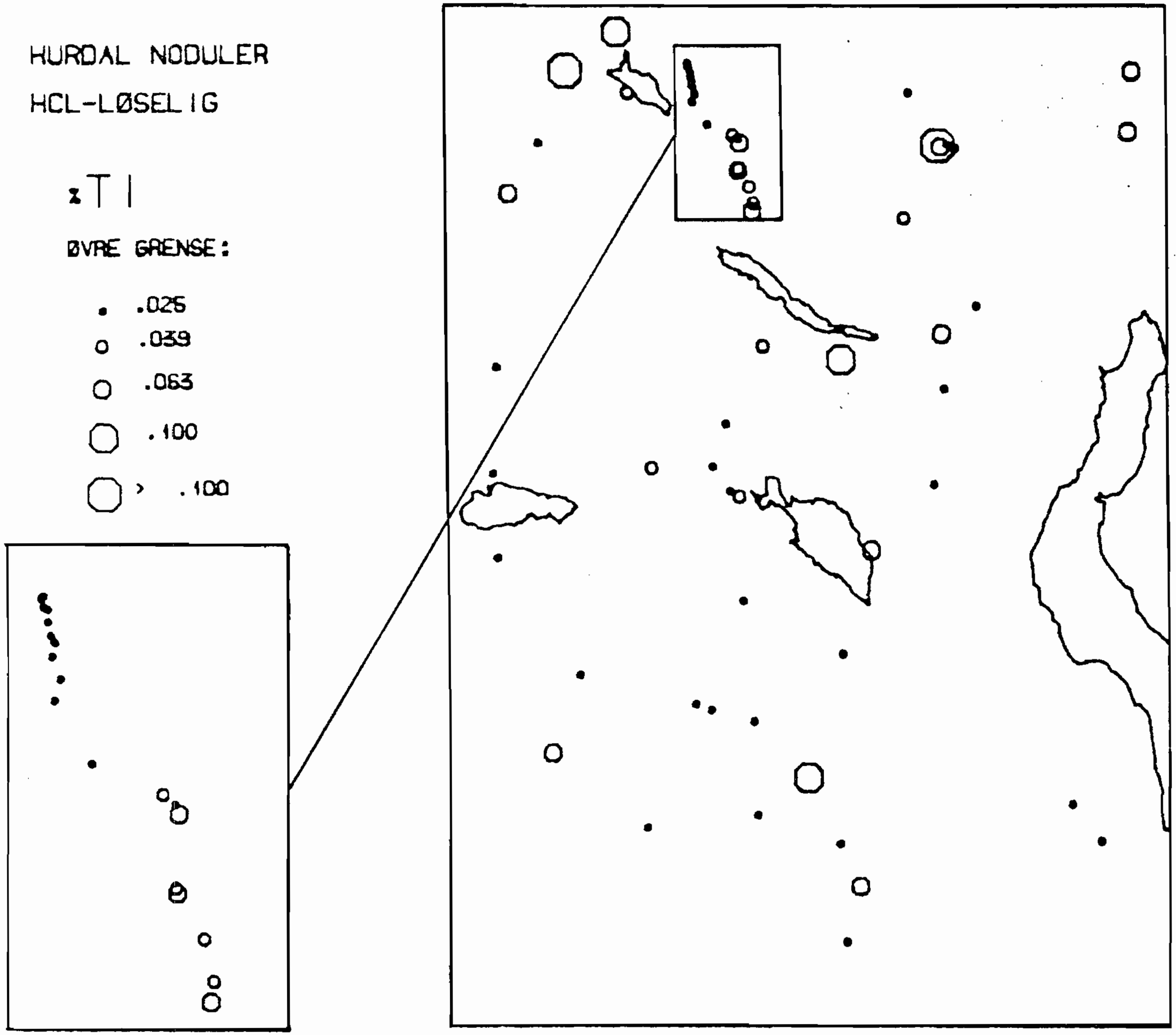
NGU-report 86.169. FIGURE 20.23



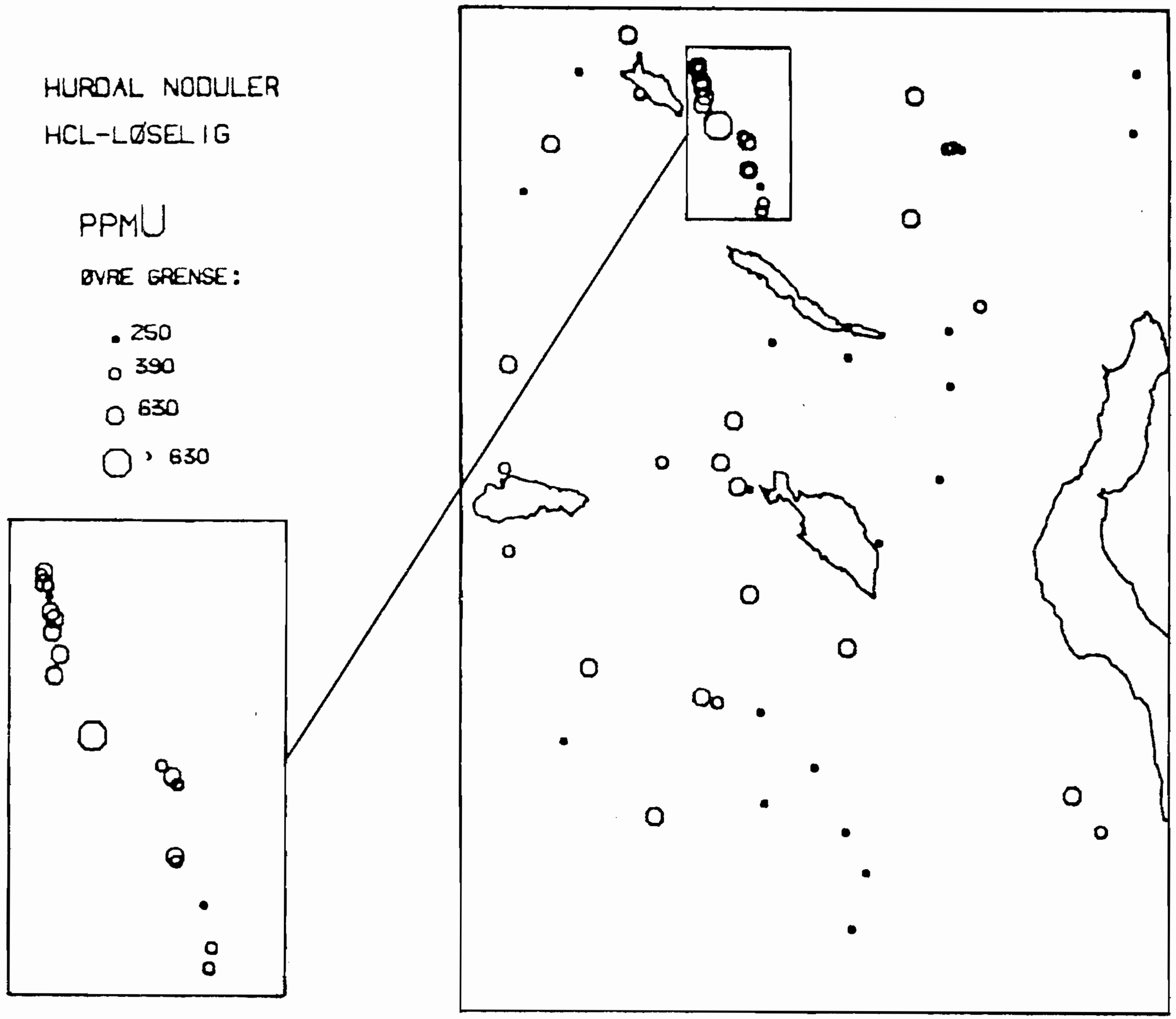
NGU-report 86.169. FIGURE 20.24



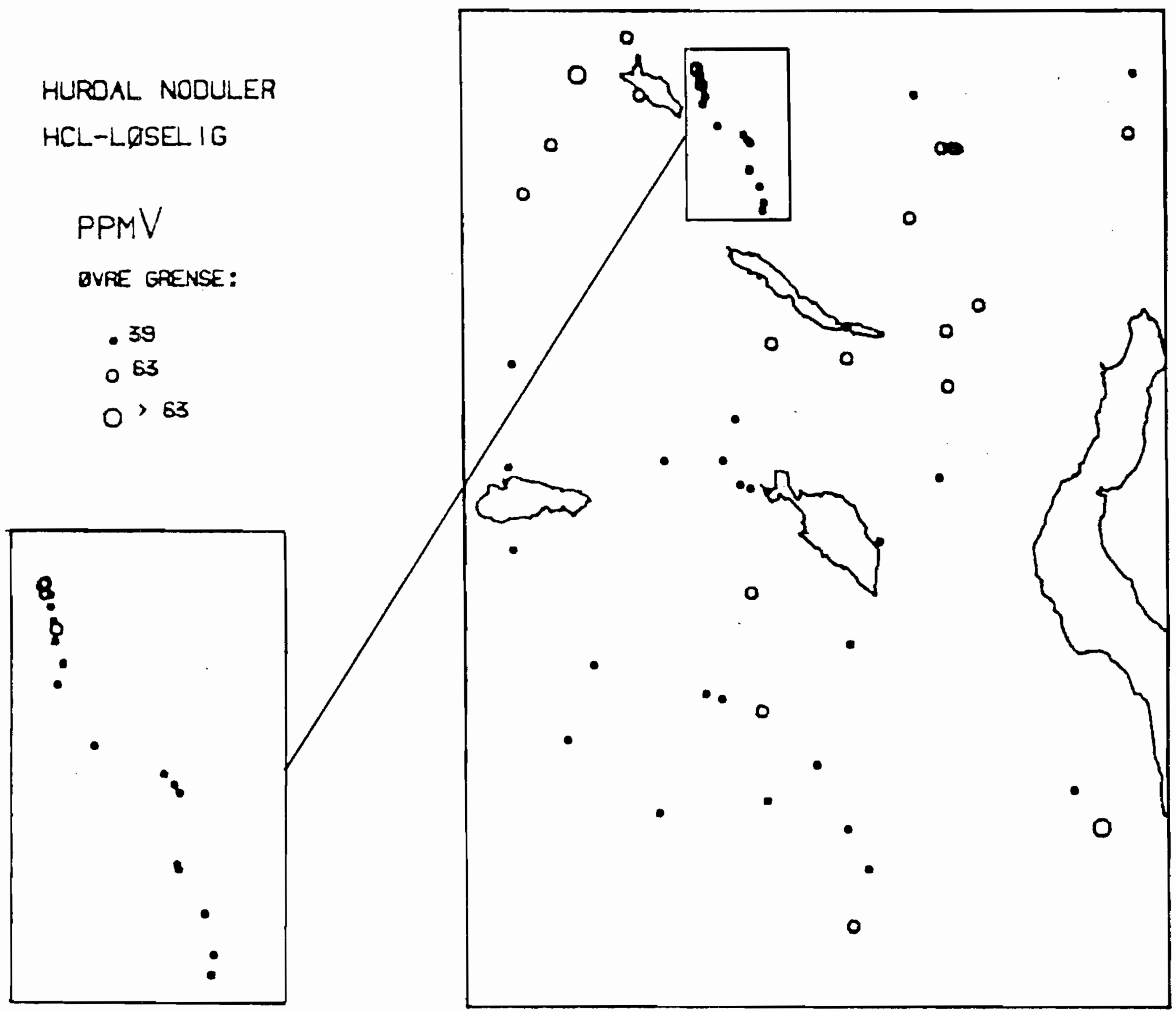
NGU-report 86.169. FIGURE 20.25



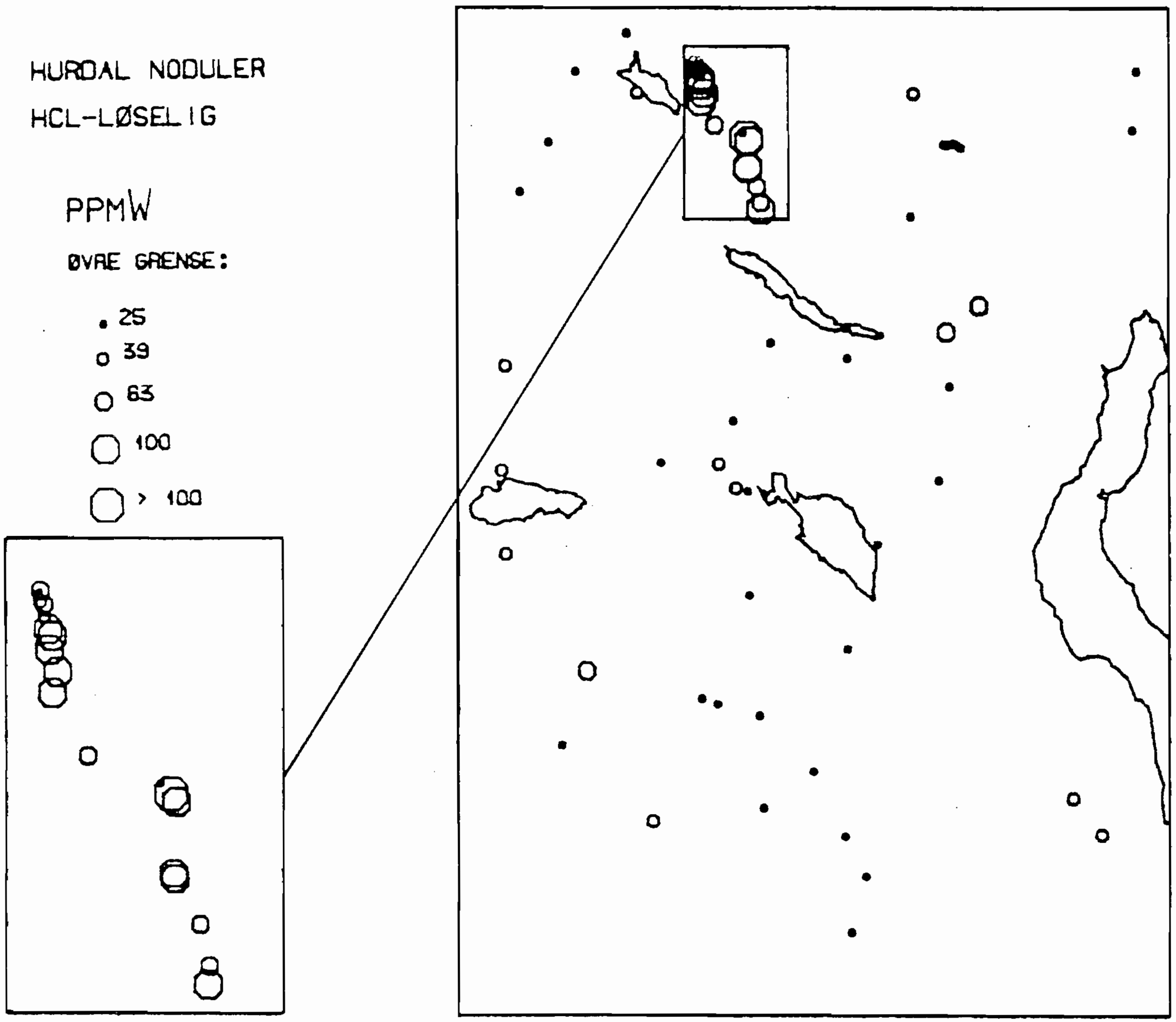
NGU-report 86.169. FIGURE 20.26



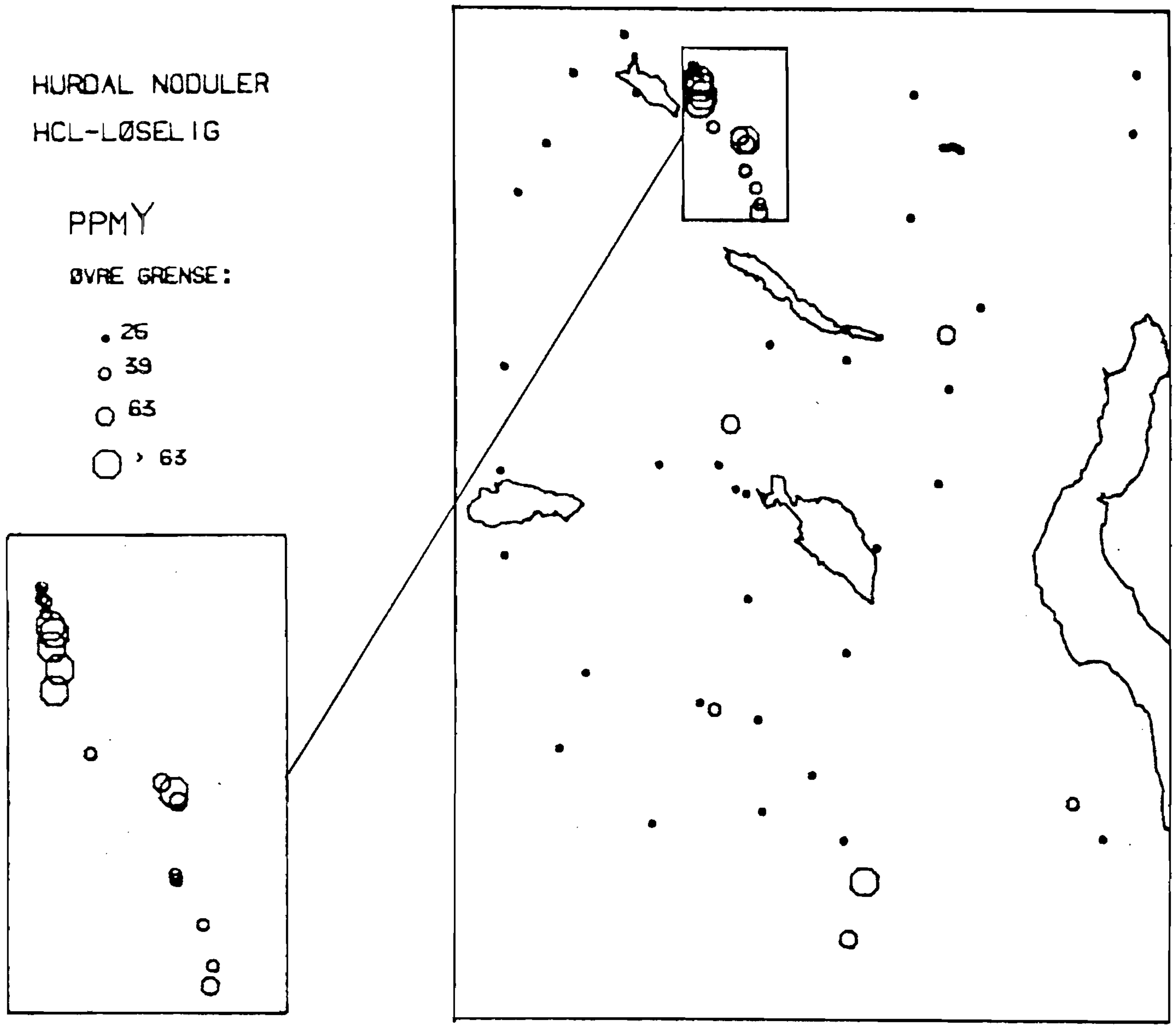
NGU-report 86.169. FIGURE 20.27



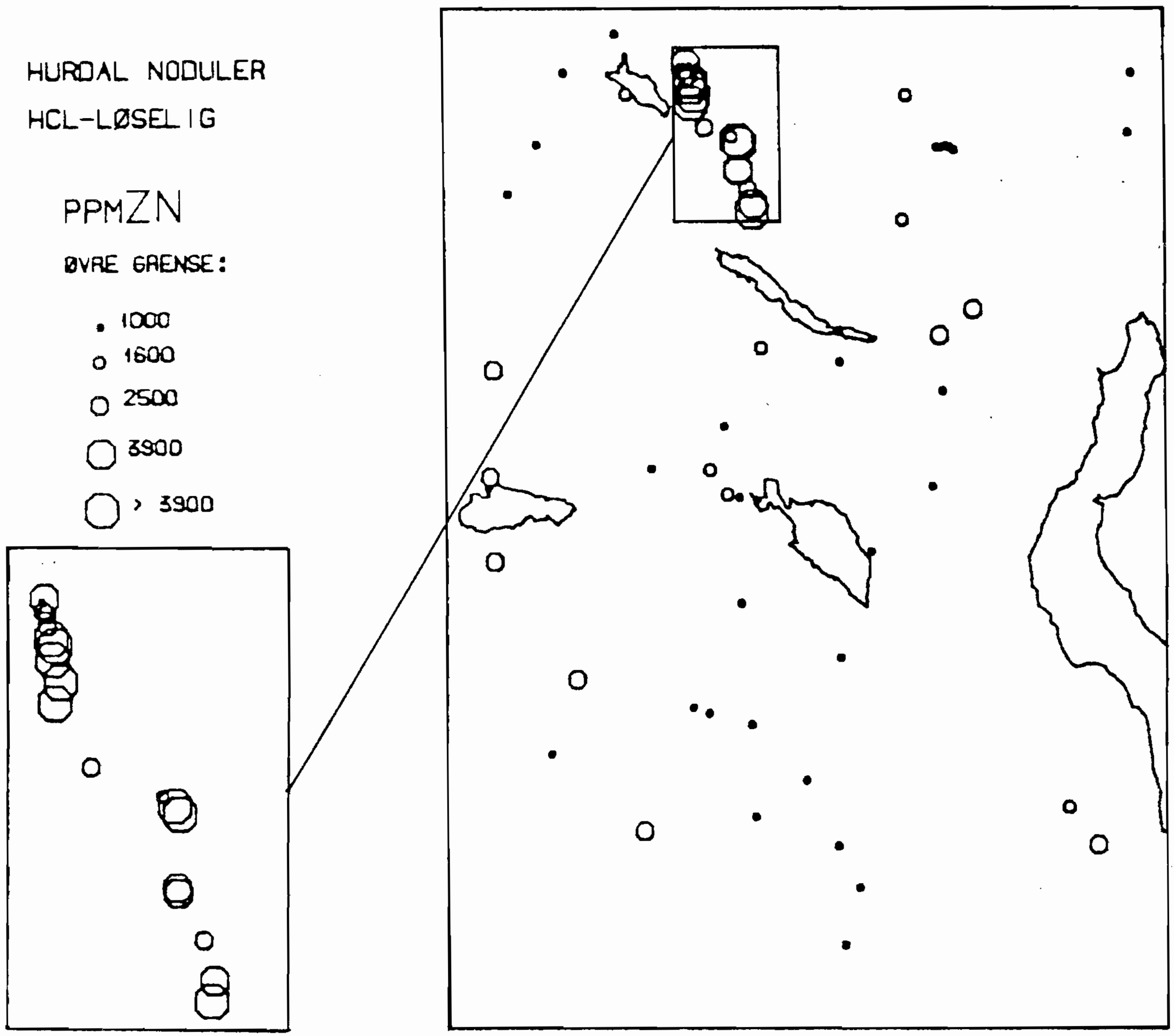
NGU-report 86.169. FIGURE 20.28



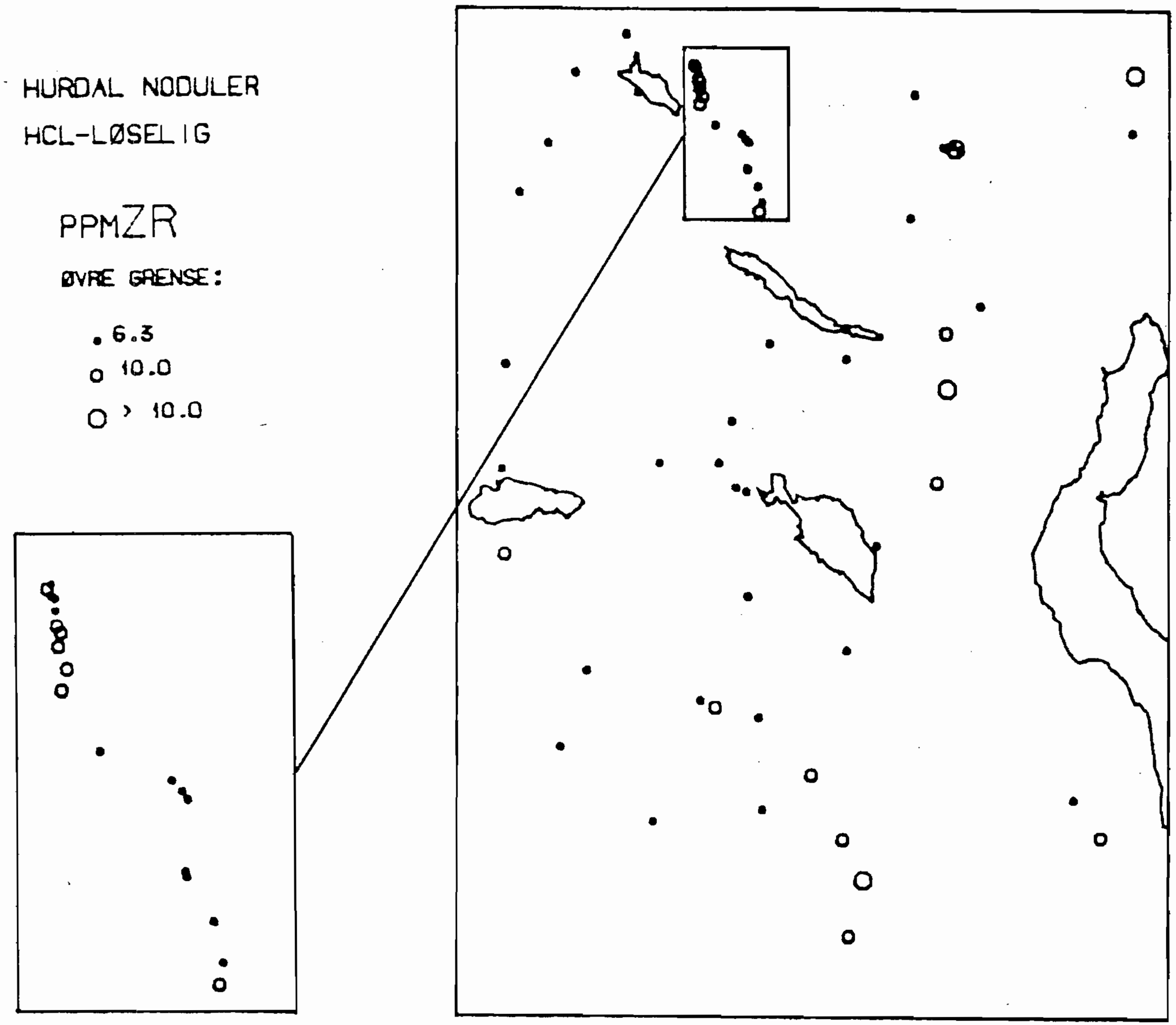
NGU-report 86.169. FIGURE 20.29



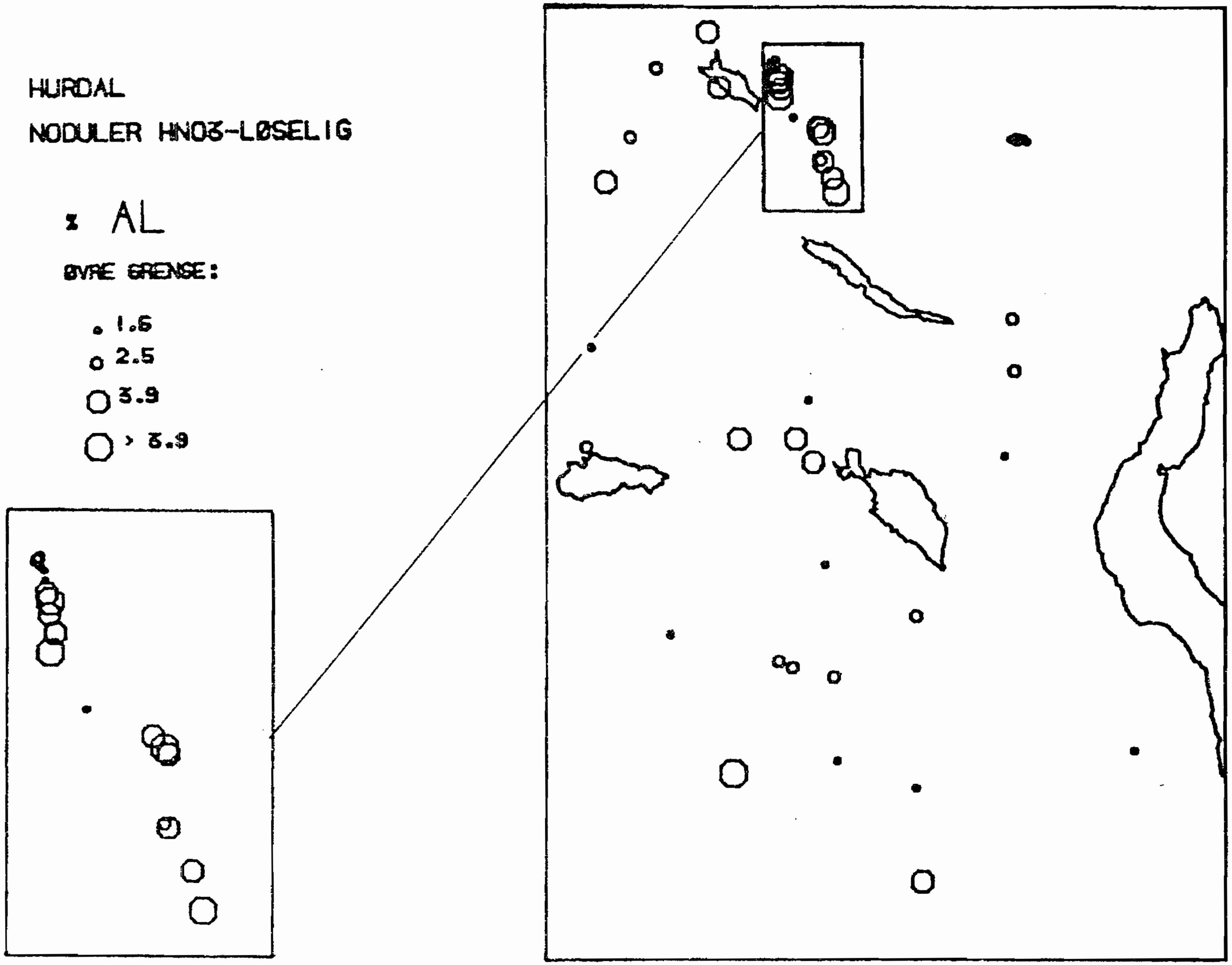
NGU-report 86.169. FIGURE 20.30



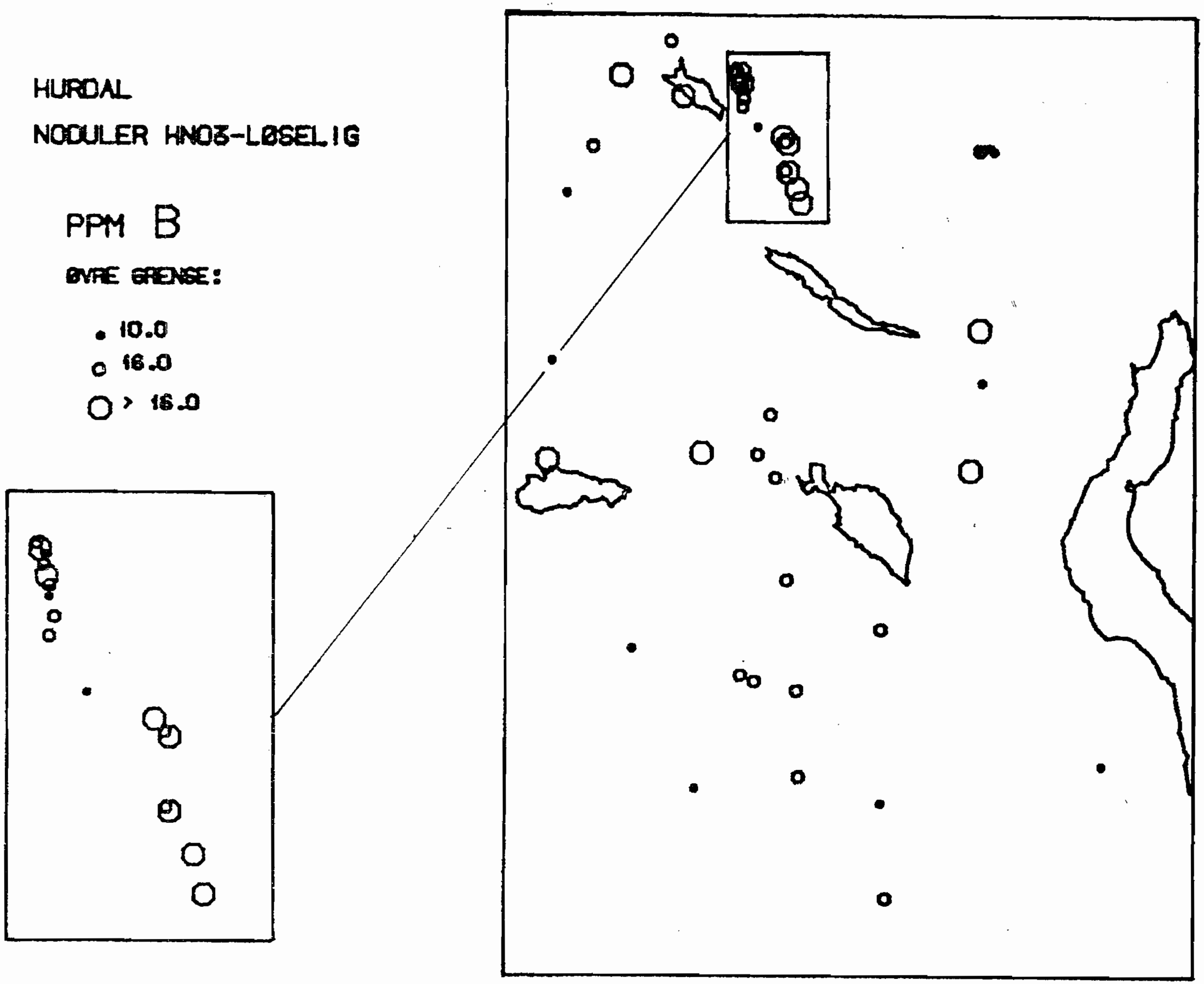
NGU-report 86.169. FIGURE 20.31



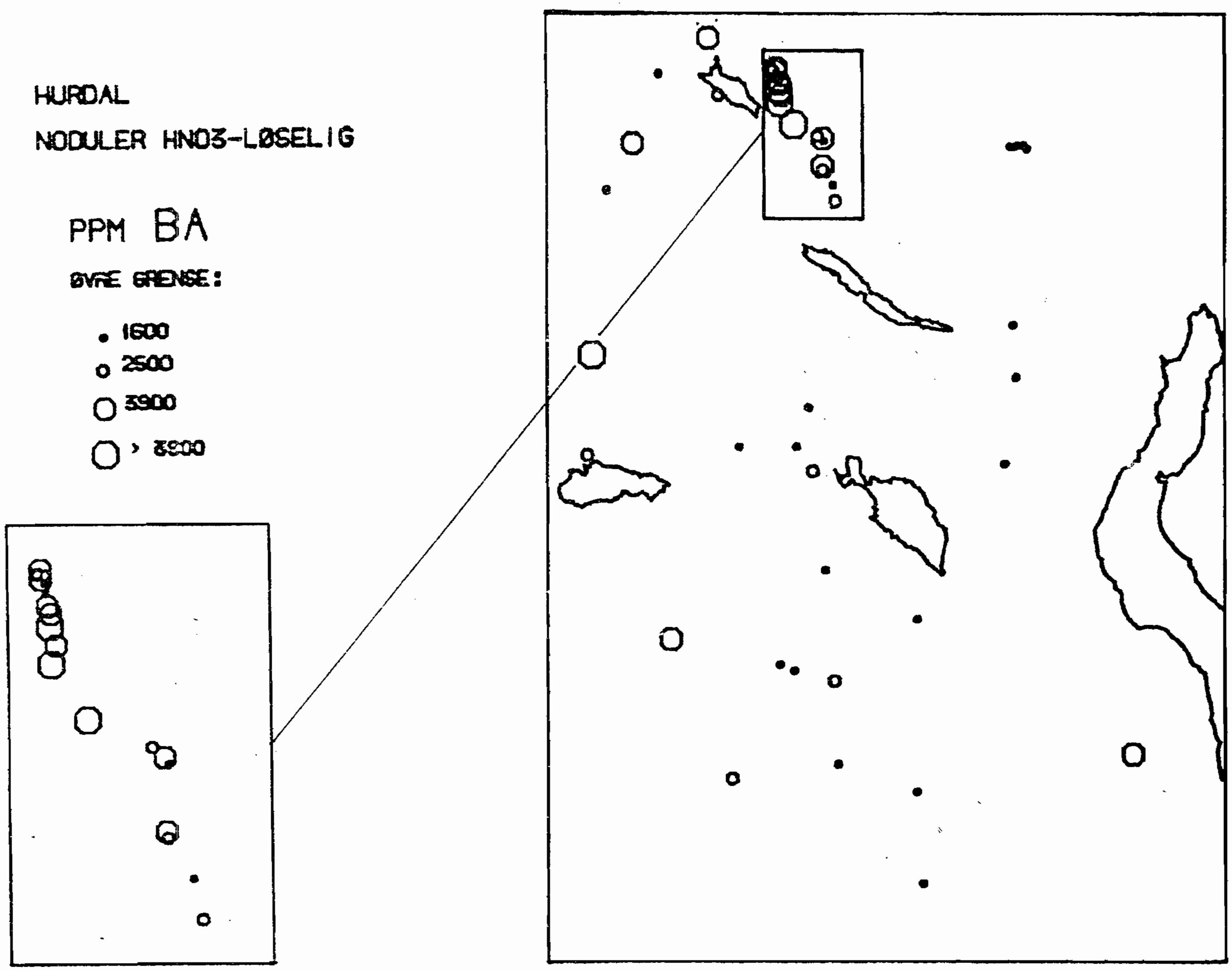
NGU-report 86.169. FIGURE 20.32



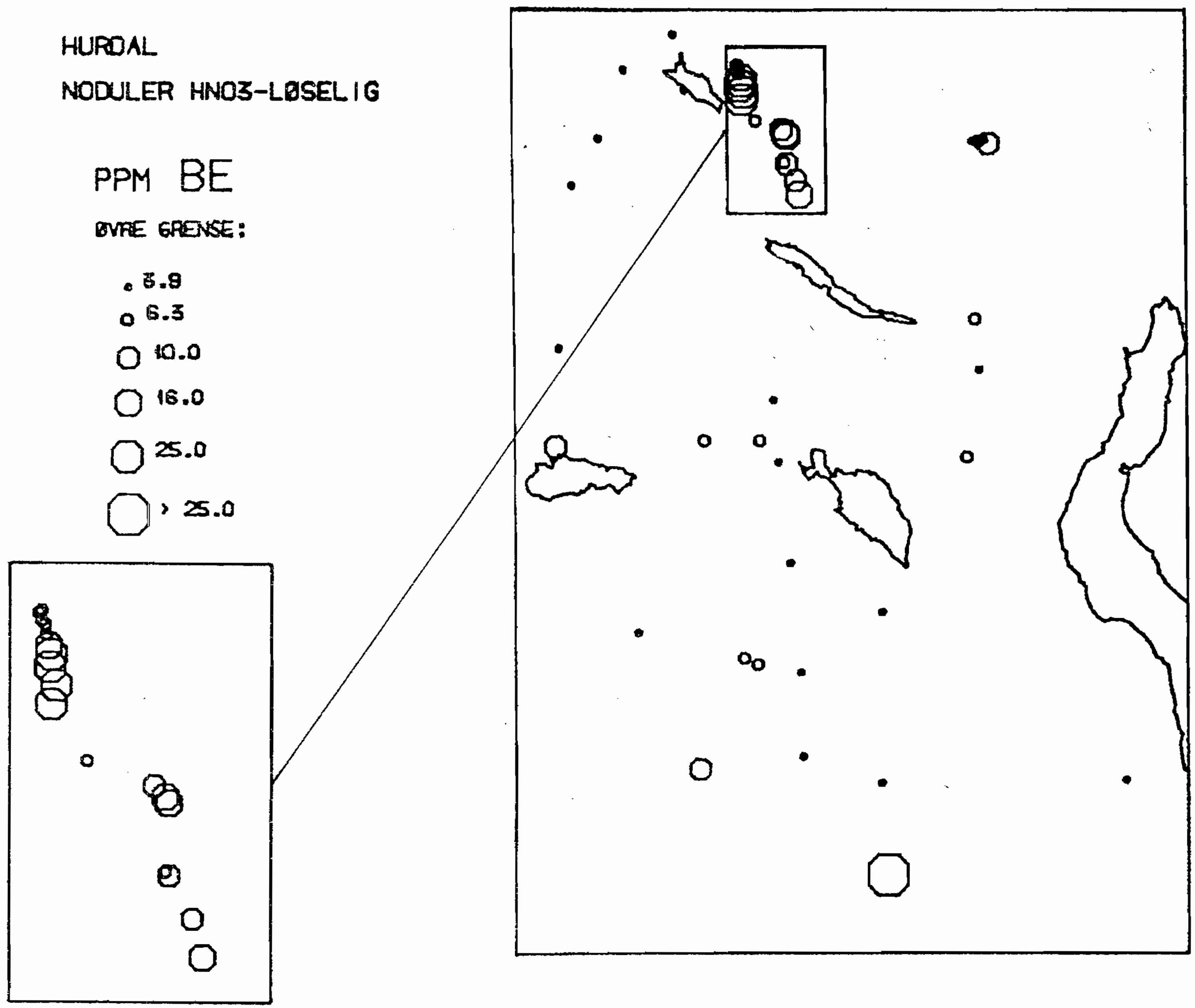
NGU-report 86.169. FIGURE 21.1



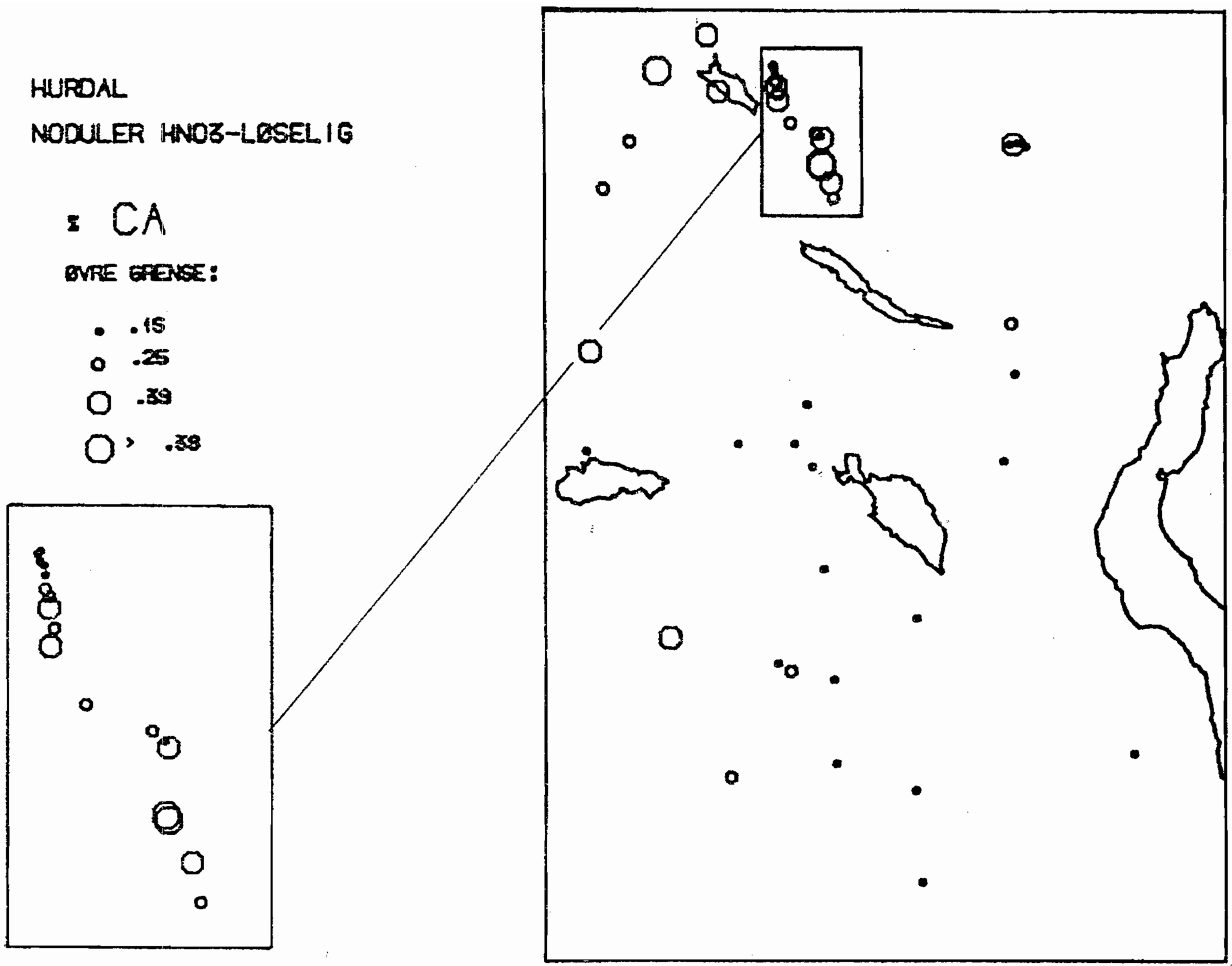
NGU-report 86.169. FIGURE 21.2



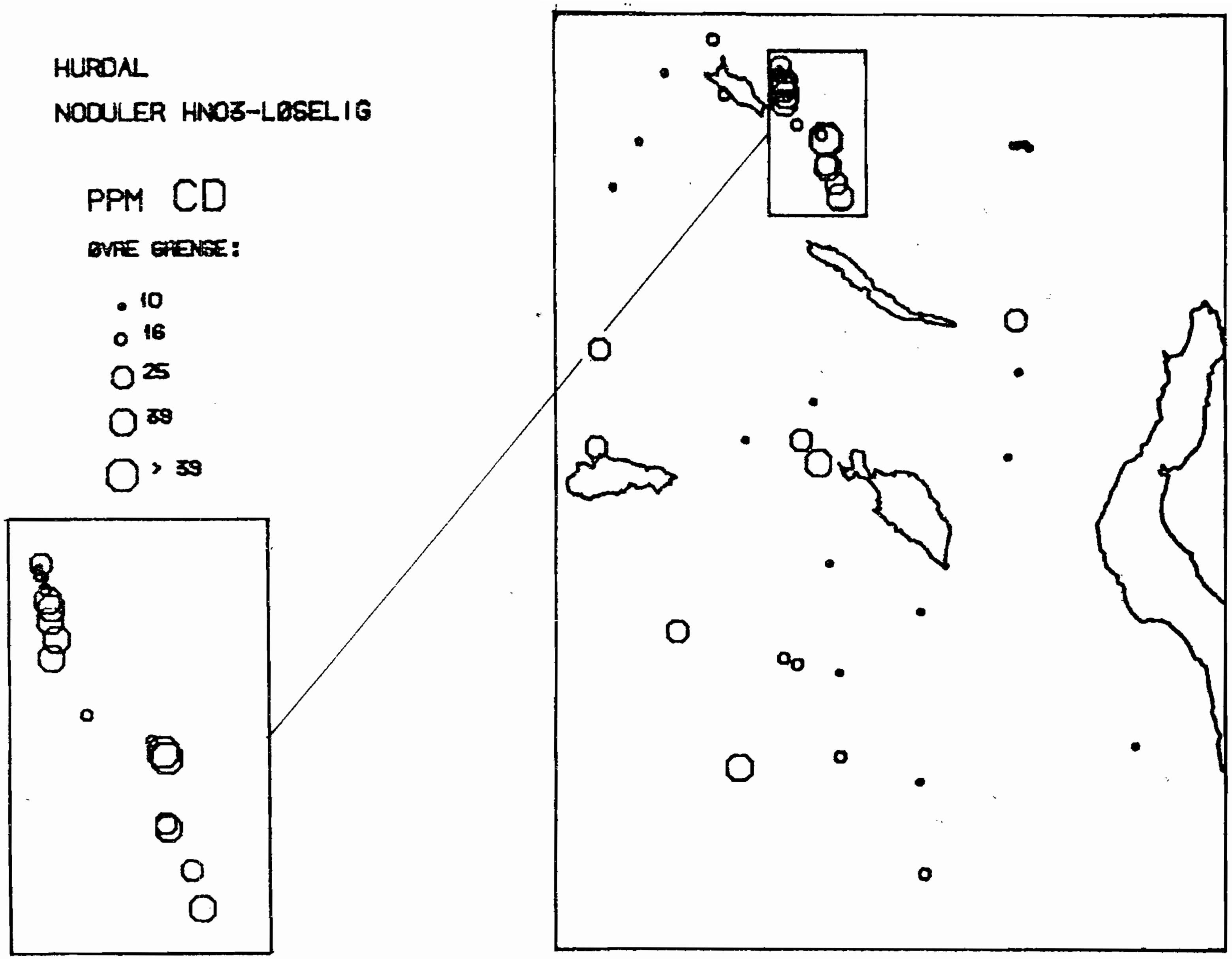
NGU-report 86.169. FIGURE 21.3



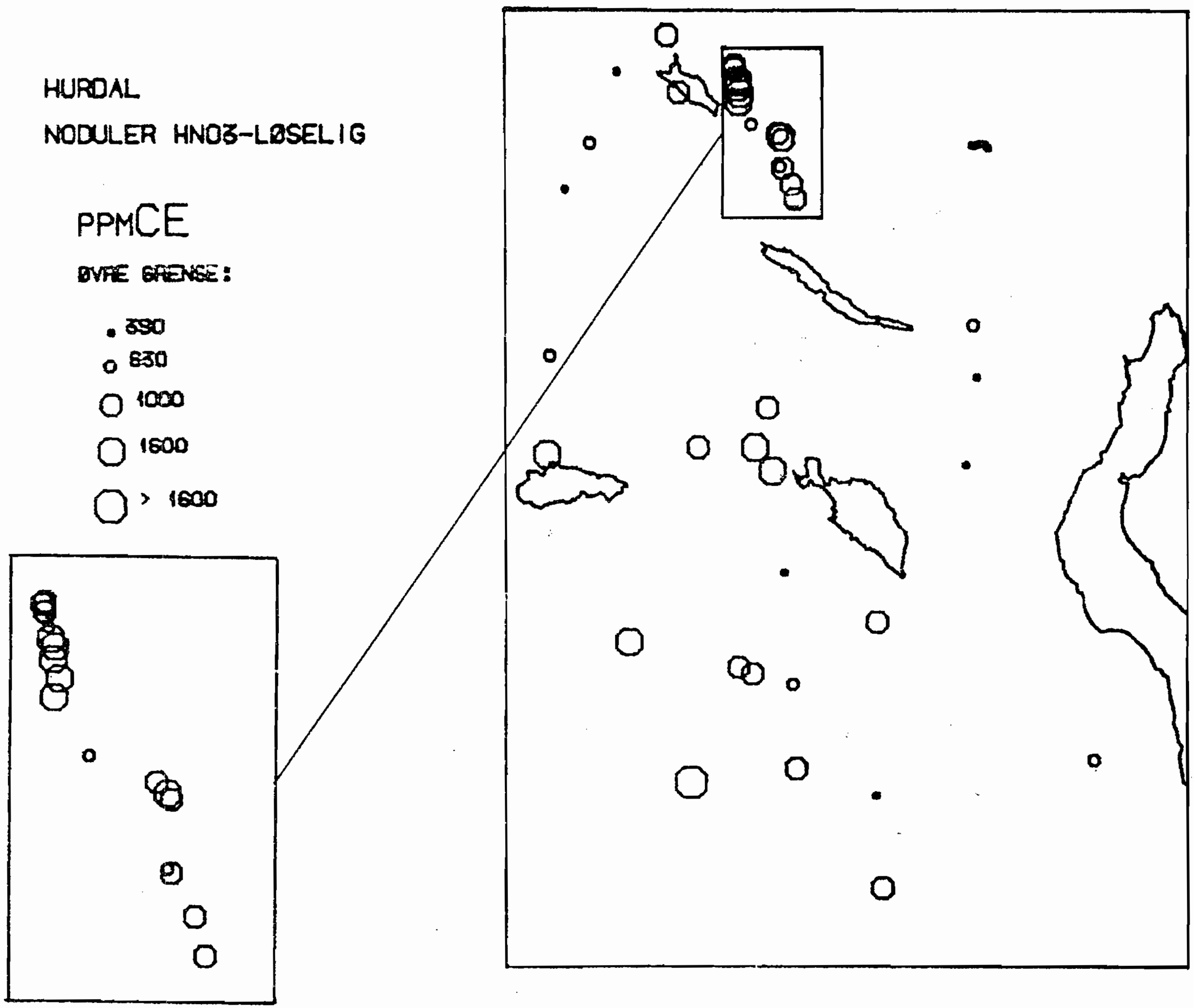
NGU-report 86.169. FIGURE 21.4



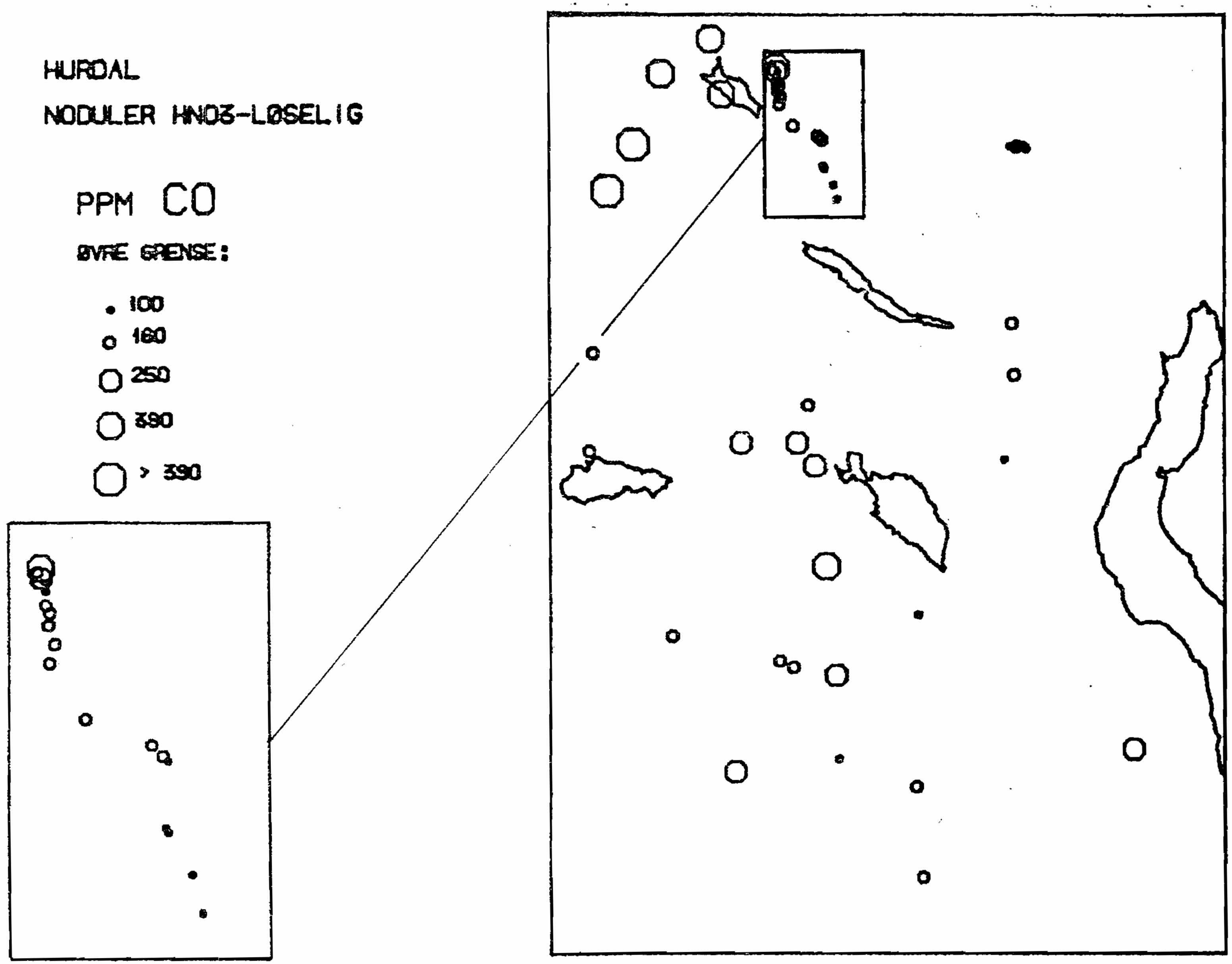
NGU-report 86.169. FIGURE 21.5



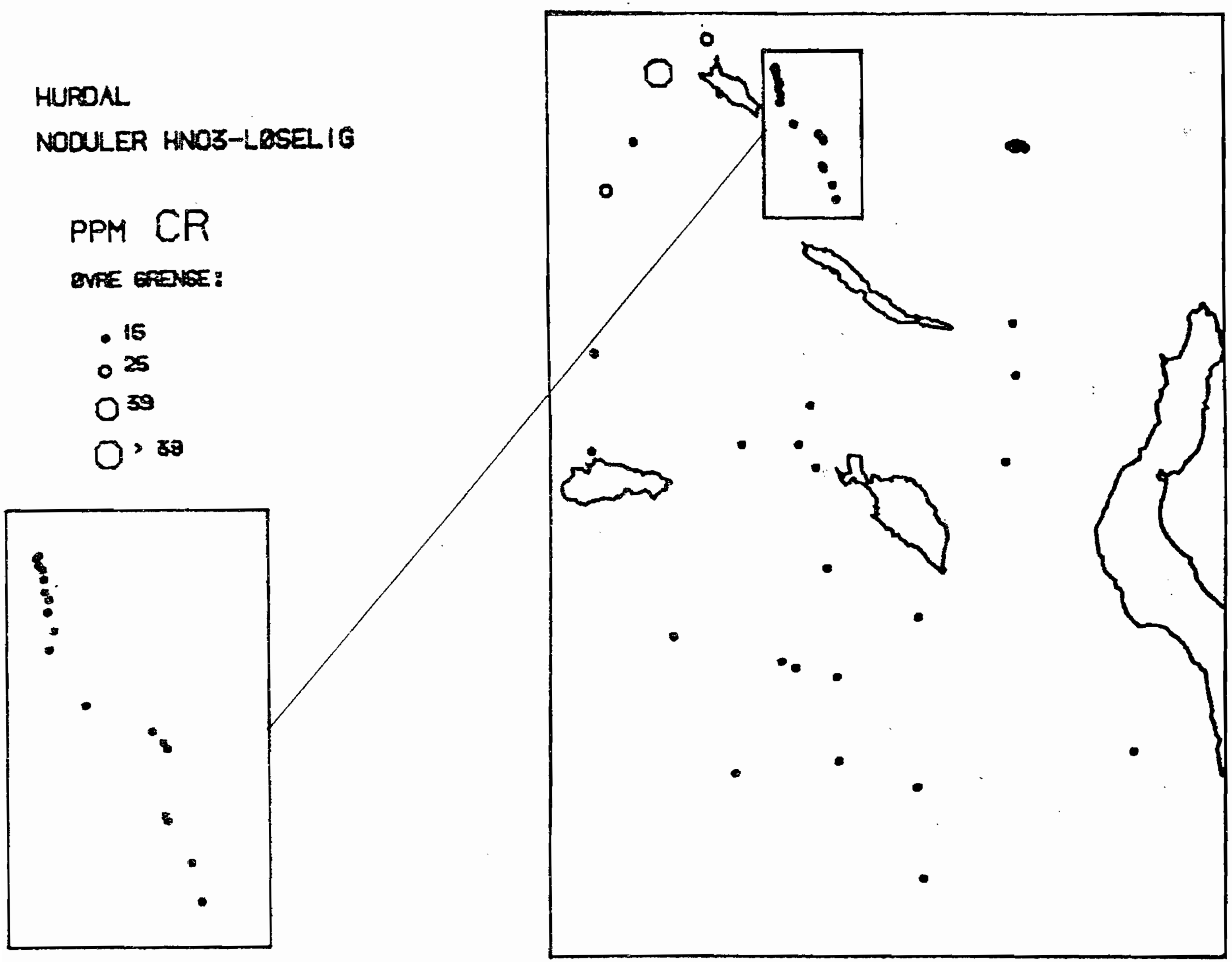
NGU-report 86.169. FIGURE 21.6



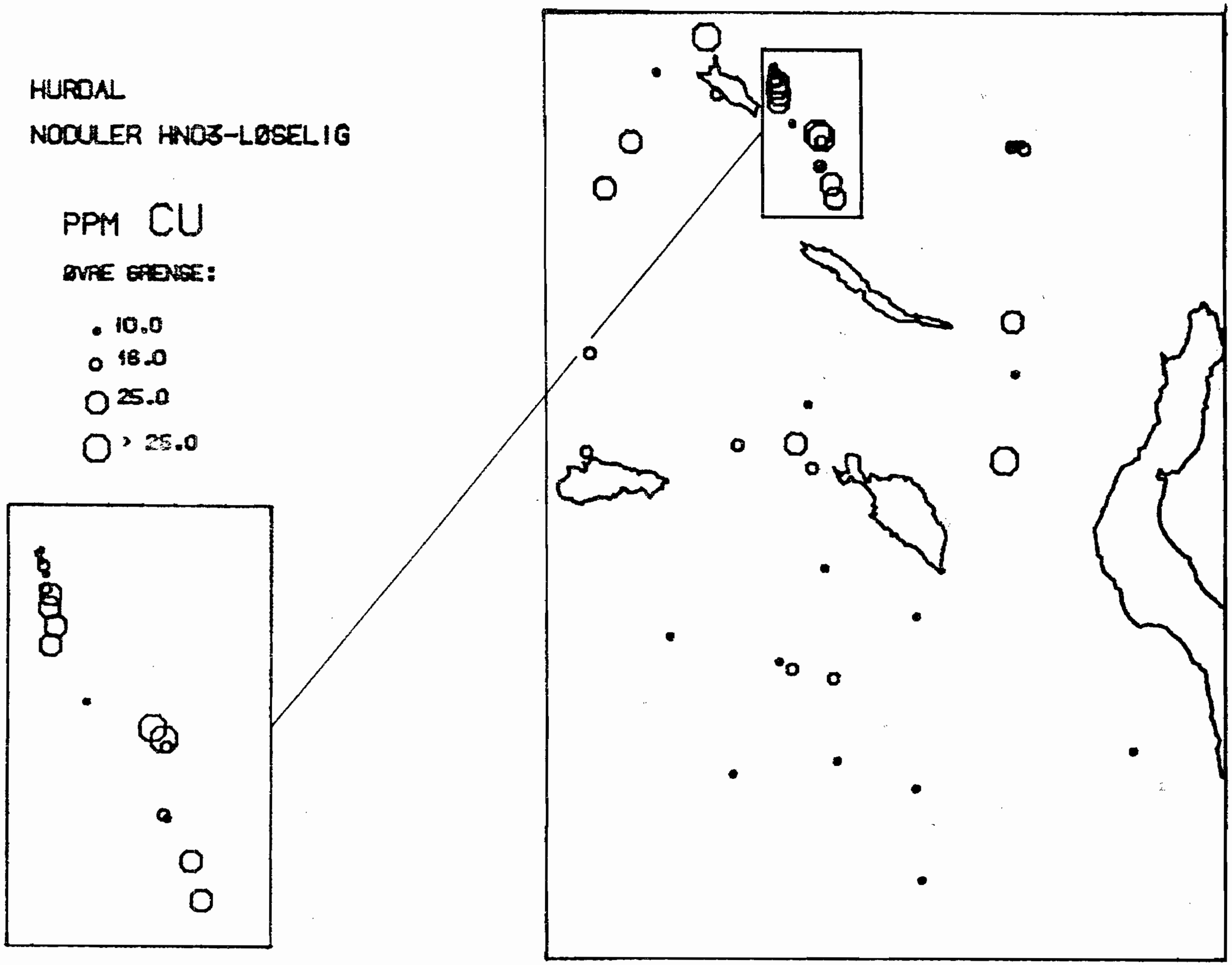
NGU-report 86.169. FIGURE 21.7



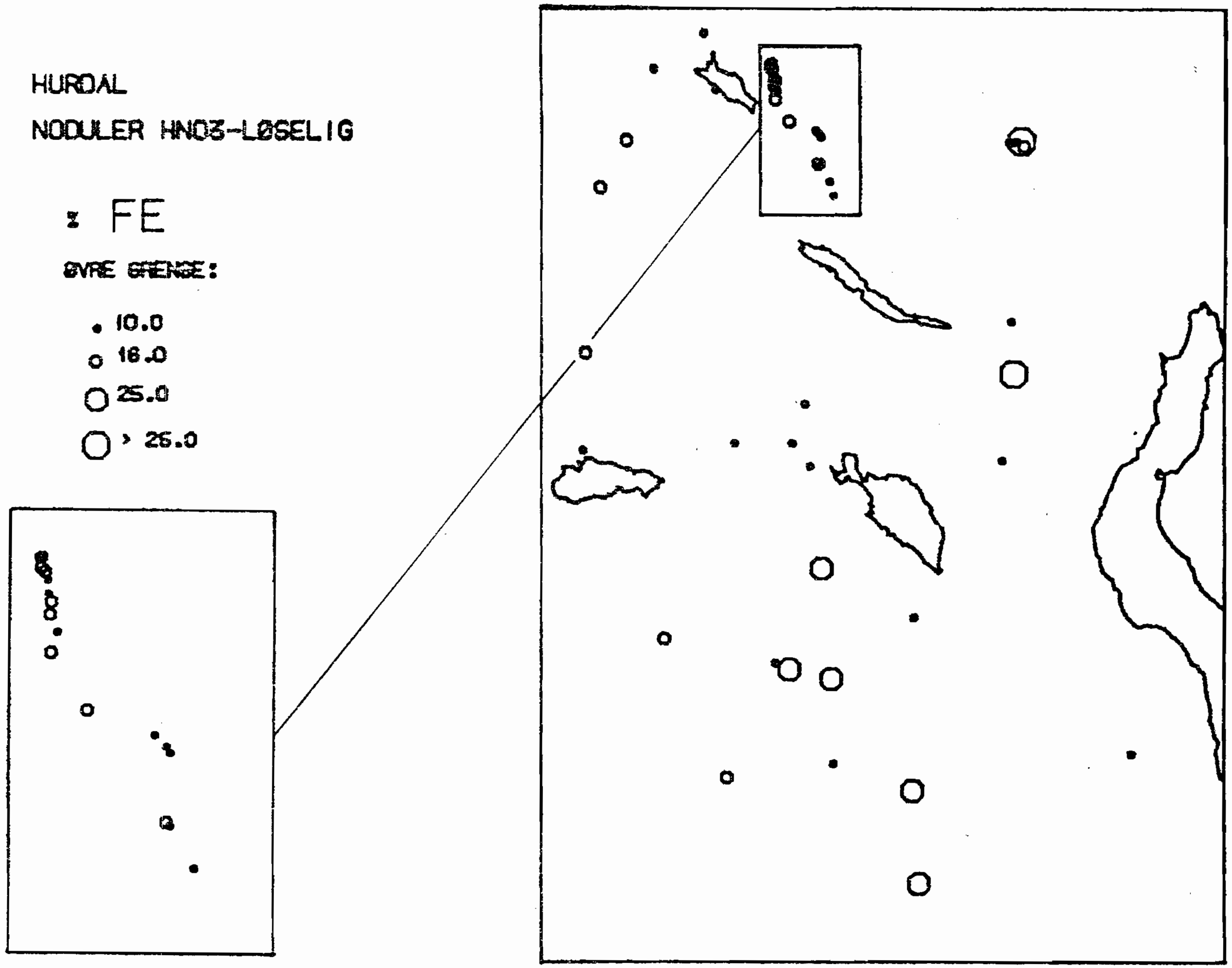
NGU-report 86.169. FIGURE 21.8



NGU-report 86.169. FIGURE 21.9



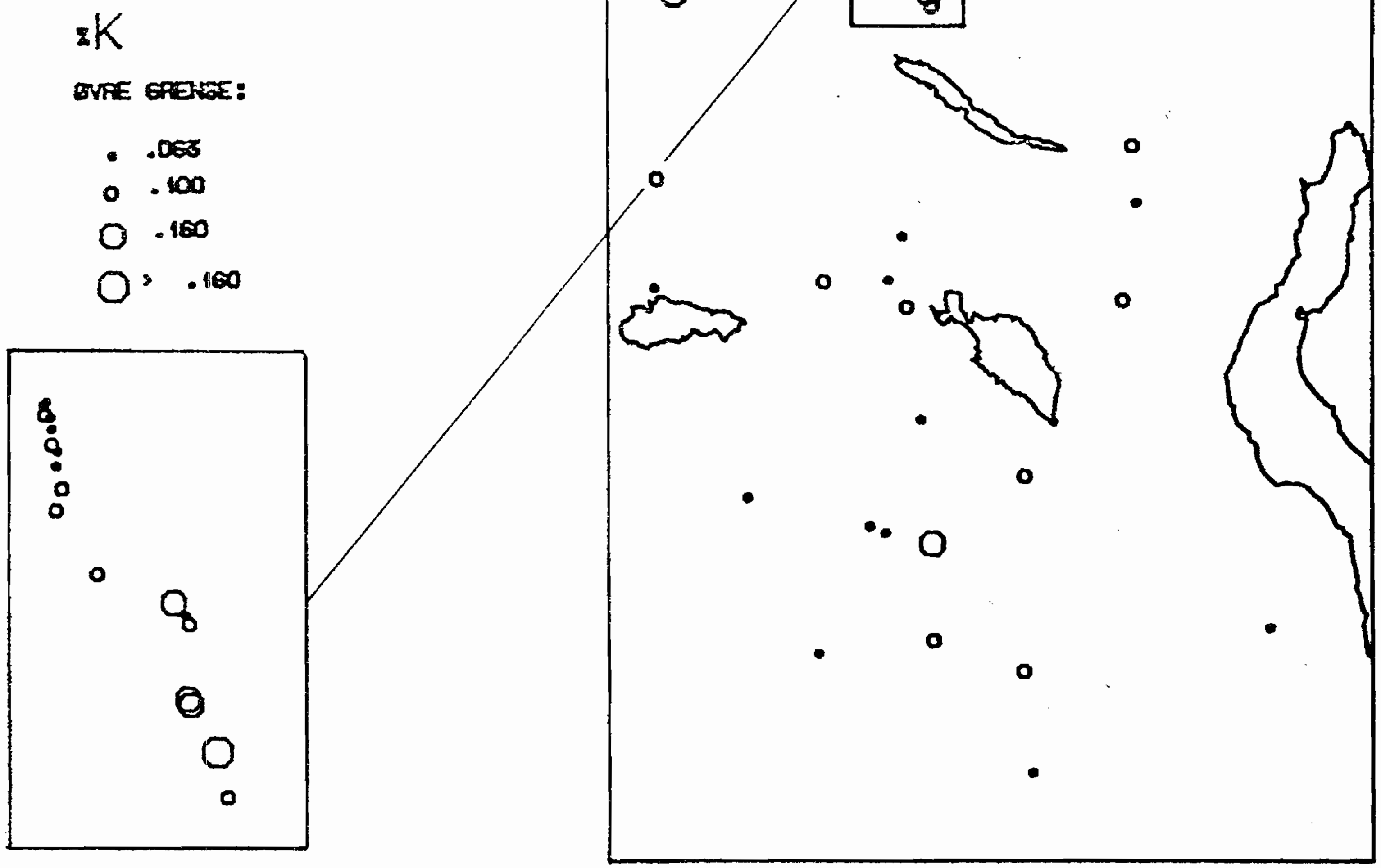
NGU-report 86.169. FIGURE 21.10



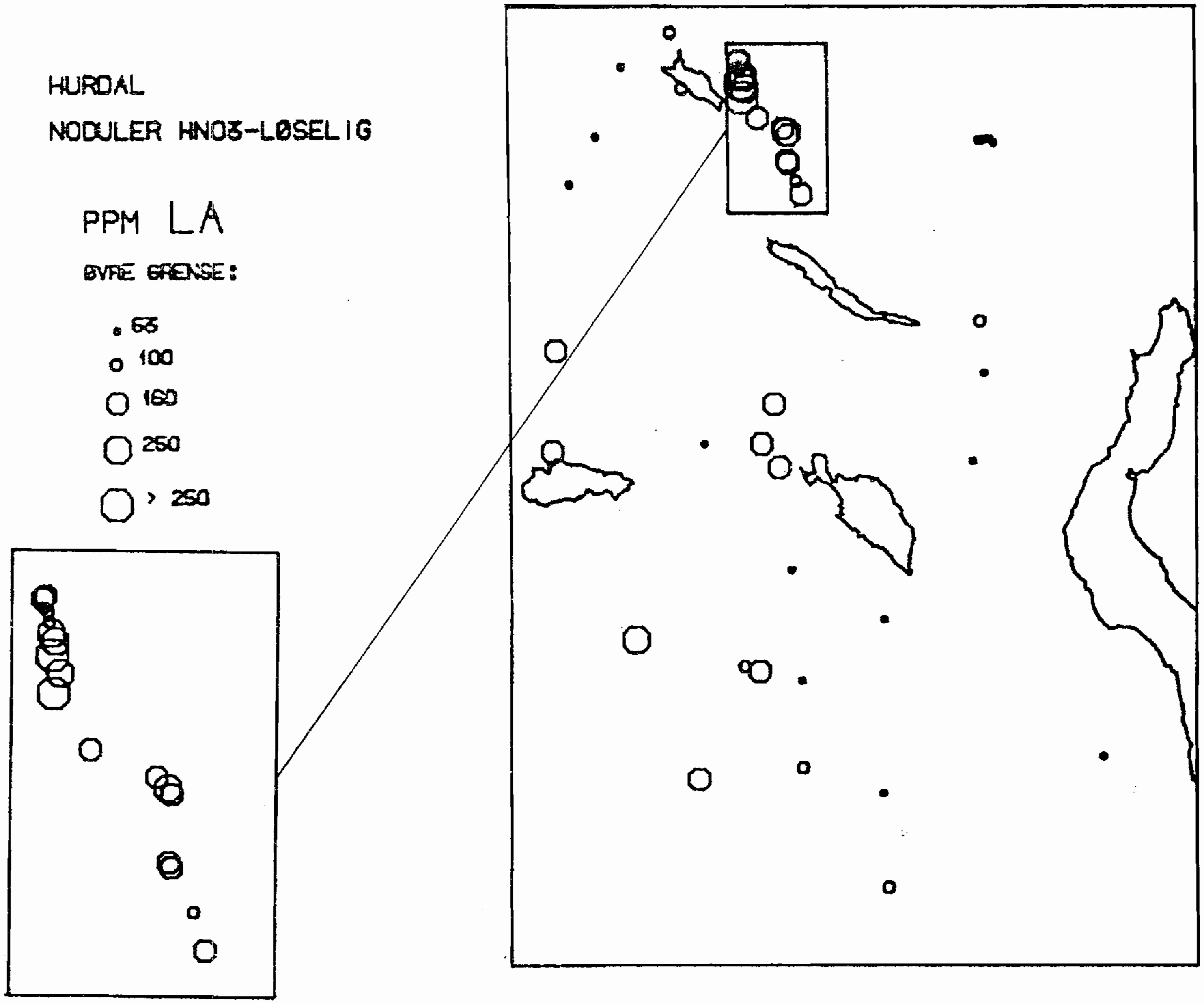
NGU-report 86.169. FIGURE 21.11

HURDAL

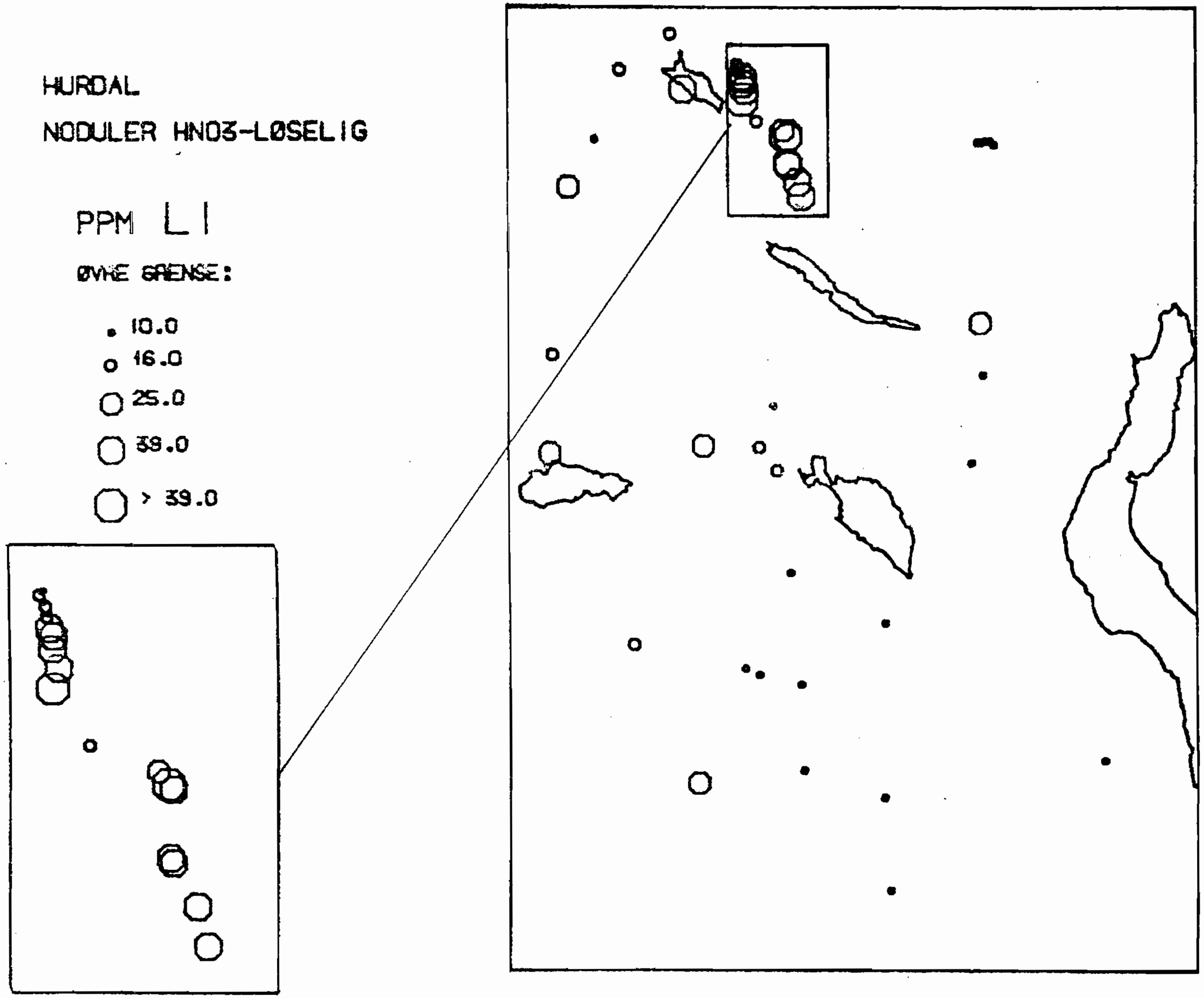
NODULER HNO3-LØSELIG



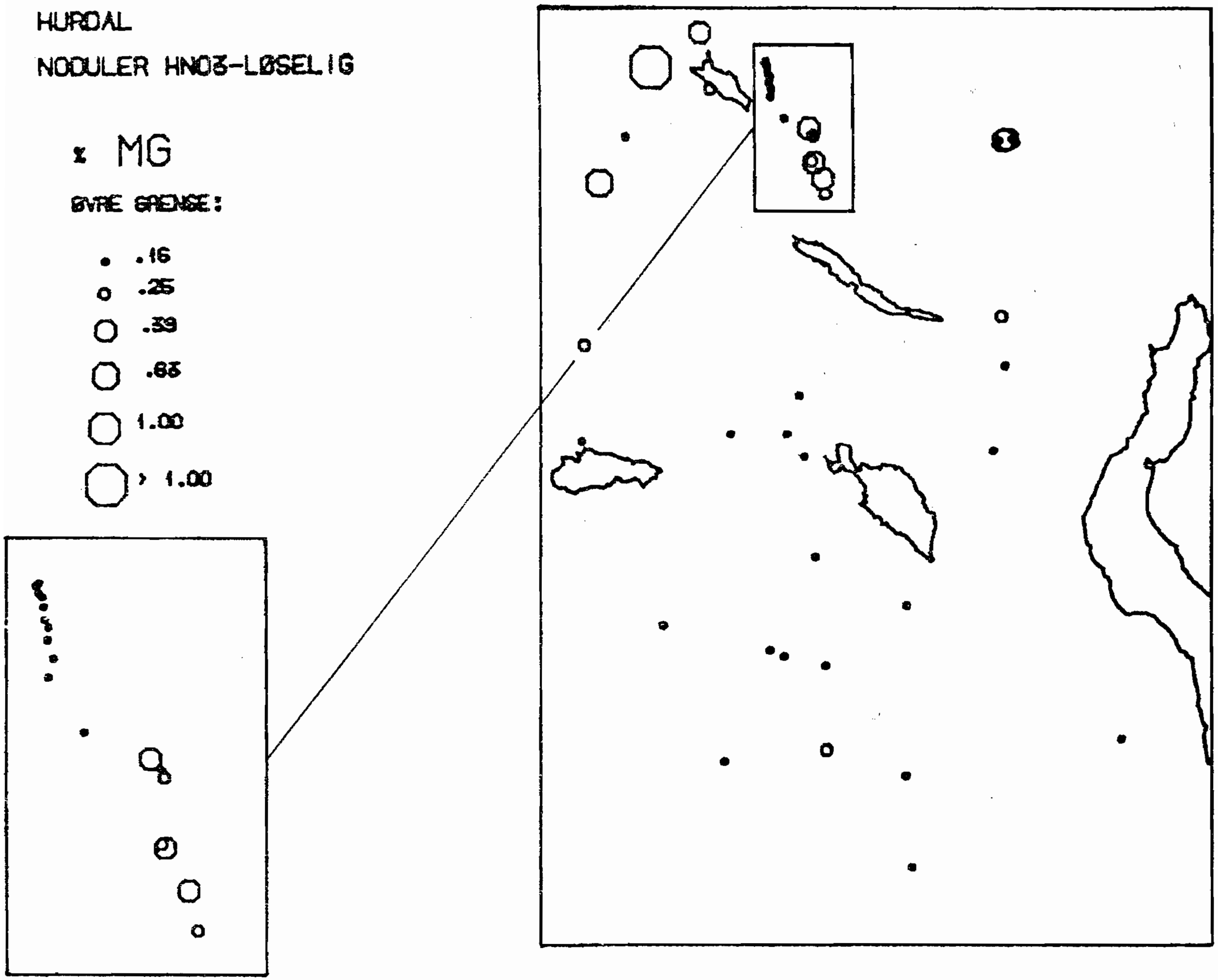
NGU-report 86.169. FIGURE 21.12



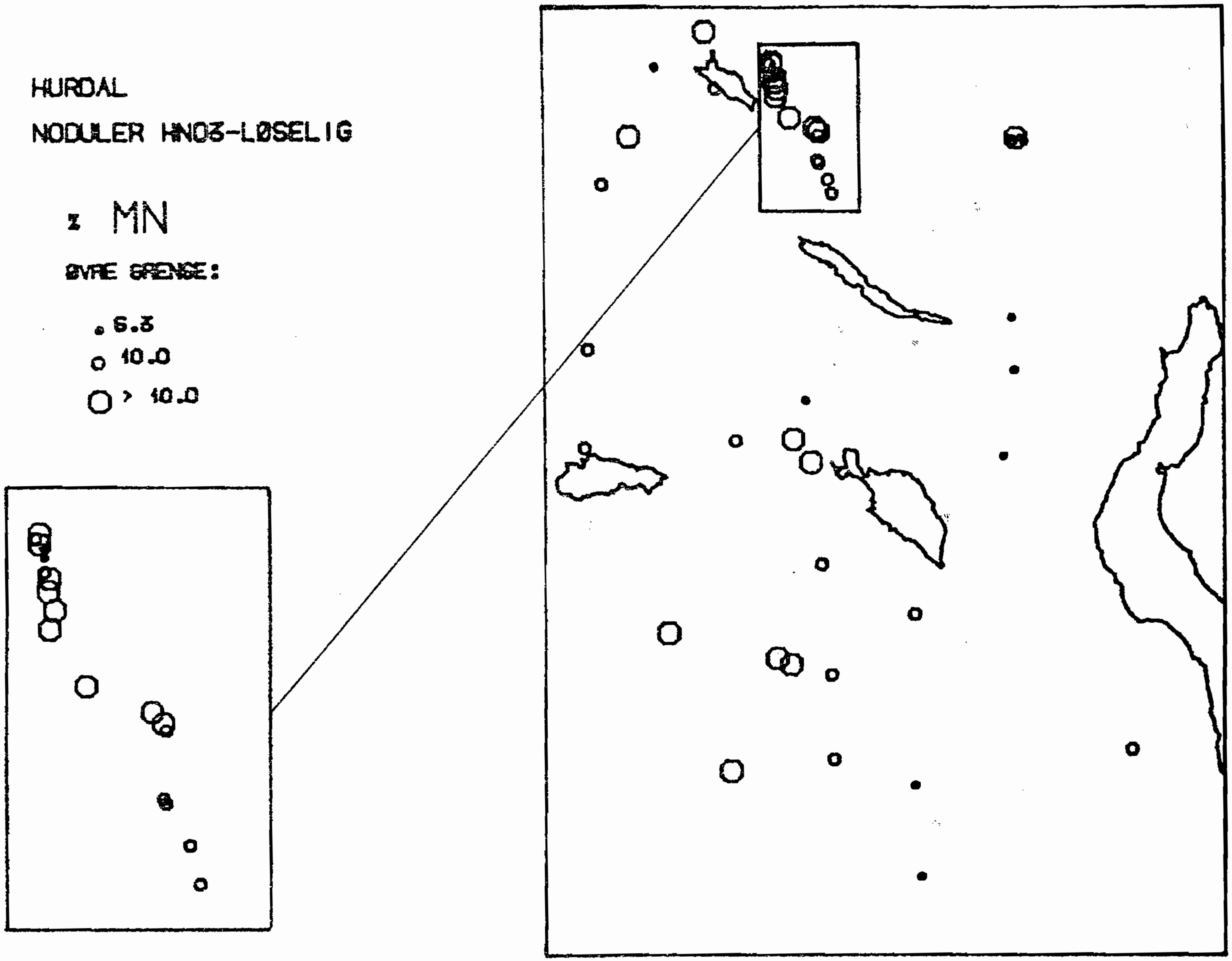
NGU-report 86.169. FIGURE 21.13



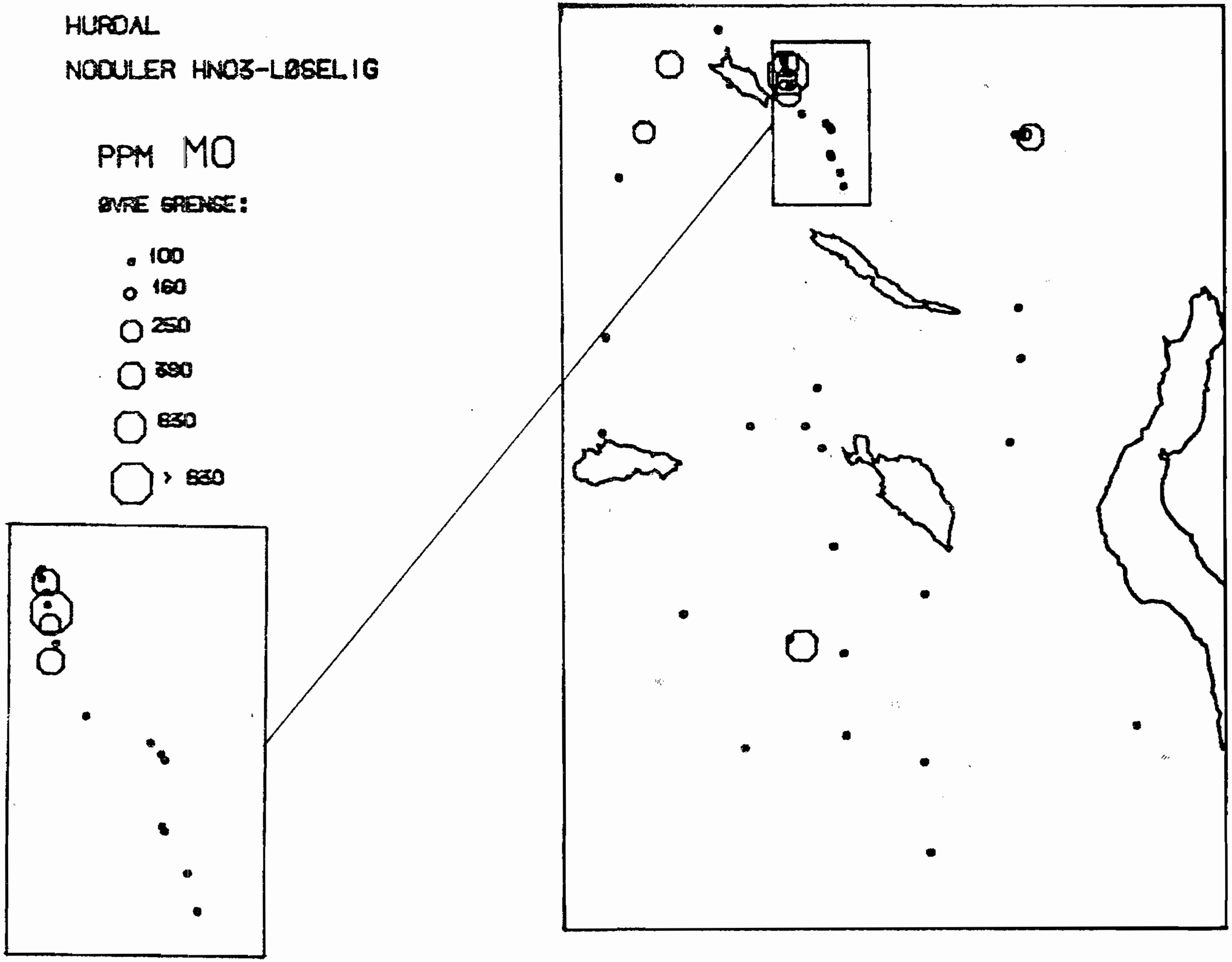
NGU-report 86.169. FIGURE 21.14



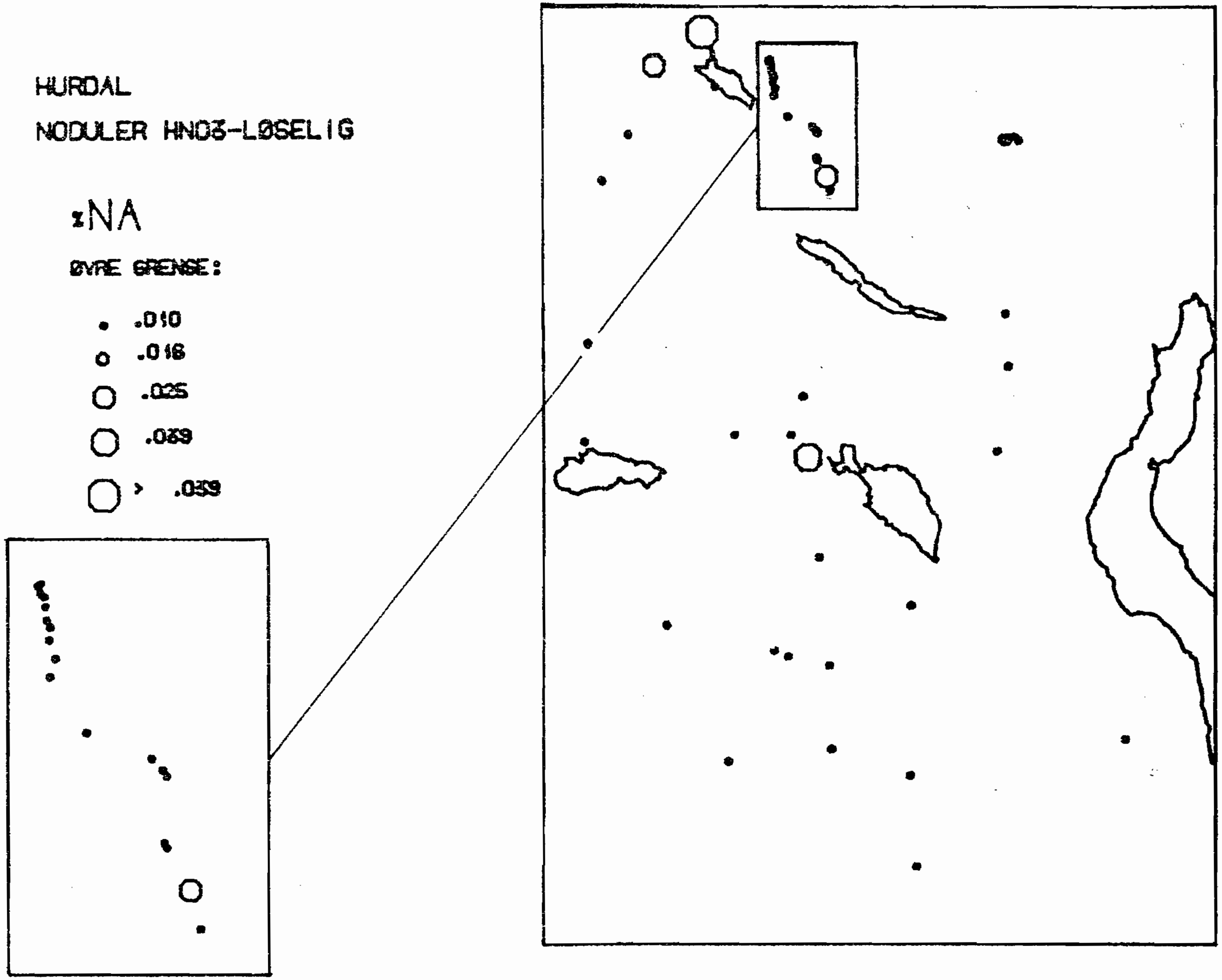
NGU-report 86.169. FIGURE 21.15



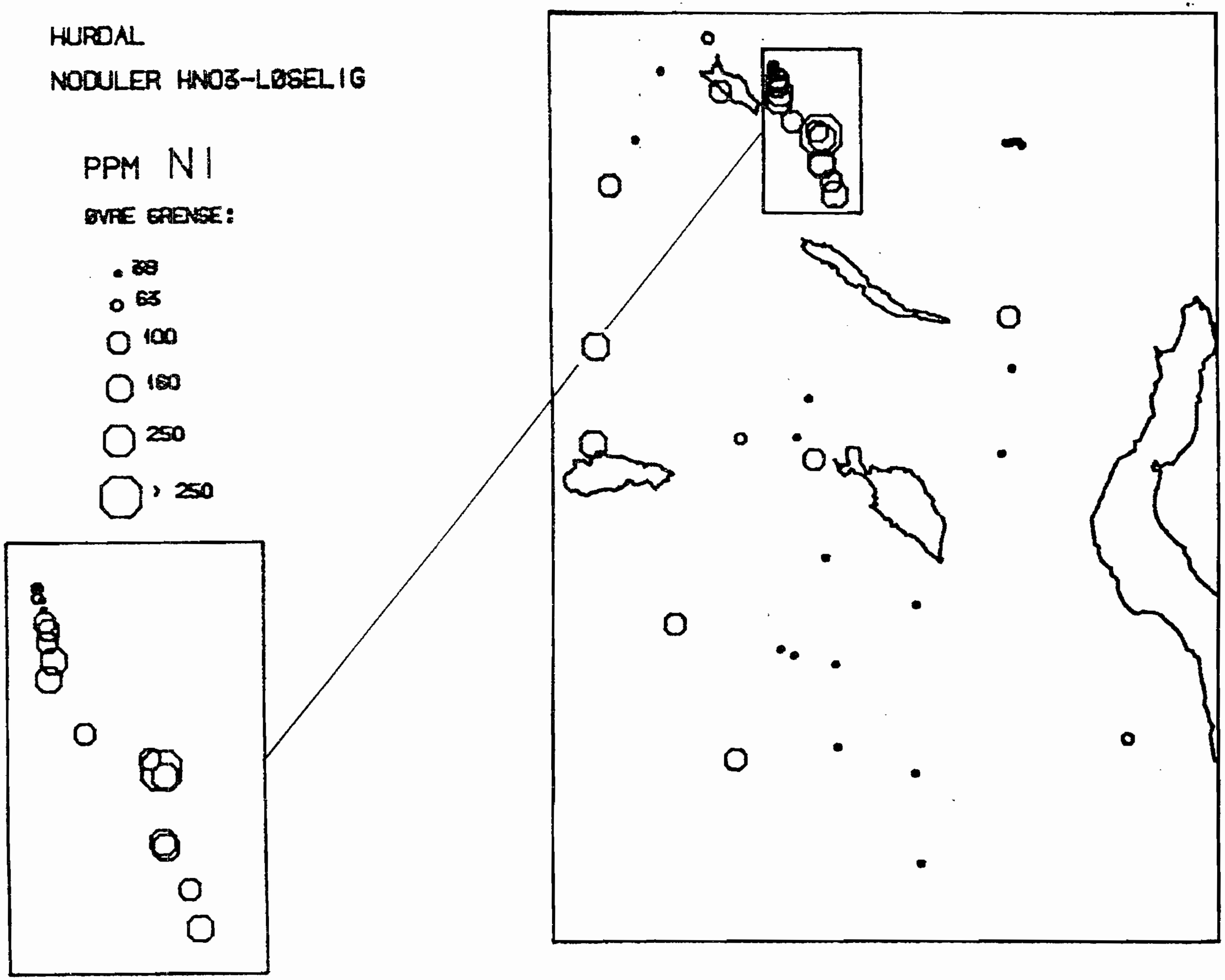
NGU-report 86.169. FIGURE 21.16



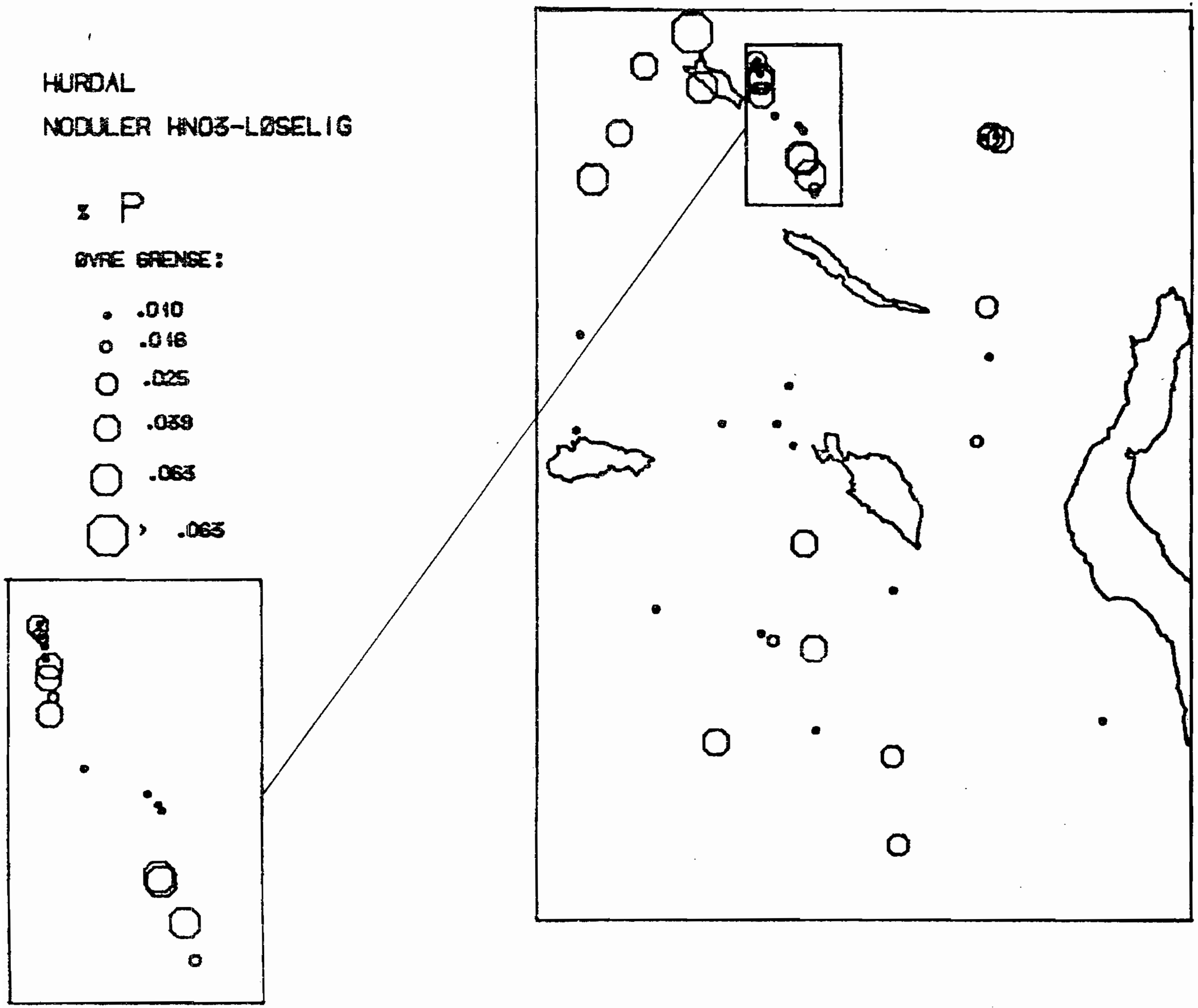
NGU-report 86.169. FIGURE 21.17



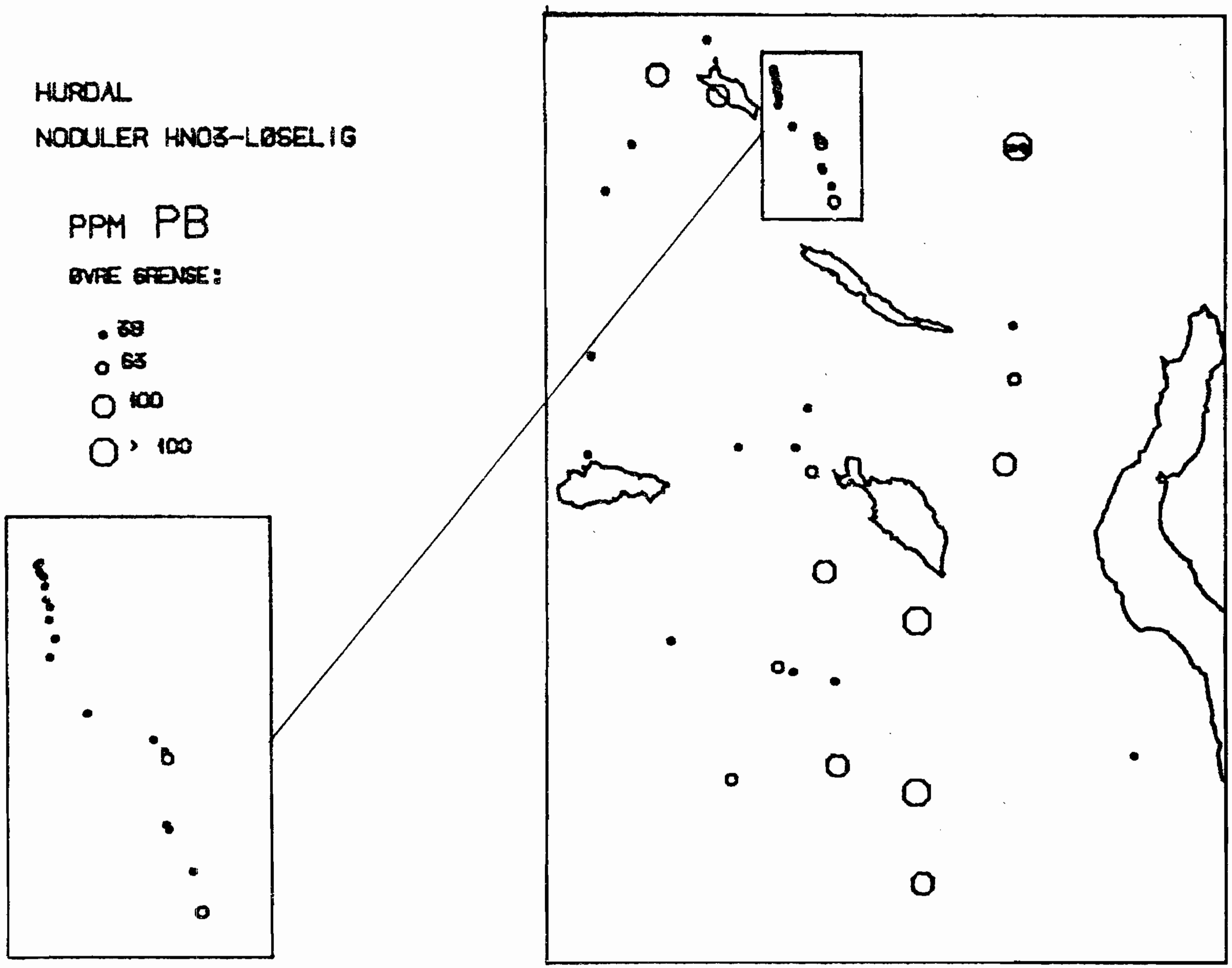
NGU-report 86.169. FIGURE 21.18



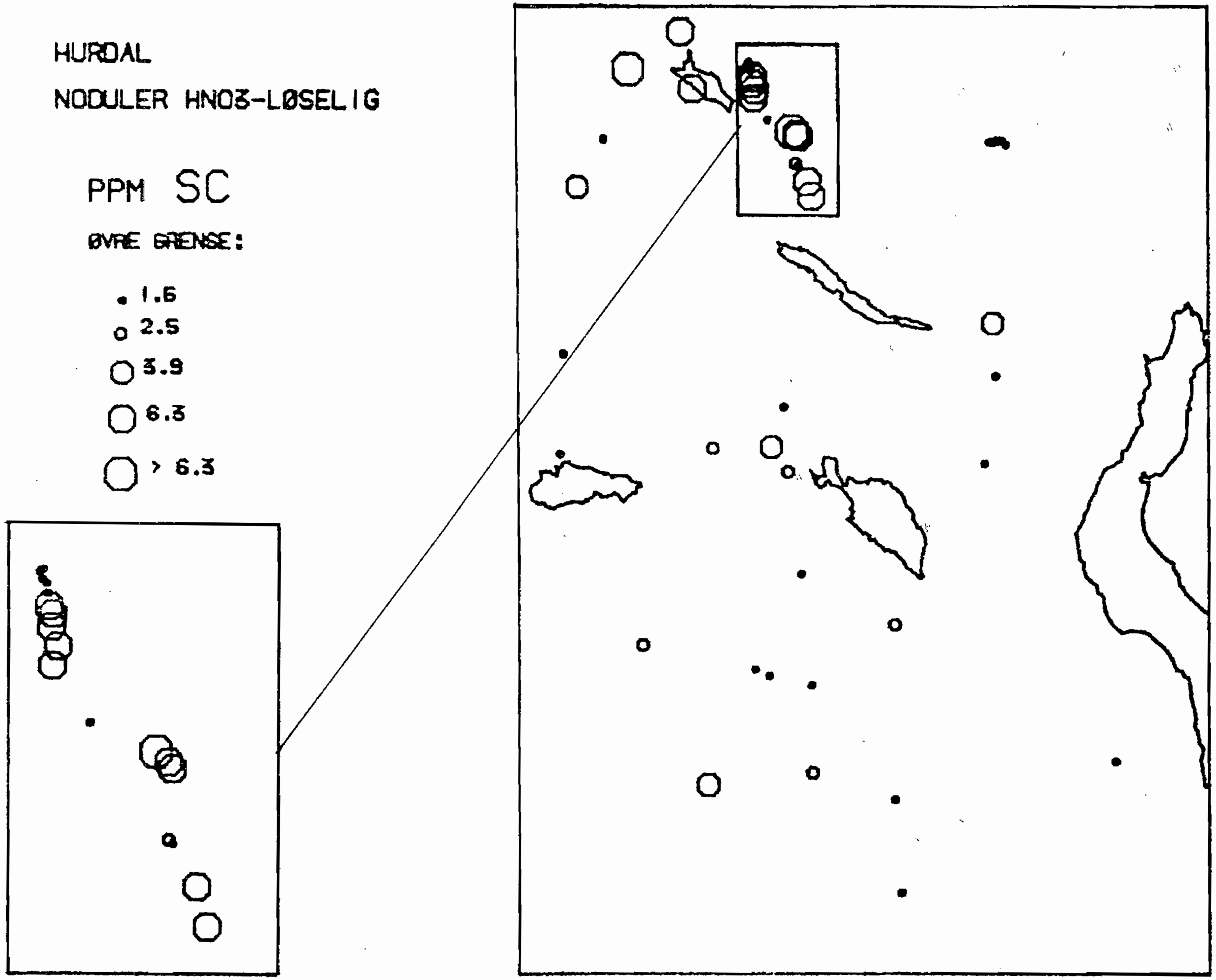
NGU-report 86.169. FIGURE 21.19



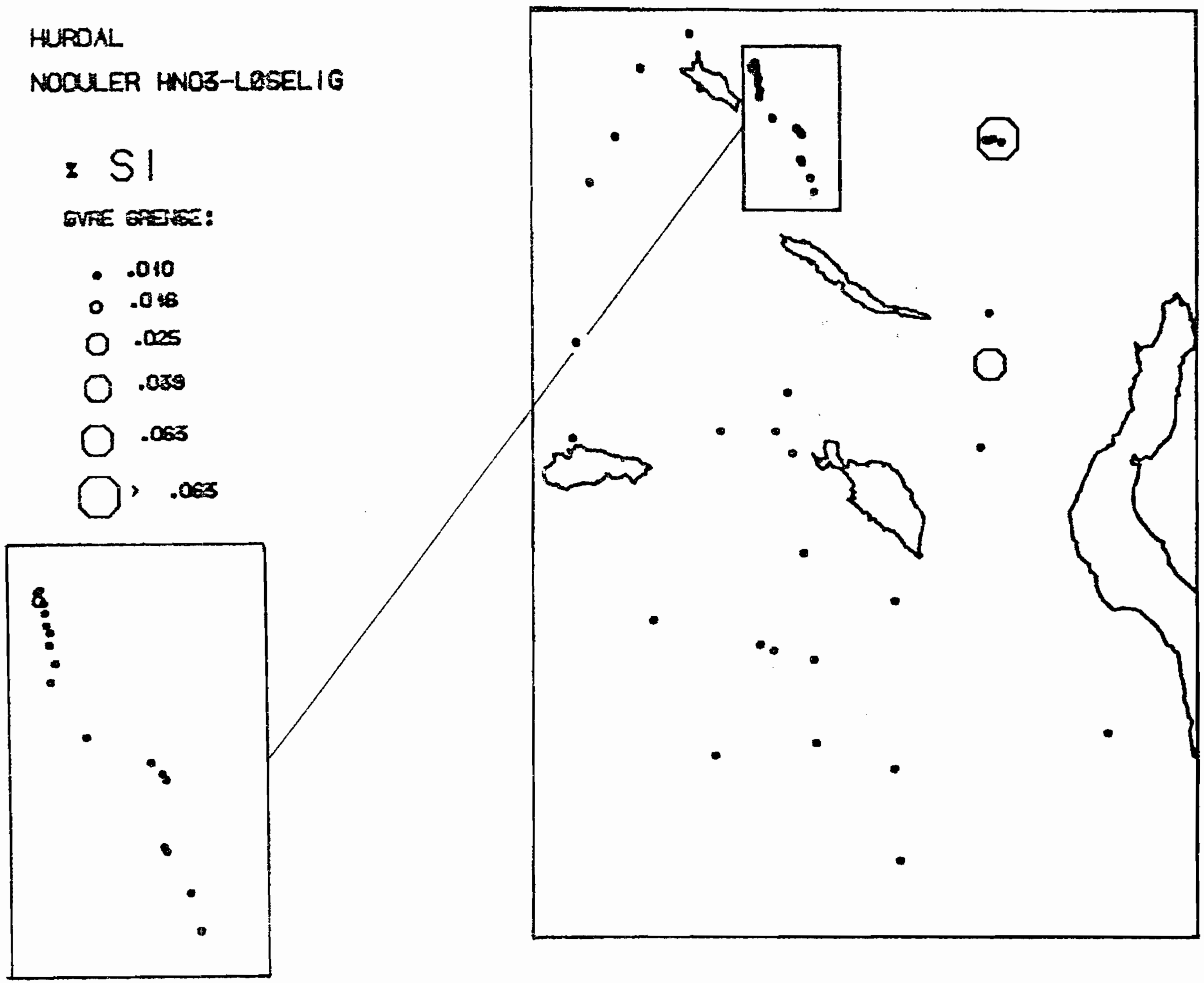
NGU-report 86.169. FIGURE 21.20



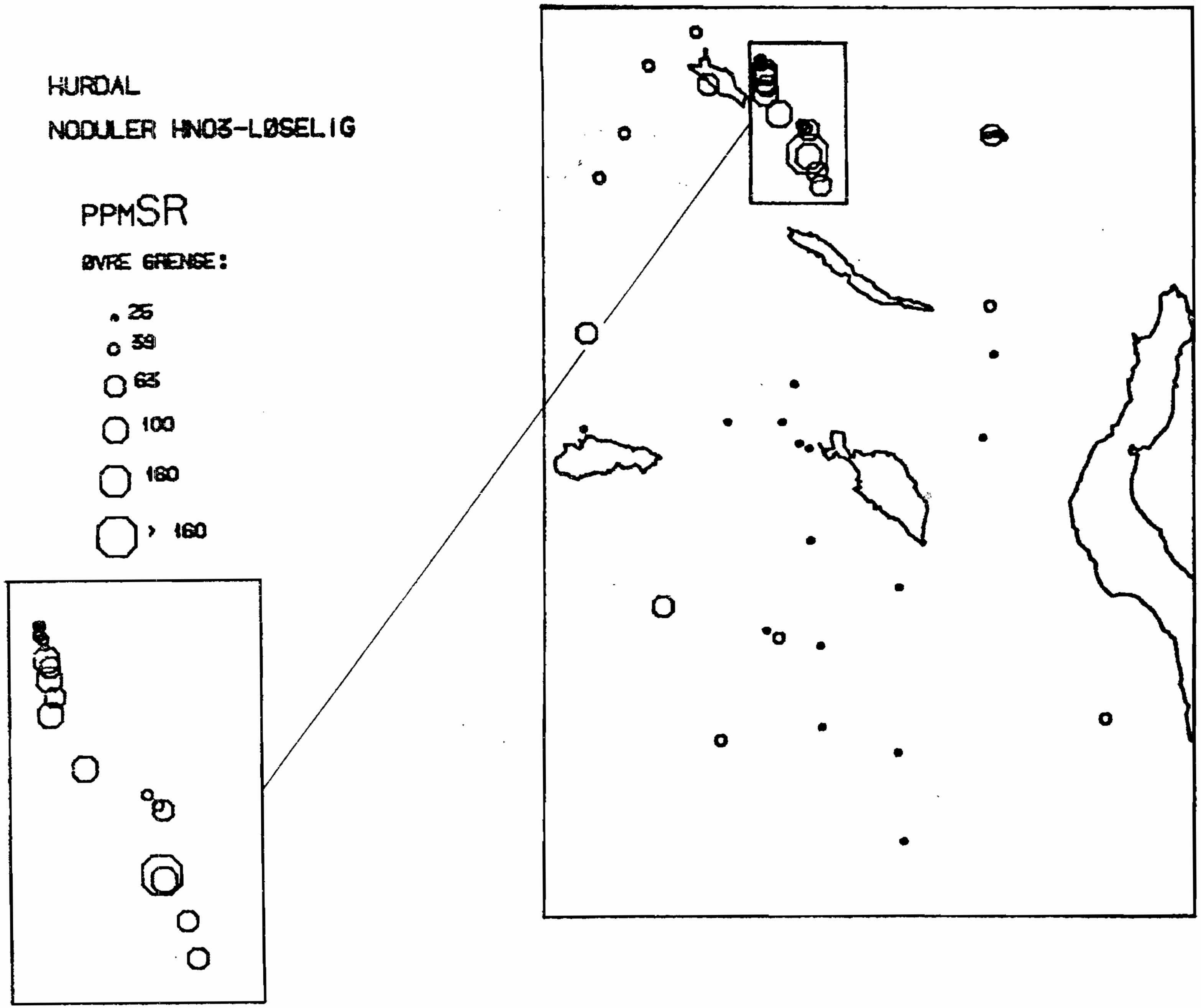
NGU-report 86.169. FIGURE 21.21



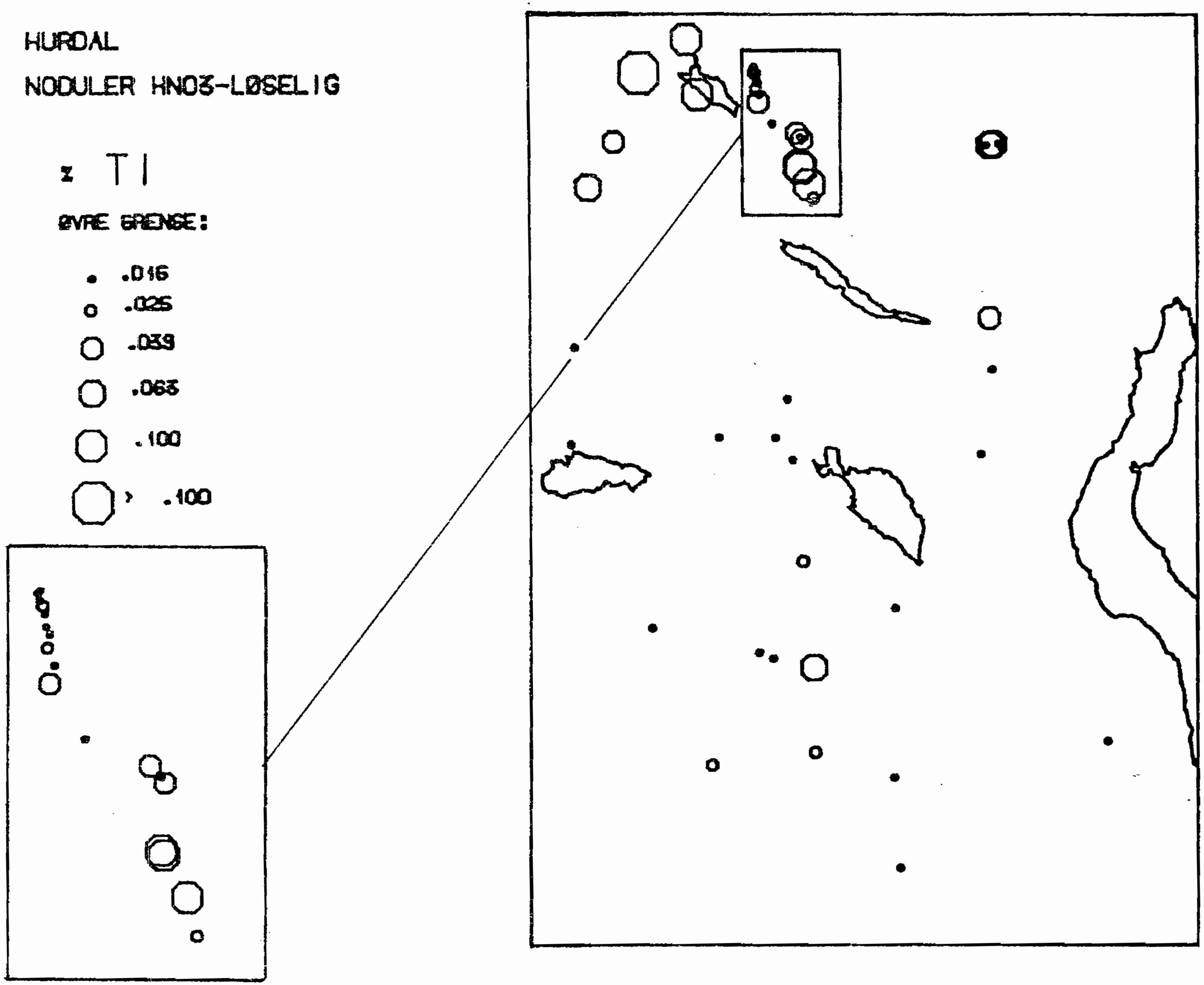
NGU-report 86.169. FIGURE 21.22



NGU-report 86.169. FIGURE 21.23



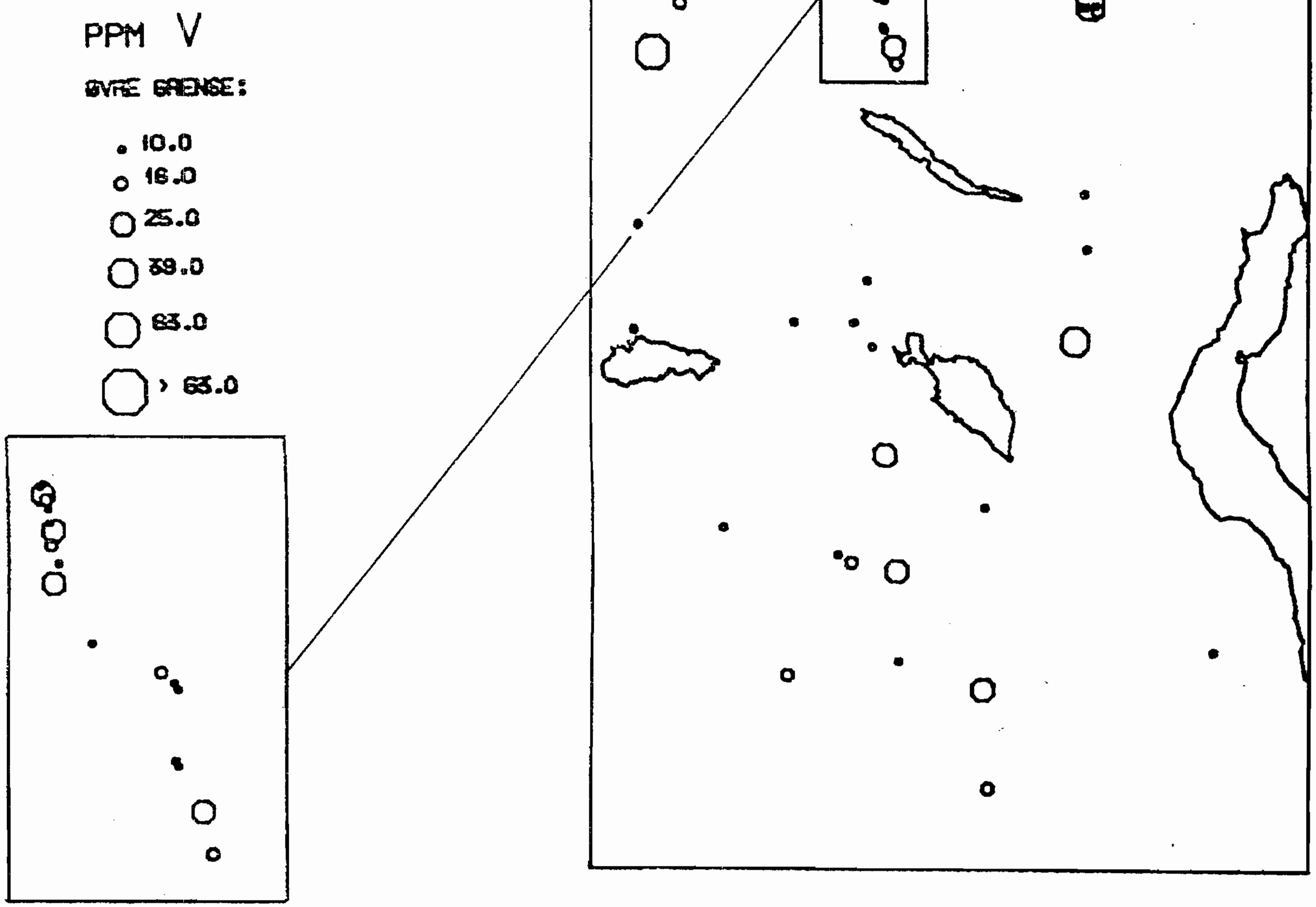
NGU-report 86.169. FIGURE 21.24



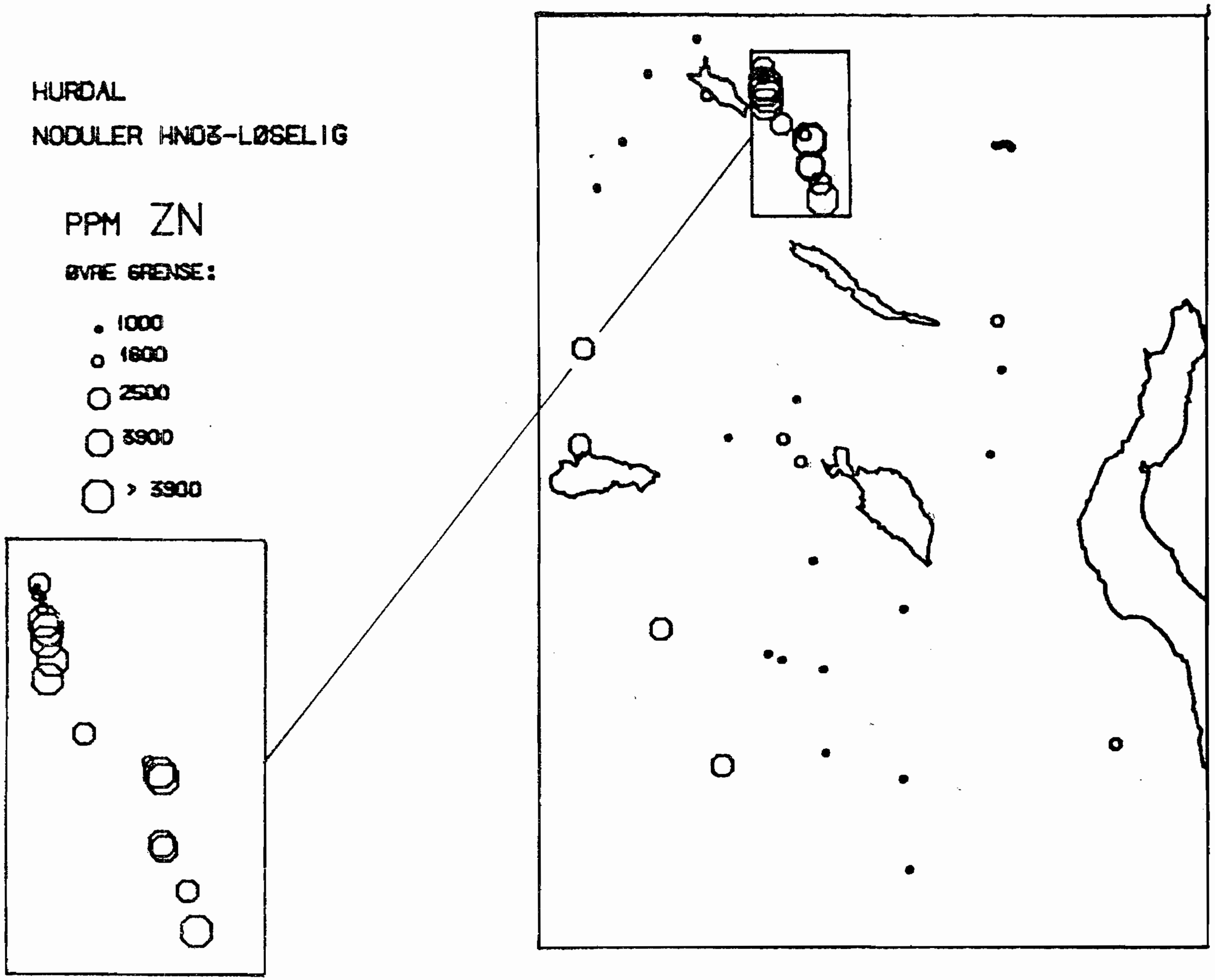
NGU-report 86.169. FIGURE 21.25

HURDAL

NODULER HNO3-LØSELIG



NGU-report 86.169. FIGURE 21.26



NGU-report 86.169. FIGURE 21.27

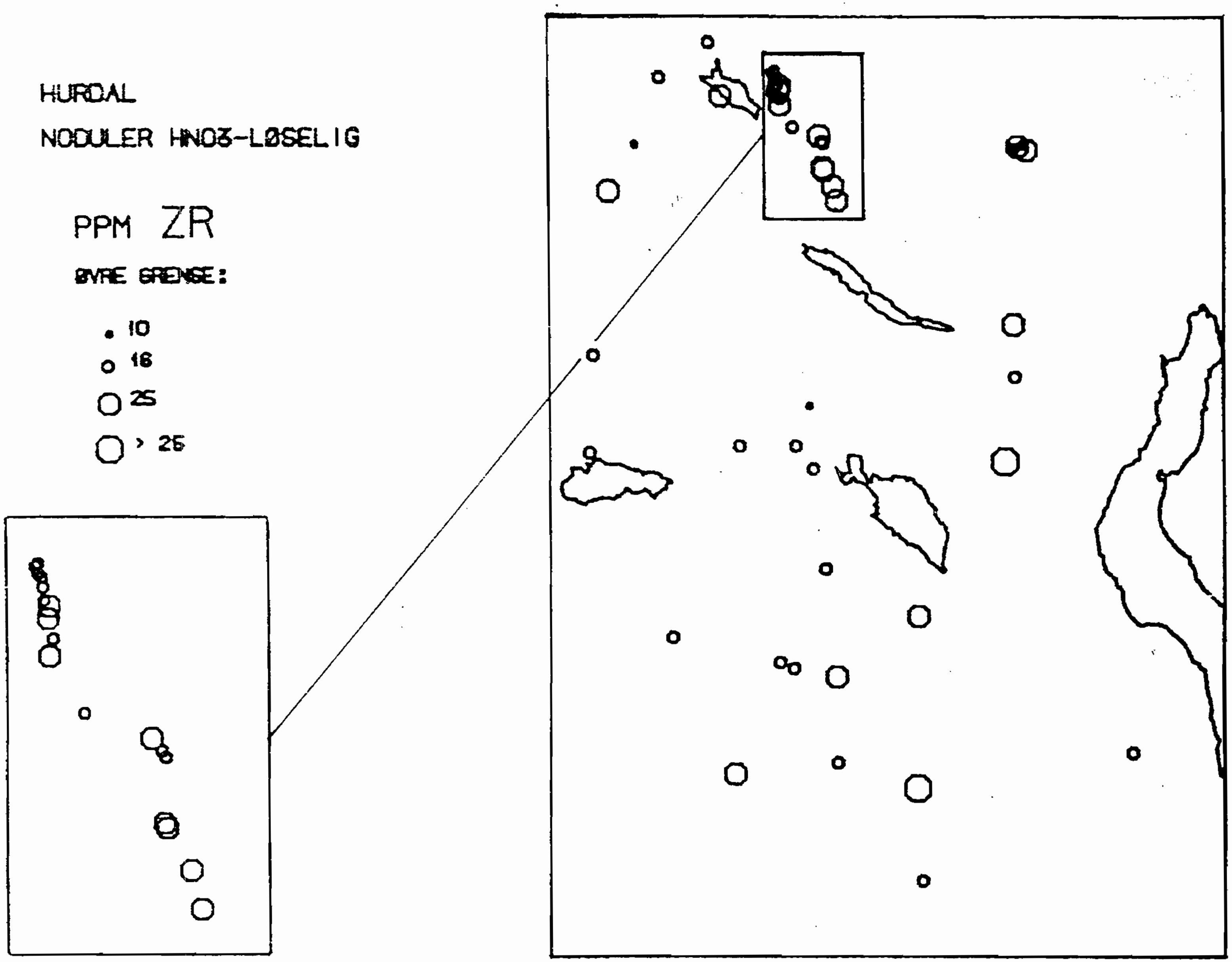
HURDAL

NODULER HNO_3-LØSELIG

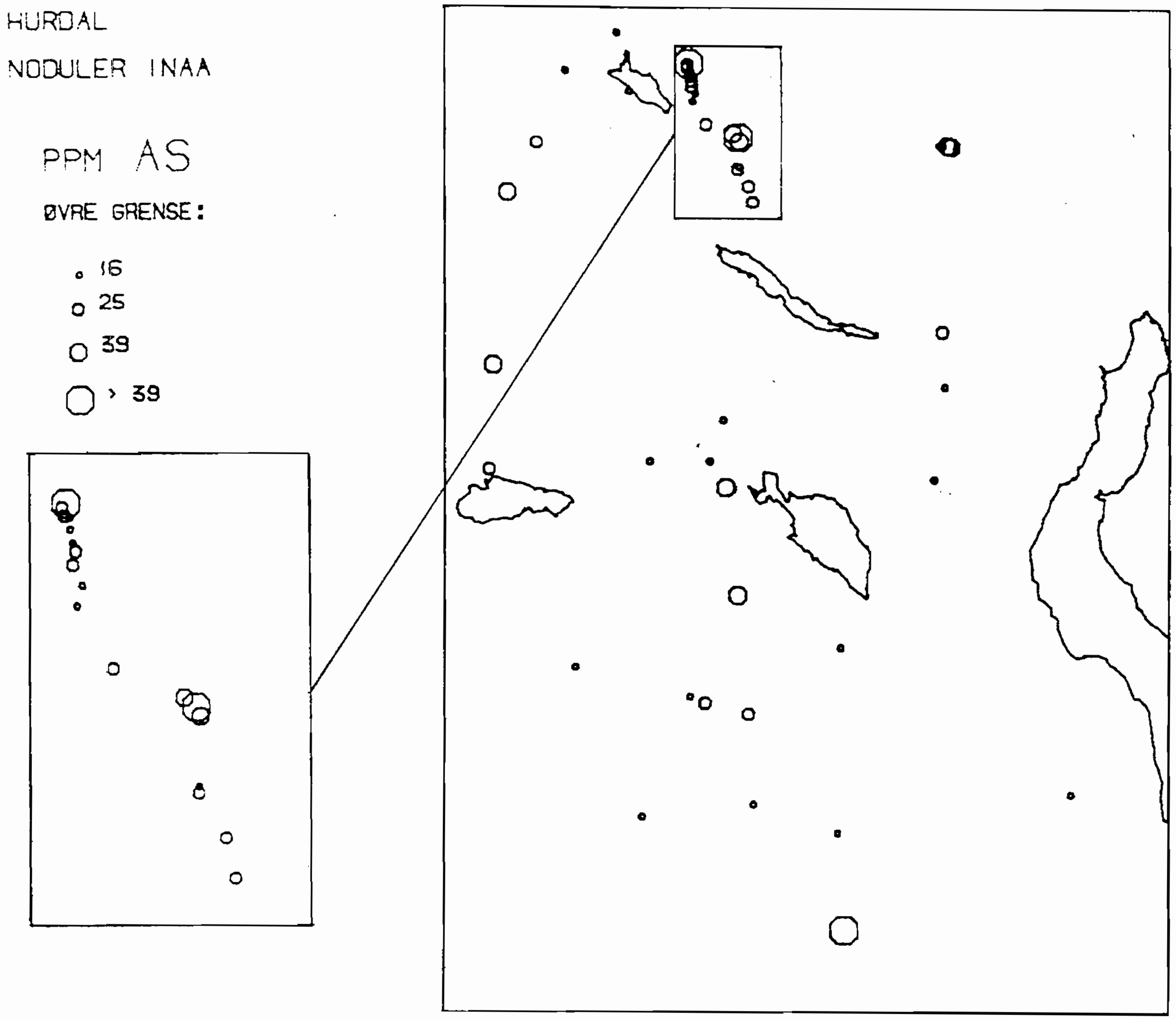
PPM ZR

ØVRE GRENSE:

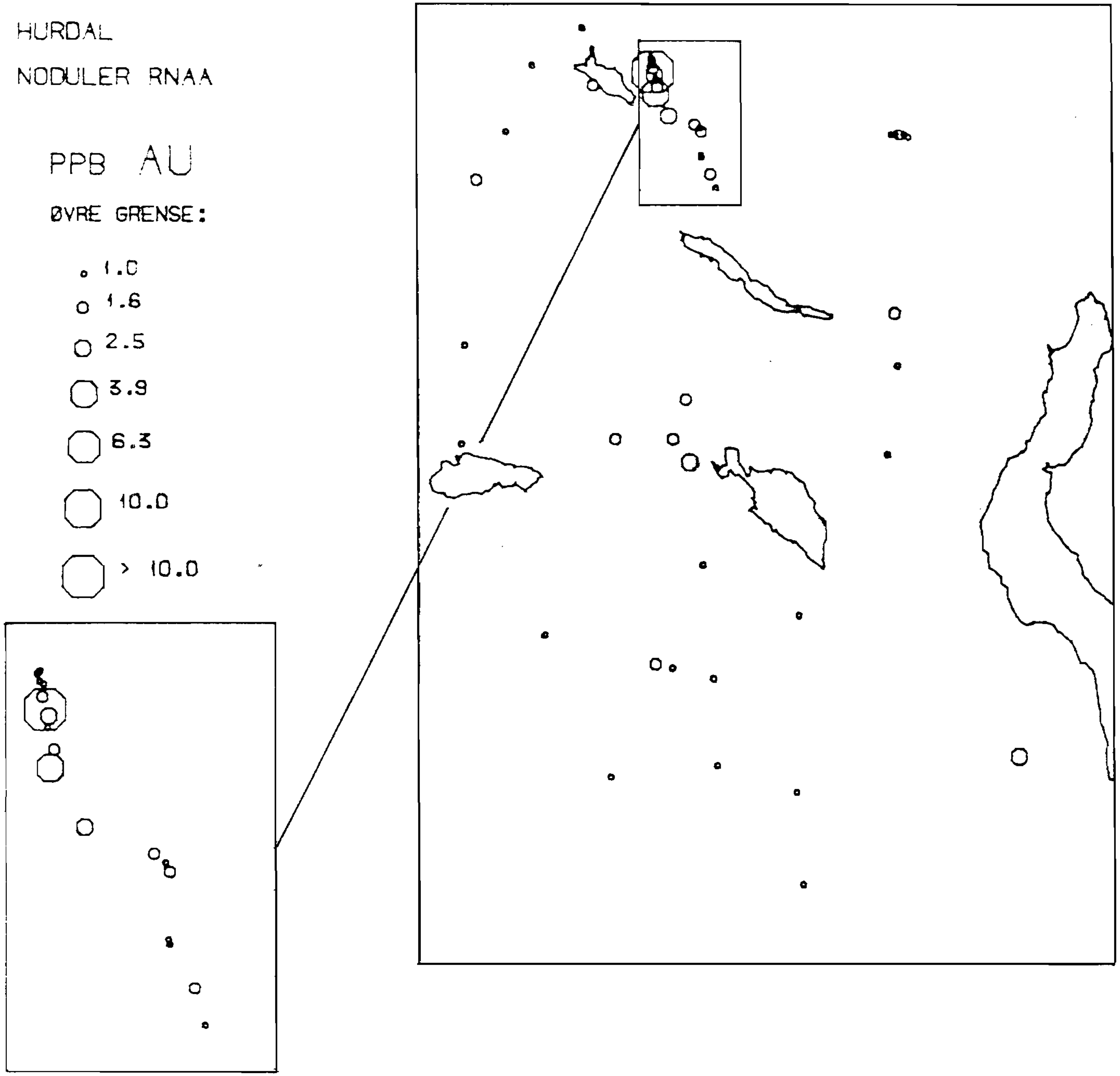
- 10
- 16
- 25
- > 25



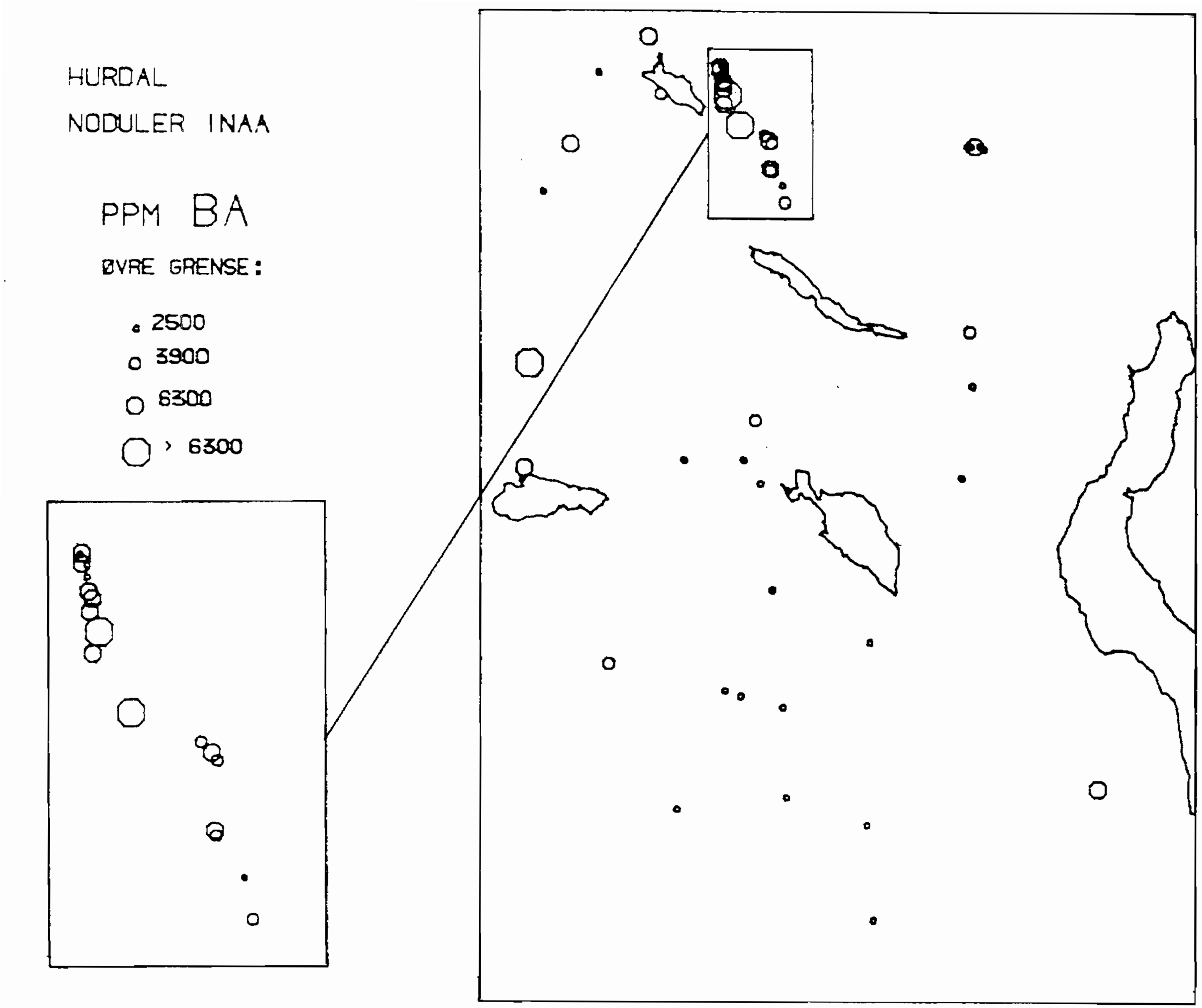
NGU-report 86.169. FIGURE 21.28



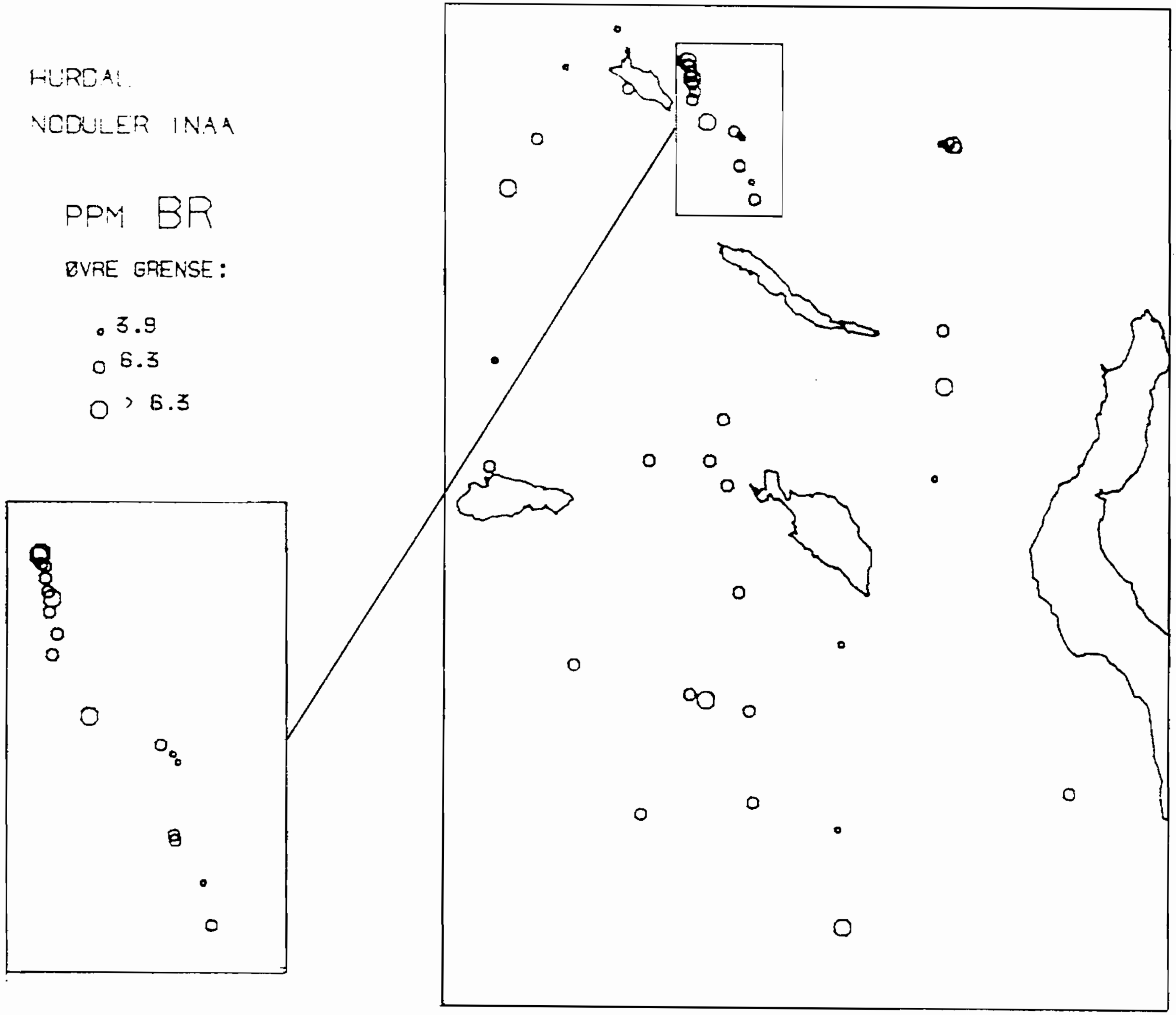
NGU-report 86.169. FIGURE 22.1



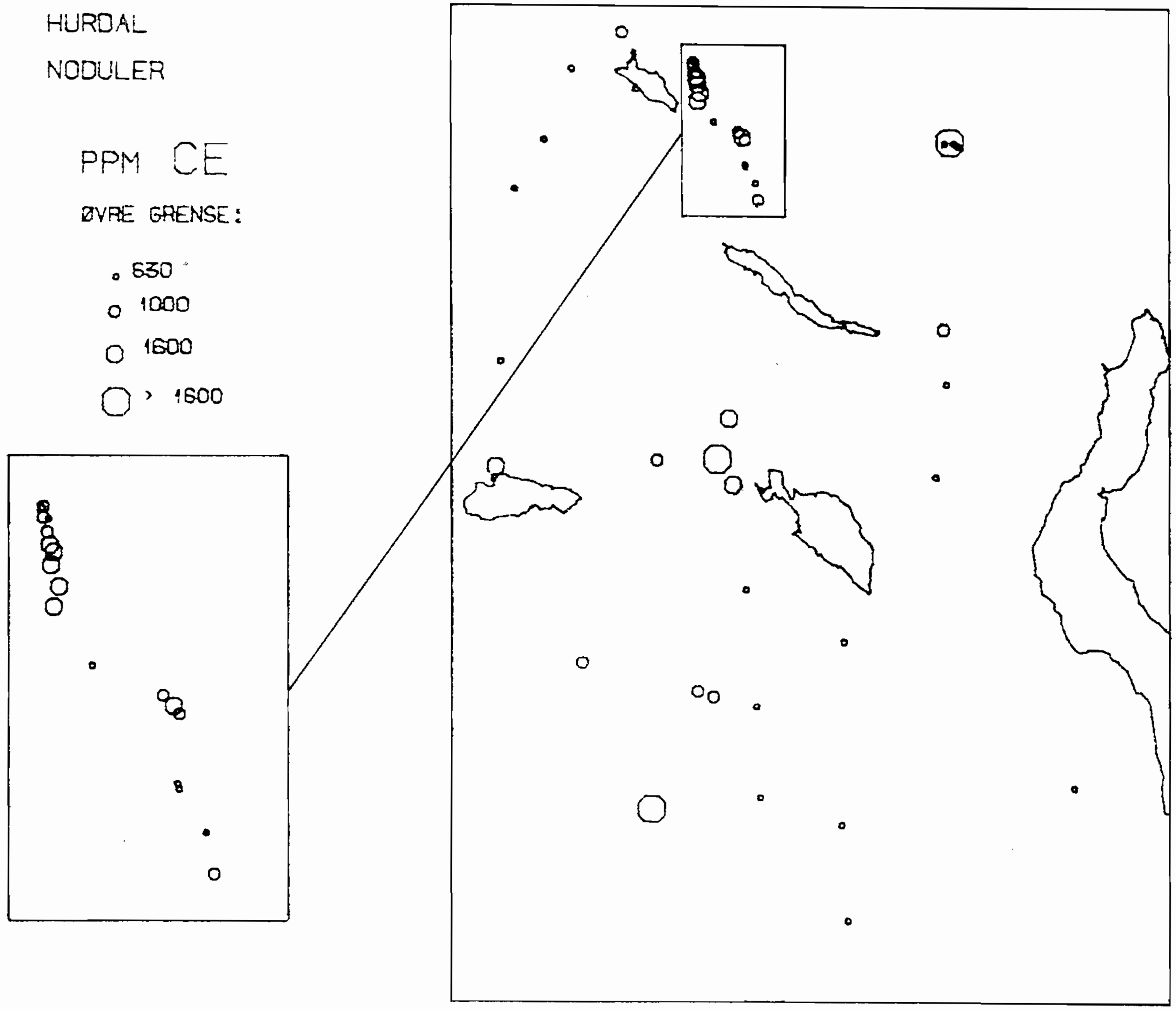
NGU-report 86.169. FIGURE 22.2



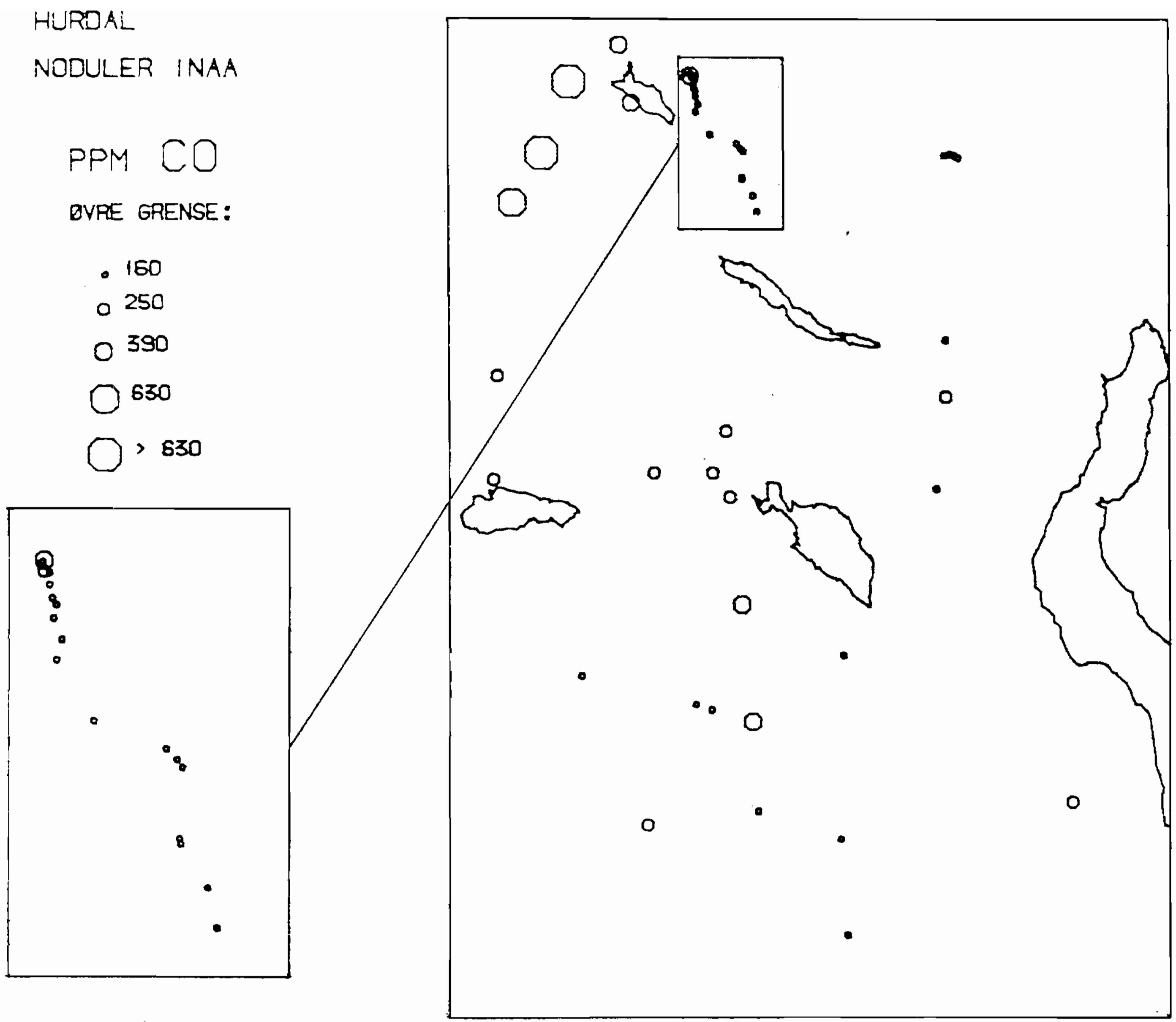
NGU-report 86.169. FIGURE 22.3



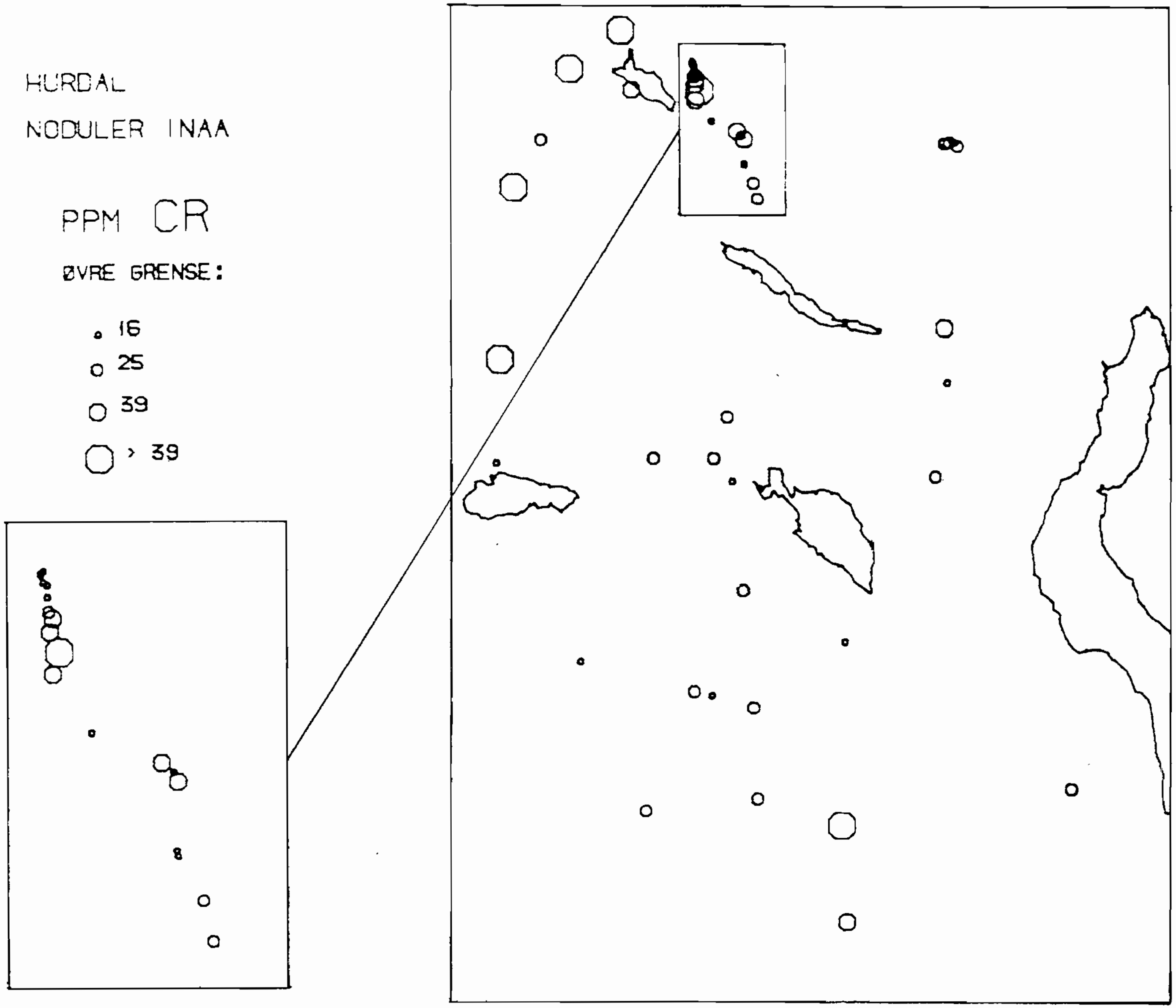
NGU-report 86.169. FIGURE 22.4



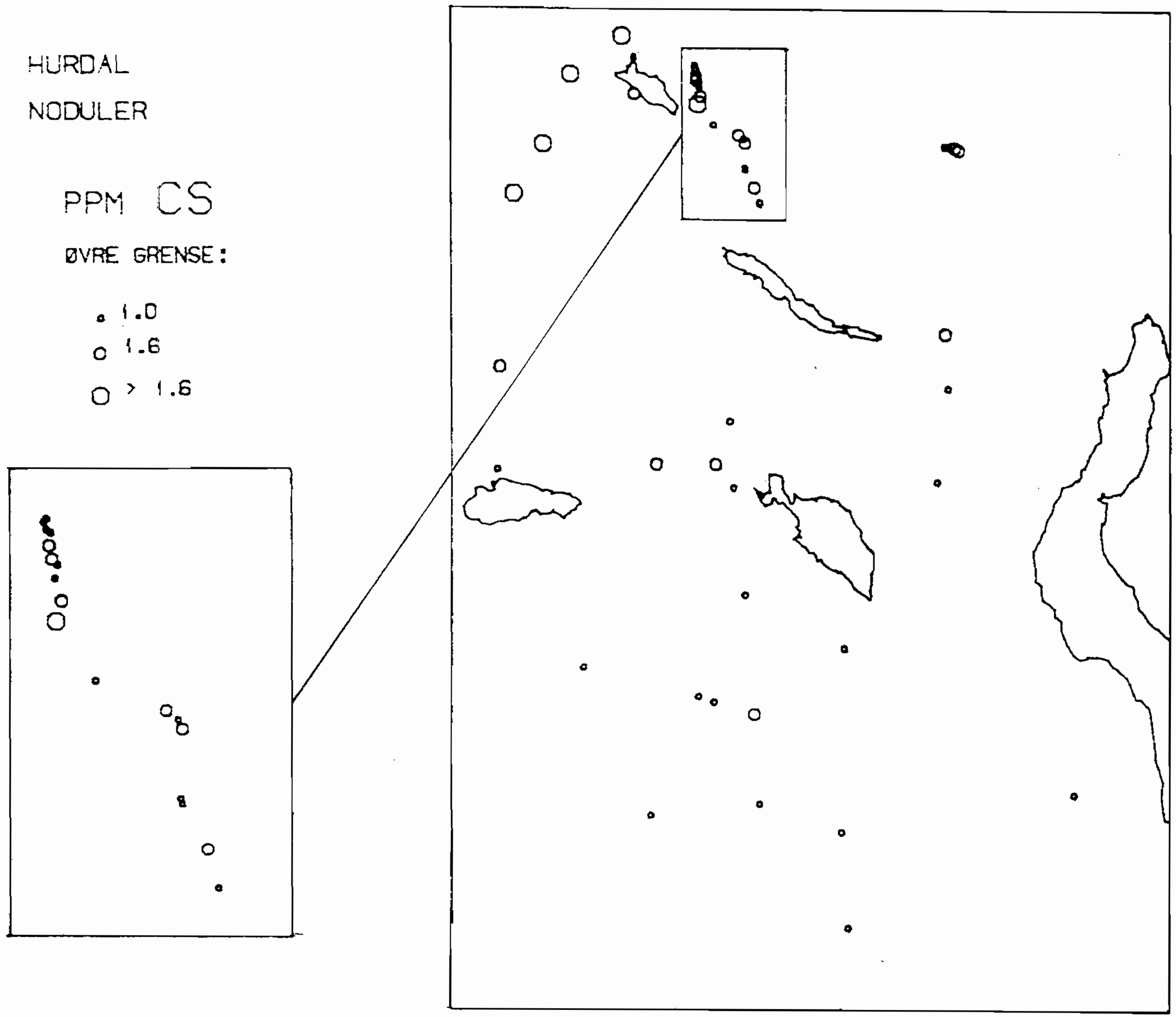
NGU-report 86.169. FIGURE 22.5



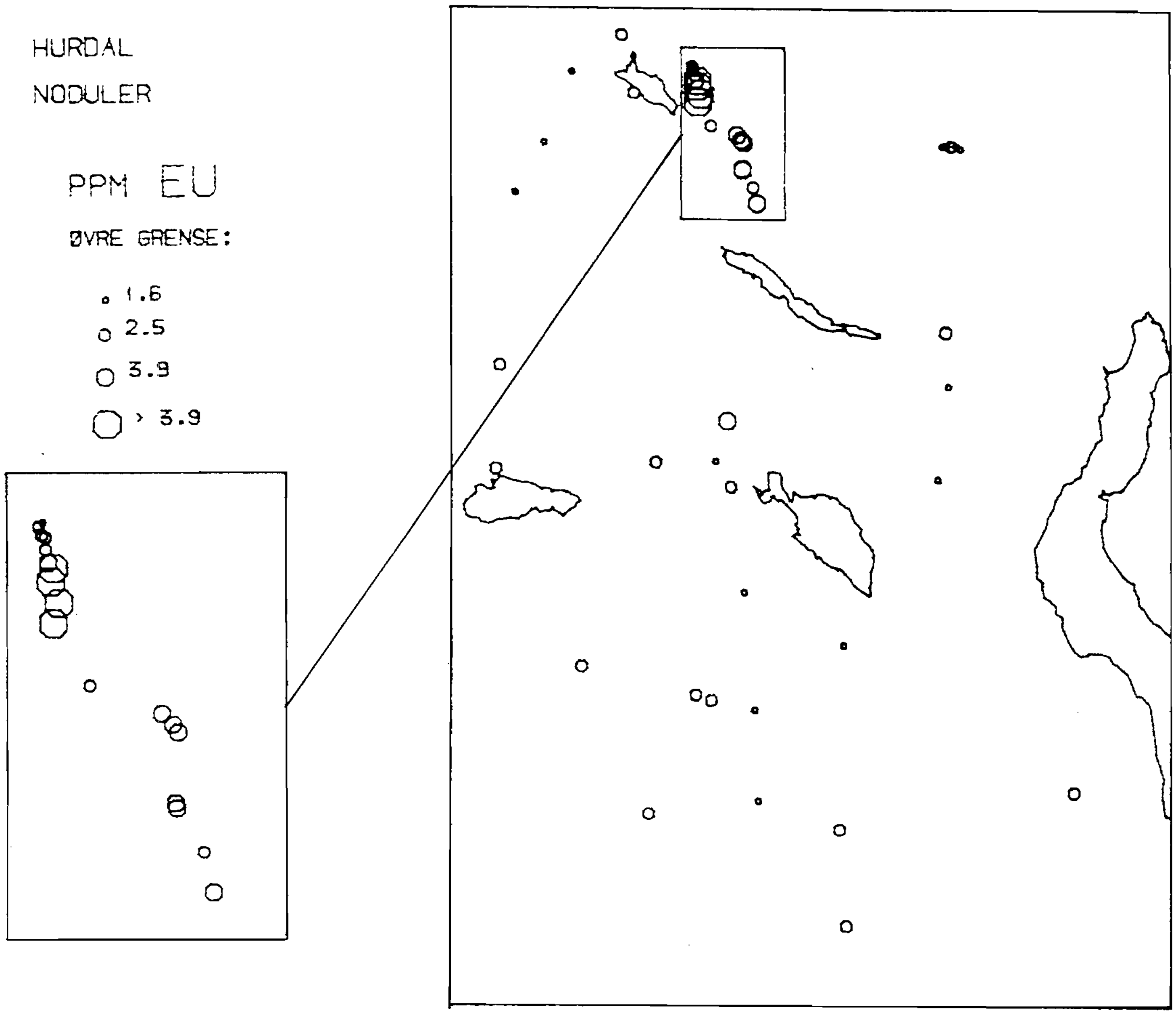
NGU-report 86.169. FIGURE 22.6



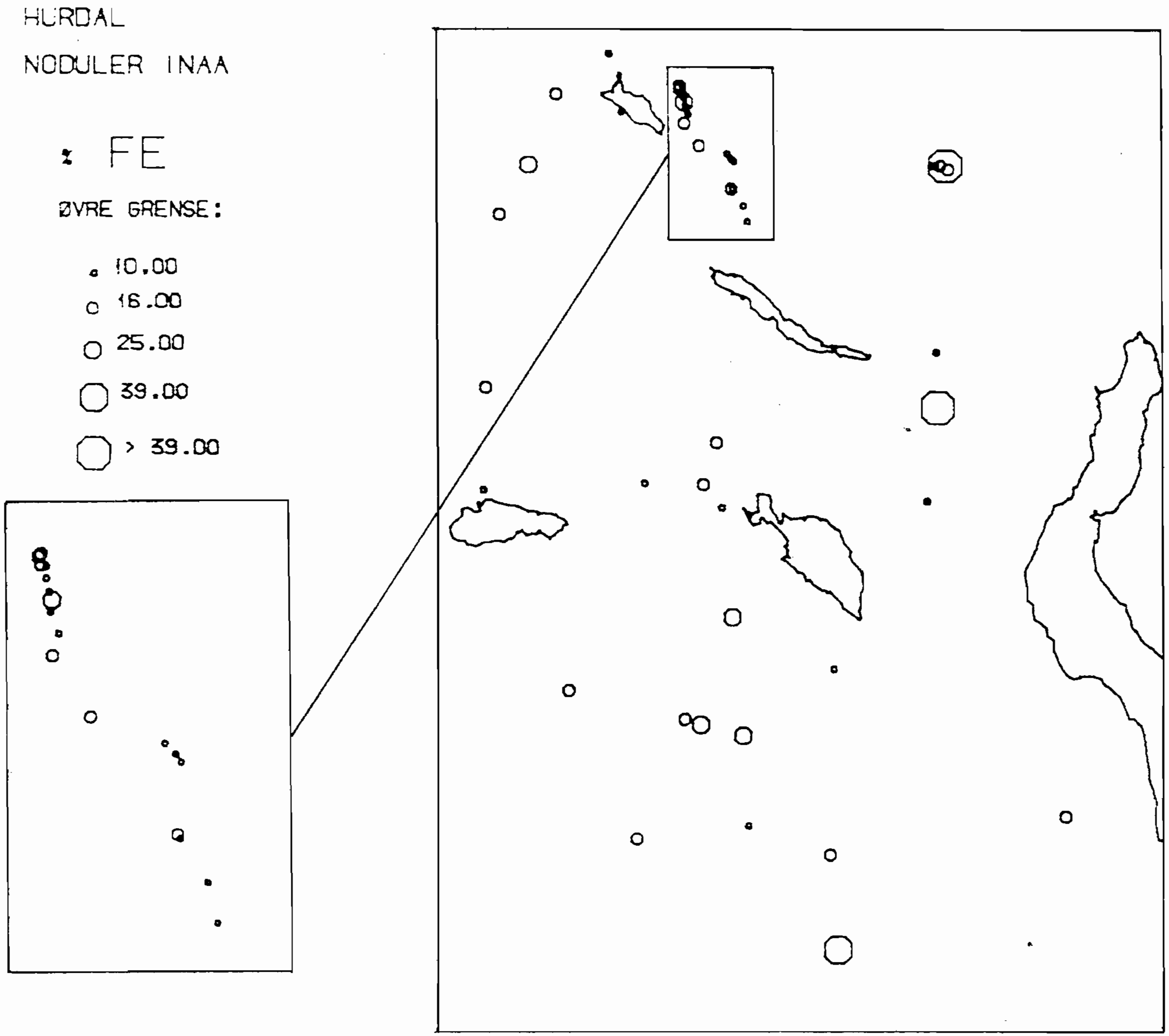
NGU-report 86.169. FIGURE 22.7



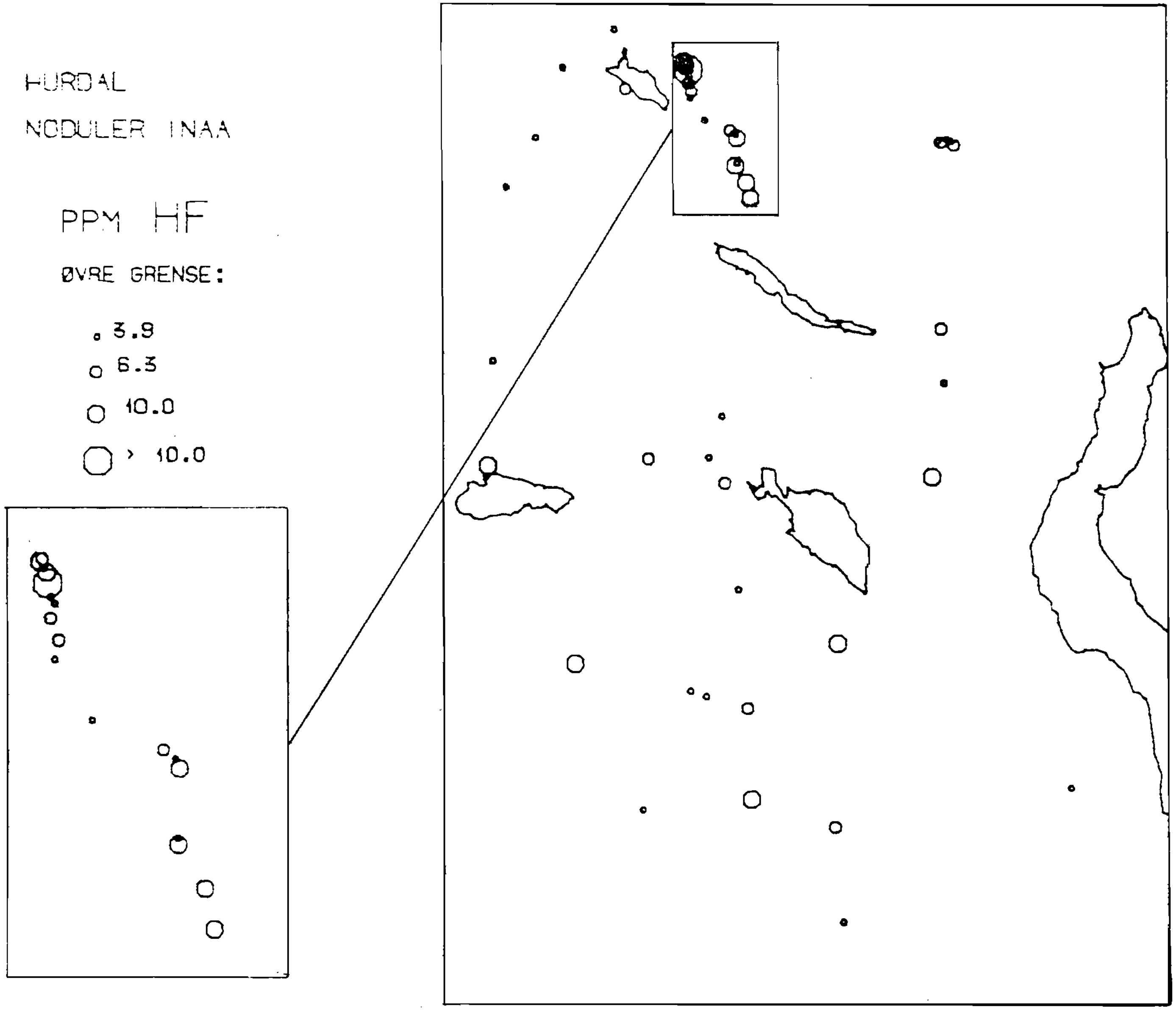
NGU-report 86.169. FIGURE 22.8



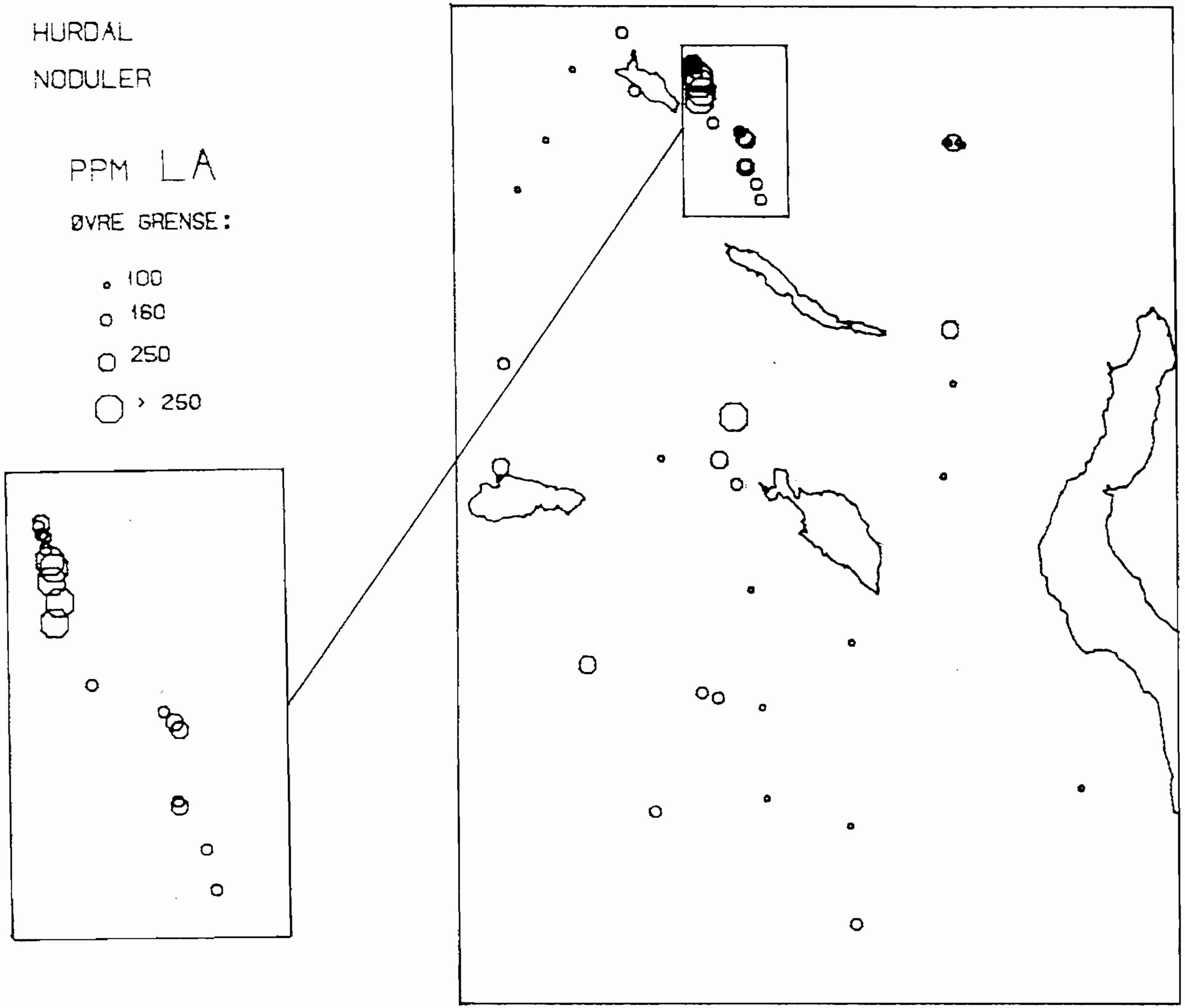
NGU-report 86.169. FIGURE 22.9



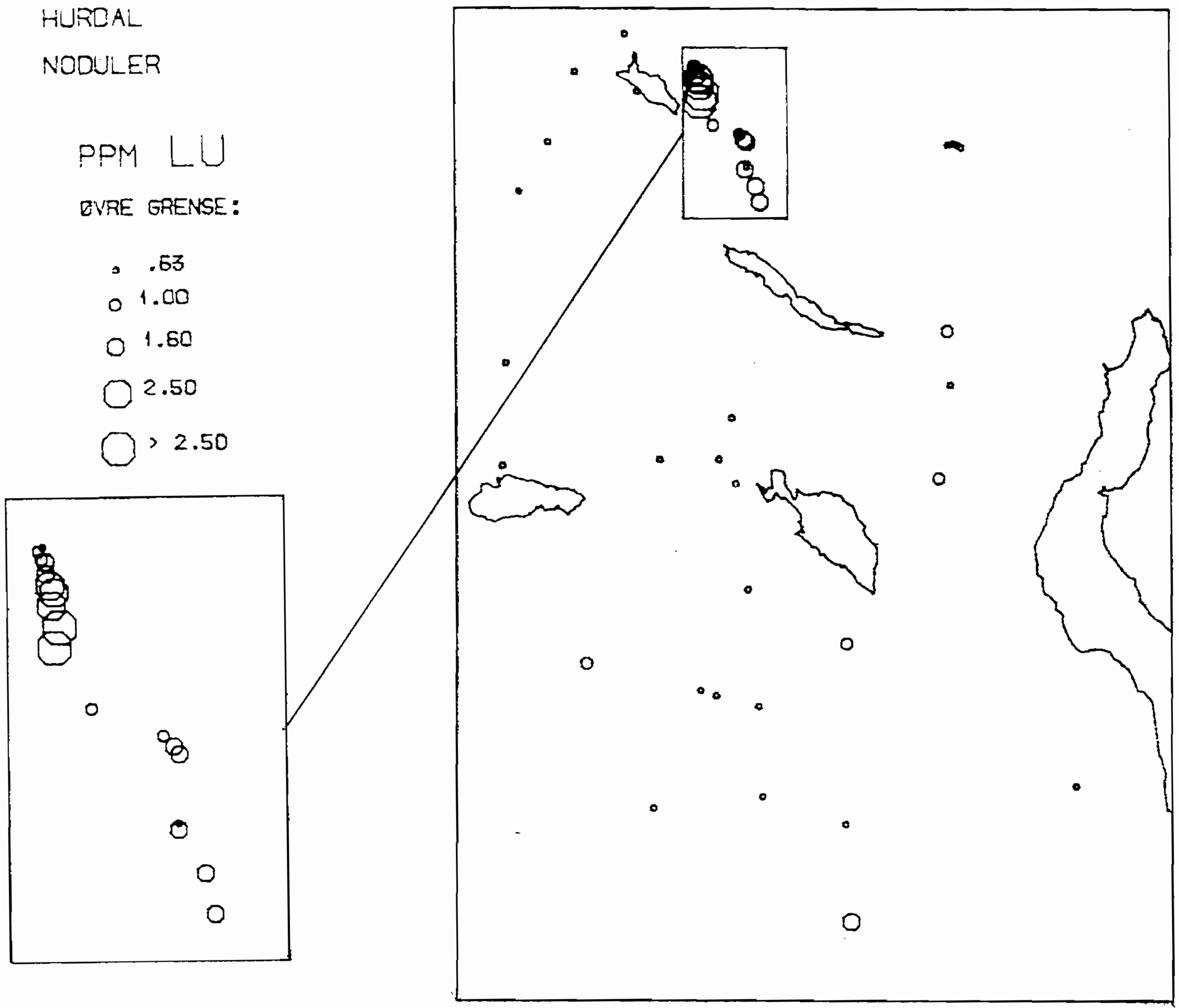
NGU-report 86.169. FIGURE 22.10



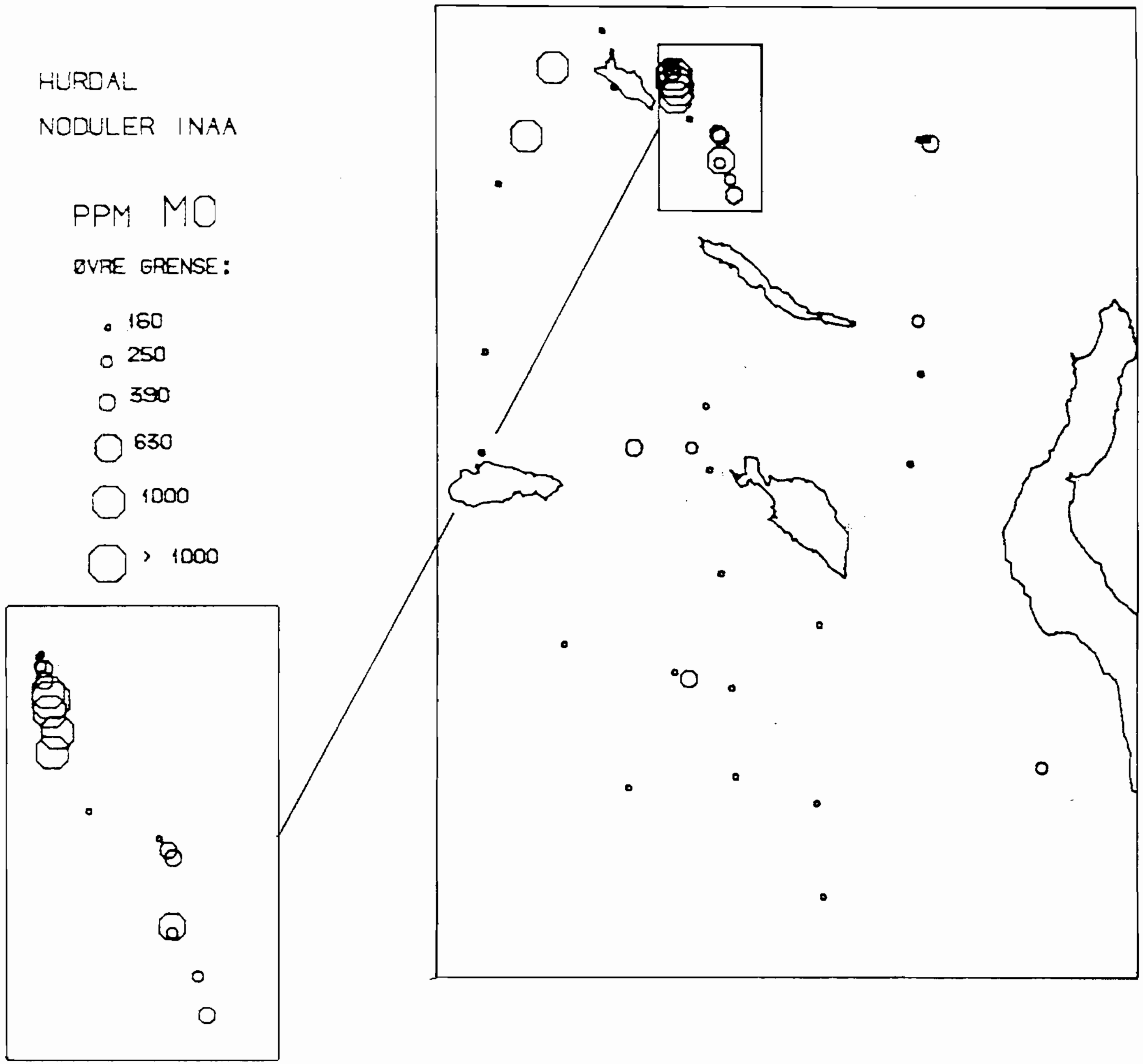
NGU-report 86.169. FIGURE 22.11



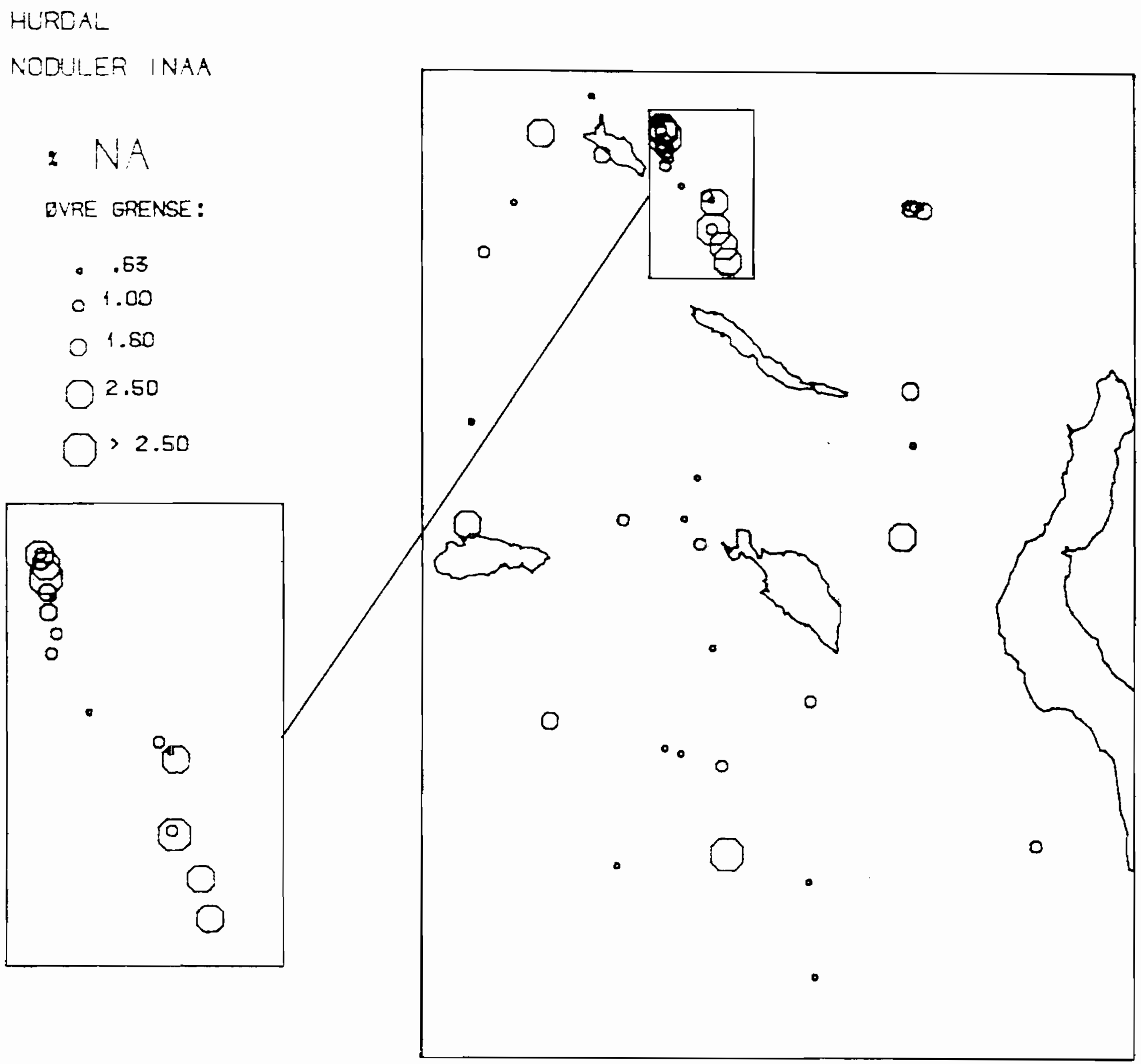
NGU-report 86.169. FIGURE 22.12



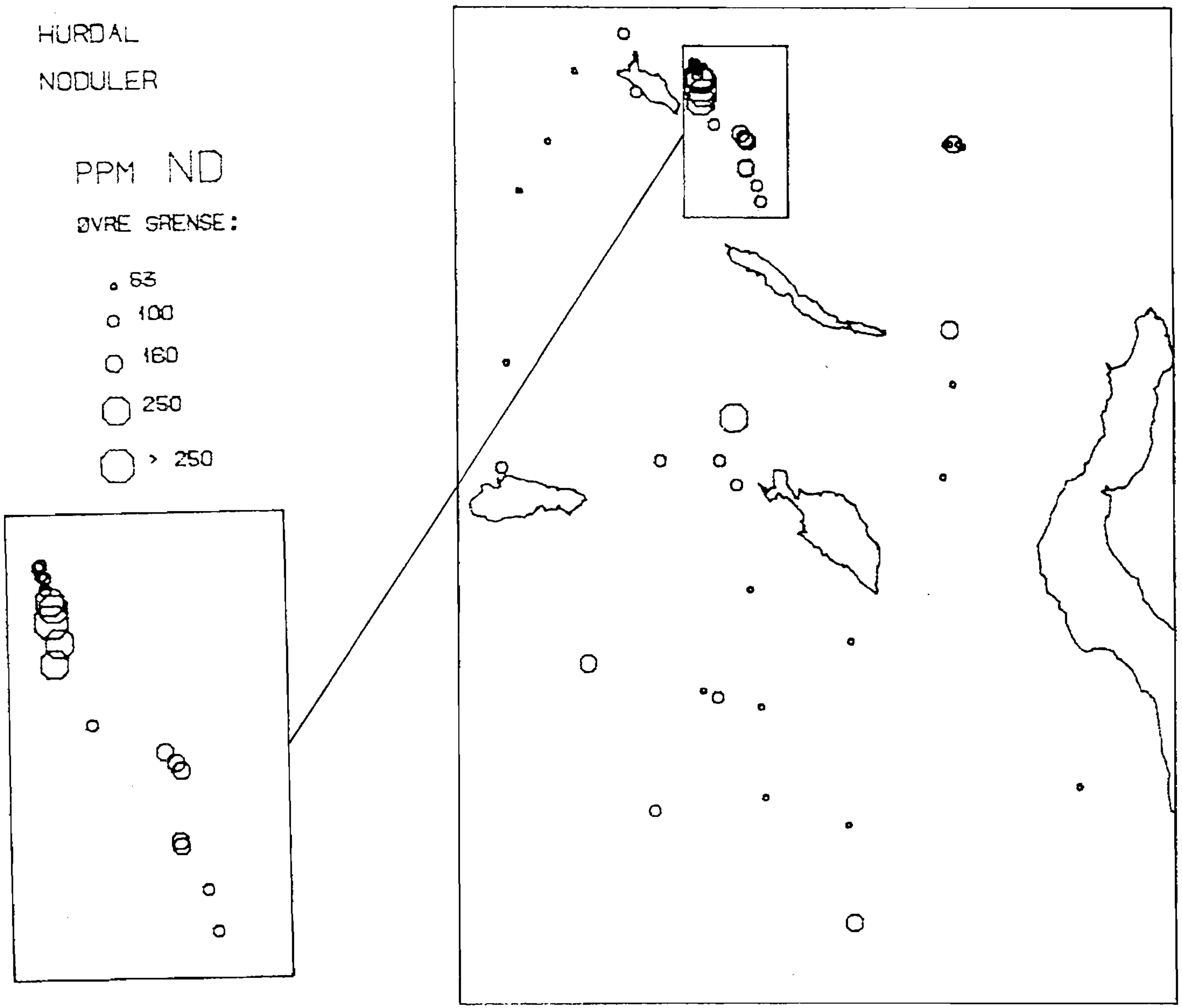
NGU-report 86.169. FIGURE 22.13



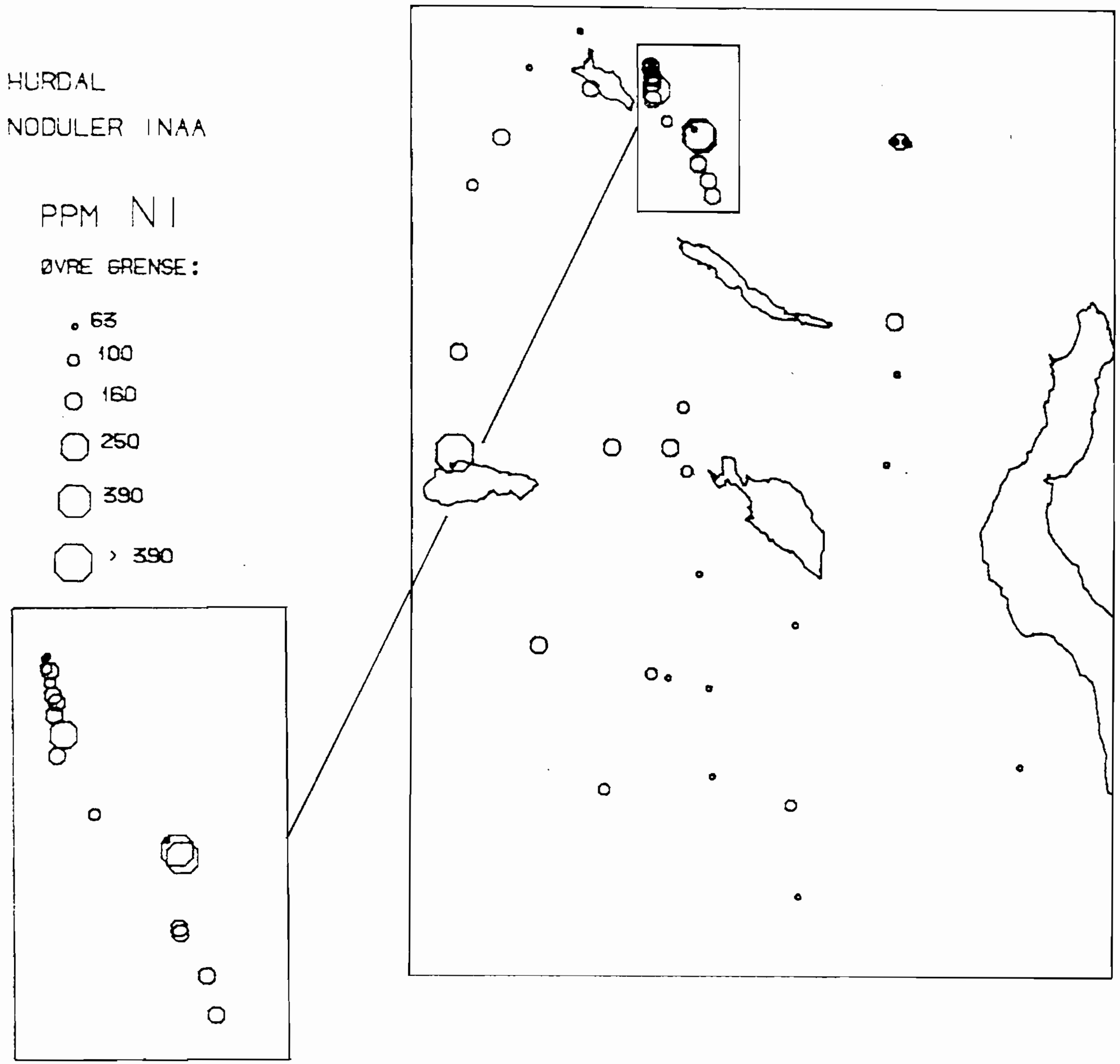
NGU-report 86.169. FIGURE 22.14



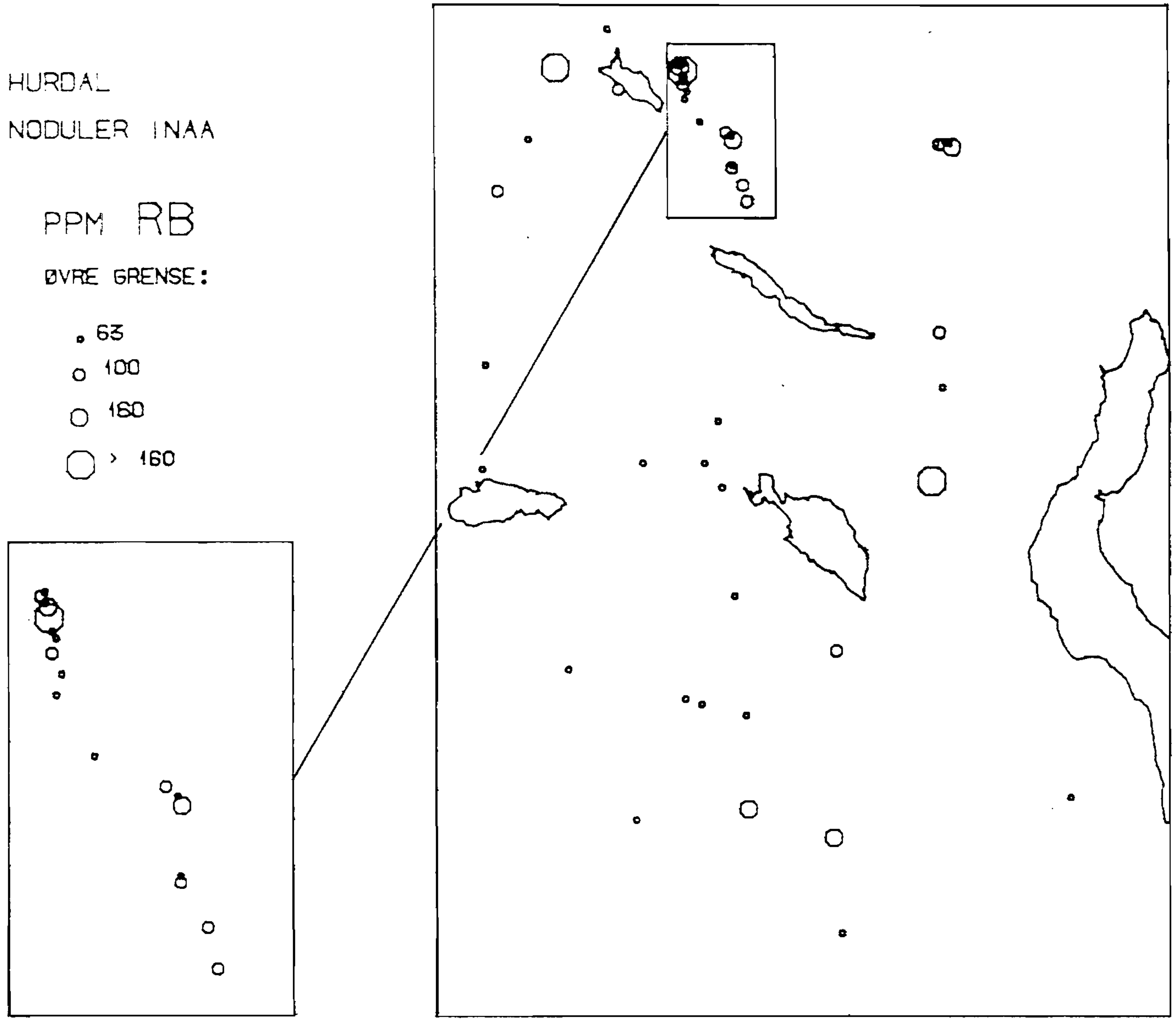
NGU-report 86.169. FIGURE 22.15



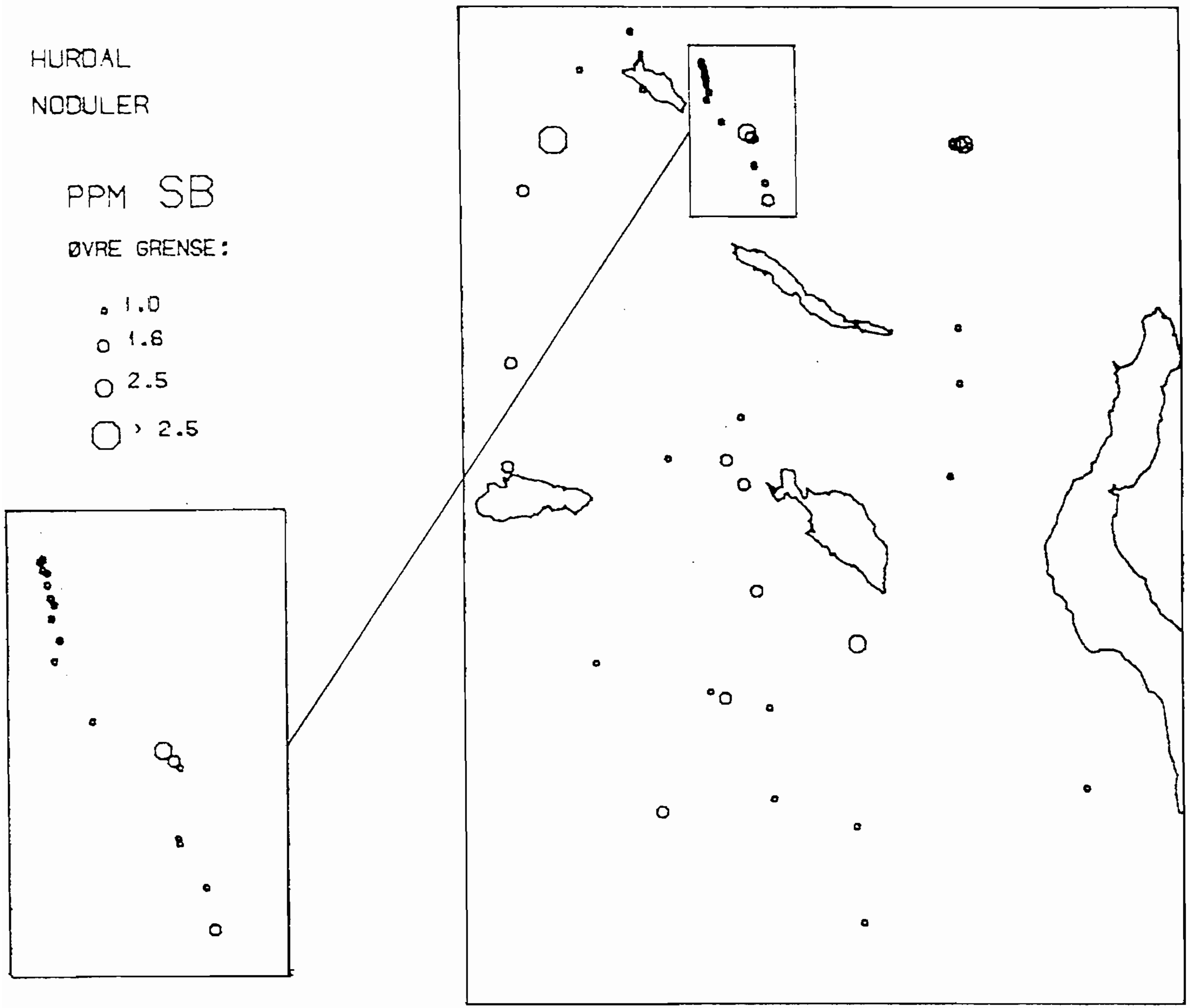
NGU-report 86.169. FIGURE 22.16



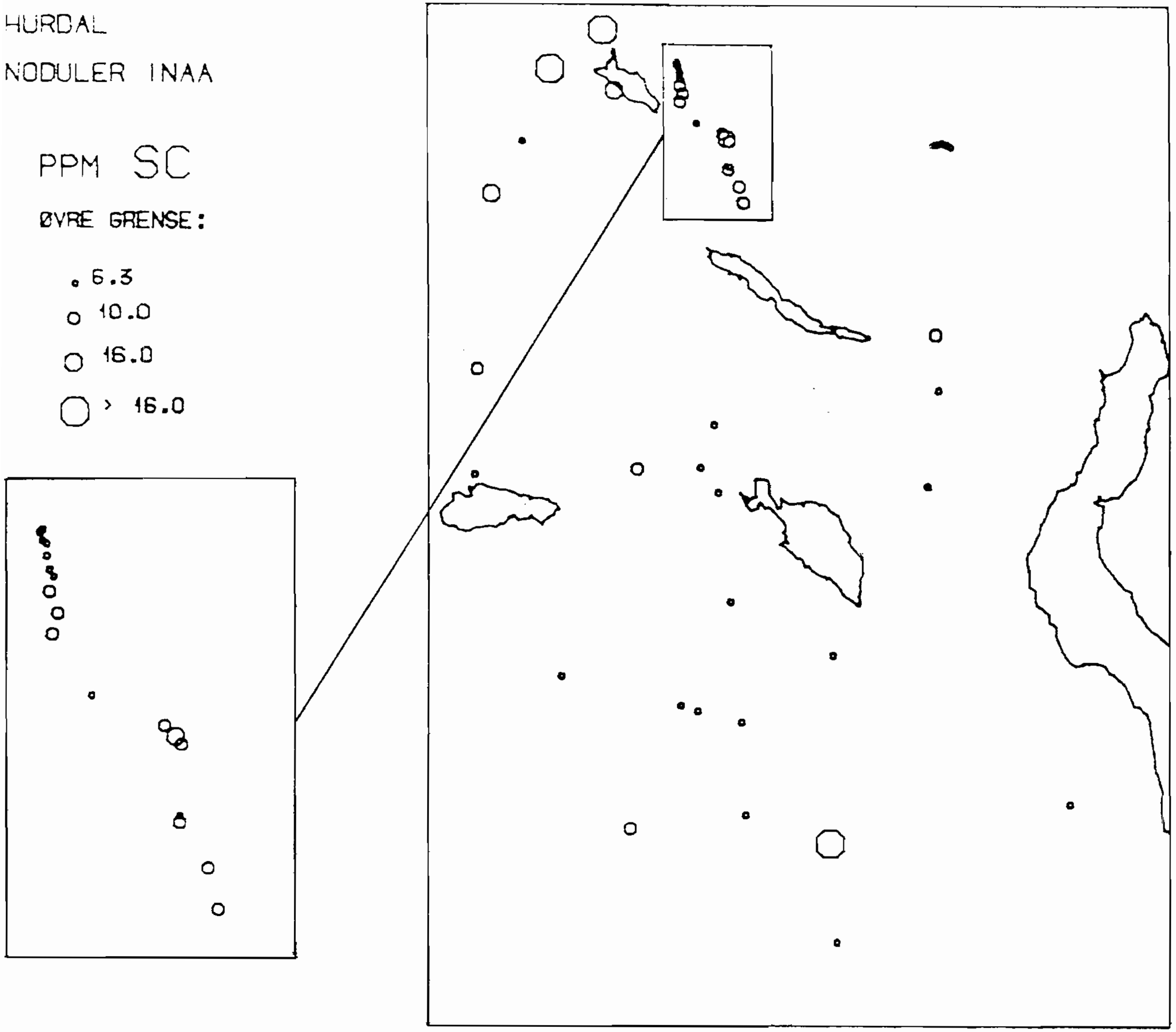
NGU-report 86.169. FIGURE 22.17



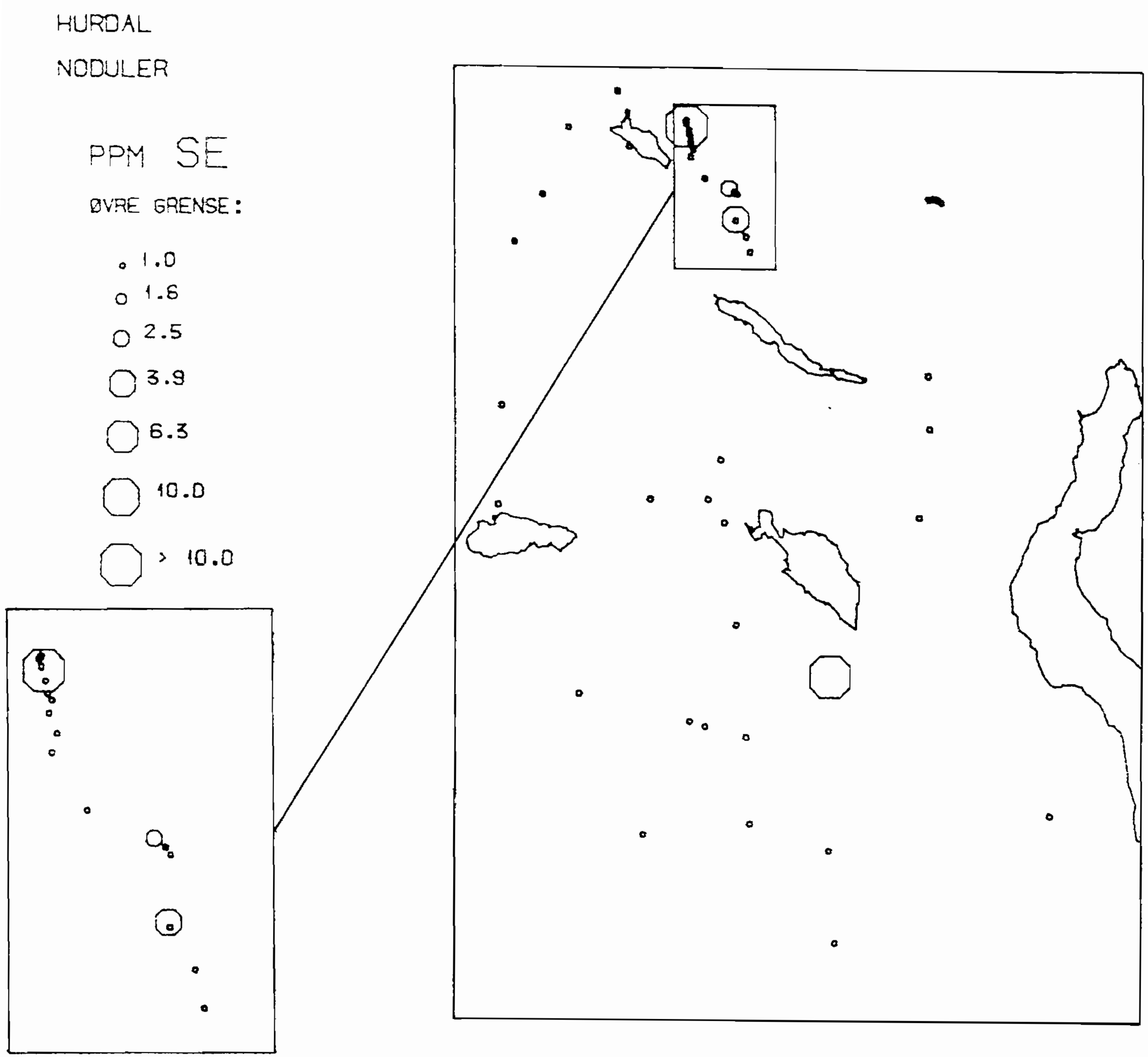
NGU-report 86.169. FIGURE 22.18



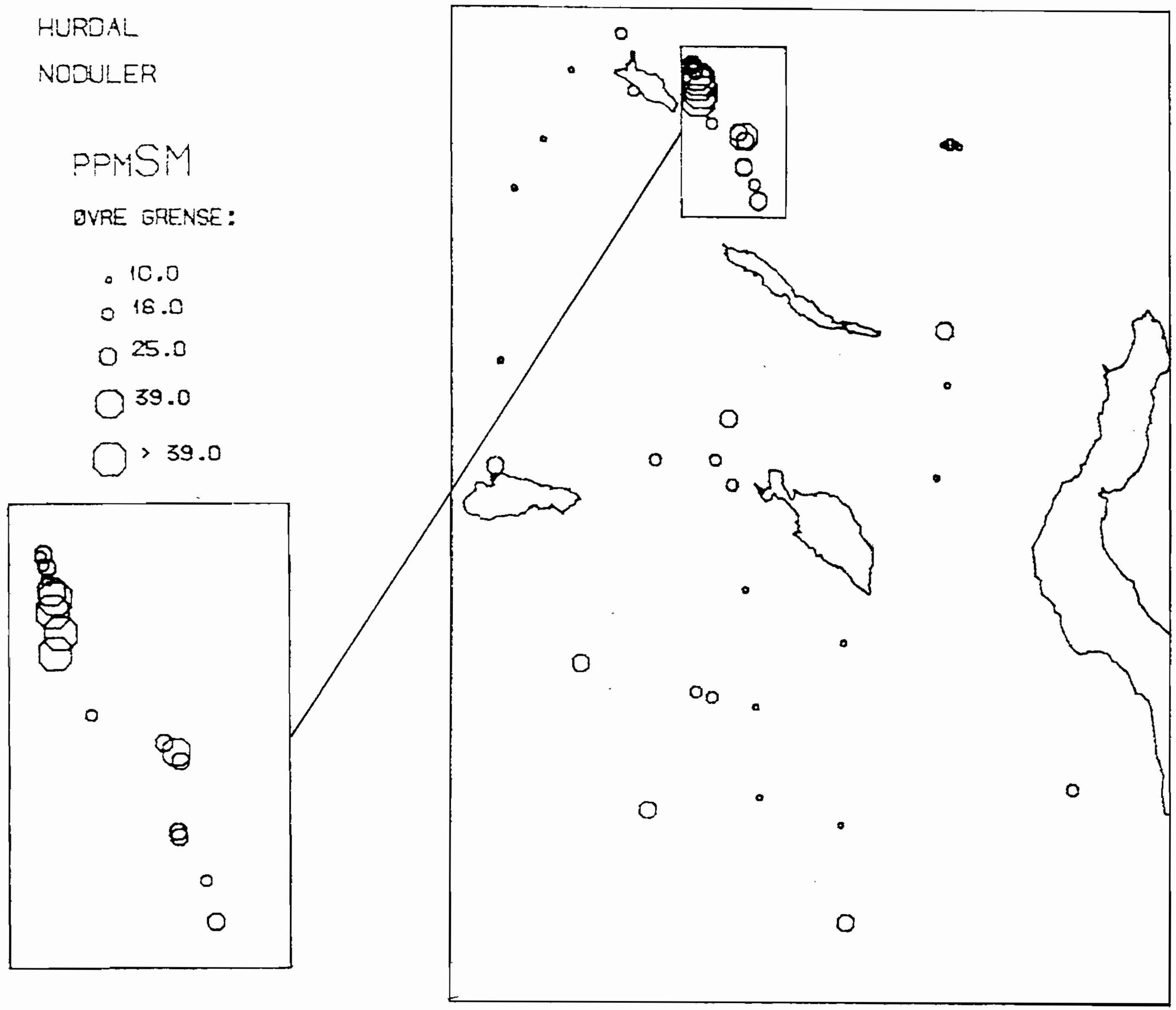
NGU-report 86.169. FIGURE 22.19



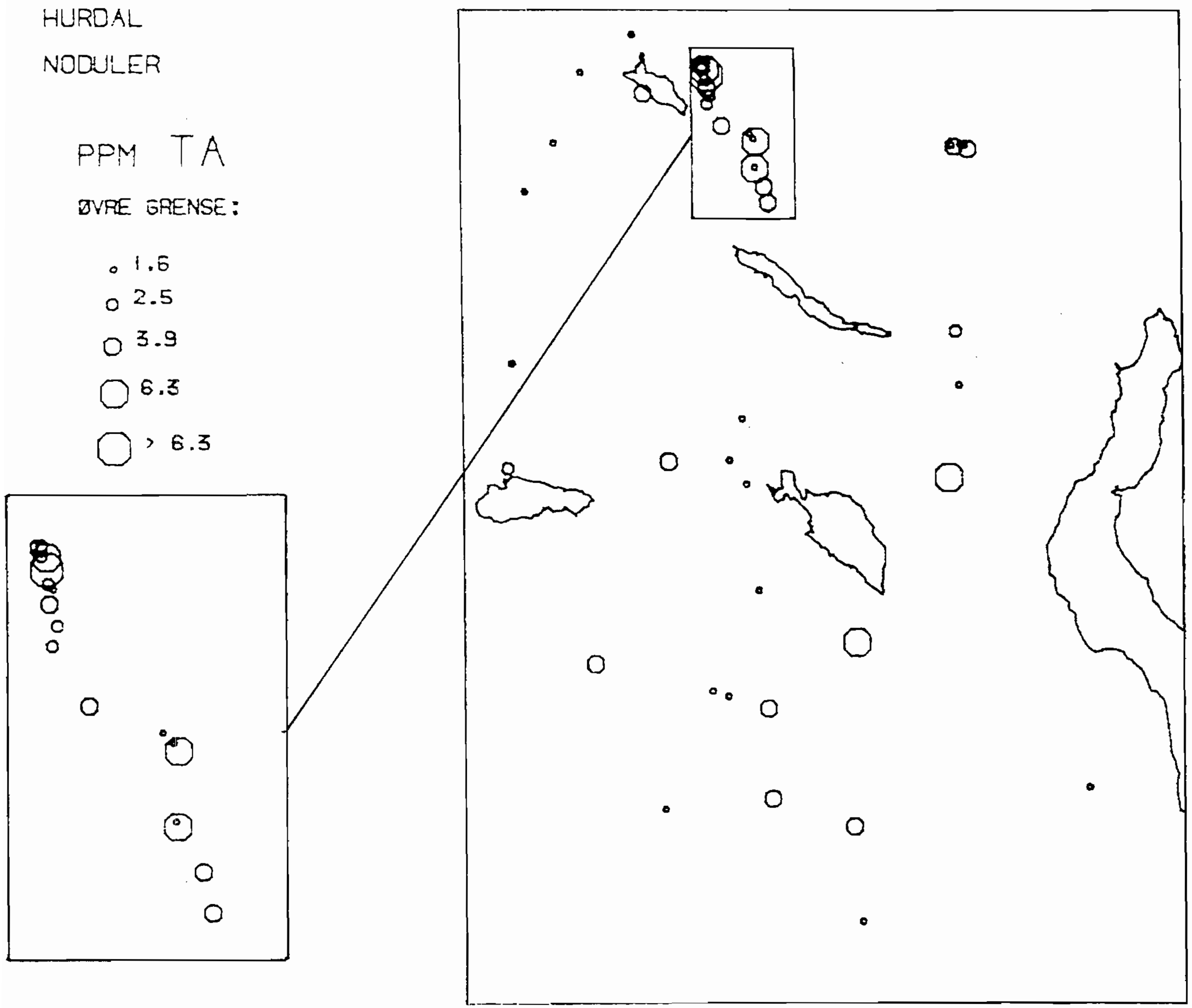
NGU-report 86.169. FIGURE 22.20



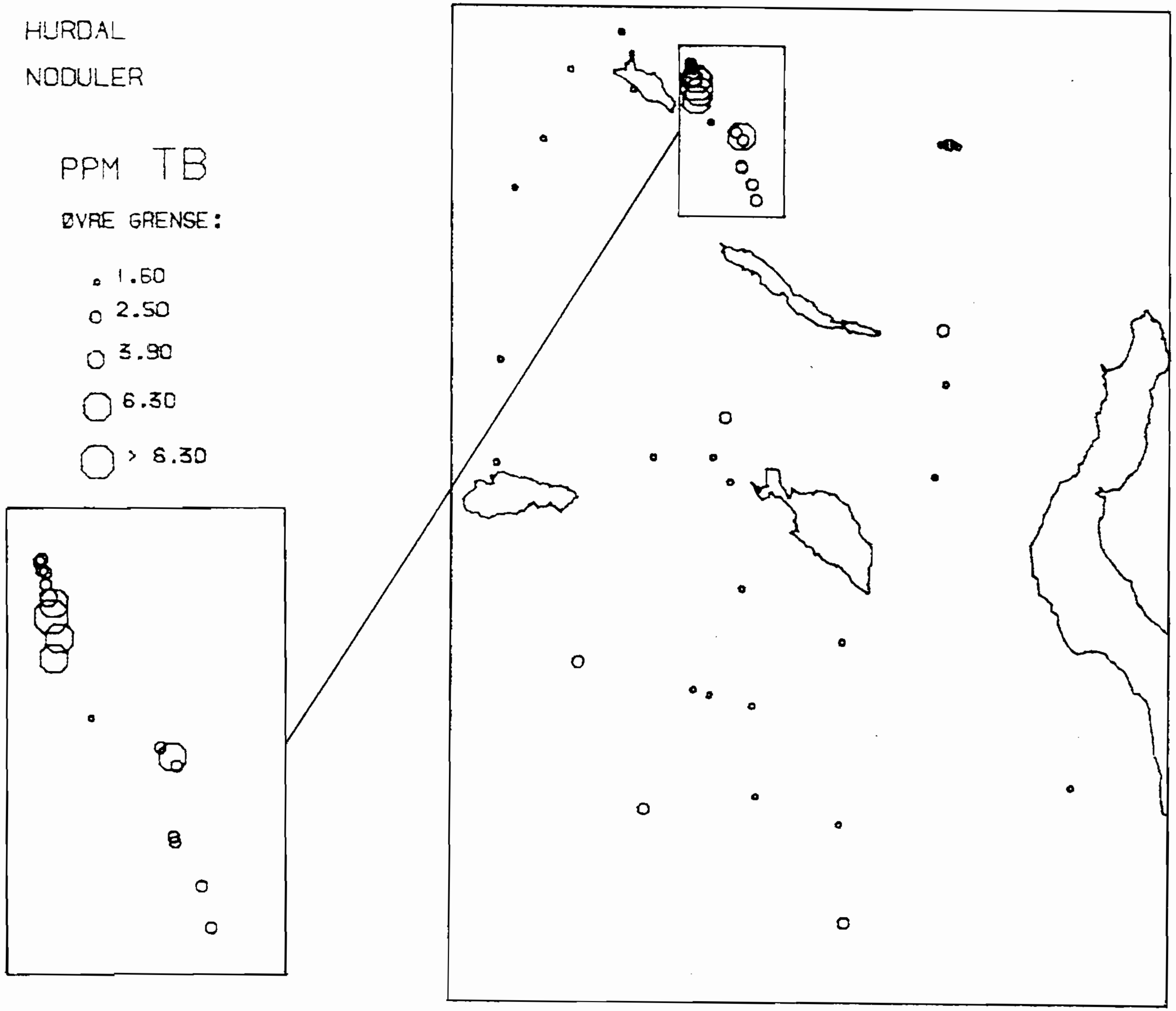
NGU-report 86.169. FIGURE 22.21



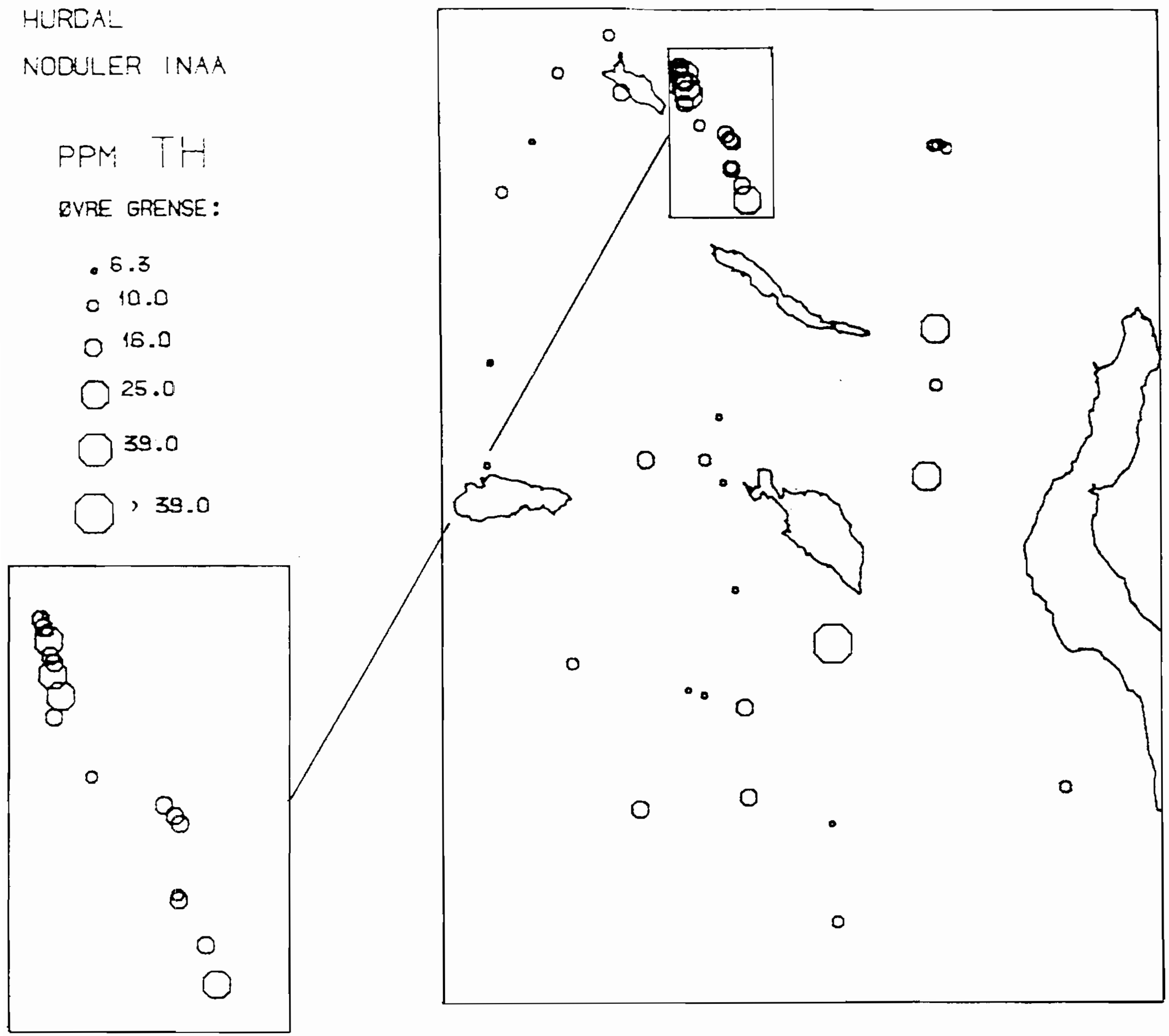
NGU-report 86.169. FIGURE 22.22



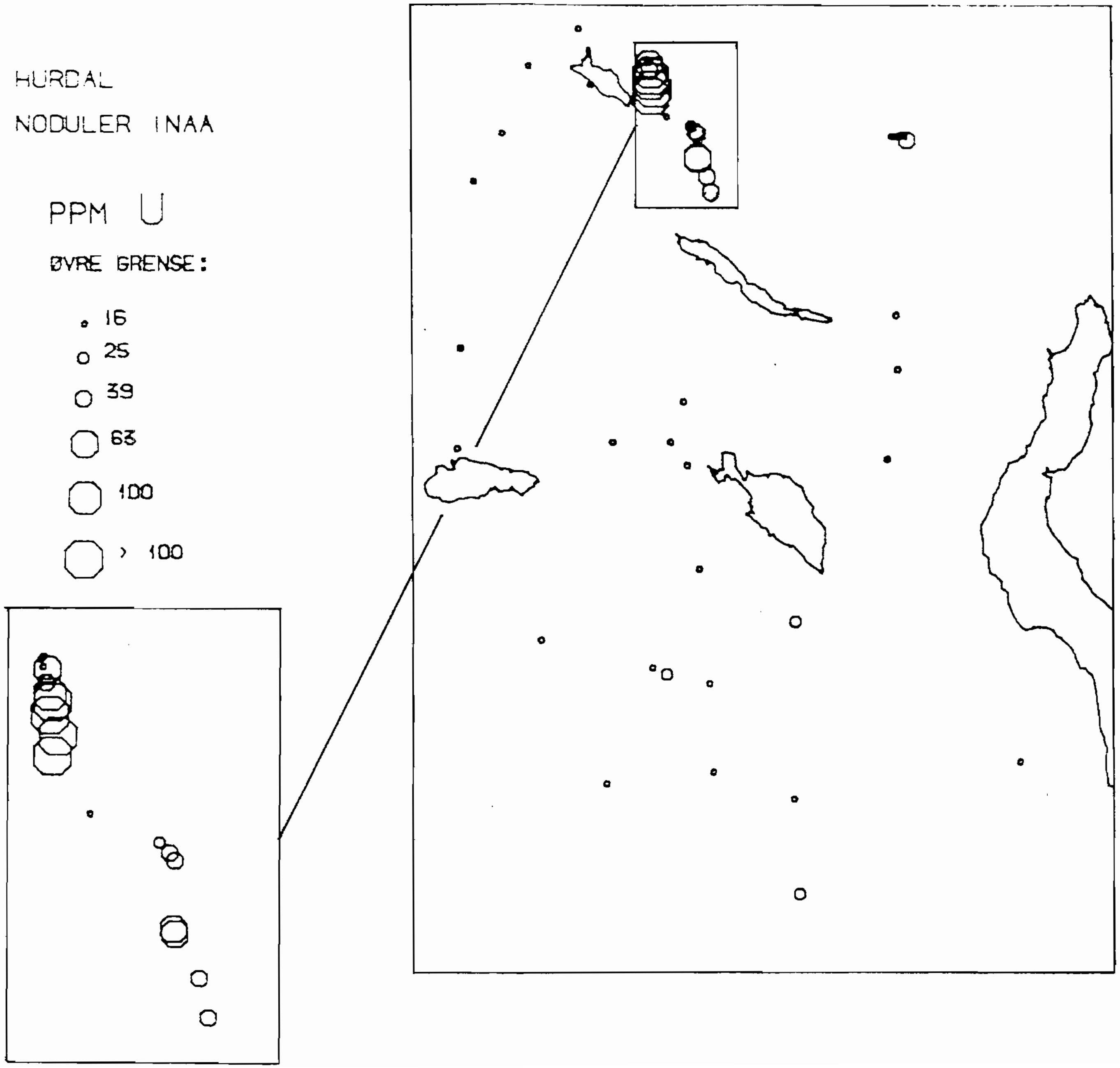
NGU-report 86.169. FIGURE 22.23



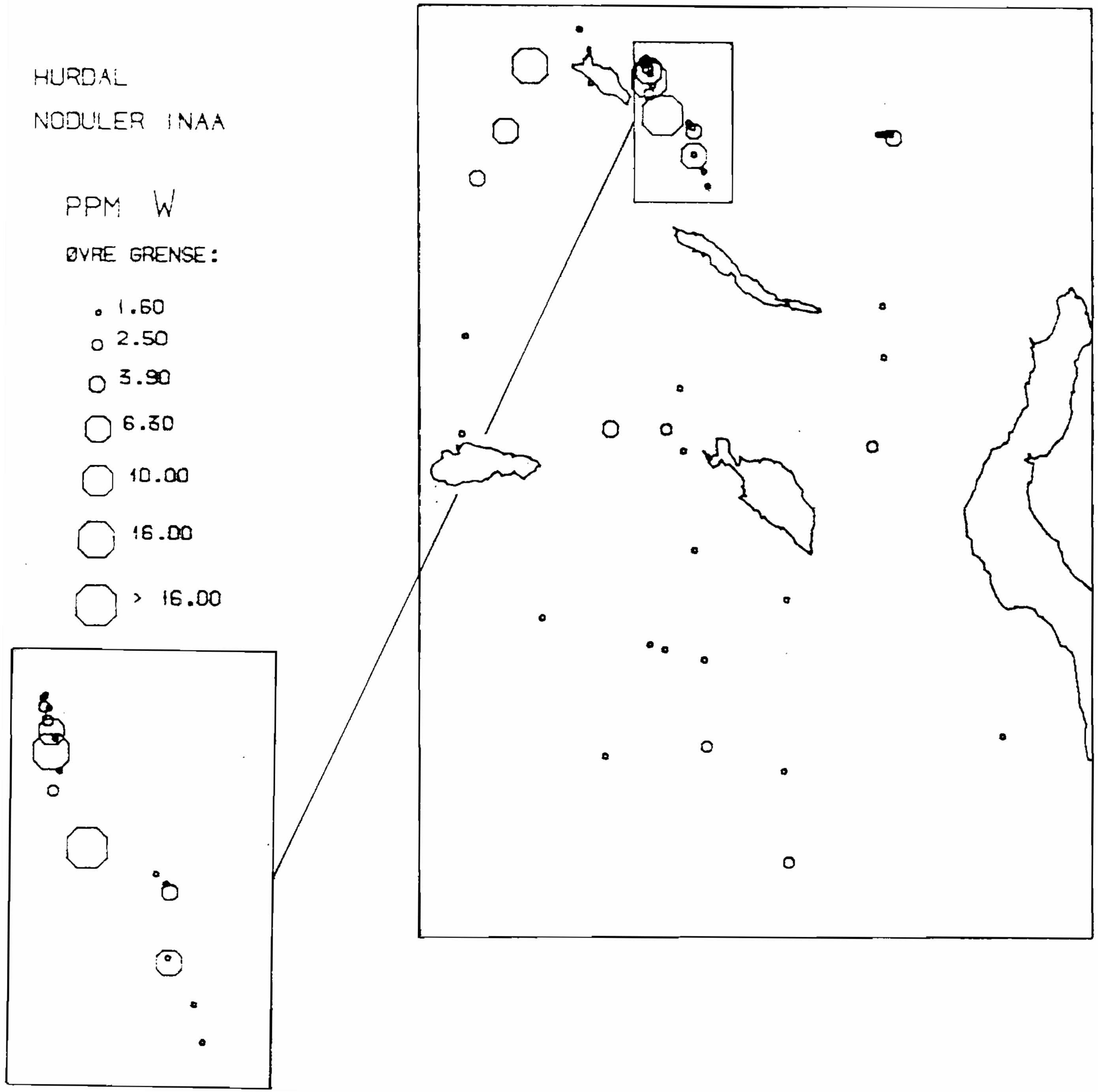
NGU-report 86.169. FIGURE 22.24



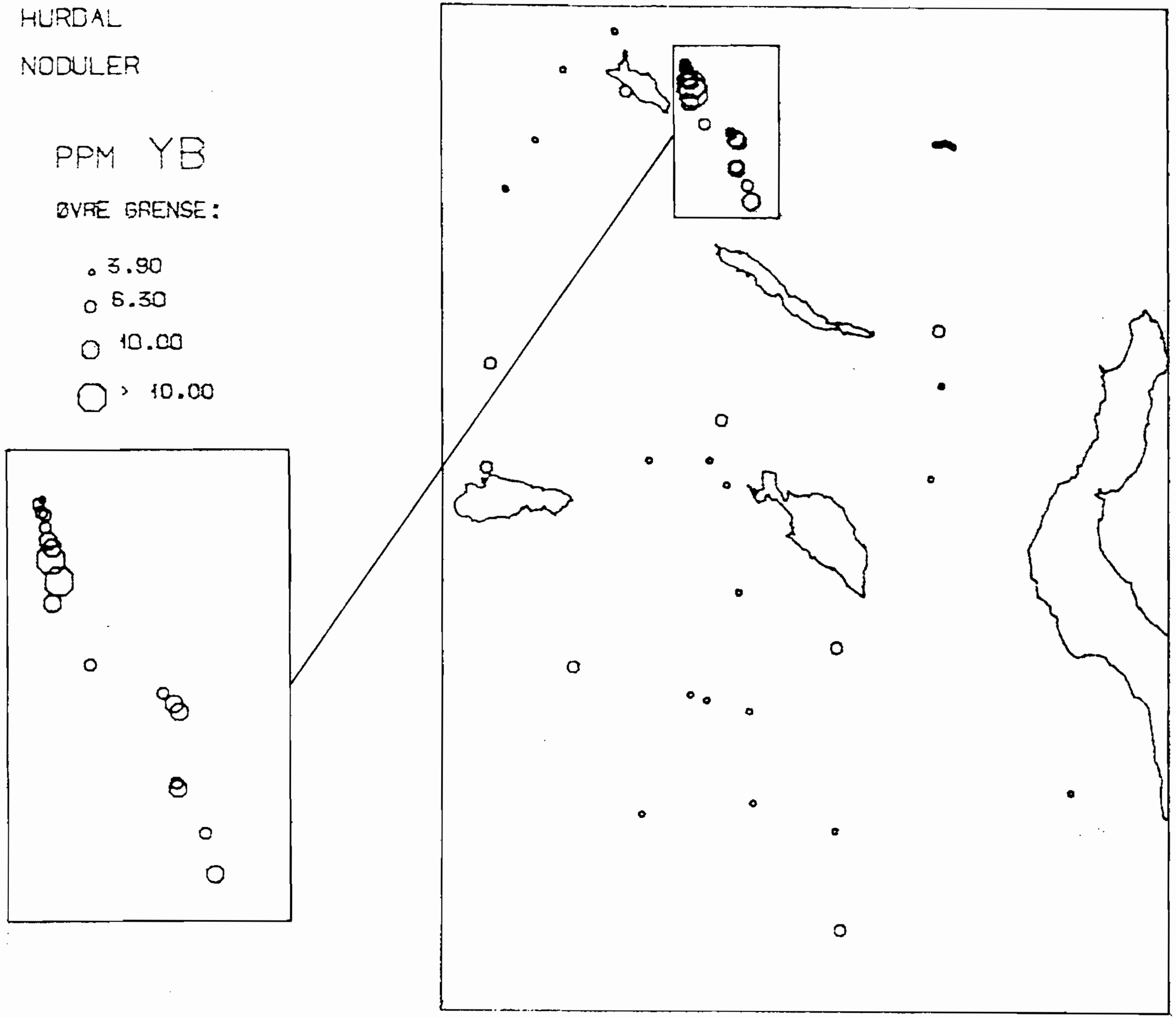
NGU-report 86.169. FIGURE 22.25



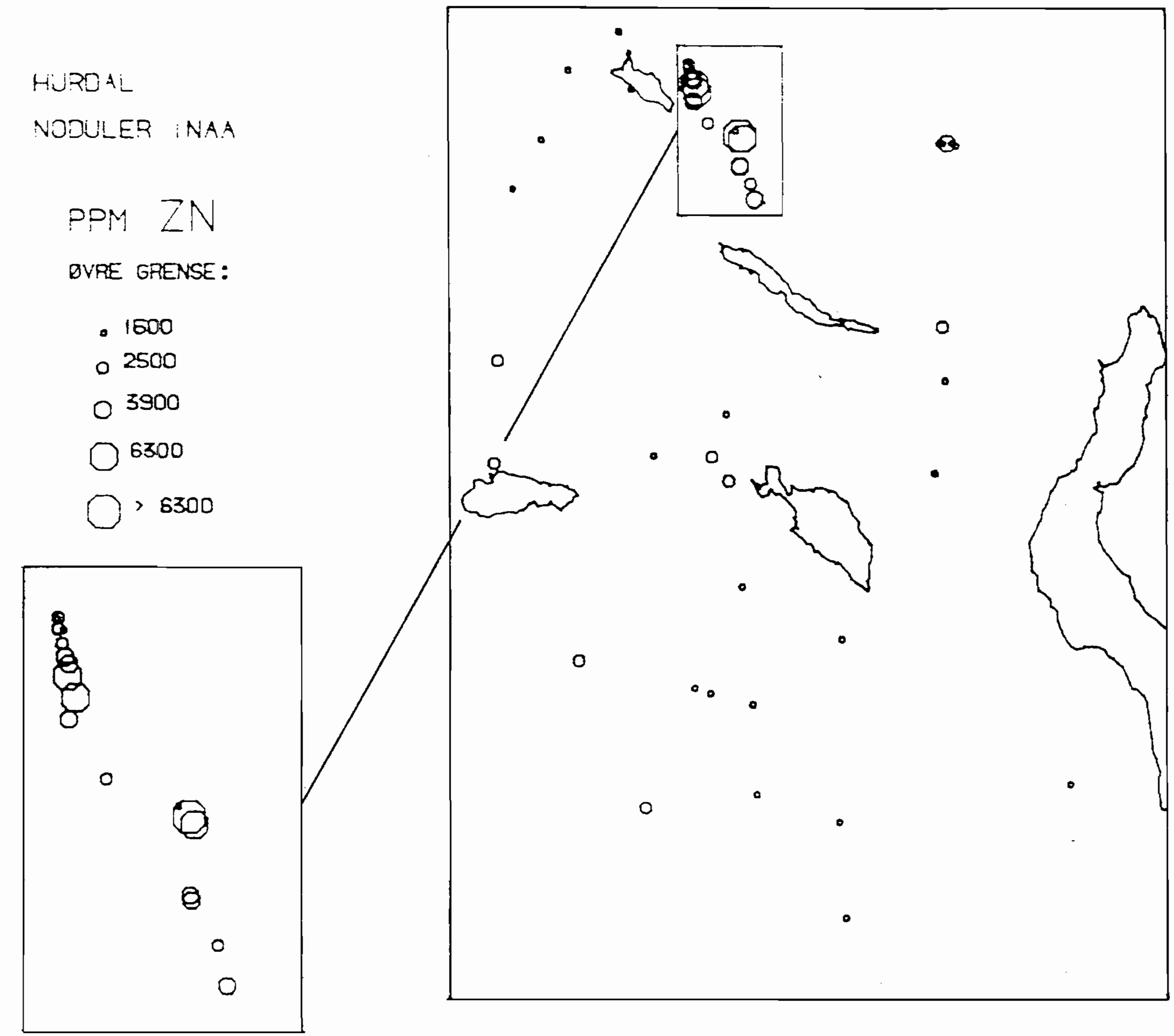
NGU-report 86.169. FIGURE 22.26



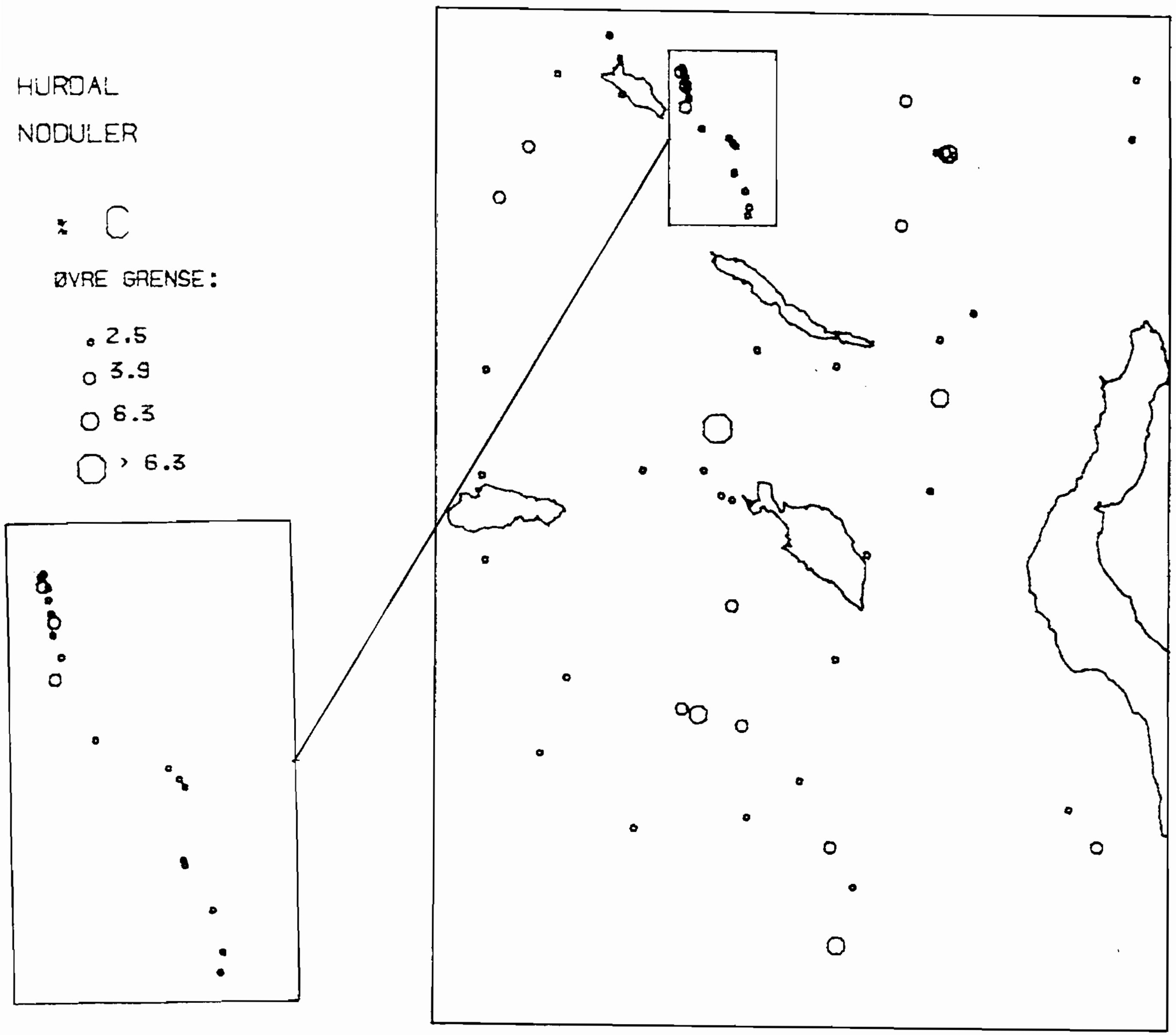
NGU-report 86.169. FIGURE 22.27



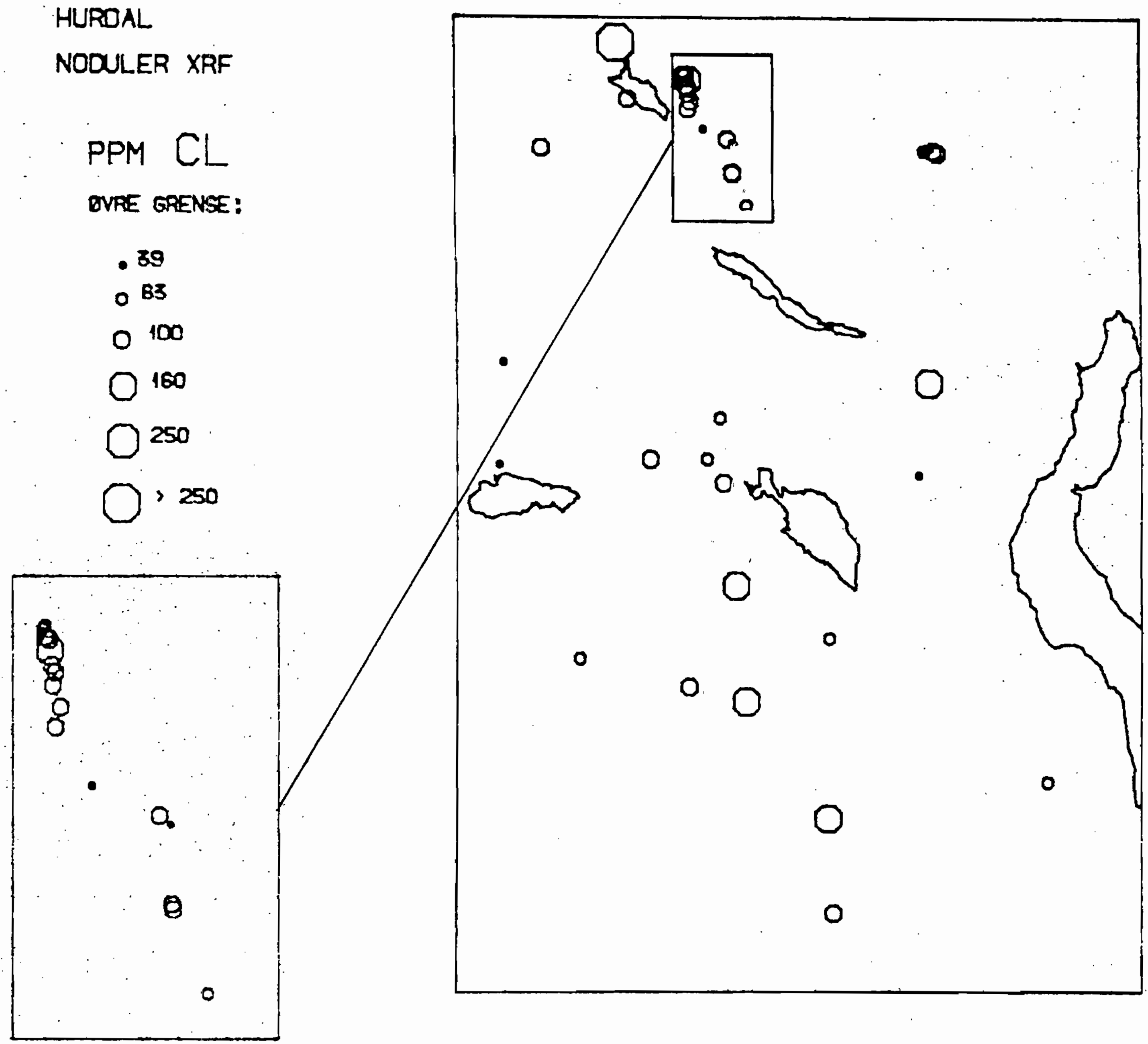
NGU-report 86.169. FIGURE 22.28



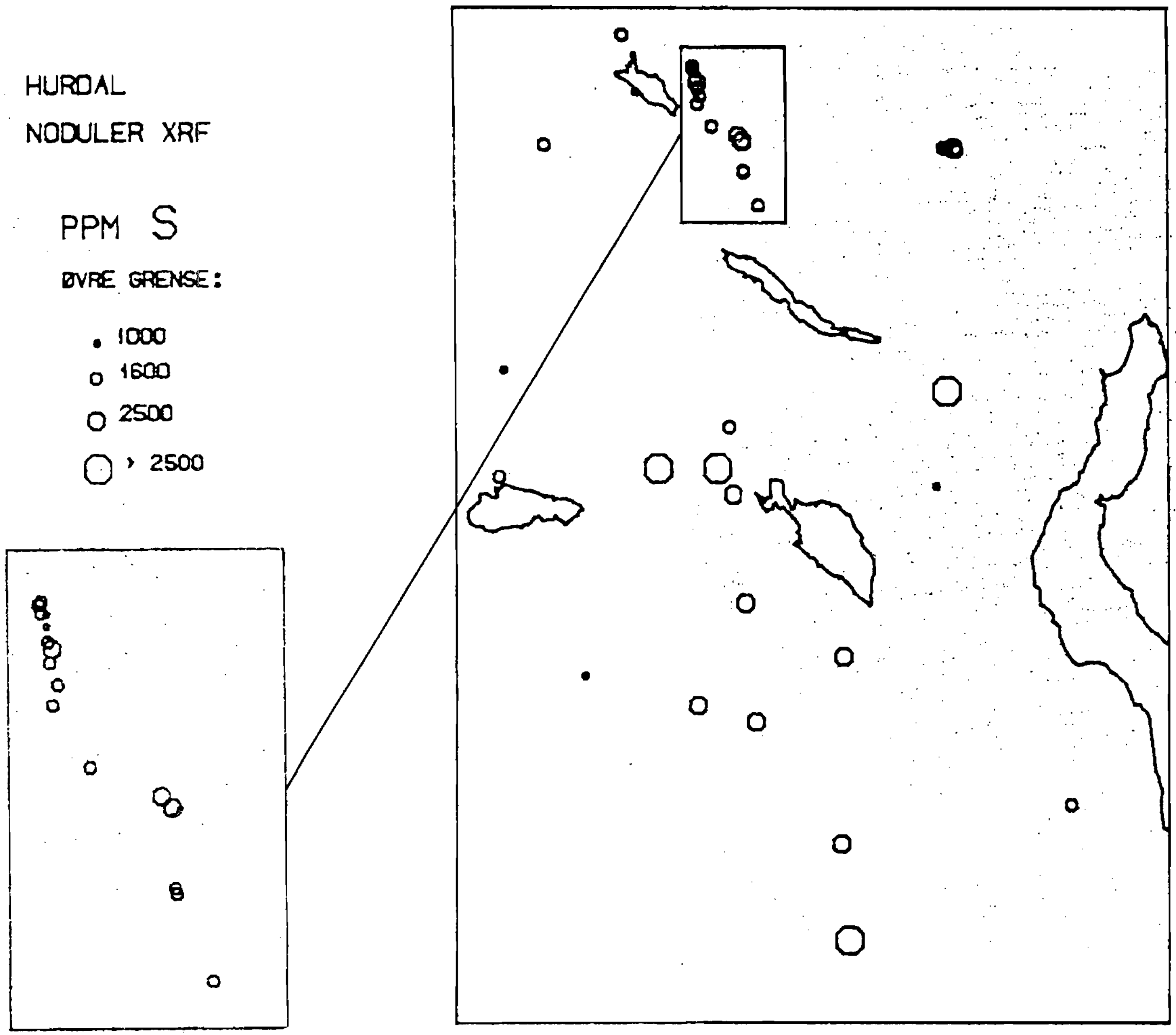
NGU-report 86.169. FIGURE 22.29



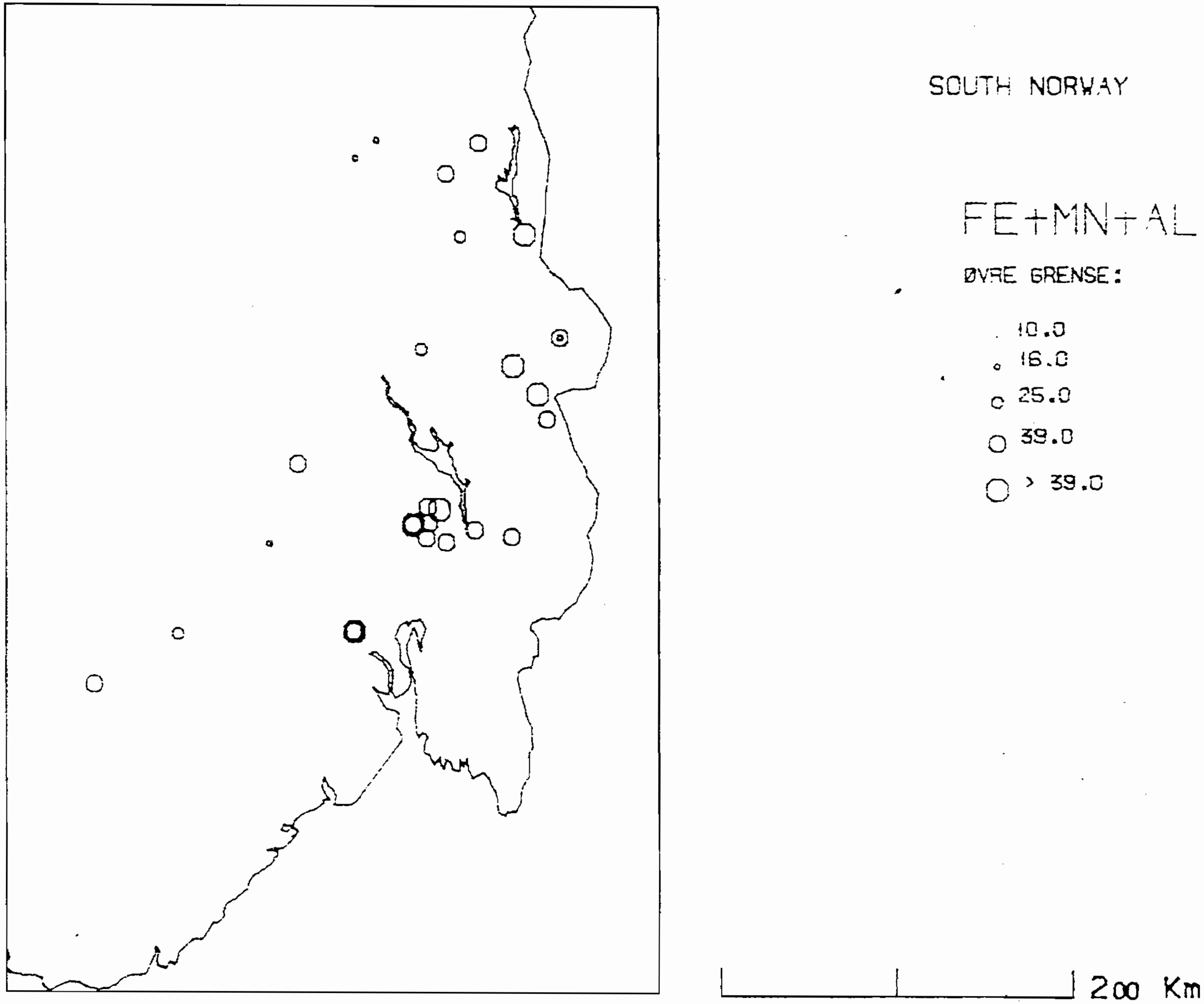
NGU-report 86.169. FIGURE 22.30



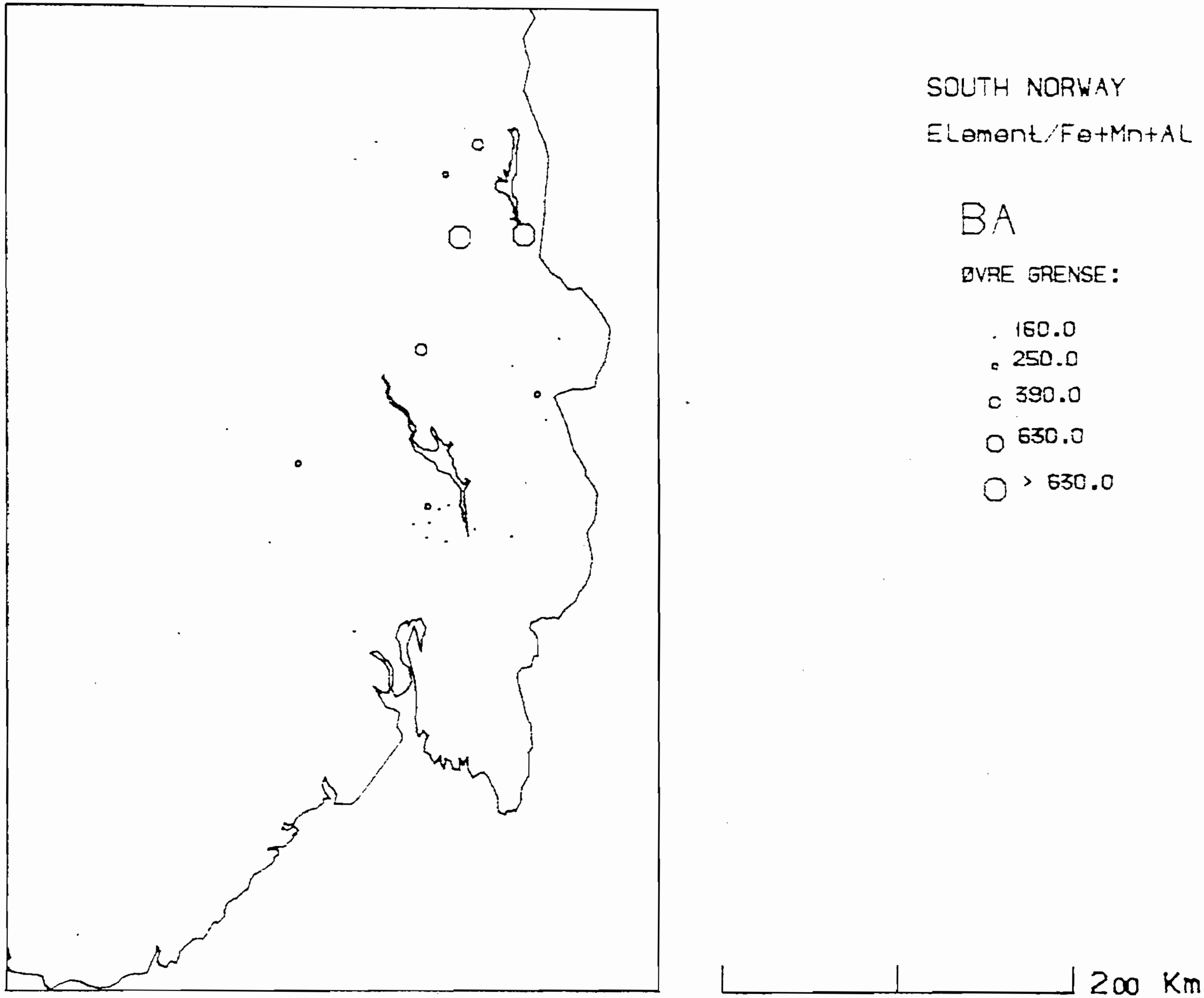
NGU-report 86.169. FIGURE 22.31



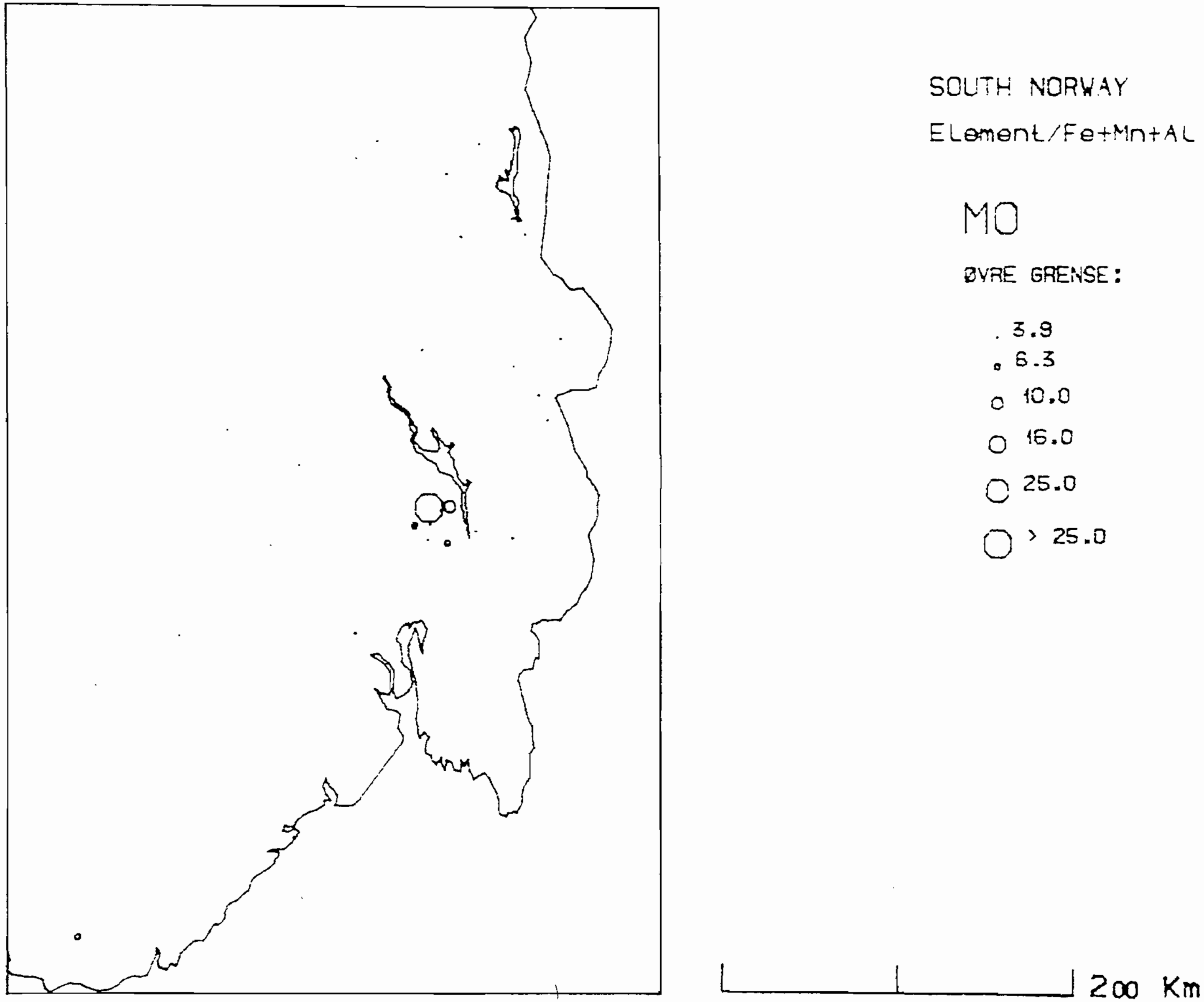
NGU-report 86.169. FIGURE 22.32



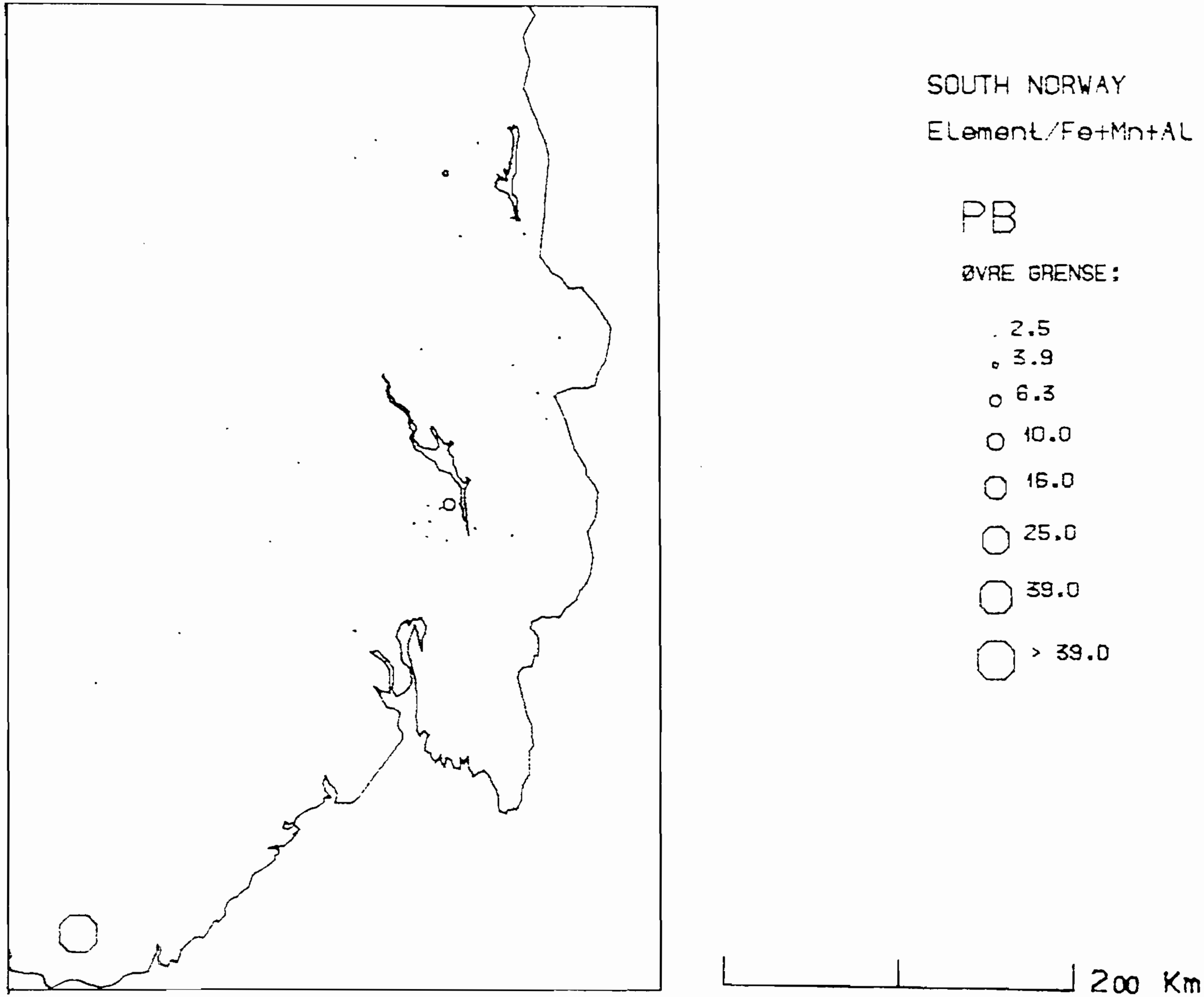
NGU-report 86.169. FIGURE 23.1



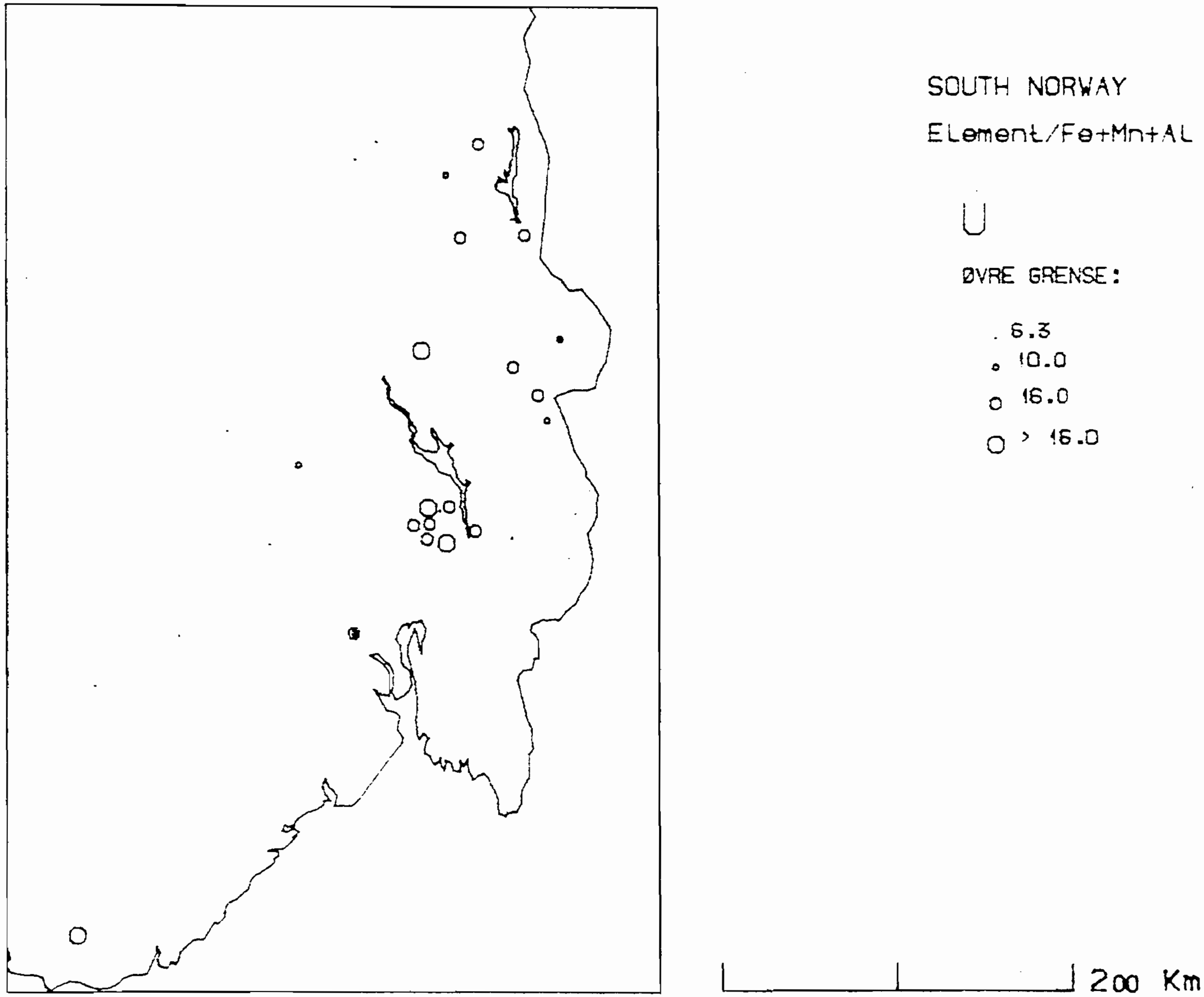
NGU-report 86.169. FIGURE 23.2



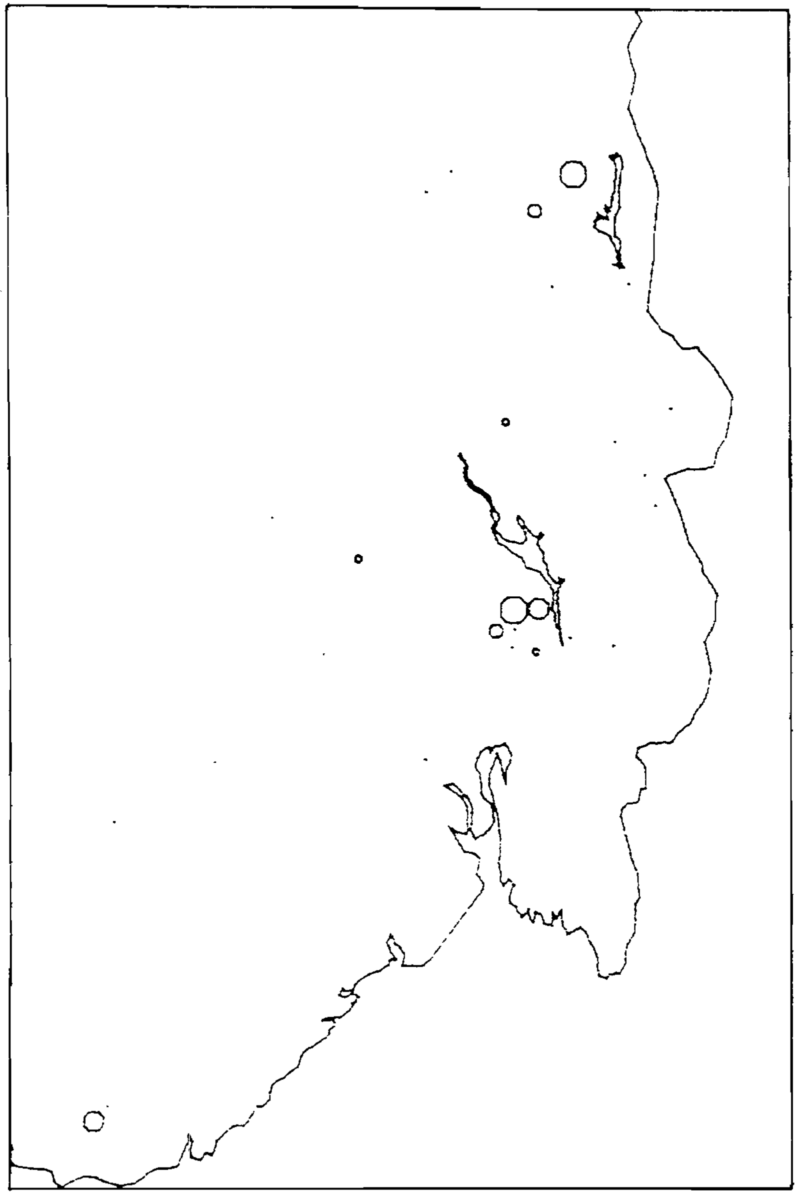
NGU-report 86.169. FIGURE 23.3



NGU-report 86.169. FIGURE 23.4



NGU-report 86.169. FIGURE 23.5



SOUTH NORWAY

Element/Fe+Mn+AL

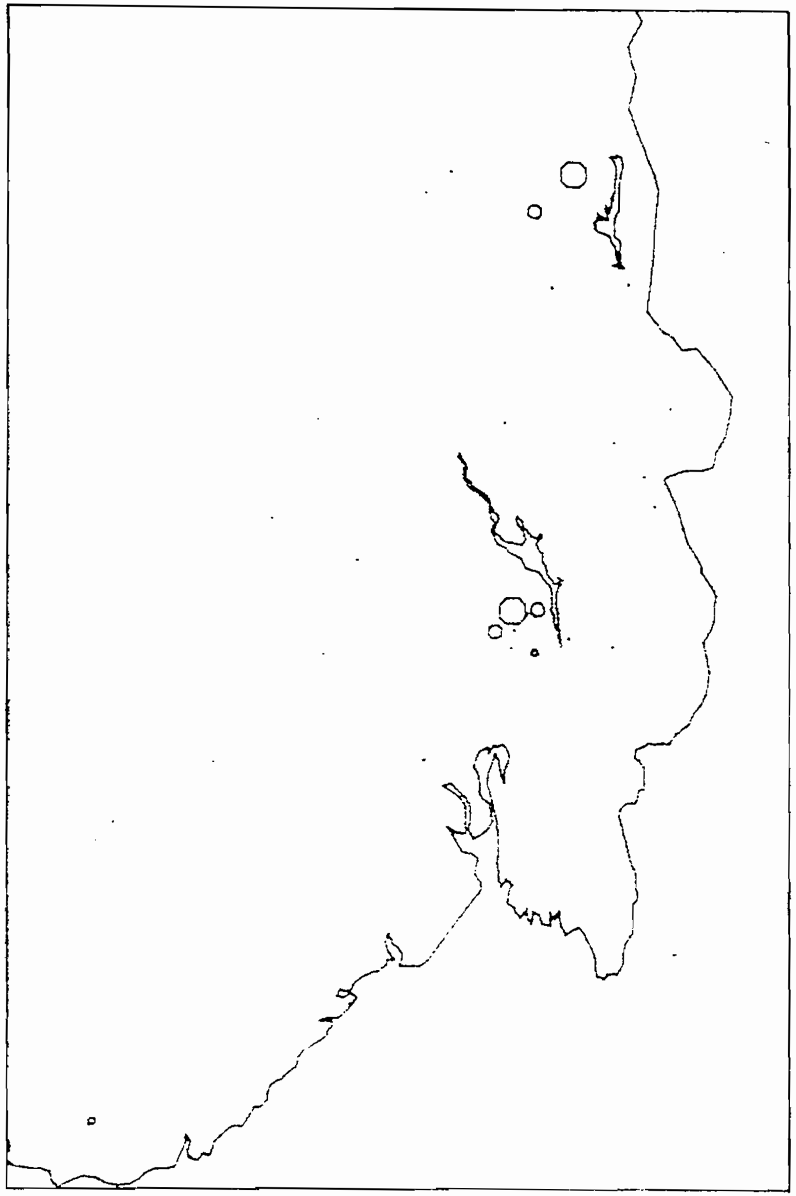
W

ØVRE GRENSE:

.63
1.00
1.60
2.50
> 2.50

200 Km

NGU-report 86.169. FIGURE 23.6



SOUTH NORWAY

Element/Fe+Mn+AL

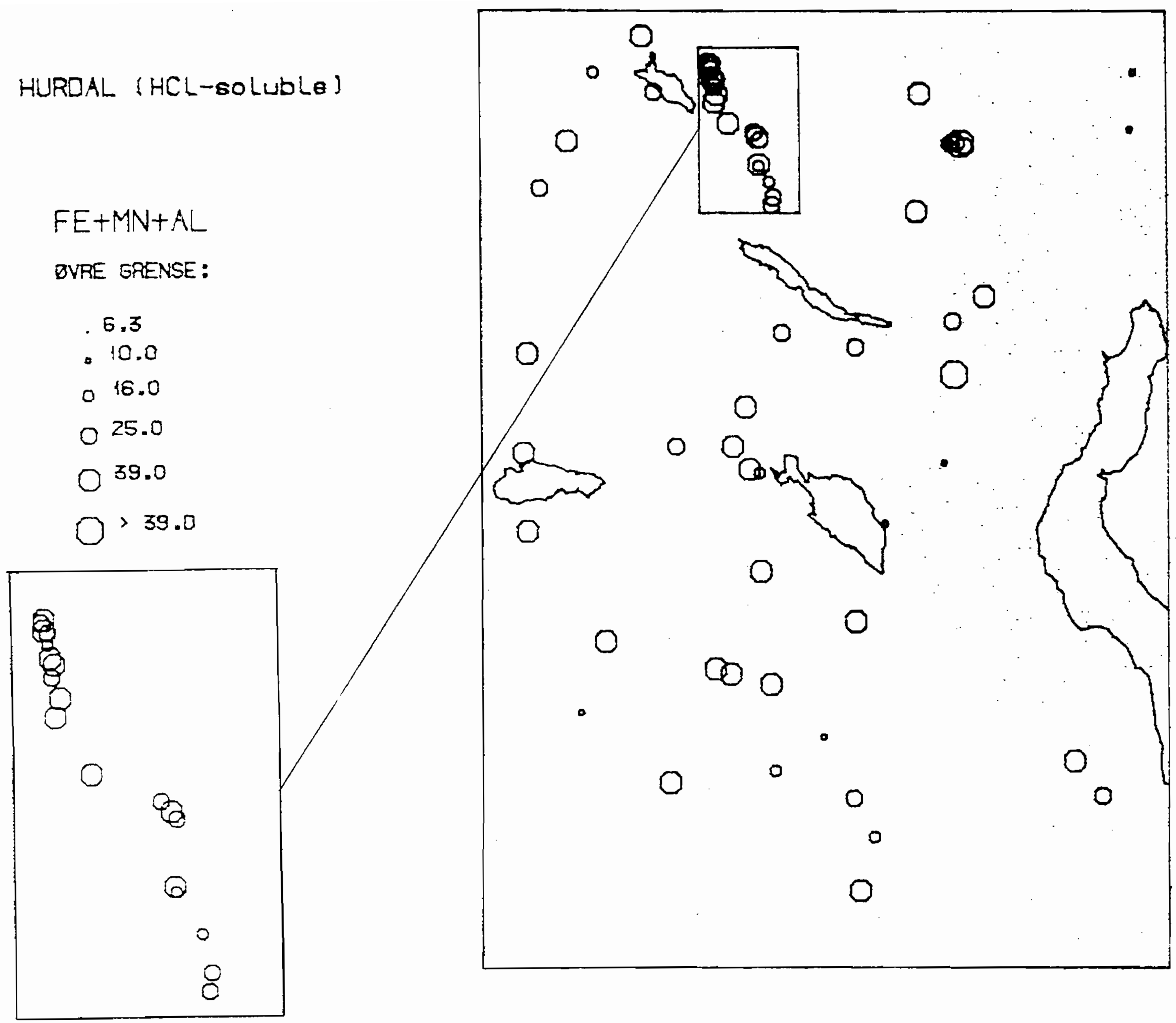
ZN

ØVRE GRENSE:

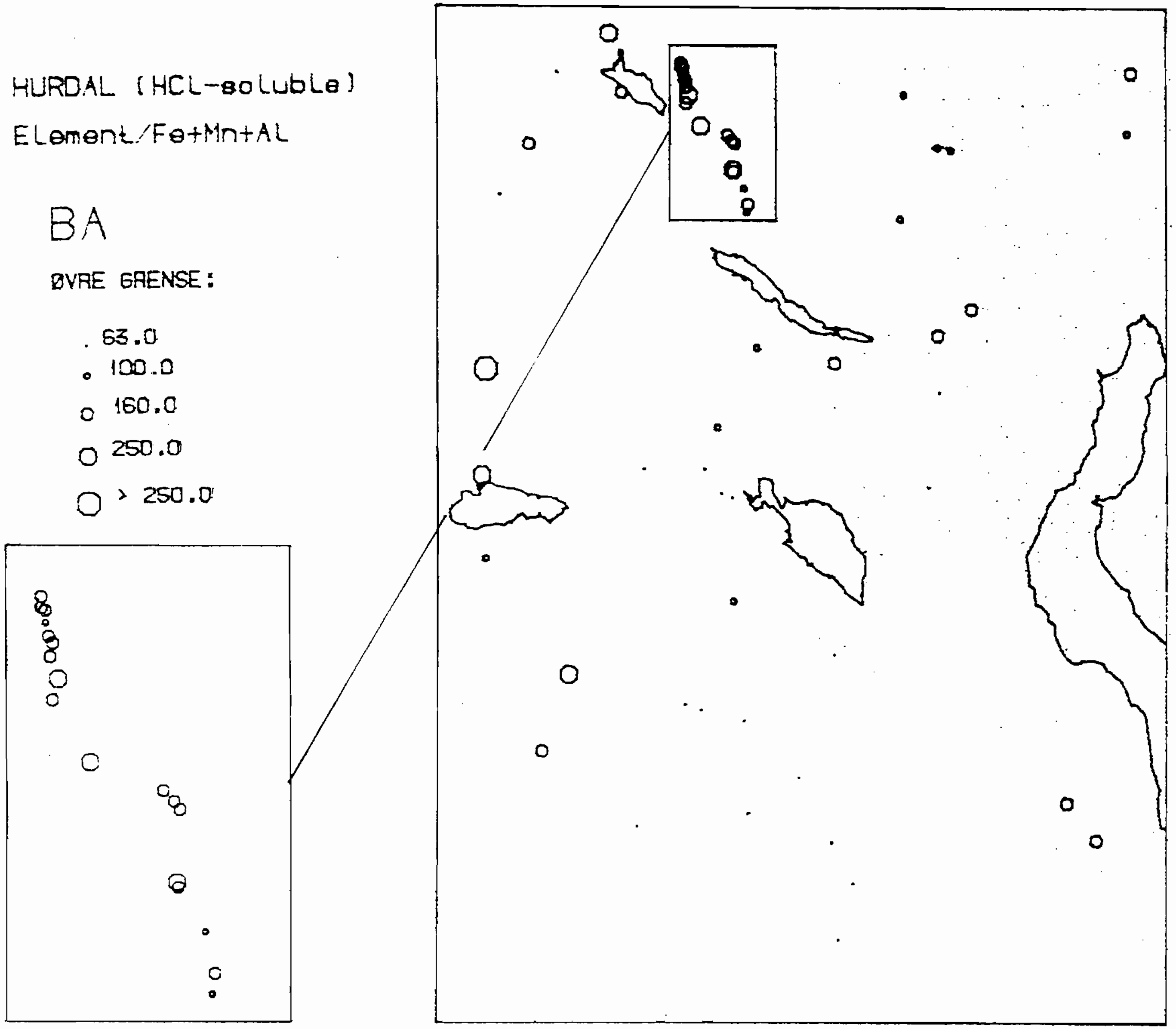
. 59.0
o 63.0
o 100.0
O 160.0
O > 160.0

200 Km

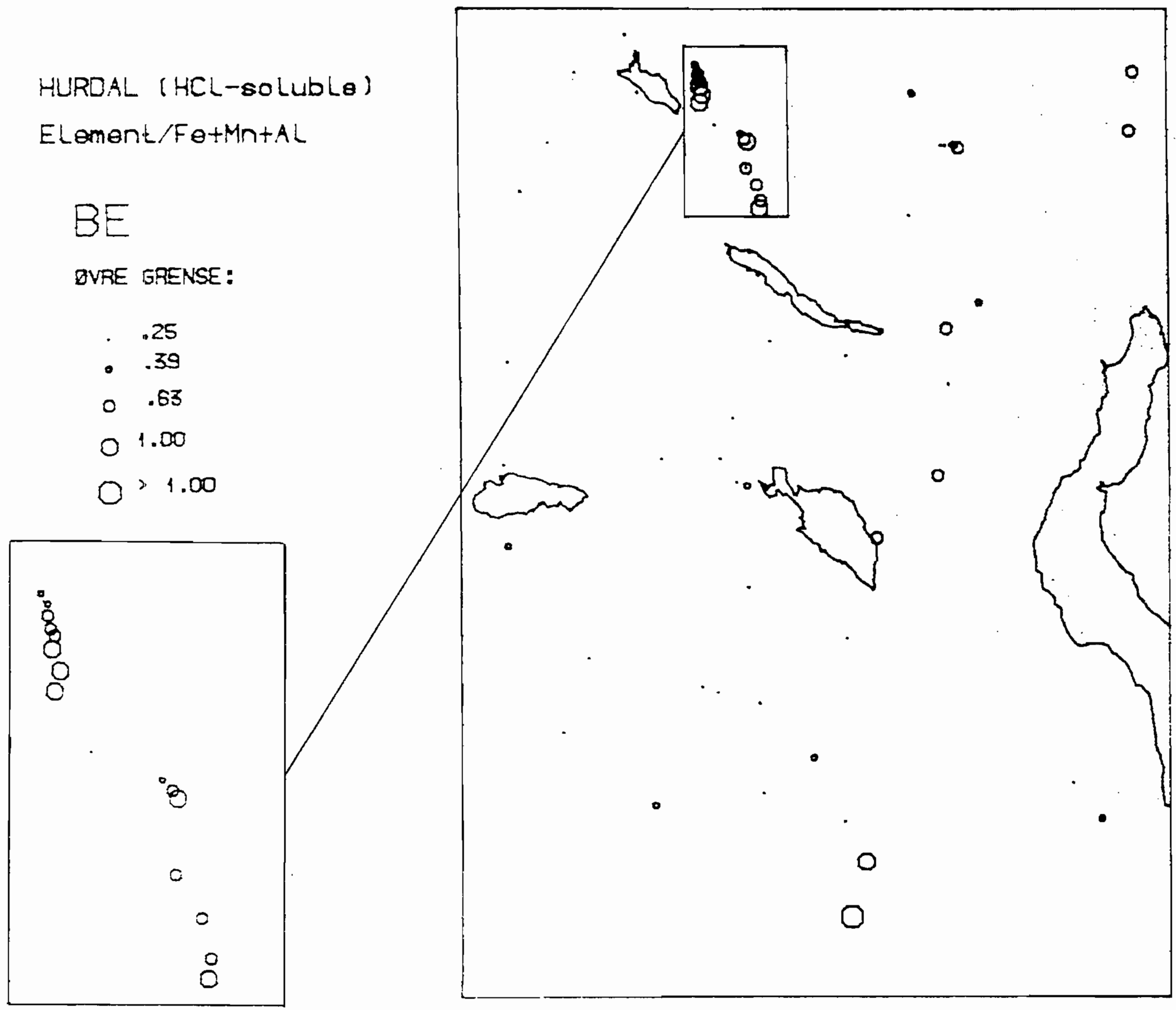
NGU-report 86.169. FIGURE 23.7



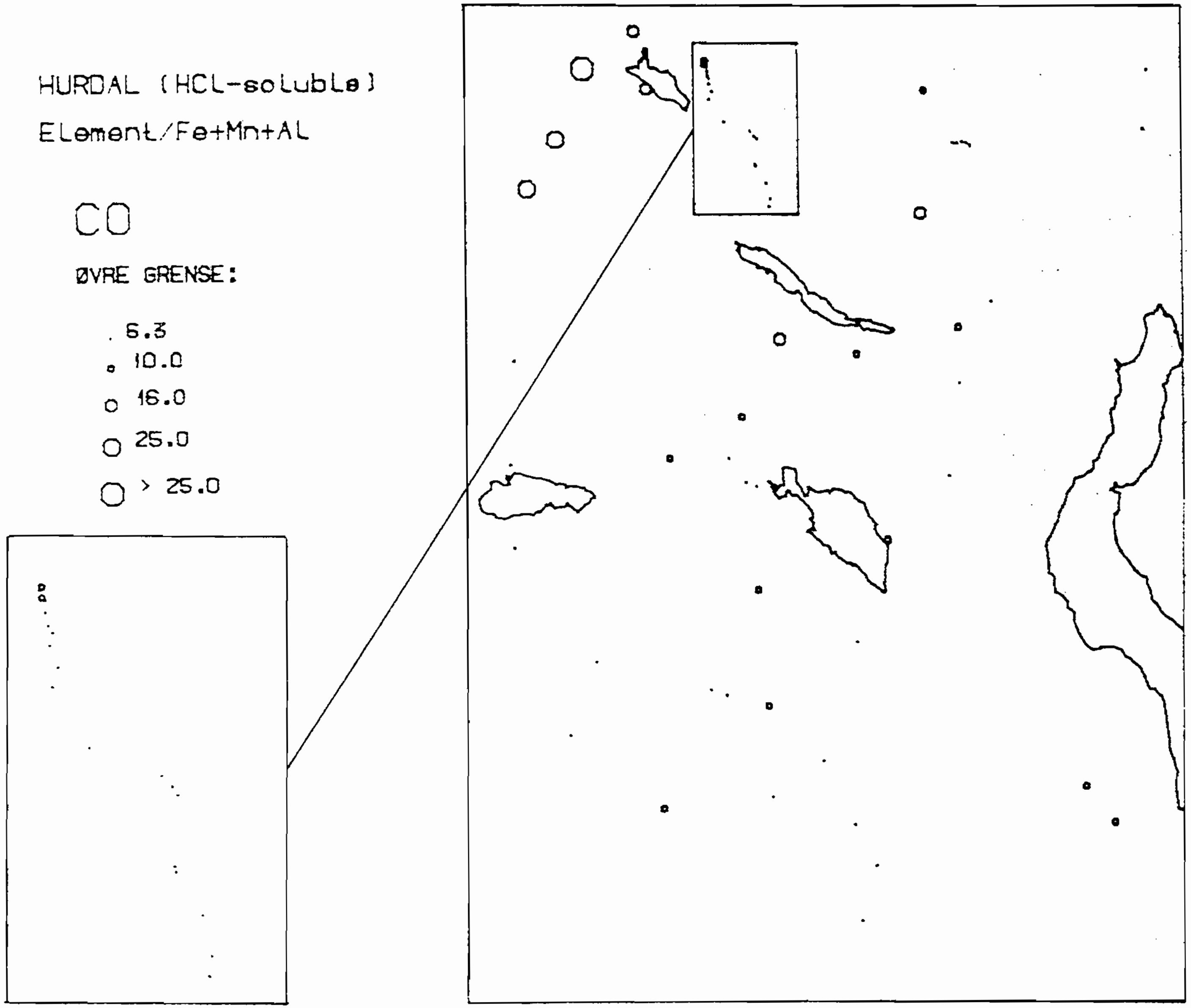
NGU-report 86.169. FIGURE 24.1



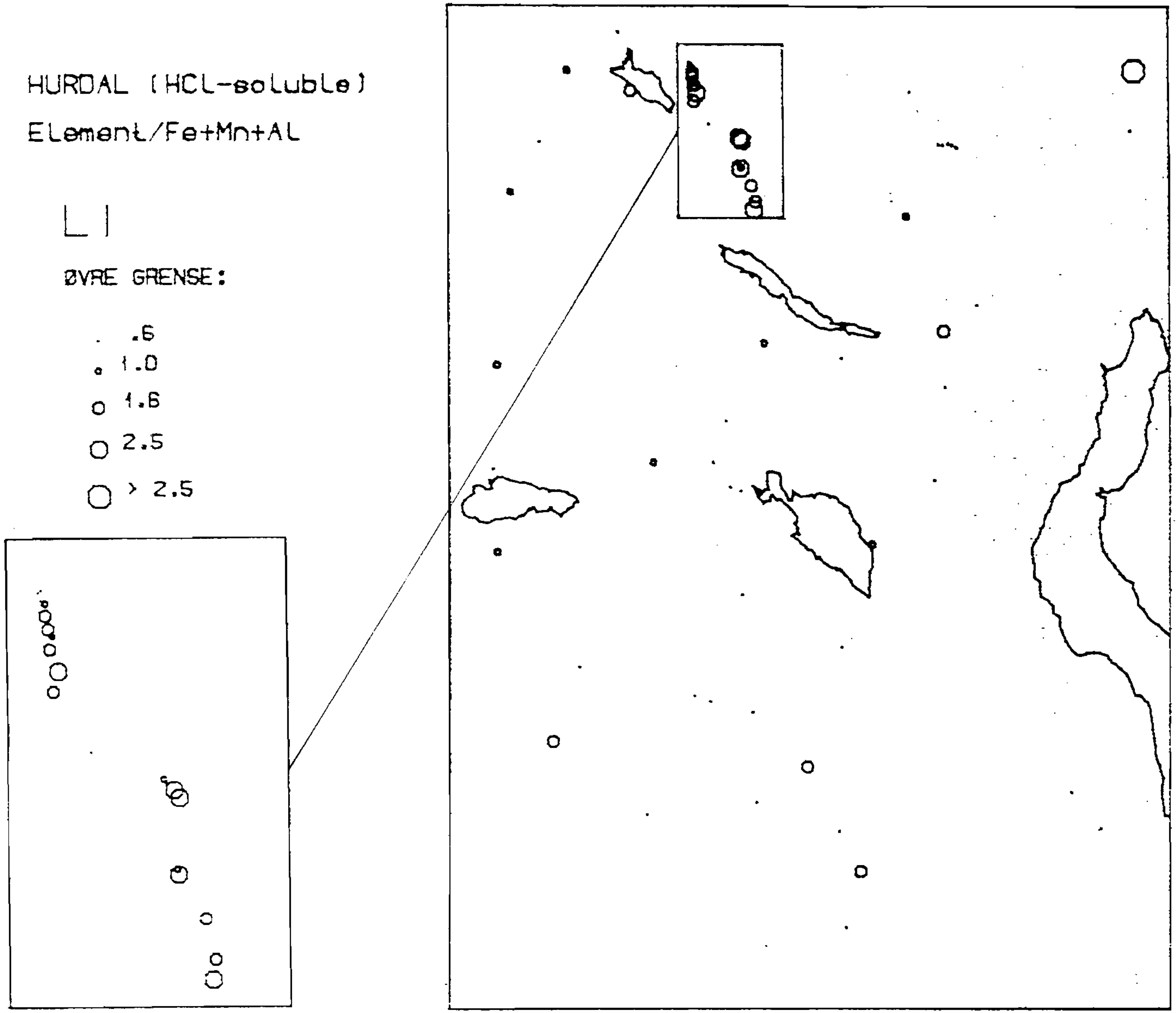
NGU-report 86.169. FIGURE 24.2



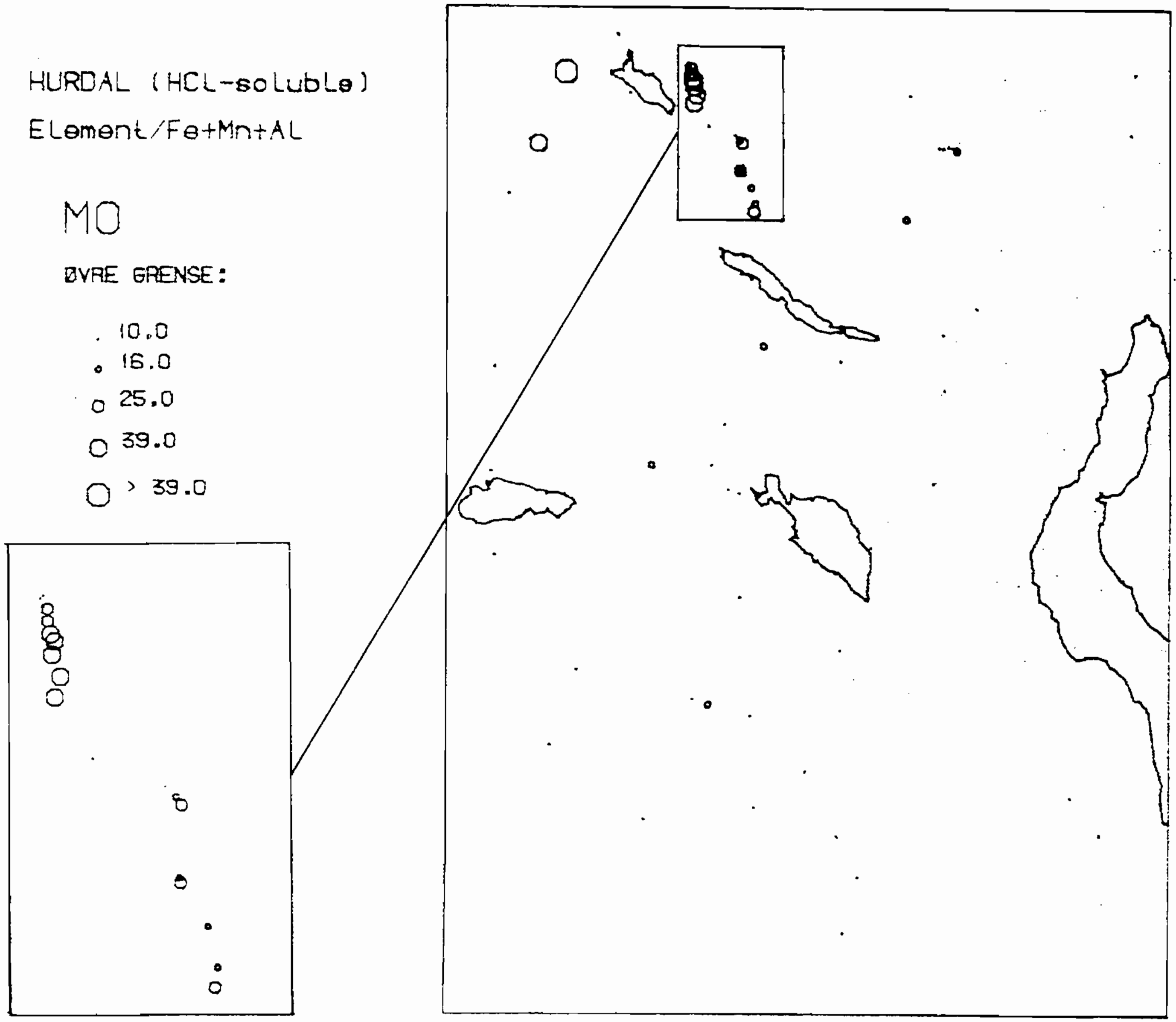
NGU-report 86.169. FIGURE 24.3



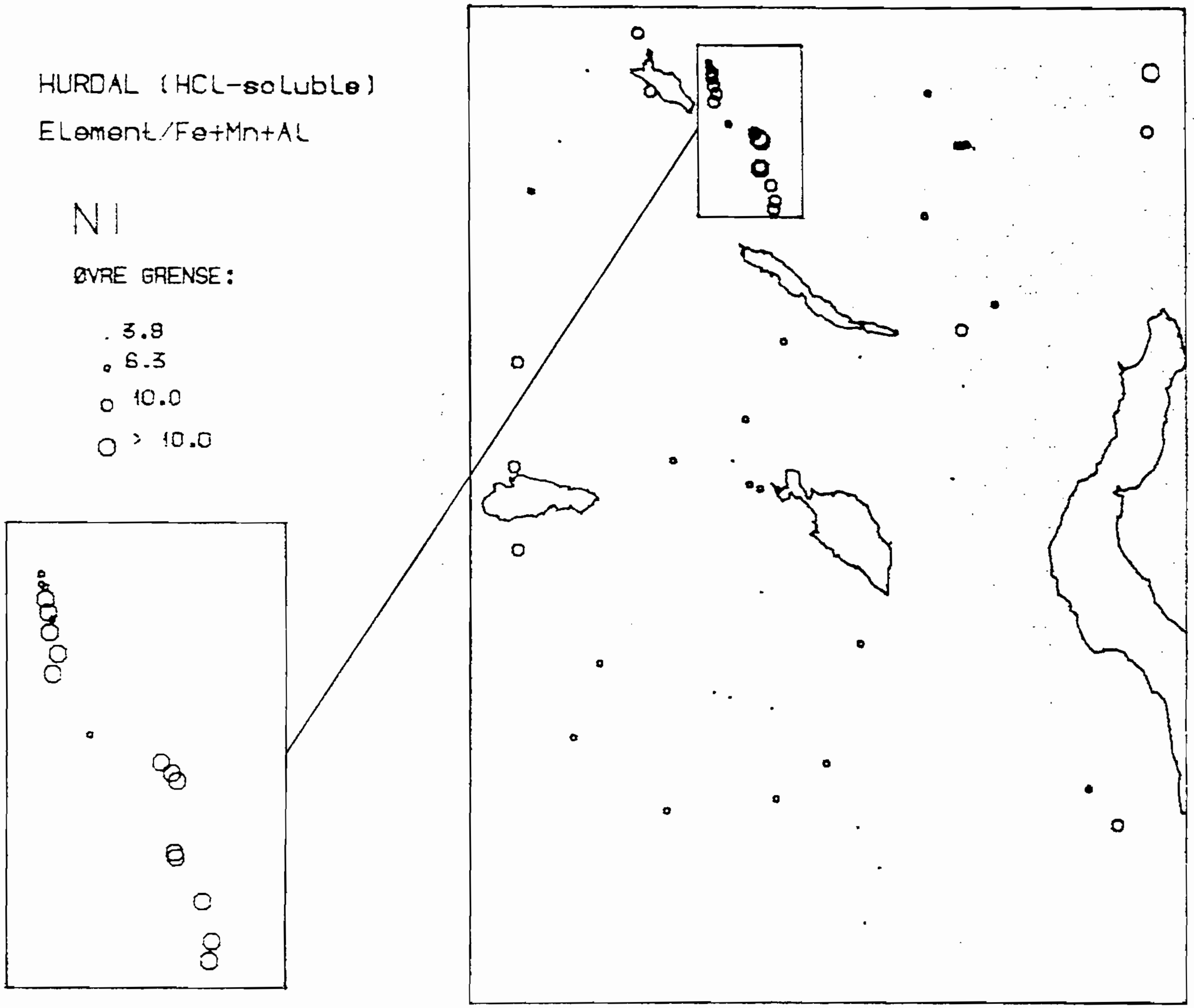
NGU-report 86.169. FIGURE 24.4



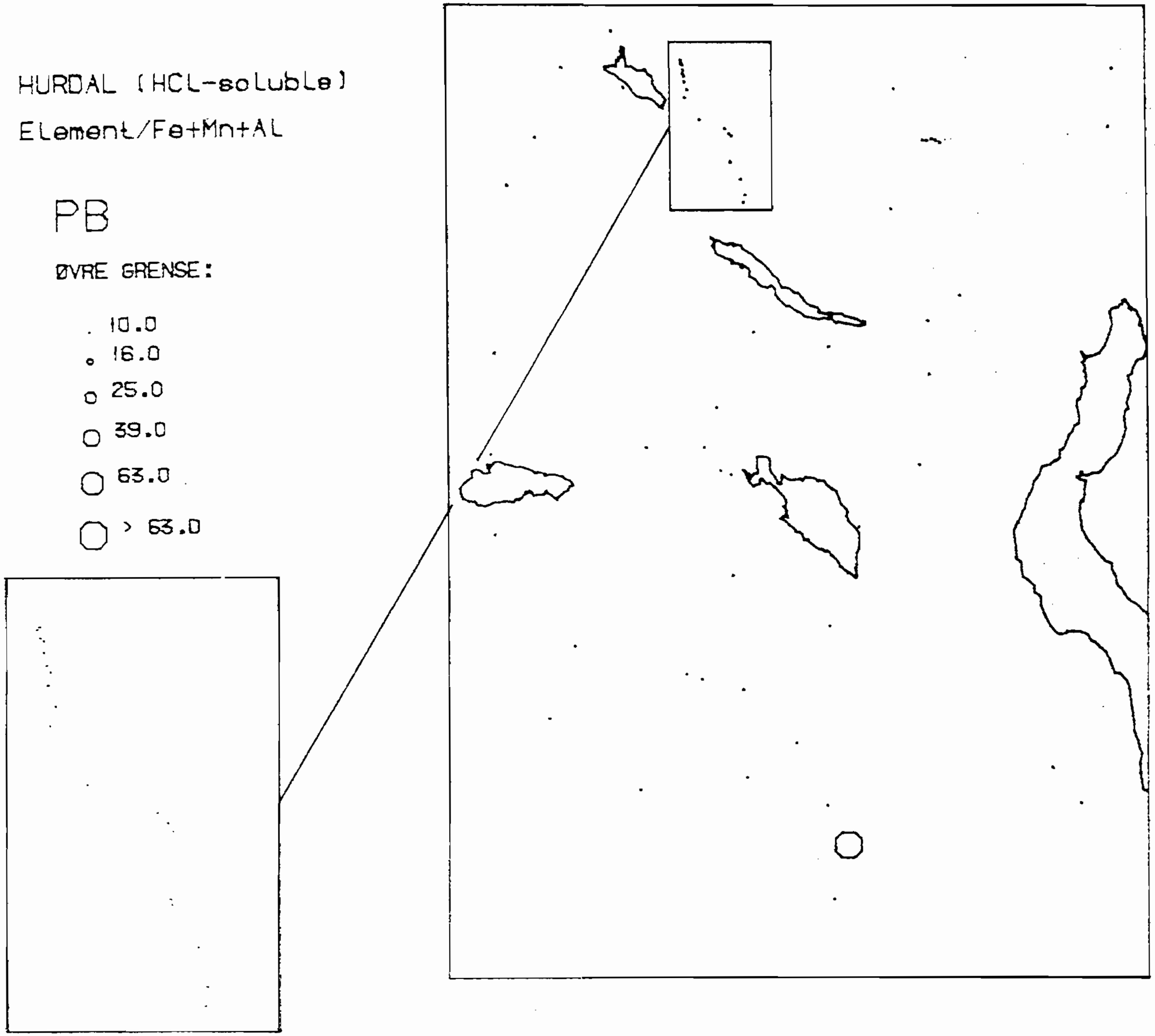
NGU-report 86.169. FIGURE 24.5



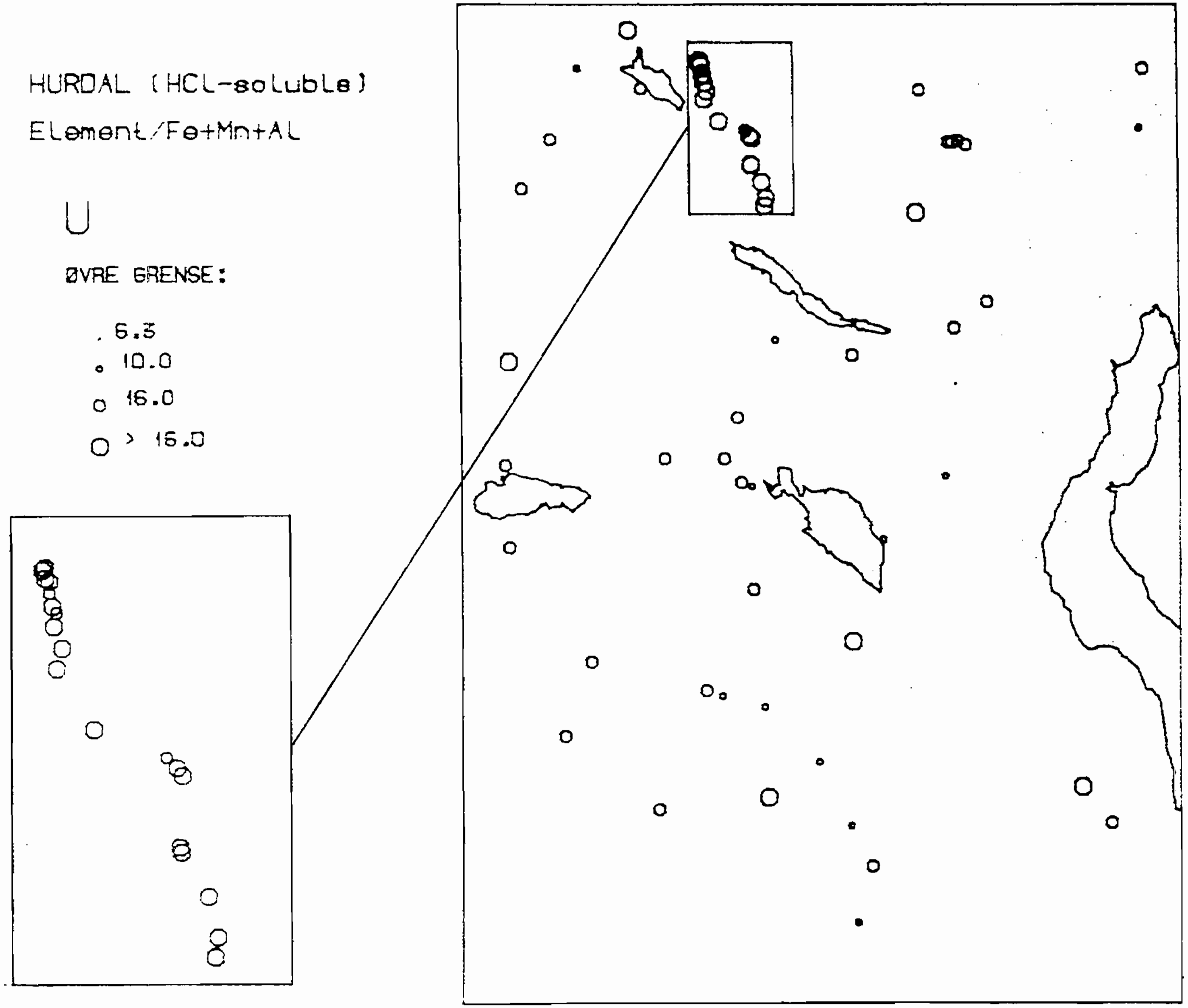
NGU-report 86.169. FIGURE 24.6



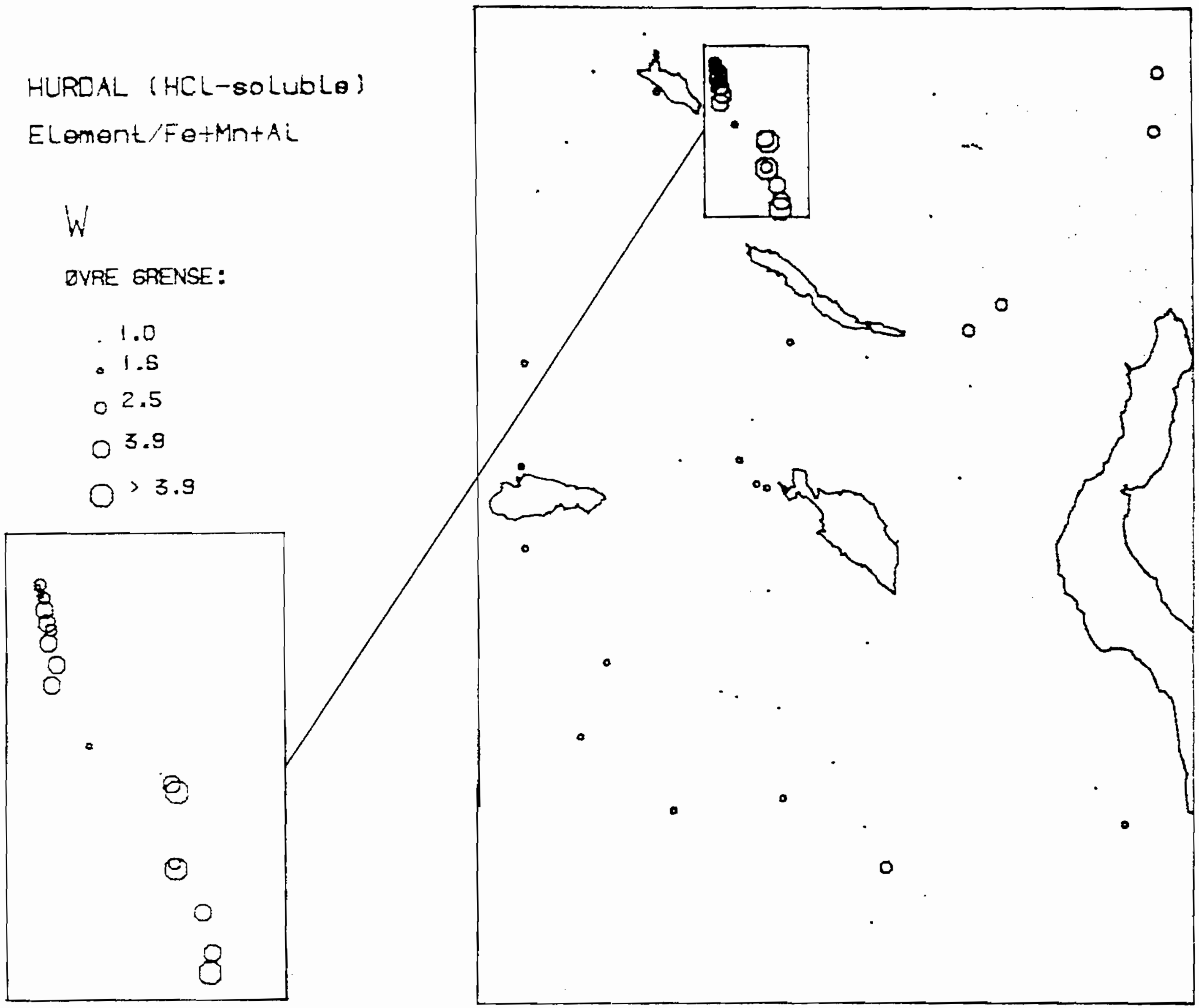
NGU-report 86.169. FIGURE 24.7



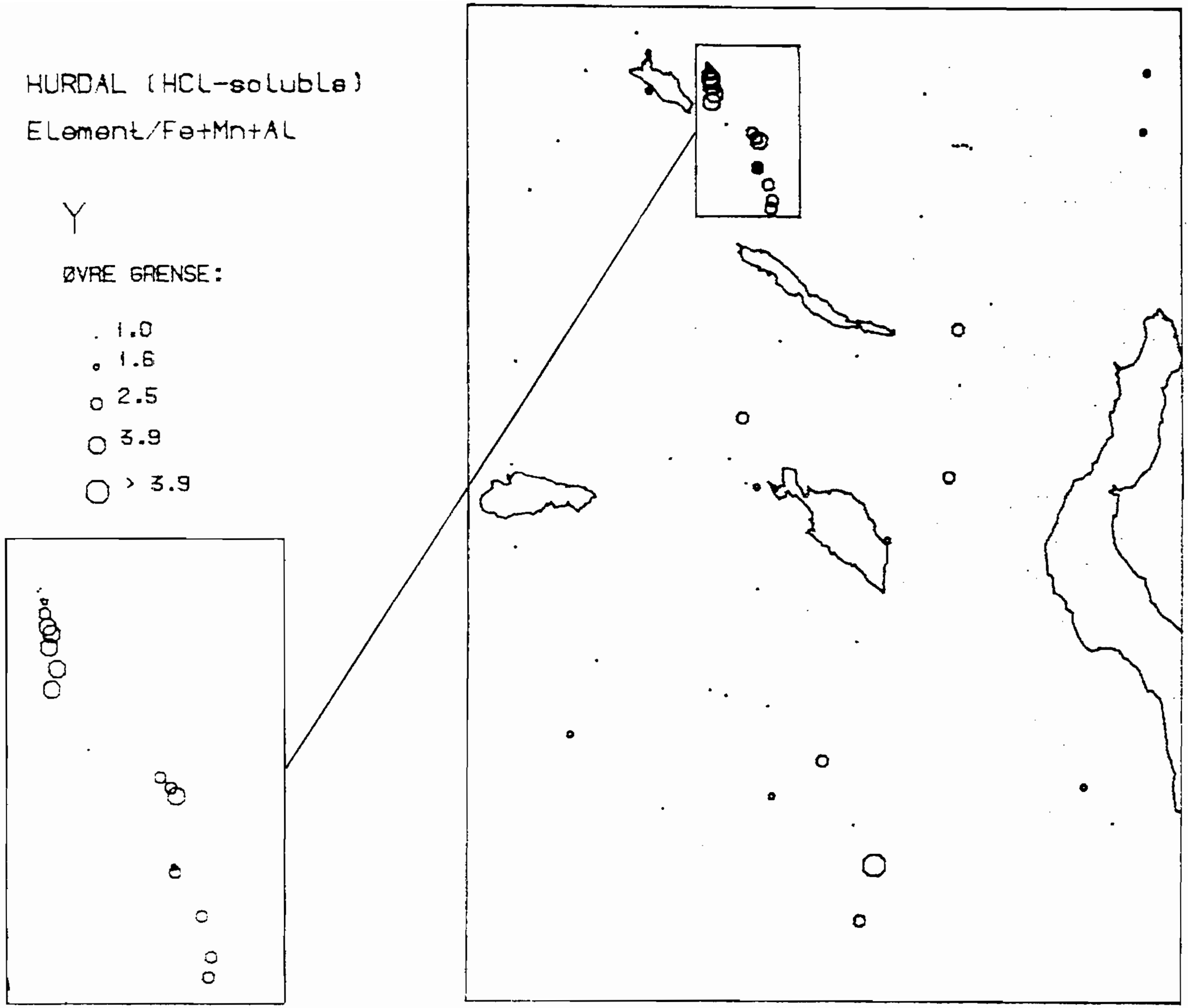
NGU-report 86.169. FIGURE 24.8



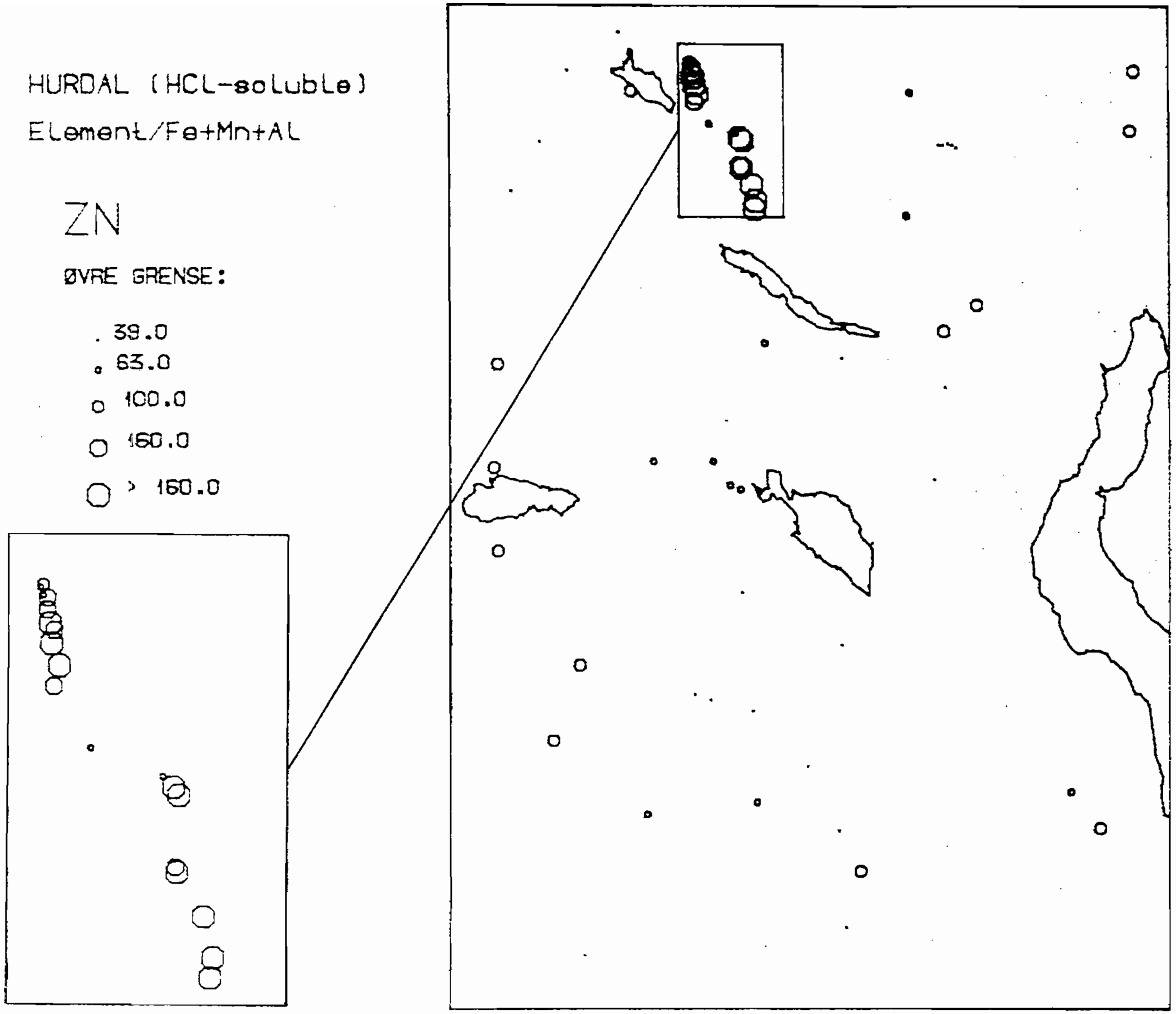
NGU-report 86.169. FIGURE 24.9



NGU-report 86.169. FIGURE 24.10



NGU-report 86.169. FIGURE 24.11



NGU-report 86.169. FIGURE 24.12