RELATÓRIO DA VIAGEM

DO

ENGENHEIRO QUÍMICO

HUGO AUGUSTO SPINELLI

CPRM

RELATÓRIO DA VIAGEM DO ENGENHEIRO QUÍMICO HUGO AUGUSTO SPINELLI AOS ESTADOS UNIDOS EM VISITA AOS LABORATÓRIOS ANALÍTICOS DO U. S. GEOLOGICAL SURVEY

RESUMO CRONOLÓGICO DA VIAGEM

25.06 - Saída do Rio de Janeiro às 21 horas

26.06 - Chegada a Denver, Colorado às 14 horas

28.06 - DENVER

Visita ao Field Services Section do Branch of Exploration Research (F.S.S.)

- Entrevista com A. P. Maranzino, Chefe do Laboratório
  (Exposição sôbre a estrutura e finalidades do F.S.S.)

- Visita aos laboratórios do F.S.S.

29.06 - DENVER

- F.S.S. - Entrevista com A. P. Maranzino
  (Orçamento, planejamento, etc.)

- Visita ao Skyline Labs Inc
  (Laboratório particular para geoquímica)

- Entrevista com D. J. Grimes, Assistente do Chefe do F.S.S.
  (Pessoal - treinamento)

30.06 - DENVER

- F.S.S. - Entrevista com Helen F. Eichler, Chefe do Setor de Administração do F.S.S.
  (Administração - fluxo de trabalho - contrôle de amostras)

- Visita ao Setor de Preparação de Amostras
- Entrevista com J. G. Negri
  (Compras, logística e química)
- Visita ao Setor de Processamento de Dados

01.07 - DENVER

- F.S.S. - Entrevista com L. Wilch.

  (Armazenamento e processamento de dados).

- Federal Center - Geochemical Census Branch.

  Entrevista com Roy Mendes.

  (Programação e processamento de dados).

- Federal Center - Branch of Exploration Research.

  Entrevista com F. C. Canney (Chefe), F. N. Ward (Substituto), H.W. Lakin (Químico) e J. N. Botbol (Geo-estatístico).

  (Organização das pesquisas geológicas - projetos).

  Apresentação a Mrs. C. A. Watkins - Office of International Geology - Responsável pelos bolsistas em Denver.

02.07 - DENVER

- Federal Center - Analytical Laboratories Branch.

  (Visita aos laboratórios de Espectrografia, Sedimentologia e Raios X).

- Viagem para Winnemuca - Nevada.

03.07 - NEVADA

- Funcionamento dos Laboratórios Móveis.

04.07 - NEVADA

- Visita a serviços de campo de projetos de exploração geoquímica do Branch of Exploration Research em companhia do geólogo residente na região(Ralph Truesdell).

06.07 - Viagem para Menlo Park - Califórnia.

MENLO PARK

- Analytical Laboratories Branch - Espectrografia - Entrevista com H. L. Bastron.

07.07 - MENLO PARK

- Marine Geology Services.

Entrevista com Vance Kennedy (química de águas) e C. Leong (análises de ouro e mercúrio).

08.07 - MENLO PARK

- Analytical Laboratóries Branch.

Entrevista com C. O. Ingamells (análises via úmida - pesquisa).

09.07 - Viagem São Francisco - Reno.

10.07 - Viagem de automóvel Reno - Salt Lake City.

- Visita as minas de cobre de Binghan Canyon - Utah.

11.07 - Viagem Salt Lake City a Denver.

12.07 - Chegada a Denver

DENVER

- Federal Center-Analytical Laboratories Branch - Laboratórios de química e preparação de amostras.

Entrevista com W. W. Niles (preparação e controle de amostras) e A.T.Myer (espectrografia).

14.07 - Viagem para Washington D.C.

WASHINGTON

- Apresentação a Mrs. C. W. Browne - (Office of International Geology) Responsável pelos visitantes em Washington).

15.07 - WASHINGTON

- Entrevista com R. T. Murphy - Office of International Training - AID.

- Branch of Geochemistry and Mineralogy - Laboratório de Raio X.

16.07 - WASHINGTON

- Analytical Laboratories Branch

Entrevista com Irving May (Administração e Organização) - L. Shapiro (análises rápidas de rochas) e H. Rose (Raios X).

- Laboratório de Raio X do Branch of Geochemistry and Mineralogy.

19.07 - WASHINGTON

- Resolução de problemas para a viagem de regresso.

20.07 - Viagem para Porto Rico

PORTO RICO

- Apresentação ao pessoal do Laboratório Geoquímico del Area de Recursos Naturales.

21.07 - PORTO RICO

- Laboratório Geoquímico - Visita geral.

22.07 - PORTO RICO

- Entrevista com o Dr. Roberto Vasques Romero - Secretário da Area de Recursos Naturales do Govêrno de Porto Rico.
- Visita ao Laboratório Industrial do Departamento de Obras Públicas.

25.07 - Regresso ao Rio de Janeiro.

26.07 - Chegada ao Rio de Janeiro

HAS/dcm.

CPRM

RELATÓRIO DA VIAGEM DO ENGENHEIRO QUÍMICO HUGO AUGUSTO SPINELLI AOS ESTADOS UNIDOS EM VISITA AOS LABORATÓRIOS ANALÍTICOS DO U. S. GEOLOGICAL SURVEY

INTRODUÇÃO

Nossa viagem aos Estados Unidos visou a visita aos laboratórios do United States Geological Survey a fim de estudar sua organização, instalação e funcionamento, com a finalidade de adaptar as observações feitas aos laboratórios da Companhia de Pesquisa de Recursos Minerais.

O U.S.G.S. é o órgão responsável pela pesquisa geológica nos Estados Unidos, estendendo sua colaboração a outros países.

O campo de ação do U.S.G.S. alcança, apenas os estudos geológicos, não se estendendo aos resultados econômicos a que êstes estudos podem levar.A pesquisa de jazidas, avaliação e exploração pertencem à área particular, sendo vedado ao U.S.G.S. os trabalhos desta natureza.

Dentro desta orientação, feitos os estudos geológicos, seus resultados são publicados, deixando a cargo da iniciativa particular sua continuação e aproveitamento econômico.

Não tendo finalidade econômica direta, os investimentos no U.S.G.S. são recuperados pelo govêrno, indiretamente, através das taxas advindas da exploração consequênte aos seus trabalhos.

Para apôio às suas pesquisas geológicas o U.S.G.S. possui uma série de laboratórios situados em Washington D.C, Denver-Colorado, Menlo Park - Califórnia e San Juan - Porto Rico. Êstes laboratórios desenvolvem suas atividades em três campos diferentes:

a. pesquisa científica

b. estudos de métodos

c. apoio analítico

O primeiro campo tem como único compromisso com os trabalhos do U.S.G.S. o fato da pesquisa ser feita na área geológica.

No segundo campo de trabalho são feitos estudos de métodos que poderão ser usados nos laboratórios de apoio analítico como, também, nos estudos geológicos.

O terceiro campo visa o apoio analítico aos trabalhos de pesquisa geológica, estendendo-se desde a análise visando espécimens geológicos, até o apoio analítico aos trabalhos de pesquisa geoquímica. Neste último caso, os laboratórios dedicam-se, principalmente, às análises geoquímicas, havendo um compromisso, direto, com a produção de resultados.

Dos laboratórios do U.S.G.S. visitados o Field Service Section de Denver e o Laboratório Geoquímico de Porto Rico destinam-se, principalmente, ao apoio analítico geoquímico, devendo, quando necessário, fornecer resultados rápidos.

Nos laboratórios do Analytical Laboratories Branch de Washington, Denver e Menlo Park as atividades são orientadas, principalmente, para o primeiro e segundo campos de trabalho, havendo uma certa atividade de apoio analítico sem obrigação de resultados rápidos, podendo demorar, as vezes, mais de seis meses, a entrega dos mesmos.

Em uma viagem da natureza da que fizemos, em que visitamos em trinta dias oito laboratórios e serviços de campo, situados em pontos extremos de um país de grande extensão, não é possível uma visão em profundidade em todos os pontos.

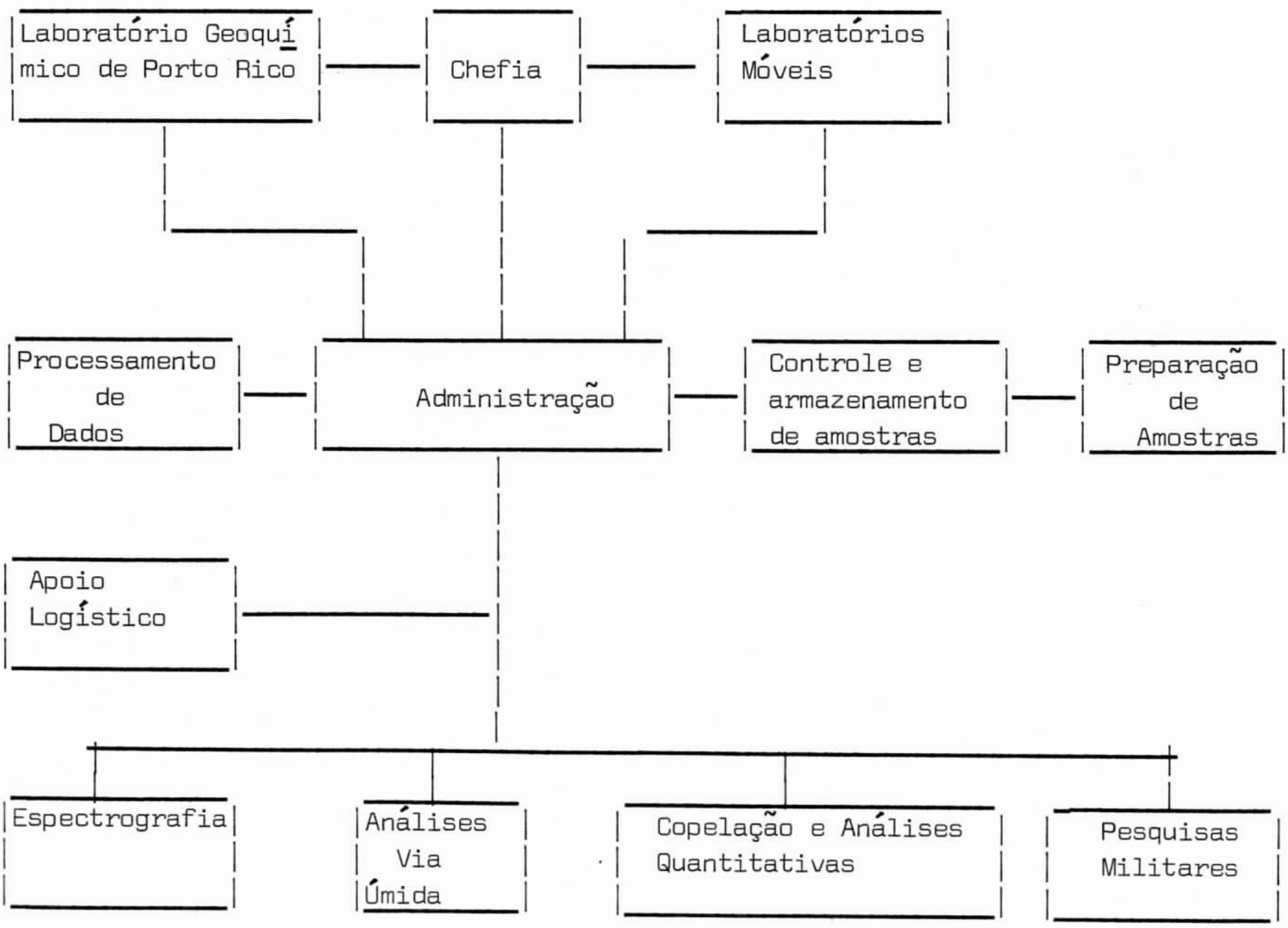
Foi procurada, então, uma visão panorâmica e, ao lado disto, nossa atenção foi concentrada sôbre o setor que mais se assemelha ao nosso campo de atividade atual.

Devido a natureza dos trabalhos preponderantes nos laboratórios da C.P.R.M., cuja atividade principal, atualmente, dirige-se no sentido das análises geoquímicas, com resultados rápidos, nossa atenção foi dirigida, principalmente, para o Field Service Section do Branch of Exploration Research.

I - FIELD SERVICES SECTION - BRANCH OF EXPLORATION RESEARCH

Êste laboratório centraliza a maior parte do apoio analítico às pesquisas geoquímicas. Também aí são preparados os laboratórios móveis que atendem, diretamente no campo, aos serviços de pesquisa geoquímica. O Laboratório de Geoquímica de Porto Rico está subordinado à êste.

Os diversos setores do F. S. S. estão esquematizados a seguir:



CHEFIA - é exercida por um Chefe (A.P. Maranzino) e um Assistente (D. J. Grimes) que exerce a administração técnica dos laboratórios.

ADMINISTRAÇÃO E CONTRÔLE E ARMAZENAMENTO DAS AMOSTRAS - a êstes 2 (dois) setores estão afetos a entrada e contrôle do material e a saída dos resultados das análises.

As amostras são recebidas pelo contrôle que as confere e remete a documentação à Administração. Nesta, são conferidos e anotados os dados dos pedidos de análises, verificando-se o número do projeto, Geólogo, local, etc., e a prioridade atribuida ao pedido. Nesta etapa é feita a numeração das amostras.

A documentação é remetida ao Laboratório e ao Contrôle que fica aguardando a oportunidade para remeter as amostras à Preparação de Amostras.

Quando preparadas, são devolvidas ao Contrôle onde ficam aguardando o pedido do Laboratório para análise.

A parte da documentação remetida ao Laboratório é anotada neste e, quando há vaga no serviço, as amostras são solicitadas ao Contrôle, levando em conta as prioridades estabelecidas.

REQUISIÇÃO DE ANÁLISE - A requisição de análise por parte dos Geólogos é feita através de dois formulários (Anexos 1 e 2). O primeiro é o Pedido de Análise para as amostras que estão relacionadas no segundo.

A metade da esquerda do Pedido contém os dados identificadores do Geólogo e Projeto e ainda;

a) número de amostras constantes do pedido;

b) liberdade de divulgação (release code), onde o Geólogo indica as limitações quanto à divulgação dos resultados e a data após a qual poderão ser liberados;

c) análises solicitadas (work requested);

d) prazo para receber os resultados (o prazo normal é de cerca de quatro meses);

e) destino do excesso de amostra após a análise, etc.

A metade da direita do Pedido servirá para encaminhamento nos laboratórios.

No segundo formulário as amostras são relacionadas, individualmente, de acôrdo com a numeração do campo, com as indicações de localização e os dados Geológicos necessários à sua caracterização.

O preenchimento dêstes formulários está orientado por um manual geral do U.S.G.S. (Sample Submital Manual) (Anexo 3), modificado e simplificado especialmente para o F.S.S. por um suplemento (Anexo 4).

A Requisição de Análise consta de uma fôlha de Pedido de Análise, acompanhada de várias fôlhas de Relação de Amostras.

Pode-se notar pela organização dos formulários que é solicitado um único tipo de análise para tôdas as amostras relacionadas, não havendo possibilidade de pedir análises diferentes para algumas das amostras.

NUMERAÇÃO DAS AMOSTRAS - (Tag Number) - Esta numeração é feita pela Administração do F.S.S. e servirá para a identificação futura da amostra, inclusive nos pedidos de novas análises para aquela amostra e no processamento de dados.

É usado um código alfa-numérico de três letras e três algarismos o que permite numeração para trinta milhões de amostras.

Na Relação de Amostras é colocada a nuneração do Laboratório ao lado da do Geólogo e, na parte da direita do Pedido de Análise (Tag Nºs and Former Jobs) são anotados o primeiro e o último número da série.

Quando se trata de análises nos Laboratórios Móveis, é reservada uma série de números para cada serviço, de acôrdo com o número de amostras previstas na programação prévia do Geólogo. O responsável pelo Laboratório Móvel recebe a informação e numera as amostras do mesmo modo que na Séde.

PRIORIDADES - Na parte esquerda do Pedido, onde o Geólogo indica o prazo para recebimento dos resultados, é anotado o código de prioridade.(Anexo 5).

Há sete graus. Na prioridade "1" a amostra será processada quando houver folga no Laboratório; a prioridade "2" é a normal e representa uma entrega de resultados em cêrca de quatro meses (veja aviso no Pedido de Análise). Os trabalhos no Brasil, África e outras regiões têm prioridade "5".

Em todos os casos de prioridades"1" a "6" os laboratórios organizam as sequências e solicitam as amostras ao Contrôle. No caso da prioridade "7" a amostra é conduzida por pessoa da Administração, devendo o laboratório interromper o serviço que estiver fazendo para atende-la.

A prioridade é solicitada pelos Geólogos ao fazerem o planejamento do trabalho anual, a fim de permitir o planejamento global.

SAÍDA DOS RESULTADOS - Os resultados das análises são anotados, manualmente, em formulários próprios, ao lado do número das amostras (Anexos 6 - 1 a 6 - 6). Os formulários, preenchidos, são remetidos à administração que tira cópias xerox, sendo uma enviada ao geólogo e outra ao processamento de dados.

CONTRÔLE E ARMAZENAMENTO - Conferidas as amostras e de posse da documentação com os números de laboratório elas são remetidas, pelo Contrôle, à Preparação de Amostras. As amostras preparadas são acondicionadas em pequenas caixas cilíndricas de papelão grosso, marcadas com o número da amostra (no corpo e na tampa) e devolvidas, com o excesso que houver, ao Contrôle, onde ficam aguardando a chamada no Laboratório.

Terminada a análise, a caixa com o restante da amostra é devolvida ao Contrôle. Aí, se houver excesso, as caixas são completadas e armazenadas. Êste armazenamento é permanente, havendo amostras de todo o material anteriormente analisado.

Caso haja, ainda, sobra de amostra, o Contrôle age de acôrdo com a orientação que veio no pedido de análise, no quadro "After Job is completed". Em qualquer oportunidade o trabalho feito pode ser revisto ou ampliado, mediante indicação do número da amostra que é fàcilmente localizada.

PREPARAÇÃO DE AMOSTRAS - A aparelhagem no setor consta de:

a. estufa,

b. britador,

c. moinhos de disco,

d. moinhos de bolas de mulita com agitação rápida (Red Devil),

e. pulverizadores automáticos com gráu de ágate,

f. quarteadores jones,

g. homogenizadores.

Os moinhos de disco são verticais com discos de cerâmica de 6". Êstes moinhos são instalados no interior de capelas o que impede que o pó desprendido durante a pulverização se dissemina para a sala de trabalho.

As amostras pulverizadas são colocadas nas embalagens padronizadas, que são caixas cilíndricas de papelão grosso, com 5 cm de diâmetro e 7 cm de altura. No interior de cada uma é colocado um cartão de papelão, do tamanho da secção vertical da caixa, com perfurações retangulares, formando uma malha.

As caixas são colocadas nos homogenizadores que fazem-nas girar. O material no interior, passando, sucessivamente, através das malhas do cartão, fica perfeitamente homogenizado.

O tipo de preparação é padronizado. Entretanto, se algum geólogo necessita de um trabalho especial, faz a indicação necessária no pedido de análise.

LABORATÓRIOS - São quatro os tipos de laboratórios do F.S.S.

a. análises Espectrográficas,

b. análises Via Úmida (Absorção Atômica),

c. Copelação,

d. análises especiais quantitativas

O setor de Espectrografia trabalha, principalmente, em análises semi-quantitativas, com queima total da amostra e comparação visual, usando o método de

seis degraus publicado nos boletins do U.S.G.S., com três valores padronizados e outros três obtidos por interpolação visual.

O trabalho de rotina se estende a trinta elementos como se pode ver no formulário de resultados espectrográficos (Anexos 6-1 a 6-4). Entretanto, desde que seja solicitado pelo geólogo, outros elementos poderão ser determinados por espectrografia, cobrindo uma faixa de sessenta elementos.

É importante acentuar que tôdas as amostras são submetidas à análise espectrográfica.

A vantagem, inicial, dêste sistema, é que esta análise preliminar permite uma visão geral dos elementos constituintes e sua concentração, como orientação para as demais análises, se for o caso. Além disto, como os espectrogramas são registrados em filmes e êstes têm uma duração razoável, os dados podem ser revistos ou novas informações, que não interessaram inicialmente, podem ser obtidas dos filmes arquivados, com pequeno trabalho adicional. Uma outra vantagem, também, é a extensão dos estudos geoquímicos a outros elementos além daqueles que foram indicados no pedido de análise, aproveitando o trabalho de amostragem já feito.

A aparelhagem usada nos laboratórios de Espectrografia é a seguinte:

a. Espectrógrafos Jarrel - Ash - 1.5
   - Wadsworth,

b. Espectrógrafos do Analytical Research
   Laboratories - Spectrografic Analyser - .8,

c. Comparador visual para leitura de chapas - de fabricação própria,

d. Balanças Analíticas de Torção,

e. Eletrodos de grafite, pré fabricados, da Ultra Carbon Co,
   - Tipos Pt 1590.U 2 e 7075 U 2 de 3/16" para receber a amostra e 1964 U 2 de 1/8" como eletrodo superior.

Os espectrógrafos usados são de dispersão média, porém seu uso, em lugar dos de dispersão elevada, deve-se ao fato de possuirem um sistema ótico fixo, sem necessidade de ajustes constantes, podendo ser montados nos caminhões dos Laboratórios Móveis.

Êstes espectrógrafos trabalham, apenas, com filmes.

As balanças analíticas usadas são na maioria, de torção. Estas balanças têm sensibilidade analítica e comparadas com as balanças de travessão e cutelo, são de manuseio muito mais rápido, permitindo fluxo muito maior de amostras.

Nos laboratórios de Análise Via Úmida são usados métodos de Absorção Atômica.

São vários os aparêlhos de Absorção Atômica existentes no F.S.S.Em geral, cada aparêlho é destinado a analisar apenas um pequeno grupo de elementos, o que facilita o ajuste, aumentando a eficiência e a produção.

A maioria dos aparelhos é da marca Perkin-Elmer, modelos 303 e 290. Deve-se esta preferência ao bom serviço de manutenção mantido pelo fabricante,o que é essencial para esta aparelhagem.

As análises neste setor, embora sejam quantitativas, visam mais a produção que a precisão. Os métodos de análise utilizados são os publicados nos boletins do U.S.G.S.

Os espectrógrafos e os aparêlhos de absorção atômica são manuseados por químicos, porém, parte da tarefa, pode ser feita por técnicos sem gráu universitário, principalmente tarefas preliminares.

No laboratório de Cupelação são feitos os trabalhos preliminares de concentração para a dosagem de metais raros (ouro e grupo da platina). As determinações finais para o caso de pequenas concentrações (na ordem de partes por bilhão) são feitas por Absorção Atômica em um laboratório anexo, ou por Espetrografia.

Há também um laboratório de química analítica quantitativa, onde são feitas determinações especiais, não comuns, análises mais precisas e, também, análises de rochas, usando métodos mais clássicos, sem exigência de produção.

As análises de mercúrio são feitas em um Detetor de Mercúrio, aparelho especial, desenhado pelos técnicos do U.S.G.S. e construído em suas oficinas. Êste aparelho é usado em todos os laboratórios do U.S.G.S. e alguns particulares.

PROCESSAMENTO DE DADOS - O U.S.G.S. possui dois computadores onde são armazenados e processados os dados referentes às suas atividades. Um dêstes computadores se encontra no Federal Center em Denver e o outro em Washington. Por motivos estratégicos há triplicação dos dados analíticos sendo os mesmos armazenados em três rolos, ficando um em cada séde de computador e o terceiro no Laboratório.

Uma cópia dos formulários com os resultados das análises é remetida para o setor de perfuração de cartões que funciona no F.S.S.

O próprio formulário de resultados geoquímicos (Anexos 6.1 a 6.4) já está organizado de modo a facilitar o operador.

Os resultados das análises de cada amostra são perfurados em um conjunto que pode abranger até quarenta e seis cartões, conforme mostram as instruções anexas (Anexos 7, 8 e 9). Os cartões perfurados são remetidos para o computador onde os dados são passados para fita magnética.

O programa de processamento atualmente usado é denominado RASS-II (Roch Analyses Storaje System) e foi implantado em 1968. Anteriormente o programa usado era denominado RASS-I mas foi alterado devido a pouca eficiência.

É importante o fato de que ainda não foi possível passar para o novo programa os dados armazenados pelo programa RASS-I, tendo sido evidenciada a necessidade de se iniciar o trabalho já com um programa de processamento eficiente.

LABORATÓRIOS MÓVEIS - Durante quatro mêses do ano, de junho a outubro, é feito o atendimento dos serviços de campo por meio dos Laboratórios Móveis.

A finalidade dêstes laboratórios é o apoio analítico rápido aos serviços de campo que, por sua natureza, necessitam resultados urgentes.

Dêste modo, em alguns casos, os resultados são fornecidos em 24 horas, permitindo ao geólogo orientar sua programação de acôrdo com os dados analíticos recebidos.

A programação das viagens dos Laboratórios Móveis é feita com muita antecedência, baseada nas programações dos geólogos. Nestas programações enviadas com cerca de três a quatro meses de antecedência, o geólogo solicita o Laboratório Móvel e indica a natureza do trabalho, a duração e o número de amostras a analisar.

Normalmente, quando o Laboratório chega ao local, já há um certo número de amostras acumuladas.

Terminado o programa o Laboratório dirige-se a outro local para novo programa.

Há três tipos de unidades volantes: a de Preparação de Amostras, a de Absorção Atômica e Detetor de Mercúrio e a de Espectrografia.

A aparelhagem das unidades é retirada dos laboratórios do F.S.S. e instalada nos caminhões. Desta forma, durante a época dos trabalhos de campo, o serviço no F.S.S. de Denver fica quasi paralisado.

Conforme o serviço é destacado, inicialmente,o conjunto das unidades de Preparação e Absorção Atômica.

As unidades de Espectrografia, em menor número, atendem, cada uma, a maior número de serviços. Normalmente, elas só vão para cada localidade quando já há muitas amostras acumuladas. Graças a capacidade diária elas absorvem, ràpidamente, o serviço acumulado e dirigem-se a outro local.

Muitas vezes a unidade de preparação reboca um grupo gerador a fim de fornecer energia para o conjunto. Entretanto, na maioria dos casos, o Laboratório Móvel pode estacionar em pequenas cidades ou povoados onde há sempre ener

gia elétrica. Nestes casos o U.S.G.S. entra em acôrdo com a Administração local que põe a disposição, em um logradouro público, instalações para tomada de fôrça para o Laboratório Móvel.

OPERAÇÃO DO FIELD SERVICES SECTION - A eficiência do F.S.S. repousa no planejamento que é feito com muita antecedência, mediante um grande entrosamento entre Químicos e Geólogos.

A fim de preparar o orçamento é feita uma programação dos trabalhos dos Geólogos, cerca de quatro meses antes do período anual. Nesta programação devem ser previstas, com o máximo de precisão, em natureza e quantidade, as análises a serem feitas. Os Geólogos e os Químicos discutem os trabalhos e determinam o que deve ser executado.

Os dados são remetidos ao Programador do Orçamento que avalia as possibilidades dos Laboratórios e prevê as necessidades de equipamento e pessoal.

O orçamento do Laboratório é constituído de algumas verbas especiais e de uma porcentagem nas verbas dos projetos de geologia.

Se, levantadas as necessidades e pedidas as verbas, estas não derem para cobertura de todo o trabalho, são efetuados cortes na programação dos Geólogos, a fim de enquadrar tudo no orçamento.

Uma vêz aprovada a programação, caso algum Geólogo remeta maior número de amostras que as previstas, o serviço pode ser rejeitado.

PESSOAL - O F.S.S. tem cerca de cinquenta funcionários sendo pouco menos da metade constituída por técnicos universitários. Entretanto, durante os serviços de campo, são contratados mais 30% a 40% de auxiliares,principalmente entre estudantes, que estão em férias durante boa parte dêste período.

Para tarefas auxiliares, tais como preparação de amostra e trabalhos preliminares de análise, alguns elementos podem ser considerados aptos com uma semana de treinamento.

A equipe de campo é chefiada por um Químico, com dois auxiliares. Êstes, quando experientes, executam a maior parte de trabalho, ficando para o Químico a organização e as tarefas mais especializadas.

SERVIÇOS NO LABORATÓRIO DO F.S.S. DE DENVER - Uma vêz terminada a época dos serviços de campo, os carros regressam a Denver e a aparelhagem é reinstalada nos laboratórios. Inicia-se então o período de atendimento aos serviços menos urgentes, cujas amostras já estavam acumuladas ou o atendimento das novas amostras remetidas.

APOIO LOGÍSTICO - A fim de atender às necessidades de material consumido há um completo almoxarifado com reagentes, vidrarias, peças de reposição e aparelhos de pequeno porte.

Há um perfeito serviço de Oficina Mecânica e de Oficina Eletrônica, bem como Carpintaria.

Desta forma, além do apoio no reparo rápido da aparelhagem defeituosa, há possibilidade de adaptações e construção de aparelhos. O pessoal treinado presta assistência não só ao Laboratório de Denver como aos Laboratórios Móveis.

Muito importante é o apoio a ser dado aos Laboratórios Móveis para os quais, qualquer falha ou atrazo pode prejudicar, enormemente, sua eficiência. Assim, além do planejamento do abastecimento e aparelhagem, também deve haver, sempre que solicitada, uma assistência rápida.

Cada Seção do F.S.S. possui uma coleção dos principais textos técnicos e revistas referentes à especialização.

II - LABORATÓRIO GEOLÓGICO DE PESQUISAS NATURAIS DE PORTO RICO

Êste Laboratório, situado em San Juan, Porto Rico, é operado, conjuntamente, pela Área de Recursos Naturales do Departamento de Obras Públicas do Es

tado Associado de Porto Rico e pelo U. S. Geological Survey, estando sob a dependência administrativa do Field Services Section de Denver. (Anexo 10).

Êste é um pequeno laboratório, destinado, principalmente, a análises geoquímicas, com a finalidade de dar apoio analítico aos trabalhos de pesquisa mineral executados pelo Govêrno de Porto Rico, em cooperação com o U.S.G.S.

A principal aparelhagem dêste Laboratório consiste em um Espectrógrafo Jarrel - Ash - Wadsworth, 1.5 e um Espectrofotômetro de Absorção Atômica, Perkin Elmer, Mod. 403. Possui balanças analíticas de torção e as instalações normais de preparação e armazenamento de amostras.

A numeração das amostras é própria do laboratório. Os dados analíticos são perfurados em cartões e gravados em fitas ficando uma cópia estocada no serviço de programação próprio de Porto Rico sendo outras cópias remetidas para o U.S.G.S.

Por ocasião de nossa visita, o pessoal do Laboratório era constituído por um Químico Chefe, quatro Químicos, um Estudante Estagiário, um Técnico de Processamento e o pessoal auxiliar de laboratório.

A capacidade nominal do Laboratório é de cerca de cem amostras por dia, entretanto, a solicitação tem sido muito aquém dêste valor.

III - BRANCH OF EXPLORATION RESERCH

Os serviços de pesquisa geoquímica do U.S.G.S. estão subordinados a esta Divisão da qual dependem, também, os dois laboratórios de análises geoquímicas mencionados. Funciona no conjunto do Federal Center em Denver.

Aquí é feito o contrôle orçamentário dos projetos de pesquisa e dos laboratórios geoquímicos.

Além da administração dos projetos de pesquisa geológica esta Divisão executa estudos sôbre métodos gerais de pesquisa. Há cerca de vinte dêstes estudos em andamento,entre os quais nos foram mencionados os seguintes:

- Prospecção com contrôle remoto por radar.
- Detecção de formações minerais em algumas falhas geológicas em Nevada, sob camada de trinta metros de sedimentos.
- Novos métodos de detecção de mercúrio no ar e no solo.
- Concentrações traços de metais pesados como indicadores de mineralização.
- Mecanismo da dispersão de ouro e prata.
- Preparação de mapas tridimensionais.
- Dispersões primárias indicadoras de jazidas.
- Tratamento matemático, automático, de dados.

IV - BRANCH OF ANALYTICAL LABORATORIES

Esta Divisão engloba os laboratórios de Washington D. C., do Federal Center - Denver - Colorado e de Menlo Park - Califórnia.

Conforme foi dito anteriormente, êstes laboratórios destinam-se à pesquisas científicas e de métodos, com pequena atividade ligada,diretamente, ao atendimento dos projetos geológicos sem compromisso de tempo, a não ser em casos especiais.

Genèricamente, a organização e as instalações dêstes três laboratórios é semelhante. Cada um está dividido em setores de trabalho (Anexos 11.1 - Project Title).

Os principais ramos são Serviços e Pesquisas Analíticas, Serviços e Pesquisas Espectrográficas, Espectrometria de Raio X, Seções Finas e Polidas e, mais particularmente, Radioatividade e Radioquímica (Washington e Denver), Análises de Rochas (Denver) e Análises Rápidas de Rochas (Washington).

Muitos dos nomes dos Técnicos que chefiam êstes setores são comumente encontrados na literatura científica, tais como Ingamells, Shapiro,Rose,Myers, etc.

No aspecto geral encontramos nestes três Laboratórios aparelhagem semelhante, constituída de Espectrógrafos, Espectrômetros de Absorção Atômica,Es

pectrômetros de Chama, e Espectrômetros de Absorção Molecular, Balanças Analíticas, etc., variando os modelos e marcas. A operação dêstes aparêlhos é padronizada, em geral, por métodos clássicos ou métodos especiais do U.S.G.S.

Entretanto há alguns casos que merecem citação especial, como seja:

a. O Espectrógrafo de Leitura Direta, para análises quantitativas automáticas, em Denver. - Trata-se de um Espectrógrafo da Consolidated Electrodynamic and Control Division. - Com a regulagem atual, êste aparelho pode determinar, quantitativamente, quarenta elementos menores em cada amostra.

O processo analítico demora cerca de oito minutos por amostra e os resultados já são impressos, automàticamente. - Entretanto, êste aparelho requer uma assistência técnica constante, devido as aferições que necessita.

b. Método para análise espectrográfica quantitativa em que as chapas fotográficas contendo os espectrogramas são lidas automàticamente em um densitômetro ligado, diretamente a um computador programado com as curvas analíticas, o que fornece os resultados impressos, sem nova interferência do técnico.

c. Análises Rápidas de Rocha - Êstes métodos já são conhecidos pela literatura. Entretanto ainda não haviamos tido a oportunidade de verificar, pessoalmente, a aparelhagem criada por L. Shapiro para sua execução e o seu funcionamento.

V - MARINE GEOLOGY

Em Menlo Park, Califórnia, estivemos em visita a um projeto da Water Resourch Division, em execução no Marine Geology. Êste projeto visa o estudo geoquímico de sedimentos fluviais e o comportamento dêstesna concentração de ions. Tal projeto foi proposto ao Govêrno Americano pelo Químico Vance Kennedy, que o dirige. Aprovado o projeto, foi-lhe designada uma verba e cedidas instalações no Marine Geology para sua execução.

VI - BRANCH OF EXPERIMENTAL GEOCHEMISTRY AND MINERALOGY - WASHINGTON

Tivemos oportunidade de visitar as instalações dos laboratórios de Raio X e Petrografia dessa Divisão, situadas em Washington.

VII - LABORATÓRIO INDUSTRIAL - DEPARTAMENTO DE OBRAS PÚBLICAS - PORTO RICO

Êste laboratório destina-se a pesquisas e estudos sôbre aproveitamento de produtos agrícolas. Um dos projetos em desenvolvimento consiste no aproveitamento, mediante tratamento químico, do bagaço de cana de açúcar, abundante em Porto Rico, como forragem para gado, o que falta nesta País.

O Laboratório funciona com verbas do Govêrno de Porto Rico e de acordos com o Govêrno Americano. Suas instalações são modernas, embora constituída de aparelhagem normal.

VIII - SKYLINE LABS. INC. - DENVER

Tivemos oportunidade de visitar êste laboratório particular, especializado em análises geoquímicas.

Sua finalidade é o atendimento dos serviços particulares de exploração, uma vêz que os laboratórios do U.S.G.S. não atendem a êste tipo de trabalho. É um laboratório pequeno, muito bem instalado, com produção econômica e elevada.

Sua aparelhagem principal consta de dois espectrógrafos, um Jarrel-Ash 1.5 e um IRL.8, um Espectrofotômetro de Absorção Atômica Perkin Elmer 403, balanças de torção e instalações normais de laboratório. Na preparação de amostras sobressaem dois moinhos especiais de disco livre de alumina pura, com alta rotação, que permitem a preparação de uma amostra em apenas três minutos.

O laboratório trabalha dezesseis horas por dia, em dois turnos de oito horas, tendo uma capacidade de até dez mil amostras por mês, se o material for entregue já preparado para análise.

IX - OBSERVAÇÕES FINAIS

Várias observações feitas merecem destaque. Já estamos procurando adaptar aos nossos trabalhos aquilo que nos pareceu mais urgente, enquanto que em outros casos, tomaremos as providências que forem de nossa alçada e solicitaremos ou sugeriremos o que couber.

1. Preparação de amostras - instalação dos moinhos em capelas - Aproveitamos o fato de que êste Setor está em vias de ser transferido para outro local e reformulamos os projetos anteriores, nesta nova base.

2. Armazenamento permanente das amostras - devido ao trabalho e gasto que representa uma amostra colhida e as possibilidades de estudos futuros sôbre a mesma, acreditamos que a medida é muito útil. Estamos projetando a modificação do sistema para apresentar à Diretoria de Operações.

3. Análises espectrográficas com determinação de trinta elementos - Em época anterior à nossa viagem já estavamos planejando o alargamento da faixa de trabalho do Setor de Espectrografia. Estamos intensificando estas medidas.

4. Análises Espectrográficas semi-quantitativas em tôdas as amostras geoquímicas.

   Cremos ser de grande importância a adoção desta medida. Embora venha encarecer o trabalho analítico, isto será insignificante em relação ao valor do trabalho já executado (planejamento, prospecção, transporte e análises pedidas) podendo fornecer dados de grande valor para novos caminhos da pesquisa.

5. Aquisição de um aparelho analisador de mercúrio e determinação deste elemento nas amostras geoquímicas. Ao que sabemos o mercúrio é um elemento de grande utilidade nestas pesquisas.

6. Adoção de métodos de Absorção Atômica em lugar de métodos clássicos. Os métodos de Absorção Atômica, embora menos preciosos, enquadram-se perfeitamente no campo de um trabalho prático, fornecendo resultados muito mais rápidos.

7. Balanças de Torção - Dentro do conceito prático de eficiência, êste tipo de balança oferece muito maior rapidez no trabalho, Cremos que se impõe a substituição.

8. Padronização das Requisições de Análise - Lançamento de dados técnicos e geológicos.

9. Importância da programação da remessa de amostras com bastante antecedência. Esta medida já havia sido sugerida por nós.

   Esta programação poderá ser flexível, pois sua execussão, devido às dificuldades que comumente temos que enfrentar, nem sempre será possível.

   É necessário, entretanto, que as alterações sejam comunicadas, sistematicàmente, para que se tornem medidas para enfrentar suas conseqüências.

10. Maior entrosamento entre Geólogos e Químicos, participando êstes da organização dos projetos, não só com a finalidade de ajustar os trabalhos futuros como, ainda, interessar, o Químico, cada vez mais, nos trabalhos em que colabora, dando-lhe uma vizão mais objetiva dos problemas a enfrentar.

11. Processamento de Dados - necessidade de se iniciar um trabalho para tratamento dos dados que já estão sendo obtidos em número bastante elevado. O tratamento, manual, dêstes dados, se fôr conseguido, é lento e ineficiente.

12. Laboratórios Móveis - Êste é um recurso largamente usado pelo U.S.G.S. para aumentar a eficiência das pesquisas geoquímicas. Devido às condições locais - boas estradas, instalações, comunicações e apoio fá - ceis - não há grandes dificuldades em sua utilização.

No Brasil, cremos que para algumas regiões a adaptação do sistema seria relativamente fácil. Para outras, entretanto, será necessário um estudo cuidadoso para se chegar a uma solução mais de acôrdo com as condições locais.

Queremos deixar aqui o nosso agradecimento à C.P.R.M. e a sua Direção pela oportunidade que nos foi oferecida.

Desejamos agradecer, também, ao Dr. Richard Lewis pelo auxílio que nos prestou, ao Dr. Alberto P. Maranzino pelas informações e conceitos apresentados e a tôdas as demais pessoas que nos ajudaram a executar a tarefa.

Rio de Janeiro, 31 de agôsto de 1971

HUGO AUGUSTO SPINELLI
Chefe do LAQUI

HAS/brs. dcm.

FIELD SERVICES SECTION

REQUEST FOR ANALYSIS

Page _____ of _____ Pages.

Anesco 1

Job No. _____

No. of Samples _____

Submitter: _____ Date submitted: _____

Address: _____ Collected from State: _____

Phone No.: _____ County: _____

Project No.: _____ Offshore /_____/ check

Release Code and Date: _____ Send to: Sample Control
Rm 1919, Bldg. 25
Federal Center
Denver, Colo. 80225

WORK REQUESTED

AA or chemical: (circle)	Assay (specify)	Spectrographic:	Special Analysis: (specify)
Au, Hg, Cu, Pb, Zn, CxHM, CxCU, Ag, As, Sb, Mo, Te, U, Ni, Co, W Other: (specify)	Quantitative Chemistry: (specify)	Semiquant. standard 30 elements (specify) /___/ Quantitative (specify) /___/ Other (specify) /___/	

Results needed by:

_____ (date)

(Normal requests have up to a 4 month turn-around-time)

After Job is completed: check one

Discard Bulk _____

Return Bulk to Geologist _____

Send Bulk to _____

SPECIAL INSTRUCTIONS:

If samples are concentrates, please make special note for analysts. Indicate nature of the sample for analyst in selecting best procedure. Identify unusual samples; gossan, organic, etc.

_____

_____

_____

FOR SAMPLE CONTROL USE ONLY

Tag Nos. and Former Jobs:

PREPARATION:

By: Notes: Date: _____

SPECTROSCOPY:

No. of Samples _____

No. of Detns: _____ Spec No. _____ Date Reported _____

CHEMISTRY:

_____ _____ _____

_____ _____ _____

_____ _____ _____

COMMENTS:

FOR RASS _____

U SCAN _____

TO C/A _____

Job No. ______ Amesco 2

Page ______ of ______ Pages

See Sample Submittal Manual 3rd Edition and Supplement No. 1

* (1) Field No.	(2) Tag No.	* (3) Location (degrees, minutes, seconds) or X - Y grid: Lat. (X)	Long. (Y)	* (4) Material Class	Sample Type	Sample Source	Rock Type	Igneous Form	Structural Setting	Matrix	Oxidation State	Alteration	Ore Minerals	Mineral Deposit Form	(5) Geol. Age	Rock Name Code	(6) Free Coding Space 1	2	3	4	5	6	7	8	9	10	11	12	13	14	Formation Name	(7) COMMENTS

* Fields 1, 3 and 4 - Mandatory if data are to be entered into the RASS II Computer File.
Fields 5, 6 and 7 - Optional if data are to be entered into the RASS II Computer File.
Fields 1 and 7 - Mandatory for all other Requests for Analysis.

Amesco 3

SAMPLE SUBMITTAL MANUAL
3RD EDITION, 1969

SUPPLEMENT NO. 1, 1970

THESE INSTRUCTIONS ARE ONLY FOR SUBMITTING SAMPLES TO THE LABORATORIES OF THE FIELD SERVICES SECTION OF THE BRANCH OF EXPLORATION RESEARCH.

Prepared by: Data Processing Group
Field Services Section
Branch of Exploration Research

Much of the information included in pages 32 to 39 of the Sample Submittal Manual, 3rd Edition, 1969, (herein called the Manual), is revised in this Supplement. All other information, especially that regarding Requests for Analysis by the Analytical Laboratories Branch remain the same.

A copy of the Field Services Section Request for Analysis form, as revised, is shown in Fig. 5. The sample description coding form is shown in Fig. 6. Both Fig. 5 and 6 are legal size documents--8½" x 14".

ALL OTHER REQUEST FOR ANALYSIS FORMS OF THE FIELD SERVICES SECTION ARE OBSOLETE AND SHOULD BE DESTROYED.

GENERAL INSTRUCTIONS FOR ALL PROJECTS

See page 36 of the Manual. Fill out left side of Request Form (Fig. 5). Note the change from "Security Status" to a "Release Code and Date".

State and County

Identification of state is mandatory. Identification of county is optional.

For the state of Alaska, use "Alaska Request for Analysis" form. Identification of the AMS 2^{o} quadrangle is optional.

For the Commonwealth of Puerto Rico, use the "Laboratorio Recursos Naturales Request for Analysis" form. Identification of the quadrangle number and Barrio are optional.

FIELD SERVICES SECTION
REQUEST FOR ANALYSIS

Page _____ of _____ Pages.

Job No. _____

No. of Samples _____

Submitter: _____ Date submitted: _____

Address: _____ Collected from State: _____

Phone No.: _____ County: _____

Project No.: _____ Offshore /_____/ check

Release Code and Date:____ Send to: Sample Control
Rm 1919, Bldg. 25
Federal Center
Denver, Colo. 80225

WORK REQUESTED

AA or chemical: (circle)	Assay (specify)	Spectrographic:	Special Analysis: (specify)
Au,Hg,Cu,Pb,Zn, CxHM,CxCU,Ag,As, Sb,Mo,Te,U,Ni, Co,W Other: (specify)	Quantitative Chemistry: (specify)	Semiquant.standard/__/ 30 elements(specify) Quantitative (specify) /__/ Other(specify) /__/	

Results needed by:

_____(date)

(Normal requests have up to a 4 month turn-around-time)

After Job is completed: check one

Discard Bulk _____

Return to Submitter _____

Send to _____

SPECIAL INSTRUCTIONS:

If samples are concentrates, please make special note for analysts. Indicate nature of the sample for analyst in selecting best procedure. Identify unusual samples; gossan, organic, etc.

FOR SAMPLE CONTROL USE ONLY

Tag Nos. and Former Jobs:

PREPARATION:
By: Notes: Date: _____

SPECTROSCOPY:
No. of Samples _____

No. of Detns:_____ Spec No. _____ Date Reported _____

CHEMISTRY:

_____ _____ _____

_____ _____ _____

_____ _____ _____

COMMENTS:

FOR RASS _____

U SCAN _____

TO C/A _____

Figure 5. (Reduced to page size)

FIELD SERVICES SECTION

Job No. ____________

Page ____________
of ____________ Pages

* (1)	(2)	* (3)		* (4)											(5)		(6)															(7)
		Location (degrees, minutes, seconds) or X - Y grid													See Sample Submittal Manual 3rd Edition and Supplement No. 1																	
																	Free Coding Space															
Field No.	Tag No.	Lat.(X)	Long.(Y)	Material Class	Sample Type	Sample Source	Rock Type	Igneous Form	Structural Setting	Matrix	Oxidation State	Alteration	Ore Minerals	Mineral Deposit Form	Geol. Age	Rock Name Code	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Formation Name	COMMENTS

* Fields 1, 3 and 4 - Mandatory if data are to be entered into the RASS II Computer File.
Fields 5, 6 and 7 - Optional if data are to be entered into the RASS II Computer File.
Fields 1 and 7 - Mandatory for all other Requests for Analysis.

Figure 6. (Reduced to page size)

Submitter's Field No. - Field #1

All projects must complete Field #1 (Fig. 6). As many alpha and numeric characters may be used as you wish; however, only the first thirteen (13) are recorded in the RASS II system, and only the first eight (8) may be transferred to a STATPAC tape as the "row ID".

The local Sample Control Unit will assign a six (6) character tag or laboratory number to your sample.

Comments - Field #7

If your data are not to be entered into RASS, you must complete Field #7. Keep it simple and short. This information will be used by Sample Control and the analysts only. Remember, processing of the samples in the laboratories will be greatly facilitated and problems of contamination will be reduced if you will group samples of similar kind together on the forms. Information given in the "Comments" column of the form will also help in this regard, and will be of aid to the analyst in selecting the best laboratory technique.

INSTRUCTIONS FOR PROJECTS HAVING DATA ENTERED INTO RASS II

Additional requirements for projects entering data into the RASS II Computer File are: a) Field #3 - mandatory, b) Field #4 - mandatory, c) Fields #5, #6, and #7 - optional. See Fig. 6.

Latitude and Longitude or X-Y Grid - Field #3

See pages 37 and 38 of the Manual for general information. Location information is now mandatory for projects entering data into RASS.

Coded Descriptions of the Samples - Field #4

Coded information pertaining to each sample must be given in Field #4. The only codes to be used in this field are shown on page 4 of this Supplement and are self-explanatory.

Optional Coded Information for RASS II

Rock Name Codes and Codes for Geologic Age - Field #5 are given on pages 5 to 9 of this Supplement.

Free Coding Space - Field #6

This space has been added so that the requestor may add more retrievable geologic parameters. The fourteen (14) columns provided may be used as the requestor wishes. They may be grouped as fields or used as individual characters; however, the format must be consistent for a given project and the requestor should have his code sheet on file with our Data Retrieval Unit.

SUPPLEMENT NO. I - March 4, 1970

CODES FOR DESCRIPTIONS OF SAMPLES
(If uncertain, or inapplicable, leave blank)

Release Code

A. Data may be released only to agencies of U.S. Gov't.
B. Data may be released only within U.S.G.S.
C. Data may be released only to submitter
D. Data may be released to anyone

Material class

A. Rock
B. Unconsolidated sediment
C. Organic material
D. Soil
E. Water
F. Other

Sample type

A. Single (grab)
B. Composite
C. Channel
D. Other

Sample source

A. Outcrop
B. Mine
C. Dump or prospect pit
D. Float
E. Drill hole
F. Marine
G. Other

Rock type (Be as specific as possible)

A. Unidentified rock
B. Sedimentary rock
C. Metamorphic rock
D. Igneous rock
E. Unconsolidated sediment
F. Conglomerate
G. Sandstone
H. Siltstone
I. Claystone
J. Shale
K. Limestone or dolomite
L. Carbonate
M. Gneiss
N. Schist
Ø. Quartzite
P. Marble
Q. Skarn
R. Phyllite or slate
S. Felsic igneous
T. Intermediate igneous
U. Mafic igneous
V. Ultramafic igneous
W. Feldspathoidal
X. Chert or jasperoid
Y. Other

See Rock Name Code

Igneous form

A. Plutonic
B. Extrusive
C. Dike/sill

Structural setting

A. Fracture/joint
B. Shear or fault
C. Other

Matrix (predominantly)

A. Silica
B. Fe/Mn
C. Carbonate
D. Clay
E. Other

Oxidation state

A. Oxidized
B. Partially oxidized
C. Unoxidized

Alteration

A. Propylitic
B. Argillitic
C. Siliceous
D. Sericitic
E. Feldspathic
F. Other

Ore minerals

A. Base metals
B. Precious metals
C. Mixed base and precious metals
D. Other

Mineral deposit form

A. Vein
B. Replacement
C. Disseminated
D. Other

ROCK NAME CODE

Rock Name	Code	Rock Name	Code	Rock Name	Code
adamellite	AD	camptonite	CM	epidotite	EP
agglomerate	AØ	carbonatite	CA	essexite	ES
augen gneiss	AG	cataclasite	CC	eucrite	EU
allivalite	AV	chalk	CK	evaporite	EV
alaskite	AE	charnockite	CH	felsite	FE
alluvium	AL	chert	CT	fenite	FN
amphibolite	AM	clay	CY	flint	FL
andesite	AN	claystone	CS	foyaite	FY
anhydrite	AH	coal	CØ	gabbro	GB
ankaramite	AA	colluvium	CV	geyserite	GY
anorthosite	AT	concentrate[1/]	C	glass	GL
anthracite	AC	concretion	CE	gneiss	GN
aplite	AP	conglomerate	CN	gossan	GØ
argillite	AR	coquina	CQ	granodiorite	GD
arkose	AK	crinanite	CR	granite	GR
ash	AS	dacite	DC	granophyre	GH
basalt	BA	diabase	DB	granulite	GA
basanite	BS	diatomite	DT	gravel	GV
bauxite	BX	diorite	DR	graywacke	GW
bentonite	BN	dolerite	DL	greenstone	GE
bostonite	BØ	dolomite	DØ	greisen	GS
buchite	BC	dunite	DN	grit	GT
breccia	BR	eclogite	EC	gypsum	GP
caliche	CL	epidiorite	ED	halite	HA

1/ Artifically concentrated sample (e.g. panned concentrate, heavy mineral separates, etc.).

ROCK NAME CODE -- Continued

Rock Name	Code	Rock Name	Code	Rock Name	Code
heavy sand	HS	malignite	MG	phonolite	PH
hornblendite	HR	marble	MB	phosphorite	PP
hornfels	HF	marl	MA	phyllite	PL
ijolite	IJ	melaphyre	ME	phyllonite	PN
ironstone	IR	melilitite	ML	picrite	PI
itabirite	IT	migmatite	MM	pitchstone	PS
jacupirangite	JC	minette	MI	porcellanite	PC
jadeite	JD	monchiquite	MØ	porphyry	PØ
jasperoid	JS	monzonite	MN	pumice	PU
jaspillite	JA	mud	MD	pyroxenite	PY
kentallenite	KN	mudstone	MS	quartz	QR
keratophyre	KE	mylonite	MY	quartzite	QZ
kersantite	KR	nephelinite	NE	rhyodacite	RD
kimberlite	KM	nodule	ND	rhyolite	RY
lamprophyre	LM	norite	NØ	sand	SN
lapilli	LP	novaculite	NV	sandstone	SS
laterite	LA	obsidian	ØB	schist	SC
latite	LT	olivinite	ØL	scoria	SA
leucetite	LC	ouachitite	ØU	stream sediment	SD
leucophyre	LE	ooze	ØZ	serpentine	SE
lignite	LG	palagonite	PA	shale	SH
limburgite	LI	peat	PT	black shale	SB
limestone	LS	pegmatite	PG	shonkinite	SØ
loess	LØ	peridotite	PR	sillimanite	SM
lugarite	LU	perlite	PE	silt	SI

ROCK NAME CODE -- Continued

Rock Name	Code	Rock Name	Code
Siltstone	ST	troctolite	TT
sinter	SR	tufa	TU
skarn	SK	tuff	TF
slate	SL	welded tuff	TZ
soapstone	SW	vitrophyre	VT
soil	S	vogesite	VØ
spillite	SP	wacke	WK
syenite	SY		
syenite, nepheline	SZ		
tachylite	TA		
taconite	TC		
tactite	TX		
tephrite	TP		
teschenite	TS		
theralite	TE		
tholeite	TH		
till	TI		
tillite	TL		
tinguaite	TN		
tonalite	TØ		
trachyte	TY		
trap	TR		
travertine	TV		

NOTE: If other rock or mineral names are to be coded, use free coding space.

ROCK NAME CODE -- Continued

MODIFIER CODE

Code	Igneous	Sedimentary	Metamorphic
+	meta (metamorphosed)	metamorphosed	metamorphosed
-	gneissic		
0	schistose	ferruginous	ferruginous
1	porphyry	conglomeratic	augen
2	quartz	sandy (arenaceous)	quartz
3	mica	clayey (argillaceous)	mica
4	felspathoid	silty	chlorite
5	olivine	limey (calcareous)	garnet
6	pyroxene	carbonaceous	pyroxene
7	amphibole	volcanic	amphibole
8		phosphatic	(Al silicate)
9	other	other	other
A		shaley	
B		foraminiferal	
C		diatom (diatomaceous)	
D		radiolarian	
E		siliceous	
F		terrigenous	
G		red	
H		gray	
J		tuffaceous	
K		dolomite (dolomitic)	
L		barite	
M		pyritic	

Geologic age of sample

(If more differentiation is needed or oldest possible age or youngest possible age are necessary, use free coding space.)

A. Precambrian undifferentiated	N. Triassic
B. Early Precambrian	P. Jurassic
C. Middle Precambrian	Q. Cretaceous
D. Late Precambrian	R. Tertiary undifferentiated
E. Paleozoic undifferentiated	S. Paleocene
F. Cambrian	T. Eocene
G. Ordovician	U. Oligocene
H. Silurian	V. Miocene
I. Devonian	W. Pliocene
J. Mississippian	X. Quaternary undifferentiated
K. Pennsylvanian	Y. Pleistocene
L. Permian	Z. Holocene
M. Mesozoic undifferentiated	

SIEVE CODE

(Use free coding space - use two columns* - maximum and minimum)

A.	greater than	H.	0.088 mm
B.	2.00 mm	I.	0.062 mm
C.	1.00 mm	J.	0.044 mm
D.	0.50 mm	K.	0.038 mm
E.	0.25 mm	L.	0.024 mm
F.	0.177 mm	M.	less than
G.	0.124 mm		

* EXPLANATION:

Maximum	Minimum	
A.	B.	= greater than 2.00 mm
D.	E.	= 0.50 - 0.25 mm
E.	H.	= 0.25 - 0.088 mm
J.	M.	= less than .044 mm
L.	M.	= less than .024 mm

Sieve Code

If it is necessary to identify in the Free Coding Space screened samples either for Marine use or for identification of splits of soils, stream sediments, etc., the Sieve Codes on page 9 of this Supplement may be used. You are urged to refrain from identifying sieved splits by mesh size.

Formation Name

Write formation and/or rock body name but do not exceed twenty-five (25) characters including blank spaces between names. Abbreviations are acceptable but must be consistent for retrieval and these abbreviations or other codes should be on file with our Data Retrieval Unit.

Comments

See page 38 of the Manual.

Instructions for Retrieval of Data from RASS II

In general, the instructions given in pages 39 to 43 of the Manual are applicable, but the Data Retrieval Group should be consulted as they will have any new changes.

SAMPLE SUBMITTAL MANUAL

Third Edition, 1969

Anexo 4

Instructions for submitting samples to the Branch of Analytical Laboratories and laboratories of the Field Services Section of the Branch of Exploration Research, and descriptions of procedures and computer systems for processing geochemical data.

Prepared by
Data Processing Group
Branch of Geochemical Census
U. S. Geological Survey
Denver, Colorado

Note

The coding scheme used for submitting samples to the Branch of Analytical Laboratories, as presented in this third edition of the manual, is not compatible with the scheme given in the second edition. In cases where large numbers of samples have been coded according to the scheme in the second edition, the submitter may wish to continue using the second edition for the duration of that project.

Data Processing Group

The Data Processing Group referred to on this manual is an informal unit within the Branch of Geochemical Census. Please contact Roy V. Mendes, Federal Center, Bldg. 25, Denver, Colorado (Phone: 303-233-3611, ext. 6568).

CONTENTS

CONTENTS

Preface

Research in the development of methods for information exchange in the geological sciences, including the development of machine techniques for the storage and retrieval of geologic data, is a subject of increasing concern throughout the geologic profession. A great deal of work on the subject is being done within industry, universities, and government. The development of procedures for storing geochemical data in a useable form is only a small part of this broader problem, but it too is still in the research stage. It would be self-defeating to think that either our present system or systems we have used in the past are perfected and can remain unchanged. We hope that this third edition of the "Sample Submittal Manual" will be received in this spirit.

The benefits to be derived from a machine system for storing and retrieving geochemical data are of two kinds--benefits to the project that supplied the samples, and benefits to other projects at a later time. The project that supplied the samples benefits by having the resultant data available in a form such that they can be selectively retrieved and automatically entered into a system of computer programs that will save the drudgery of data handling, thereby allowing more time for professional tasks. The benefits to other projects at a later time cannot be fully anticipated, but some likely examples are retrieval of data on specific geographic areas of interest to learn what data are available, retrieval of data on various geologic materials as an aid in formulating research problems, and retrieval of data and identification of materials meeting certain compositional specifications, especially in commodity studies.

We have observed that coding schemes being devised for describing geologic materials by other organizations are a great deal more comprehensive than either the one used in the first and second editions of this manual or the ones presented in this third edition. Indeed, the ones given in this edition are less comprehensive than those we have used previously. This results both from experience gained over the past 5 years allowing us to sort out better that part of the scheme which may be useful and that which seems less so, and from a gradual change in coding philosophy. While the more complete a coding scheme is the more useful it will be, we have come to realize that it may be better to have less information about the materials analyzed but to have this accurately and consistently.

The principal changes in the coding scheme introduced with this third edition are simplifications, primarily in coding descriptive information on sedimentary rocks and mineral deposits. Significant changes have been made in the methods for coding information on soils, metamorphic rocks, and unconsolidated sediments. Also, recognizing the fact that the need frequently arises for special purpose coding schemes for use within individual projects, we have set aside "free" space for such codes within the system.

Other changes from earlier editions consist of explanations of the total data system--RASS and STATPAC--and of procedures for their use.

Finally, the manual now includes procedures for submitting samples to laboratories of the Field Services Section of the Branch of Exploration Research in work pertaining to the Wilderness, Heavy Metals, Marine Geology and other programs.

INTRODUCTION

The purpose of this manual and the standardized sample submittal forms is to provide a means for supplying uniform descriptive information pertaining to rock samples and other materials submitted for analysis. The information will be stored in a computer-based file, along with the laboratory data resulting from the analyses, in such a way that it can be readily retrieved and tabulated or automatically prepared for further computer processing. This might be done in behalf of the geologist who originally submitted the samples for analysis, or in support of other geochemical studies as may be meaningful and appropriate. The data to be retrieved may be selected according to sample number, project number, geographic area, name of submitter, or according to other types of information, including coded sample descriptions, recorded on the sample submittal forms; they may also be selected on the basis of chemical properties of the samples as indicated by the analytical data.

From 1962 through 1967, data from the Branch of Analytical Laboratories and coded descriptive information on the samples analyzed were recorded on standard 80-column punch cards, and stored in a card file. Retrieval of data from the file, referred to as the Pre-68 Card File, is made by means of a card sorter. A computer-based file was initiated on January 1, 1968; data and descriptive information on samples submitted after this date are presently entered on magnetic tapes and retrieved by means of computer processing techniques. The computer-based file is referred to as RASS (Rock Analysis Storage System).

An overall view of the data processing system is diagrammed on figure 1. The components of the system are lettered A through J.

Component A (fig. 1) is the Pre-68 Card File of data on standard 80-column cards accumulated during the period 1962 through 1967. Retrievals from the card file are made by means of a card sorter (Component B), and entry of the retrieved data into the computer for further processing is done by special purpose programming (Component C). Because of the special programming required, preparation of data from the Pre-68 Card File for computer processing will be done only in support of high priority investigations. Retrievals and listings of the selected data from the card file, however, can be accomplished routinely. (See page 43 for instructions on requesting retrievals of data on samples submitted prior to 1968.)

Component D (fig. 1) is the principal RASS file containing the descriptive information and the analytical data on samples submitted to the Branch of Analytical Laboratories after January 1, 1968, and information and data on samples submitted to the Field Services Section Laboratories by certain projects. Analytical data may be selectively retrieved from the file and entered automatically on to a magnetic tape or disk (Component E) in a specific standardized format. Components E through J (fig. 1) make up the STATPAC system, and Component E is generally referred to as a STATPAC tape. The STATPAC tape is the central component of the system for computer processing of geochemical data. Once data are placed on a STATPAC tape, they may be processed through any of the computer programs in the STATPAC

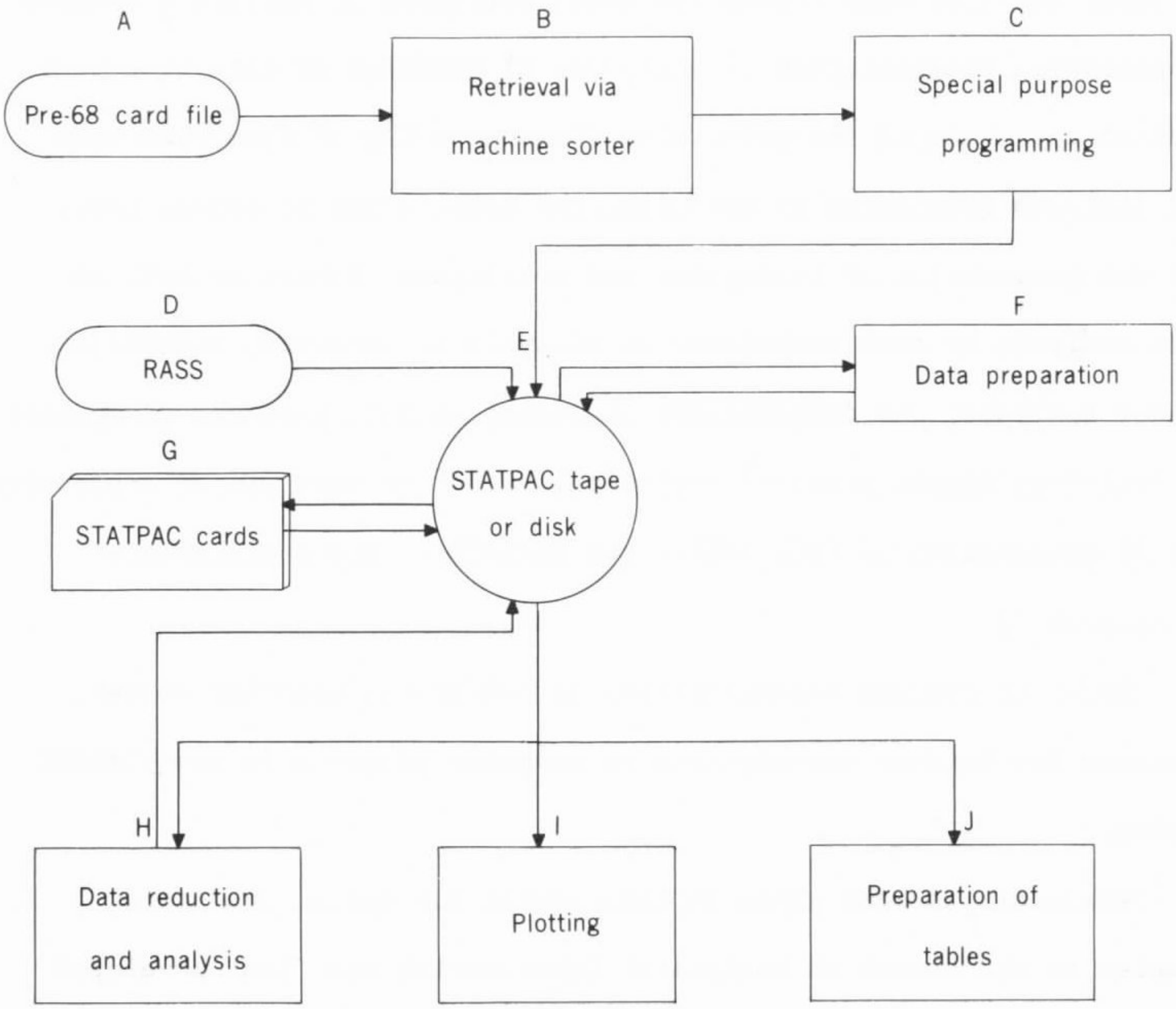


Figure 1.--Geochemical data processing system.

system. Moreover, the results of many types of computations provided by the STATPAC system can be automatically returned to a STATPAC tape for further processing. The programs in the STATPAC system include facilities for: 1) preparation of data (Component F) such as logarithmic or other kinds of data transformations, averaging of replicate samples or analyses , recalculation of analyses; 2) transfer of data to a card deck at any stage of the processing (Component G); 3) data reduction and analysis (Component H) including the computation of means, etc., and the preparation of histograms and contingency tables as well as data analysis by such techniques as analysis of variance, regression, factor analysis, and discriminant analysis; 4) data plotting (Component I) including simple plots of analytical values on maps and/or contouring; and 5) preparation of data tables for open-file type publications (Component J).

Refer to program documentations issued by the Computer Center Division for further descriptions of computer programs in the STATPAC system.

The coding scheme given in this manual for use in submitting samples to the Branch of Analytical Laboratories was first developed by several panels of specialists within the U.S. Geological Survey, and after a 5-year trial period was modified as a cooperative effort by several Branch of Geochemical Census personnel. A different coding scheme, developed in cooperation with the Branch of Exploration Research, is used for submitting samples to the Field Services Laboratories.

Two points regarding the coding schemes are emphasized:

1. The coding schemes are used in an attempt to provide consistent descriptive information on the wide variety of types of samples submitted for analysis. They will not necessarily be the best schemes that could be used for any particular sample suite.

2. The coding schemes include, for the most part, only characteristics of the samples that can be observed in the hand specimens or at the immediate sample locality. For many specimens or localities, however, the characteristics will not be observable and the coding will necessarily be incomplete. You are requested to code only those characteristics that are known at the time the samples are submitted for analysis. <u>Any additional information or corrections you care to submit at a later time, however, can be entered into the system</u>.

Suggestions for improvements in the coding schemes, consistent with the two points referred to above, and questions regarding the coding schemes or any other aspect of the data processing system should be addressed to the Data Processing Group.

INSTRUCTIONS FOR SUBMITTING SAMPLES TO THE BRANCH OF ANALYTICAL LABORATORIES

General

A copy of the "Coding Sheet and Request for Analysis" form to use in submitting samples to the Branch of Analytical Laboratories is shown on page 7. The instructions given here pertain only to the completion of this form. Before this is done, the request should be discussed with a Branch of Analytical Laboratories representative if it will involve either large numbers of samples or any laboratory work other than the most routine kinds. The samples and forms should be submitted to the Branch of Analytical Laboratories "Sample Control Representative" in either Washington, Denver, or Menlo Park.

The normal paths of the samples, the Coding Sheet and Request for Analysis forms, and the analytical data through the "mill" are shown on figure 2.

Coding Sheet and Request for Analysis Form

The "Coding Sheet and Request for Analysis" forms, comprised of front and continuation sheets, are made up in tablets consisting of an original sheet followed by 5 sheets of pressure-sensitive paper that make copies without carbons. Spaces are provided on the front sheet for information concerning the group of samples submitted. The remainder of the front sheet and the continuation sheets are used for descriptions of individual samples. When samples are submitted, an original plus four copies should be transmitted to the Branch of Analytical Laboratories. The fifth copy is retained by the submitter.

Submitted by: Example
John Smith
U.S. Geological Survey
Address: Washington, D.C.

Collected by: (if other than submitter)
Paul Jones

Release code A - Jan., 1972

Send carbon of report to:
Paul Jones
U.S. Geological Survey
Denver Federal Center

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
CODING SHEET AND REQUEST FOR ANALYSIS

Page 1 of 1 pages	Total No. of Samples 5
Date Submitted: 1-25-69	Date Results Needed: 7-1-69
Subdivision & Branch: Experimental Geology / Geochemical Census	
Project Title: Miscellaneous Investigations	
Project No. 976070	Lot No.
Approved by: (Branch Chief or Representative)	

LABORATORY USE ONLY
Report No.
Report Date:
Job No.
Lab. Comment:

Work Requested:
(List elements for partial anal.)

Rapid Rock Anal.
Quant. Chem. for Ba, Sr, Be, Th, & Zr.
Others: See Comments

PREVIOUS WORK DONE

Report No.	Type of analysis
66WS-7	Semiquant. spec.

Assigned Lab. No.	FIELD NO.	S.E. Corner–7½' Quad. LAT.	LONG.	STATE	COUNTY	FORMATION	SAMPLE NAME & DESCRIPTION
D101542	PJ-65-1	35°52'	111°30'	Ariz.	Coconino		Meteorite fragment

COMMENT:

11	12	13	14	15	16	17	19	20	21	22	23	24	25	26	27	28	29	30	35	36	37	38	39	70	71	72	73	74	75				
T	C	J					J	T																									

Assigned Lab. No.	FIELD NO.	LAT.	LONG.	STATE	COUNTY	FORMATION	SAMPLE NAME & DESCRIPTION
D101549	PJ-65-12	40°00'	105°30'	Colo.	Boulder	Boulder Ck. Granite	Biotitic quartz monzonite

COMMENT: This sample is highly weathered

11	12	13	14	15	16	17	19	20	21	22	23	24	25	26	27	28	29	30	35	36	37	38	39	70	71	72	73	74	75				
T	D	A	B				A	M	Q	C	N																					

Assigned Lab. No.	FIELD NO.	LAT.	LONG.	STATE	COUNTY	FORMATION	SAMPLE NAME & DESCRIPTION
D101565	PJ-65-85	39°15'	115°00'	Nev.	White Pine	Chainman Shale	Altered shale-adjac. to vein

COMMENT: Some pyrite is present

11	12	13	14	15	16	17	19	20	21	22	23	24	25	26	27	28	29	30	35	36	37	38	39	70	71	72	73	74	75				
T	H	F	I			B	C	C	S		A																					

Assigned Lab. No.	FIELD NO.	LAT.	LONG.	STATE	COUNTY	FORMATION	SAMPLE NAME & DESCRIPTION
D101586	PJ-65-137	14°45'	120°22'E	Phillippine Is.			Equisetum (scouringrush)

COMMENT:

11	12	13	14	15	16	17	19	20	21	22	23	24	25	26	27	28	29	30	35	36	37	38	39	70	71	72	73	74	75				
T	A						H	4	1	4	2	2	5	A	R	E	Q	U	0	2	5	5										

Assigned Lab. No.	FIELD NO.	LAT.	LONG.	STATE	COUNTY	FORMATION	SAMPLE NAME & DESCRIPTION
D125609	PJ-64-203	45°30'	112°15'	Mont.	Madison		Heavy mineral concentrate

COMMENT: Quant. Chem: Nb, Ta, Ce, La

11	12	13	14	15	16	17	19	20	21	22	23	24	25	26	27	28	29	30	35	36	37	38	39	70	71	72	73	74	75				
T	J	A	Y				D	2			A																					

INSTRUCTIONS: Prepare original plus 5 copies of this form: keep 1 copy; enclose 1 copy with samples; send original and 3 copies with memo to Laboratory. Do not mark in unnumbered boxes. Receipt of samples will be acknowledged.

Date Received _____ Estimated date of Completion _____ Signed _____
Liason Officer

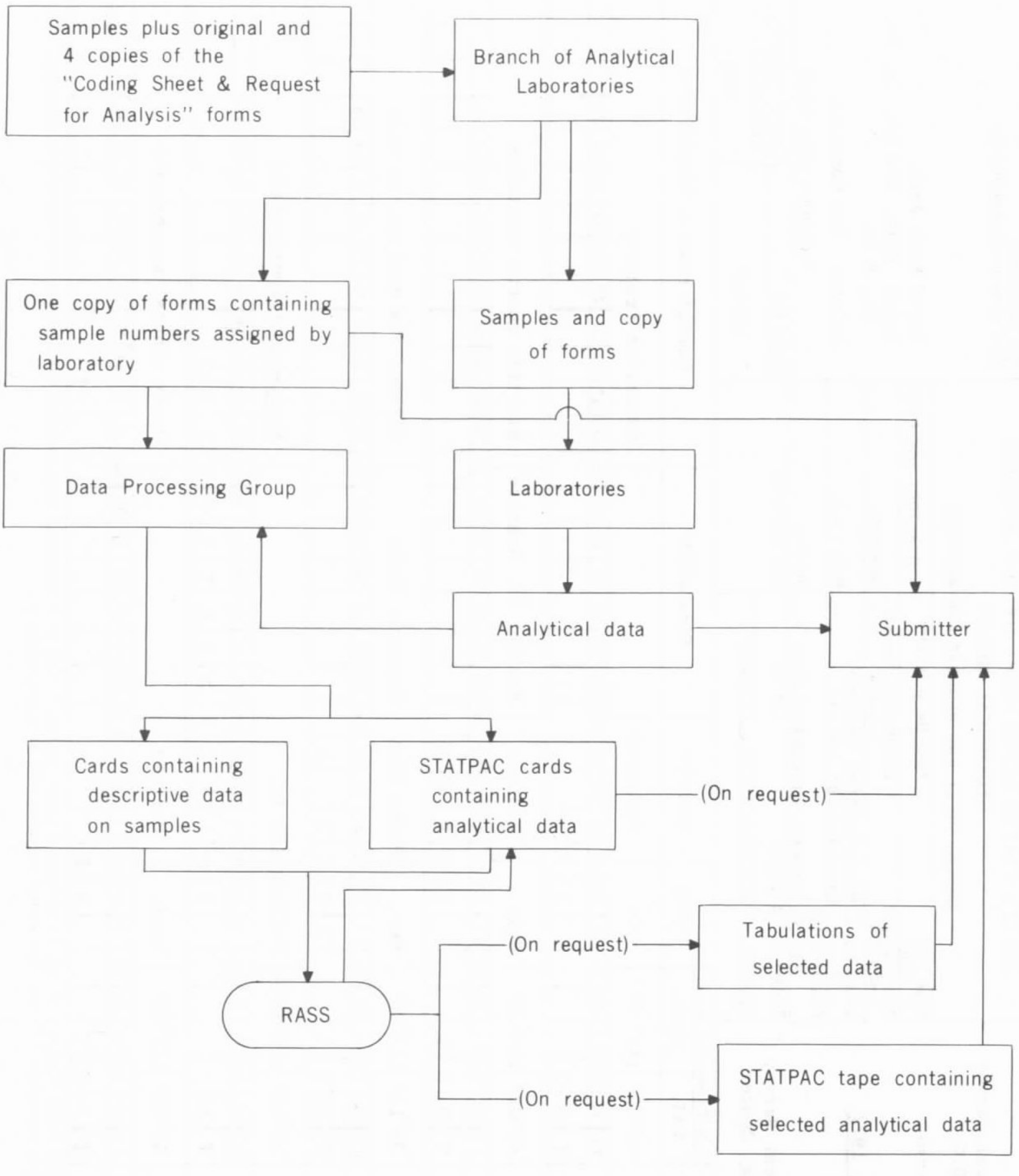


Figure 2.--Diagram showing organization of procedure for processing data from the Branch of Analytical Laboratories.

General information is requested at the top of the front sheet. The caption "Page 1 of __ Pages" refers to the total number of original (front sheet plus continuation) sheets submitted; continuation sheets should be numbered consecutively.

Data release code

The memorandum from the Chief Geologist regarding "Release of Analytical Data" reproduced on page 10 explains the system used in protecting the submitter against premature release of the data. The "release code" is for your protection and should be supplied if you wish any special precautions to be taken in restricting the distribution of the analytical data.

Work requested

In the "Work Requested" box, all types of spectrographic, chemical and physical properties analyses to be made on the entire suite of samples should be listed. If additional analyses are to be made on a few of the samples submitted, "Others: See Comments" should be written in the work requested box, and the additional analyses specified in the "Comment" boxes under the appropriate sample numbers. You are urged to discuss the work to be requested with a representative of the Branch of Analytical Laboratories.

C O P Y

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON, D.C. 20242

February 26, 1968

Memorandum

To: All professionals, Geologic Division

From: Chief Geologist

Subject: Release of Analytical Data

During the past 5 years, nearly all data generated by the Branch of Analytical Laboratories have been routinely entered into a card-based automatic data storage and retrieval system maintained by the Branch of Geochemical Census. One of the primary purposes in setting up the system was to establish a mechanism whereby data obtained for one purpose could be made available for others. To protect the original submitter against improper or premature release of data, it was stipulated that no release be made without his knowledge and permission. This has proved somewhat impractical, so a modified plan is being adopted.

In the future, for all samples to either the Branch of Analytical Laboratories or to the Field Services Laboratories of the Branch of Exploration Research, submitters will be asked to specify a "data release" code in the upper left-hand corner of their "Coding Sheet and Request for Analysis" form, and to list a date after which the data can be released without restriction. The codes are as follows:

A indicates that the analytical data may be released only to agencies of the U.S. Government.

B indicates that the data may be released only to people within the Survey.

C indicates that the data may be released only to the submitter.

The notation "B-Jan., 1972" in the upper left-hand corner of the analytical request form, for example, indicates that the submitter wishes the data to remain within the Survey until January of 1972. After this date it may be made available to anyone. Release codes and dates may be added or revised at any time on request by the submitter. If no release code is specified on the analytical request form, we will assume that, so far as the submitter is concerned, the data may be released to anyone.

/S/
Harold L. James

Requests for other "analytical services," such as preparation of thin and polished sections, should continue to be made on the forms now in use for these services.

Previous work done

The box headed "Previous Work Done" is to be filled in only if the entire suite of samples is being resubmitted for additional work. If some, but not all, of the samples are resubmittals, this information should be entered in the "Comments" box on the left side of the sheet under the appropriate sample number.

Sample description boxes

Each sample submitted is allocated a row of spaces headed consecutively: Assigned Lab No., Field No., Lat., Long., State, County, Formation, Sample Name and Description, together with a row of smaller numbered boxes beneath. Information in the top row of spaces is written out; information in the numbered boxes is coded.

Sample number

The Assigned Lab No. space on the left should be left blank for all new samples, but should be filled in for all resubmittals. Field No. refers to the sample identification number assigned by the sample collector or submitter.

Latitude and longitude

The latitude and longitude should be given in whole degrees and minutes, or in degrees, minutes, and seconds--not fractions thereof. Please ignore the reference to "SE Corner - 7½' Quad." on the Request for Analysis form (page 7). The latitude and longitude values can be transferred to a STATPAC tape with the analytical data to facilitate

automatic plotting of geochemical maps. If automatic plotting is planned, it is suggested that the latitude and longitude be given to the nearest second, or at least to a precision consistent with the scale to be used in the plotting. If automatic plotting is not planned, give latitude and longitude in degrees and minutes. (It will be convenient in many cases to provide the same approximate latitude and longitude for a large group of samples collected within one small area if automatic plotting is not planned.) North latitude and west longitude will be assumed unless otherwise noted.

State and County

State and county are written in the indicated fields by the submitter; state names may be abbreviated. For samples from Alaska, enter the name of the 2 degree AMS quadrangle in the field for county. Oceanographic samples should be designated "marine" in the county field. The name of the country should be written in the state and county fields for all samples from foreign countries except the following: Argentina, Australia, Brazil, Canada, China (mainland), India, Indonesia, Mexico, and Russia. For these nine countries, the name of the state or province should be given in addition to the name of the country.

Formation

The field for Formation should be filled in with the name of the stratigraphic unit, of formational rank or higher, represented by rock or mineral samples from the United States, Canada or Mexico. If the sample represents a named body of igneous rock, this name should be entered under Formation.

Sample Name and Description

The sample name and description field may contain the name of the sample material plus any descriptive modifiers. Use of this

field on the submittal form is especially important where the coding scheme does not provide an adequate description of the sample.

Comments

Additional information on individual samples can be placed in the spaces labeled "Comments" to the left of the numbered rows of boxes. These comments will be stored in the RASS file along with the analytical data and sample name and description. The stored comments (including the "Sample name and description") can be no longer than 64 characters, including spaces between words, punctuation, etc.

The purpose of the comments is to provide the submitter an opportunity to supply additional information about the samples that may be useful when the data are retrieved.

Numbered boxes

Information about individual samples is coded in the numbered boxes of the submittal form. Instructions and tables for coding follow in this section of the manual. Which boxes and how many boxes are to be used vary with the category of sample material (See page 19). These box numbers correspond to column numbers on standard 80 column punch cards.

Special purpose coding

Boxes 70 to 75 are reserved for your own special purpose coding scheme if such a scheme might be useful to you. The boxes may contain any individual characters A through Z or 0 through 9, as well as certain special characters compatible with

the computer system. The codes in the reserved boxes may be used as a basis for data retrieval with complete generality.

Replicated sample information

If certain items of information apply to a number of consecutive samples, ditto marks may be used to indicate this, and if the same description fits all the samples on a page, only the top sample on the page need be described, with the notation under Comments "all samples same." The rest of the samples on the page are then designated only by their sample field numbers.

Coding Instructions
Use "Coding Sheet and Request for Analysis" form (page 7)

1. Code boxes 11 to 17 as described on pages 16 to 18.
2. Code box 19 as indicated on page 19, and then code further descriptions of rock or other substances as indicated.
3. In cases where more than one code is applicable, use the one that is more specific (e.g. "Devonian" rather than "Paleozoic," "arkose" rather than "sandstone," "anthracite" rather than "coal.")
4. If unknown or very uncertain, leave blank. Do not code.
5. Boxes 70 to 75 are reserved for "private" special purpose codes that may be devised by individual projects to facilitate retrieval of selected data sets for computer processing. The Data Processing Group will assist you in devising special-purpose coding schemes if assistance is needed.

General

Box 11 - This is IMPORTANT - Place a "T" in box 11 to indicate that you are using this third edition of the sample submittal manual. - This is IMPORTANT.

Box 12 - Character of the sample.

Typical of a larger body or population at the sample site

Atypical of the larger body or population from which the sample was taken. (Sample was selected for some special attribute and is not intended to be typical.)

Typicalness unknown or uncertain

A	B	C	Single sample (e.g., hand specimen, grab sample)
D	E	F	Composite sample (e.g., chip samples)
G	H	I	Channel sample
J	K	L	Single, composite, channel or any other type sample processed in the field or laboratory (e.g., panned concentrate, mineral separate, purified, leached, ashed, evaporated, etc.). Use the codes on the following pages to describe the nature of the original unprocessed sample. Indicate the nature of the processed sample under "Sample name and description" and/or "Comments." 1/
X	Y	Z	Other

1/ Most plants, organic-rich soils and rock, and other organic materials are ashed in the laboratory prior to analysis and therefore should be coded here (Box 12) as J, K, or L.

Box 13 - Source of sample

(If unknown or inapplicable, do not code)

A. Natural outcrop (or surface layer)
B. Roadcut
C. Float
D. Open pit mine or quarry
E. Prospect pit
F. Underground mine
G. Mine dump
H. Mill product (smelters, tailings)
I. Refinery product
J. Drill core or auger sample
K. Drill cuttings, sludge
L. Produced from well (oil, water, etc.)
M. Marine sample
Z. Other

Boxes 14 - 16 - Geologic age of sample

(If unknown, very uncertain, or inapplicable, do not code)

Age known - code in box 14
Age uncertain - code oldest possible age in box 15 and youngest possible age in box 16.

A. Precambrian undifferentiated
B. Early Precambrian (Archeozoic)
C. Late Precambrian (Proterozoic)
D. Paleozoic
E. Cambrian
F. Ordovician
G. Silurian
H. Devonian
I. Mississippian
J. Pennsylvanian
K. Permian
L. Mesozoic
M. Triassic
N. Jurassic
P. Cretaceous
Q. Tertiary
R. Paleocene
S. Eocene
T. Oligocene
U. Miocene
V. Pliocene
W. Quaternary
X. Pleistocene
Y. Holocene

Box 17 - Economic geology

Use of this section is contemplated for identifying samples of ores and/or related protore or altered materials, or other samples of possible economic significance. Use the codes below if applicable, and describe the sample briefly under "Sample name and description" and/or "Comments."

Code in box 17
↓

A. Sample is of mineralized rock - contains epigenetic ore minerals. Code box 19 and other boxes as per instructions on page 19.

B. Sample is of altered rock - may contain epigenetic gangue minerals. Code box 19 and other boxes as per instructions on page 19.

C. Sample is of vein, cavity, or fracture filling, or is of material that has completely replaced a pre-existing rock, and contains ore minerals. Samples in this category, unless they are of single minerals or of one of the substances itemized on page 31, are generally coded as Z in box 19 (page 19), and no further coding is required.

D. Sample is of vein, cavity, or fracture filling, or is of material that has completely replaced a pre-existing rock, but contains gangue minerals only. Samples in this category, unless they are of single minerals or of one of the substances itemized on page 31, are generally coded as Z in box 19 (page 19), and no further coding is required.

E. Sample is from a residual concentration that is or may be of economic value (e.g. lateritic iron deposits, certain bauxite deposits, etc.). Samples in this category, unless they are of single minerals or of one of the substances itemized on page 31, are generally coded as Z in box 19 (page 19), and no further coding is required.

F. Sample has not been mineralized or altered, but contains or may contain economic concentrations of metals (e.g. magmatic segregation, sedimentary iron ore, placer, etc.). Code box 19 and other boxes as per instructions on page 19.

G. Sample has not been mineralized but is from material that is or may be of economic value as a non-metallic ore or product (e.g. phosphorite, oil shale, coal, building stone). Code box 19 and other boxes as per instructions on page 19.

Z. Other materials from or related to deposits of existing or potential economic significance. Code box 19 and other boxes as per instructions on page 19.

Category of sample material

Code in Box 19		For additional coding required, see page
A.	Igneous rock	20
B.	Metamorphic rock (including migmatite)	21
C.	Sedimentary rock	22
D.	Unconsolidated sediment	23
E.	Single mineral	24
F.	Soil	25
G.	Water	26
H.	Plant	27, 28, 29
I.	Organic fuel or related substance	30
J.	Miscellaneous (See list on page 31.)	31
Z.	Other 1/	—

1/ No further coding required. Describe sample briefly under "Sample name and description" and/or "Comments."

Note: DON'T FORGET TO PLACE A "T" IN BOX 11 (See top of page 16.).

Igneous rocks

(Use if and only if box 19 contains an A)
(Where more than one code is applicable, use the one that is more specific.) (If unknown or very uncertain, do not code.)

Box 20 - Form

Code

A. Lava flow
B. Volcanic breccia or agglomerate
C. Pyroclastic, unsorted, indurated
D. Pyroclastic, unsorted, loose
E. Pyroclastic, bedded, indurated
F. Pyroclastic, bedded, loose
G. Pyroclastic
H. Extrusive rock
J. Dike
K. Sill, laccolith, etc.
L. Stock
M. Pluton
N. Pipe or plug
P. Intrusive breccia
R. Intrusive rock
S. Flow or sill(?)
T. Inclusion (of uncertain origin)
U. Xenolith
V. Autolith
W. Segregation

Box 21 - Texture and structure

Porphyritic (code matrix texture)
| Non-massive (layered, laminated)
| | Massive
↓ ↓ ↓

A, B, C. Glassy
D, E, F. Aphanitic
G, H, J. Fine grained, < 1 mm
K, L, M. Medium grained, > 1 mm, < 5 mm
N, P, Q. Coarse grained, > 5 mm, < 2 cm
R, S, T. Pegmatitic, > 2 cm
U, V, W. Pumiceous
X, Y, Z. Other

Box 22 - Quartz-feldspar relations

Quartz-bearing
| Quartz-free (< 5% quartz)
↓ ↓

A, B. K-Na feldspars dominant
C, D. K feldspar=plagioclase
E, F. Plagioclase dominant
G, H. Feldspar present
J, K. Little or no feldspar
L, M. Feldspathoidal

Box 23 - Tentative name

A. Felsic igneous rock
B. Intermediate igneous rock
C. Mafic igneous rock
D. Ultramafic igneous rock
E. Alkalic igneous rock
F. Carbonatite
G. Alaskite
H. Granite
J. Pegmatite
K. Aplite
L. Syenite
M. Quartz monzonite
N. Monzonite
P. Granodiorite
Q. Quartz diorite
R. Diorite
S. Gabbro
T. Diabase
U. Dunite
V. Anorthosite
W. Pyroxenite
X. Amphibolite
Y. Peridotite
1. Rhyolite
2. Trachyte
3. Phonolite
4. Quartz latite
5. Latite
6. Dacite
7. Andesite
8. Basalt
9. Olivine basalt
+. Lamprophyre
-. Volcanic glass
*. Obsidian
@. Pumice

Z. Other (Give name under "Sample name and description.")

(List prominent accessory minerals under "Sample name and description" and/or "Comments.")

Metamorphic rocks

(Use if and only if box 19 contains a B)
(Where more than one code is applicable, use the one that is more specific)
(If unknown or very uncertain, do not code)

Box 20 - Type of metamorphism

Metaigneous
| Metasedimentary
| | Original rock type uncertain
↓ ↓ ↓

A, B. C. Contact metamorphism
D, E, F. Regional metamorphism
G, H, J. Shear metamorphism
K, L, M. Hydrothermal (metamorphic or deuteric)
N, P, Q. Mixed types of metamorphism

Box 21 - Facies or grade

(See Turner, F. J., 1968, Metamorphic Petrology: McGraw-Hill Book Company, pages 187 and 366)
Code

After Turner (1968)

A. Albite-epidote-hornfels facies
B. Hornblende-hornfels facies
C. Pyroxene-hornfels facies
D. Sanidinite facies
E. Zeolite facies
F. Prehnite-pumpellyite-metagraywacke facies
G. Greenschist facies
H. Amphibolite facies
J. Granulite facies
K. Glaucophane-lawsonite-schist facies
L. Eclogite facies

General

M. Low grade
N. Medium grade
P. High grade

Z. Other (Specify under "Comments")

Box 22 - Metasomatism

Code
1. Metamorphism was clearly metasomatic
2. Metamorphism may have been metasomatic
3. No evidence for metasomatism

Box 23 - Texture

Schistose (fissile)
| Gneissic (layered)
| | Massive
↓ ↓ ↓

A, B, C. Fine grained, <1 mm
D, E, F. Medium grained, 1 mm - 5 mm
G, H, J. Coarse grained, >5 mm
K, L, M. Inequigranular
N, P, Q. Porphyroblastic

Box 24 - Composition

Quartz present
| Quartz not present
| | Presence of quartz uncertain
↓ ↓ ↓

A, B. C. Calcareous or dolomitic (marble)
D. Siliceous (quartzite)
E, F, G. Ferruginous or manganiferous
H, J, K. Alumno-silicate, pelitic (schist, phyllite, mica gneiss)
L, M, N. Calc-silicate (skarn)
P, Q, R. Feldspathic (granite gneiss, syenite gneiss, biotite gneiss)
S, T, U. Mafic (greenstone, greenschist, amphibolite)
+, V, W. Ultramafic (serpentine, pyroxenite)
X, Y, Z. Other (Specify under "Comments")

(The examples in parentheses above do not include all the possible rocks in each category)

Note: List significant minerals, especially metamorphic index minerals, under "Sample Name and Description" and/or "Comments".

Sedimentary rocks

(Use if and only if box 19 contains a C)
(Where more than one code is applicable, use the one that is more specific)
(If unknown or very uncertain, do not code)

Box 20 - Tentative name

Code		Code	
A.	Claystone	M.	Bentonite
B.	Mudstone	N.	Phosphorite
C.	Shale	P.	Chert
D.	Siltstone	Q.	Breccia
E.	Sandstone	R.	Water-laid tuff
F.	Quartzite	S.	Oil shale
G.	Conglomerate	T.	Evaporite
H.	Arkose	U.	Sulphate deposit (gypsum, anhydrite)
I.	Graywacke	V.	Chloride deposit (halite, sylvite)
J.	Limestone, marlstone	W.	Carbonate deposit (nahcolite, etc.)
K.	Dolomite, dolomitic marlstone		
L.	Limestone and/or dolomite	Z.	Other (Describe sample briefly under "Sample name and description" and/or "Comments")

Boxes 21-22 - Modifier (Code up to 2 in order of predominance)

Code		Code		Code	
A.	Laminated	N.	Dolomitic	1.	Cherty
B.	Massive	P.	Bentonitic	2.	Tuffaceous
C.	Clastic	Q.	Ferruginous	3.	Volcanic
D.	Bioclastic	R.	Manganiferous	4.	Zeolitic
E.	Concretionary	S.	Carbonaceous (organic)	5.	Petroliferous
F.	Nodular	T.	Glauconitic	6.	Sulphatic (gypsum, anhydrite, etc.)
G.	Oolitic	U.	Arkosic	7.	Chloridic (halite, sylvite, etc.)
H.	Pelletal	V.	Lithic	8.	Carbonatic (nahcolite, etc.)
J.	Sandy	W.	Micaceous		
K.	Silty	X.	Phosphatic	Z.	Other (Specify under "Sample name and description" and/or "Comments")
L.	Clayey	Y.	Siliceous		
M.	Calcareous				

Box 23 - Environment of deposition

Code	
A.	Marine
B.	Continental
C.	Transitional

Unconsolidated sediments

(Use if and only if box 19 contains a D)
(Where more than one code is applicable, use the one that is more specific)
(If unknown or very uncertain, do not code)

Box 20 - Nature of material

Code
1. Gravel
2. Sand
3. Silt
4. Clay
5. Mud (silt and/or clay)
6. Ooze
7. Marl
8. Precipitate
9. Peat (may also be coded as an organic fuel, page 30)

Boxes 21-22 - Modifier (Code up to 2 in order of predominance)

Code	Code	Code
A. Laminated	N. Dolomitic	1. Cherty
B. Massive	P. Bentonitic	2. Tuffaceous
C. Clastic	Q. Ferruginous	3. Volcanic
D. Bioclastic	R. Manganiferous	4. Zeolitic
E. Concretionary	S. Carbonaceous (organic)	5. Petroliferous
F. Nodular	T. Glauconitic	6. Sulphatic (gypsum, anhydrite, etc.)
G. Oolitic	U. Arkosic	7. Chloridic (halite, sylvite, etc.)
H. Pelletal	V. Lithic	8. Carbonatic (nahcolite, etc.)
J. Sandy	W. Micaceous	Z. Other (Specify under "Sample name and description" and/or "Comments")
K. Silty	X. Phosphatic	
L. Clayey	Y. Siliceous	
M. Calcareous		

Box 23 - Environment of deposition

Code	Code
A. Stream deposit	M. Offshore bar or spit
B. Lake deposit	N. Deltaic deposit
C. Talus or colluvium	P. Lagoonal deposit
D. Alluvial fan deposit	Q. Estuarine deposit
E. Dunes sand or loess	R. Other type of marginal marine deposit
F. Swamp deposit	S. Marine terrace deposit
G. Spring deposit	T. Nearshore marine deposit
H. Residual or lag deposit	U. Deep sea deposit
I. Glacial deposit	V. Other type of marine deposit
J. Other type of continental deposit	
K. Beach deposit	
L. Tidal flat deposit	Z. Other

Minerals

(Use if and only if box 19 contains an E)
(Where more than one code is applicable, use the one that is more specific)
(If unknown or very uncertain, do not code)

Box 20 - Mineral group

Code

A. Native elements
B. Sulfides
C. Sulfosalts
D. Oxides (excluding SiO_2)
E. Multiple oxides containing Nb, Ta, Ti
F. Halides
G. Carbonates
H. Nitrates and borates
J. Sulfates and chromates
K. Phosphates
L. Vanadates and uranates
M. Arsenates and antimonates
N. Selenium and tellurium compounds
P. Molybdenates and tungstates
Q. Salts of organic acids
R. Forms of SiO_2
S. Feldspars, feldspathoids and zeolites
T. Amphiboles, pyroxenes and other chain structures (including polygorskite and sepiolite)
U. Micas, clays, and other sheet structures
V. Ring structures and isolated tetrahedra
W. Other silicates
Z. Other

Box 21 - Host material

Code

A. Mafic intrusive
B. Mafic extrusive
C. Intermediate intrusive
D. Intermediate extrusive
E. Felsic intrusive
F. Felsic extrusive
G. Pyroclastic
H. Pegmatite, vein
J. Serpentine, metamorphosed mafic rocks
K. Hornfels
L. Tactite
M. Quartzite
N. Slate
P. Phyllite
Q. Schist
R. Gneiss
S. Granulite
T. Marble
U. Shear product
V. Conglomerate, sandstone
W. Shale, siltstone
X. Limestone
Y. Dolomite
1. Evaporite
2. Alluvium
3. Colluvium
4. Glacial drift
5. Wind-blown deposit
6. Organic material
7. Beach deposit

Z. Other (Specify under "Comments".)

Boxes 26-30 - Alphabetic code for mineral name

Use a five-letter code (one letter in each box), 1st letter and following 4 consonants. Delete: a, e, i, o, u, and y unless entire name is $\leq$ five letters; if less than 4 consonants in name, leave blank boxes on the right.

Soils

(Use if and only if box 19 contains an F)
(Where more than one code is applicable, use the one that is more specific)
(If unknown or very uncertain, do not code)

(Note: Assistance in identifying and coding soil samples can be obtained from the Data Processing Group.)

Box 20 - Soil horizon

Code

A. Top soil (A horizon)
B. Intermediate zone (B horizon)
C. Bottom zone (C horizon)
E. Composite (mixture of zones)
F. No zoning apparent

Note: Record depth from which sample was taken under "Comments."

Box 21 - Soil category

(after Ball, D. F., 1967, Classification of soils, p. 121-125 in G. F. Peterken, ed., Guide to the check sheet of IBP areas: Oxford and Edinburgh, Blackwell Scientific Publications, 133 p.)

Code

A. Saline soil.
B. High sesquioxide (ferritic) soil. (Red to reddish brown in some or all horizons)
C. Organic soil. (Highly organic throughout profile; peat, bog)
D. Well-drained non-saline, non-ferritic, calcareous soil with well-marked soil horizons. (Strong profile development)
E. Well-drained non-saline, non-ferritic, non-calcareous soil with well-marked soil horizons.
F. Poorly drained non-saline, non-ferritic, calcareous soil with well-marked soil horizons.
G. Poorly drained non-saline, non-ferritic, non-calcareous soil with well-marked soil horizons.
H. Soil with poorly defined soil horizons (weak profile development) caused by climate. (Example--some desert soils, some arctic soils)
I. Soil with poorly defined soil horizons caused by youth of soil. (Example--recent alluvium, colluvium, regosol)
J. Humus (forest litter, etc.)

Box 22 - Present biotic setting

Code

1. Cultivated land (including orchards, pastures)
2. Native grassland
3. Scattered timber land
4. Forest
5. Swamp (including bog)
6. Desert
7. Tundra (including alpine tundra)
8. Shrub or brush covered (chaparral, sagebrush)
Z. Other

Water

(Use if and only if box 19 contains a G)
(Where more than one code is applicable, use the one that is more specific)
(If unknown or very uncertain, do not code)

Box 20 - Type of water

Surface water

A. Stream

B. Normal lake

C. Evaporite lake

D. Marginal marine (brackish)

E. Normal marine

F. Canals and similar works of man

G. Glacial

H. Other surface water 1/

Ground water

J. Spring

K. Well

L. Mine

M. Oil well brine

N. Other ground water 1/

Other water

S. Atmospheric

T. Liquid inclusions

U. Pore water

Z. Other 1/

Box 21 - Environment at collection site

Water temperature < 75°F

Water temperature > 75°F

A, B. Igneous rocks

C, D. Metamorphic rocks

E, F. Sedimentary rocks

G, H. Alluvium or other unconsolidated sediments

1/ Describe sample briefly under "Sample name and description" and/or "Comments."

Plants [1/]

(Use if and only if box 19 contains an H)
(Where more than one code is applicable, use the one that is more specific)
(If unknown or very uncertain, do not code)

(Note: Assistance in identifying and coding plant samples can be obtained from the Data Processing Group.)

Box 20 - Group	Box 21 - Class or Order	Common Name or Notes
1. Dicotyledoneae	(do not code Box 21)	Seed plants; broad-leafed, net-veined; trees, shrubs, forbs.
2. Monocotyledoneae	(do not code Box 21)	Seed plants; narrow-leafed, parallel-veined; grasses, sedges, lilies, etc.
3. Gymnospermae	----------	Mostly coniferous, evergreen trees and shrubs.
	1. Pinales	Pine, spruce, hemlock, fir, larch, cypress, juniper, etc.
	2. Taxales	Yew.
	3. Ginkgoales	Ginkgo (maidenhair) tree.
	4. Gnetales	Mormon tea, and a few others.
	5. Cycadales	Cycads, "sago palm."
4. Pteridophyta	----------	The ferns and fern relatives.
	1. Equisetinae	Horsetails, "scouring rush."
	2. Lycopodinae	Lycopodium, "ground pine."
	3. Filicineae	True ferns (including Azolla, Marsilia).
	4. Others	(Selaginella, Psilotum, Isoetes, etc.)
5. Bryophyta	1. Musci	Mosses.
	2. Hepaticae	Liverworts, leafy and thallose.
	3. Anthocerotae	Hornworts.
	4. Sphagna	Sphagnum.
6. Algae	1. Rhodophyta	Red algae; mostly marine.
	2. Phaeophyta	Brown algae; all marine.
	3. Pyrrophyta	Flame algae.
	4. Chrysophyta	Golden algae.
	5. Chlorophyta	Green algae, "pond scum."
	6. Charophyta	Stoneworts.
	7. Euglenophyta	Euglena and other amoeba-like.
	8. Cyanophyta	Blue-green algae.
7. Fungi	1. Phycomycetes	Water molds, white rust, bread mold, etc.
	2. Ascomycetes	Yeast, ergot, powdery mildew, truffles, morels, etc.
	3. Basidiomycetes	Mushrooms, puffballs, smuts, rusts, etc.
	4. Fungi Imperfecti	The imperfect fungi.
	5. Ascolichenes	Lichens, with Ascomycetes.
	6. Basidiolichenes	Lichens, with Basidiomycetes.
	7. Lichenes Imperfecti	The imperfect lichens.
8. Myxophyta	1. Myxomycetacea	Slime molds.
	2. Acrasieae	
	3. Plasmodiophoreae	
	4. Bacteriophyta	Bacteria.

1/ Also see pages 28 and 29.

Boxes 22 - 25 - Family

The families are to be coded by a 4-digit number, as presented on pages 9-33, "Family Names of the Plant Kingdom," International Plant Index, vol. 1, 1962 by Sydney W. Gould. Use only the numbers to the right of the letter "V"; all entries must be 4 digits in length. If the number is less than 4 digits, it should be preceded by zeros (e.g. 42 should be 0042).

Box 26 - 27 - Species

Coding: 1st two letters

Note: Reversal of the order of "Species" and "Genus" here is deliberate, and is done to accommodate certain features of the data processing system.

Boxes 28 - 30 - Genus

Coding: 1st three letters

Box 35 - Plant part

-. Whole plant.
0. Above ground parts (usually stems and leaves combined as 1 sample, but seeds and fruits may also be combined).
1. Roots.
2. Stems (including twigs, branches, trunk, or wood).
3. Leaves (including leaf stalks or petioles).
4. Stem tips (young branch tips with immature leaves).
5. Bark of roots.
6. Bark of stems (branches or trunk).
7. Seed.
8. Fruit (Note: grass seed and cereal grains are fruits.).
9. Flowers (including entire inflorescence).
Z. Other

Box 36 - Habitat

0. Xerophyte (plants specially adapted to and growing in dry locations).
1. Mesophyte (plants growing in soil of moderate moisture content).
2. Hydrophyte (plants growing in bogs, swamps; aquatic plants).
3. Phreatophyte (plants whose roots extend to ground water table and are thus able to grow in very dry surface soil).
4. Halophyte (plants specially adapted to and growing in high salt concentrations in the soil, including "alkali" soil).
5. Epiphyte (plants growing on other plants, but deriving moisture from the air).
6. Parasite (plants growing on other plants and deriving nourishment from them).
7. Saprophyte (plants growing on decaying organic matter).

Box 37 - Life form

0. Tree, conifer (usually evergreen, with needle-like leaves).
1. Tree, non-conifer (usually deciduous, with broad leaves).
2. Shrub, conifer.
3. Shrub, non-conifer.
4. Forb (herbaceous, usually broad-leaved, plants).
5. Grass and grass-like (including sedges and rushes).
6. Vine, woody.
7. Vine, herbaceous.

Z. Other

Box 38 - Biotic setting

1. Cultivated land (including orchards, pastures)
2. Native grassland (grazing land)
3. Scattered timber land
4. Forest
5. Swamp (including bog)
6. Desert
7. Tundra (including alpine tundra)
8. Shrub or brush covered (chaparral, sagebrush)

Z. Other

Organic fuels and related substances
(Use if and only if box 19 contains an I)
(Where more than one code is applicable, use the one that is more specific)
(If unknown or very uncertain, do not code)

Box 20 - Tentative name of fuel or related substance
Code

A. Peat (May also be classified as an unconsolidated sediment, page 23).

B. Coal

C. Lignite

D. Subbituminous coal

E. Bituminous coal

F. Anthracite coal

J. Natural gas

K. Petroleum

L. Solid and semi-solid hydrocarbon (asphalt, gilsonite, etc.)

Z. Other (Describe briefly under "Sample name and description" and/or "Comments.")

Note: **Samples of oil shale should be coded as sedimentary rocks.**

Miscellaneous

(Use if and only if box 19 contains a J)
(Where more than one code is applicable, use the one that is more specific)
(If unknown or very uncertain, do not code)

Box 20
Code

A. Gossan

B. Limonite

C. Jasperoid

D. Nodule or concretion

E. Plant fossil

F. Invertebrate fossil

G. Vertebrate fossil

H. Modern shell

J. Animal parts

K. Artifact

L. Synthetic solution

M. Synthetic product (other than a solution)

N. Desert varnish

P. Caliche

Q. Duracrust

R. Fumarolic sublimate

S. Fault breccia, mylonite, or gouge

T. Meteorite

U. Tektite

Describe sample briefly under "Sample name and description" and/or "Comments."

INSTRUCTIONS FOR SUBMITTING SAMPLES TO THE FIELD SERVICES SECTION LABORATORIES OF THE BRANCH OF EXPLORATION RESEARCH

General

Only data from certain projects submitting samples to the Field Services Section Laboratories are entered into the RASS system. Other projects will use the same Request for Analysis forms in submitting samples, but they need only be partially completed. A copy of the front page of the Request for Analysis form is shown on page 33, and a list of descriptive codes is given on page 34. The flow of the samples, Request for Analysis forms, and the analytical data through the mill is diagrammed in figure 3.

To make arrangements for having the data from your project entered into RASS, contact the Data Processing Group.

Page 1 of 1 Pages.

REQUEST FOR ANALYSIS

Job No.
No. of Samples 5

Submitter: J.L. JONES
Address: DENVER
Phone No.: EXT. 3456
Project No.: 976020
Security Status: B (code)

Date submitted: 8-14-68
Collected from State: NEVADA
County: ELKO
Offshore / / check
Applicable until: JAN., 1970 (date)

Send to:
Sample Control
Rm. 1421, Bldg. 25
Federal Center
Denver, Colo. 80225

WORK REQUESTED

AA or chemical: (circle) Au, Hg, (Cu), Pb, Zn, CxHM, CxCU, Ag, As, Sb, Mo, Te, U, Ni, Co, W, Other: (specify)	Assay (specify)	Spectrographic: (circle) (Semiquant. standard 30 elements) Quantitative (specify) Other (specify)	Check here if arrangements have been made to store data in RASS ✓

**** Put remarks or special instructions on reverse side. ****

DESCRIPTION OF SAMPLES

Check or code as indicated

(Please group samples of similar type together on forms below)

Results needed by: Nov., 1968 (date)

Field No.	Tag No.	Location (degrees, minutes, seconds) or X - Y grid: Lat. (X)	Long. (Y)	Check One: ROCK	SOIL	STR. SEDIMENT	ORGANIC MATERIAL	OTHER	Codes for RASS: MATERIAL CLASS	SAMPLE TYPE	SAMPLE SOURCE	ROCK TYPE	IGNEOUS FORM	STRUC. SETTING	MATRIX	OXIDATION STATE	ALTERATION	ORE MINERALS	MINERAL DEP. FORM	CONCENTRATE 1/	Comments
JLJ-37	ABC 123	115°30'25"	41°06'42"		X				5	S	A										
JLJ-38	ABC 124	115°45'00"	40°39'20"			X			B	U	—										
JLJ-39	ABC 125	114°50'08"	40°30'10"	X					A	S	—	K									DOLOMITE
JLJ-5X	ABC 205	115°08'30"	41°00'03"	X					A	S	—	T	C		A		D				
JLJ-107	ABF 061	114°55'03"	40°10'38"					X	O	S	↓				C						CONTAINS SOME SULFIDES

1/ Place a "C" in this column if the sample to be analyzed is an artificial concentrate (e.g. panned concentrate, heavy mineral separate, etc.).

CODES FOR DESCRIPTIONS OF SAMPLES
(If uncertain, or inapplicable, leave blank)

Security status

A. Data may be released only to agencies of U.S. Gov't.
B. Data may be released only within U.S.G.S.
C. Data may be released only to submitter.
D. Data may be released to anyone.

Material class

A. Rock
B. Unconsolidated sediment
C. Organic material
5. Soil
O. Other (zero)

Sample type

S. Single (grab)
U. Composite
V. Channel
Z. Other

Sample source

A. Outcrop or surface layer
B. Mine
F. Dump or pros. pit
Ø. Float
P. Drill hole
N. Other

Rock type (Be as specific as possible)

A. Unidentified rock
B. Sedimentary rock
C. Metamorphic rock
D. Igneous rock
E. Unconsolidated sediment
F. Conglomerate
G. Sandstone
H. Siltstone
I. Claystone
J. Shale
K. Carbonate
L. Gneiss
M. Schist
N. Metaquartzite
Ø. Marble
P. Skarn
Q. Phyllite
R. Slate
S. Felsic igneous
T. Intermediate igneous
U. Mafic igneous
V. Ultramafic igneous
W. Feldspathoidal
Y. Chert or jasperoid
X. Other

Igneous form

A. Plutonic
B. Extrusive
C. Dike/sill

Structural setting

A. Fracture/joint
B. Shear or fault
C. Other

Matrix (predominantly)

A. Silica
B. Fe/Mn
C. Carbonate
D. Clay
E. Other

Oxidation state

A. Oxidized
B. Partially oxidized
C. Unoxidized

Alteration

A. Propylitic
B. Argillitic
C. Siliceous
D. Sericitic
E. Feldspathic
F. Other

Ore minerals

A. Base metals
B. Precious metals
C. Mixed base and precious metals

Mineral deposit form

A. Vein
B. Replacement
C. Disseminated
D. Other

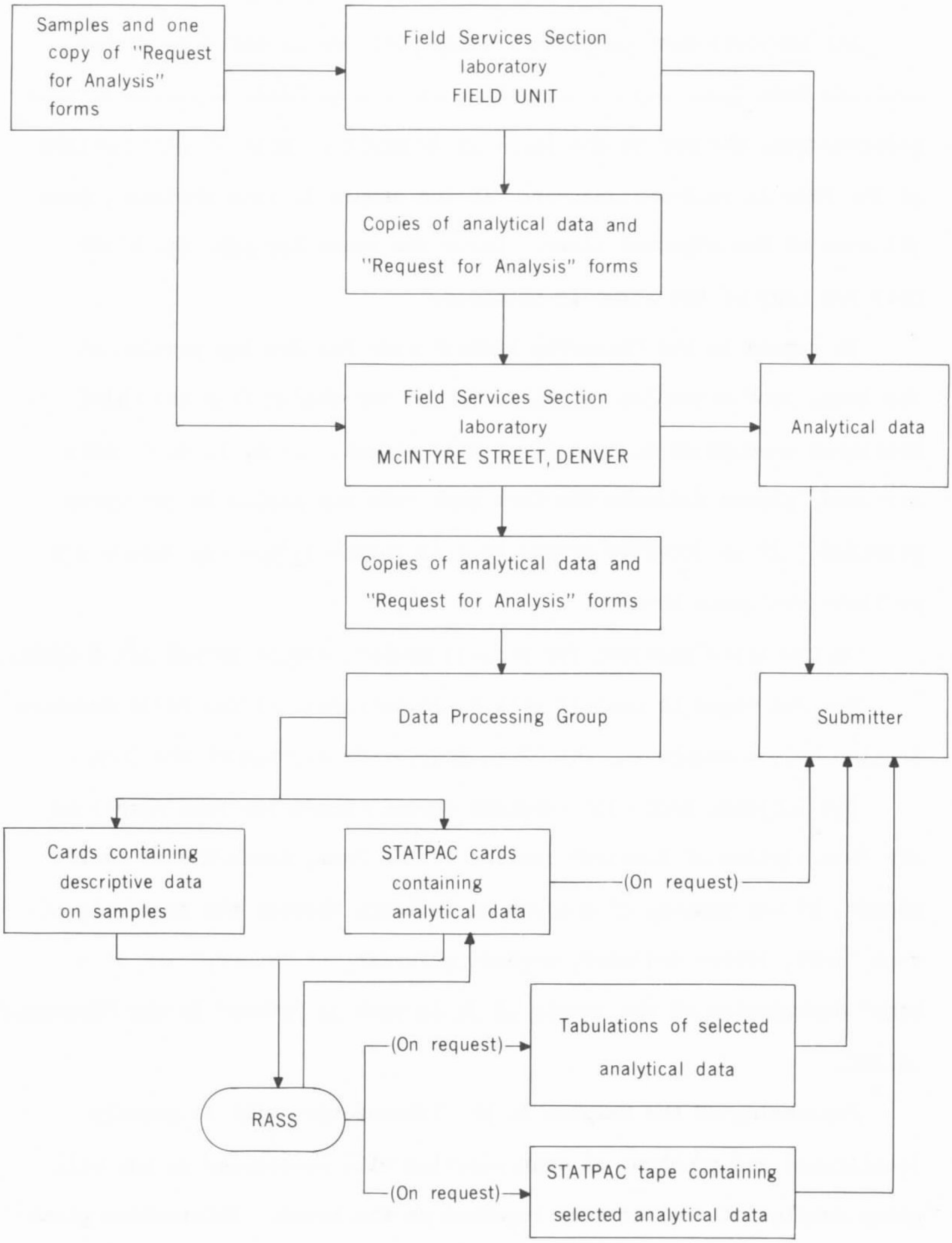


Figure 3.--Diagram showing organization of procedure for processing data from laboratories of the Field Services Section of the Branch of Exploration Research.

General Instructions for All Projects

All projects must complete the top portions of the Request for Analysis form (page 33) on submitting samples to Field Services Section Laboratories, whether in the field or in Denver. Most of this portion of the form is self-explanatory. If the sample is from offshore, give the name of the adjacent state. Leave the space for Job. No. blank. Only one copy of the forms is required.

In regard to the "Security Status" code for the top portion of the form, your attention is called to the memorandum from the Chief Geologist reproduced on page 10 of this manual. If A, B, or C codes are used, please indicate the date such code may expire in the space provided. If no Security Status code is required, you may insert a D or leave the space blank.

In the space provided for project number, please record all 6 digits.

You are urged to consult with representatives of the Field Services Section before completing the "Work Requested" portion of the form.

All projects must also complete certain items for each sample on the "Description of Samples" portion of the form, including a) field number, b) tag number, c) a check to indicate whether the sample is of rock, soil, stream sediment, organic material, or "other," and d) a brief description of the sample if it is rock or "other" in the "Comments" column.

Processing of the samples in the laboratories will be greatly facilitated and problems of contamination will be reduced if you will group samples of similar kind together on the forms. Information given in the "Comments" column of the form will also help in this regard, and will be of aid to the analyst in selecting the best laboratory technique.

Special Instructions for Projects Having Data Entered Into RASS

Additional requirements for completion of the Request for Analysis forms for projects having their data entered into RASS are: a) a check in the appropriate place in the right-hand part of the Work Requested section of the form, b) coded descriptions of the samples and the geologic environments from which they were taken, and c) if automatic plotting of maps is contemplated, either the latitude and longitude at which each sample was taken, or an X-Y location based on a grid coordinate system of your own choosing.

Coded descriptions of the samples

Aside from checking the form to indicate whether the sample is of rock, soil, stream sediment, organic material, or "other," a coded description of the sample and, if applicable, the environment from which the sample was taken must be given in the columns indicated on the form. The codes are defined on page 34 of this manual, and are self-explanatory.

Latitude and longitude or X-Y location

This information should be recorded on the Request for Analysis form if automatic plotting of geochemical maps is contemplated, or if data are to be retrieved by location other than state or county. The location at which each sample was collected may be given as latitude and longitude, or in terms of an X-Y coordinate scheme defined specifically for the project area, but one or the other method, not both, should be used for a given project. The accuracy of the final geochemical maps will, of course, depend on the degree of detail and care with which the location information is recorded. The degree of detail should be consistent with the scale at which the data are to be plotted.

Latitude and longitude may be given in whole degrees, minutes, and seconds, not fractions thereof. One second of latitude equals about 100 feet. One second of longitude equals about 85 feet in Arizona and 70 feet in Idaho.

Values of X and Y may be either positive or negative and may contain up to 5 figures, with or without a decimal point (e.g. 100.86, 10086, -10086, 9999.9, 9.9999, -99.999, or 99999 are all acceptable). This will allow a location accuracy of 1 foot in an area 38 miles across, or of 10 feet in an area 380 miles across, if the coordinate scheme is properly defined.

Comments

The "Comments" field on the Request for Analysis form is for additional information pertaining to the sample that is not provided for in the coding scheme. The comments will be stored in the RASS file along with the coded information and the analytical data. The comments can be retrieved with the data, but cannot be used as a basis for searches. Comments are limited to 64 characters in length, including spaces between words and all punctuation. Please be legible.

Field No. and Tag No.

The records in the RASS file are sequenced according to "Tag No." and tag numbers, therefore, provide a more convenient basis for retrieval than do field numbers. Because tag numbers are consistently 6-digit numbers, they are also better suited for handling in computer processing. However, if you anticipate that retrieval of your data by field number will be necessary, please make prior arrangements with the Data Processing Group before your samples are submitted to the laboratory.

Codes for other information

The coding scheme presented here for samples submitted to the Field Services Section is only a subset of that which can be used in the RASS system. If you wish to enter and retrieve data on the basis of coded geologic age, formation name, or other factors, please contact the Data Processing Group before submitting your samples to the laboratory.

INSTRUCTIONS FOR RETRIEVAL OF DATA FROM RASS

The information supplied when submitting samples for analysis, and the analytical data, are stored on magnetic tapes as part of the RASS system. Information and data pertaining to samples submitted to the Branch of Analytical Laboratories are on one group of tapes, and that on samples submitted to the Field Services Section Laboratories, are on another. In either case, selected data can be retrieved by contacting the Data Processing Group. A search statement will be formulated to define the samples on which data are to be retrieved. It will be necessary to know whether the retrieved data are only to be listed, or whether specific data are to be transferred to either a STATPAC tape or a STATPAC card deck for processing in one or more programs of the STATPAC system. The responsibility of the Data Processing Group ends when the data requested are tabulated or placed on a STATPAC tape or card deck and transmitted to the requester. The responsibility for analysis and interpretation of the data are his. The Data Processing Group, however, will be of whatever assistance it can in an advisory capacity, and in some cases will prepare statistical summaries of the data if requested to do so.

Search statements

The search statement contains the criteria defining the samples on which data are to be retrieved. It may consist simply of a list of laboratory or tag numbers, or it may contain any criteria supplied on the Request for Analysis forms when the samples were submitted to the laboratory. <u>If the information was not supplied on the Request for Analysis forms, of course, it cannot be the basis for data retrieval</u>. Other criteria which may be contained in the search statement consist of the analytical results. Typical search statements may be formulated as follows:

A) All data on samples where:

1. The project number is either 976070 or 976071.
2. The date of submittal was June 1, 1968 or later.
3. The sample is from Utah, Nevada, Arizona, or California.
4. The geologic age is Cambrian.
5. The rock name is either sandstone or quartzite.
6. The Al_2O_3 content is equal to or greater than 3%.
7. The data release code is not A, B, or C.

B) Data on the Fe_2O_3 contents of all samples where:

1. The sample locality is west of the 100th meridian, but in the U.S.
2. The sample is from a volcanic flow.
3. Either the SiO_2 content is less than 50% <u>or</u> the sample was identified as quartz-free.
4. The data release code is not C.

C) All data on all soil samples:

1. Collected in Arizona.
2. Submitted by J. L. Jones or J. Q. Doe.

Entry into the STATPAC system

Any of the analytical data on samples satisfying the criteria contained in the search statement, as well as the latitude and longitude or X-Y location data, may be transferred from the RASS file to a STATPAC tape or a STATPAC card deck. The particular tape, identified by a tape number, may be supplied by the requester or by the Data Processing Group.

When the retrieval has been completed, the requester will be given the following information:

1) Tape number.

2) Data set identifier.

3) N, the number of samples represented on the tape.

4) M, the number of variables (elements) represented on the tape.

5) Identification of the variables on the tape.

With this information (or, alternatively, with a STATPAC card deck) the requester will be able to process the retrieved data in the STATPAC system. Assistance may be obtained from personnel of either the Computer Center Division or the Branch of Geochemical Census. A diagram showing some of the principal programs contained in the STATPAC system is given in figure 4. The function of each program is described in a program documentation available from the Computer Center Division. The program documentations should be requested by number.

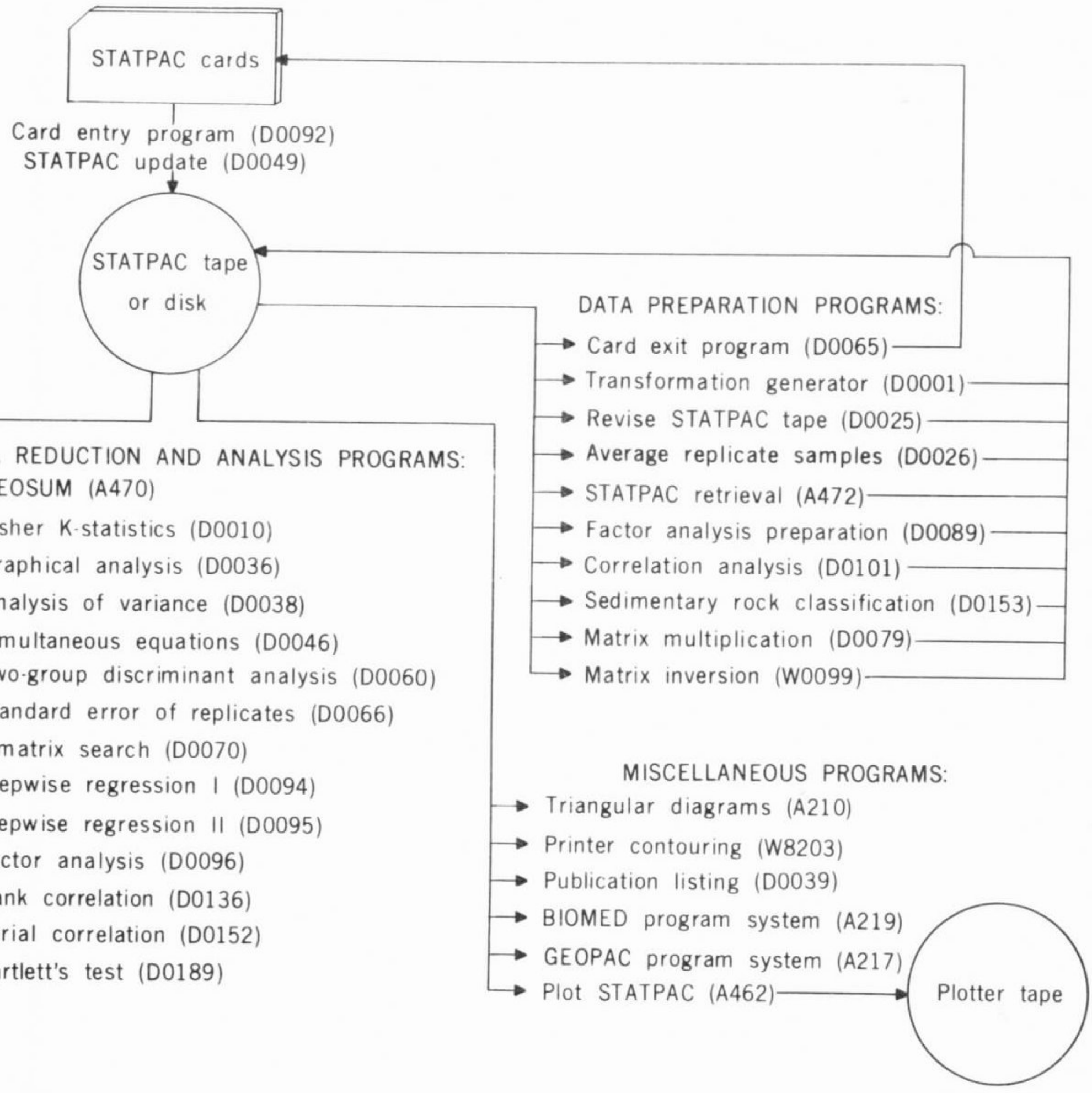


Figure 4.--Diagram of part of the STATPAC system.

INSTRUCTIONS FOR RETRIEVAL OF DATA FROM THE PRE-1968 CARD FILE

Data on samples submitted prior to 1968, stored in the Pre-1968 Card File, may be retrieved by contacting the Data Processing Group. Search statements will be formulated in the same way as described in the preceding section for retrieving data from RASS. Retrieved data will be supplied routinely in the form of a listing only. If the work is of particular importance or significance, the data may in some cases be placed on a STATPAC tape through some special programming effort. An attempt is being made to supply this service routinely, however, and you are urged to consult with the Data Processing Group if you wish to process data from the Pre-1968 Card File in the STATPAC system.

Anesco 5

3/30/71

Celia

PRIORITY CODE

FIELD SERVICES SECTION

1. Any Wilderness not having field support.

2. Any SIR or Wilderness program work requiring regular four-month-turn-around. 93

3. Will be non-SIR funding, Coop, or OIG.

4. Any Geologic Division work other than Mineral Resources (other Sub-activities).

5. Foreign work (different from OIG, i.e., work sent through from Brazil, Turkey, etc., to us here.

6. State Geologists.

7. Top Priority (i.e. walk it through. Gets personal attention all the way through our shop).

Everything has a four-month-turn-around time, with the exception of a P7 which is walked through.

FILM NO.

REPORT NO.

SEMI-QUANTITATIVE SPECTROGRAPHIC - FIELD SERVICES SECTION ANALYSIS

6 - Step D.C. Arc Request by _____ Date _____

Sheet #1

	(.05) Fe %		(.02) Mg %		(.05) Ca %		(.002) Ti %		(10) Mn		(.5) Ag		(200) As		(10) Au		(10) B		(20) Ba		D M W	Tag No.		11	Field No.	
	1	2-7	8	9-14	15	16-21	22	23-28	29	30-35	36	37-42	43	44-49	50	51-56	57	58-63	64	65-70	71	72-77	78	79-80	////////////	
1																						///////		11		1
2																								11		2
3																								11		3
4																								11		4
5																								11		5
6																								11		6
7																								11		7
8																								11		8
9																								11		9
10																								11		10
11																								11		11
12																								11		12
13																								11		13
14																								11		14
15																								11		15
16																								11		16
17																								11		17
18																								11		18
19																								11		19
20																								11		20
21																								11		21
22																								11		22
23																								11		23
24																								11		24

Fluco 6-1

REMARKS: Fe, Mg, Ca, and Ti reported in %, all other elements reported in ppm. Results are in the series 1, 0.7, 0.5, 0.3, 0.2, 0.15, 0.1, etc. Lower limits of determination are in parenthesis.

FILM NO.

REPORT NO. ANALYST _____

Sheet #2

	(1) Be	(10) Bi	(20) Cd	(5) Co	(10) Cr	(5) Cu	(20) La	(5) Mo	(10) Nb	(5) Ni	DMW	Tag no.	12	Field No.	
	1 2-7	8 9-14	15 16-21	22 23-28	29 30-35	36 37-42	43 44-49	50 51-56	57 58-63	64 65-70	71	72-77 78	79-80	//////////	
1												//////	12		1
2													12		2
3													12		3
4													12		4
5													12		5
6													12		6
7													12		7
8													12		8
9													12		9
10													12		10
11													12		11
12													12		12
13													12		13
14													12		14
15													12		15
16													12		16
17													12		17
18													12		18
19													12		19
20													12		20
21													12		21
22													12		22
23													12		23
24													12		24

Duenco 6-2

FILM NO.

REPORT NO.

G= Greater than 10%, or Greater than value shown.
H = Interference
- = Not look for.

N = Not detected at limit of detection, or at value shown.
L = Detected, but below limit of determination, or below value shown.
* = Usual limits of determinations do not apply due to use of dilution technique.

	(10) Pb	Pd	Pt	(100) Sb	(5) Sc	(10) Sn	(100) Sr	Te	U	(10) V	DMW	Tag No.	13	Field No.	
	1 2-7	8 9-14	15 16-21	22 23-28	29 30-35	36 37-42	43 44-49	50 51-56	57 58-63	64 65-70	71	72-77 78	79-80	//////////	
1												//////	13		1
2													13		2
3													13		3
4													13		4
5													13		5
6													13		6
7													13		7
8													13		8
9													13		9
10													13		10
11													13		11
12													13		12
13													13		13
14													13		14
15													13		15
16													13		16
17													13		17
18													13		18
19													13		19
20													13		20
21													13		21
22													13		22
23													13		23
24													13		24

Redo 6/3

FILM NO.

REPORT NO.

NOTE: Some combinations of elements affect the limits of determination. Approximate values are given. In unusually favorable materials, co entrations somewhat lower than the v ues given may be detected. In unfavorable materials the given limits of determination may not be attained for some of the elements.

Sheet #4

	(50) W		(10) Y		(200) Zn		(10) Zr		Si%		Al%		Na%		K%		P%		Ce		DMW	Tag No.		14	Field No.	
	1	2-7	8	9-14	15	16-21	22	23-28	29	30-35	36	37-42	43	44-49	50	51-56	57	58-63	64	65-70	71	72-77	78	79-80	//////////	
1																						///////		14		1
2																								14		2
3																								14		3
4																								14		4
5																								14		5
6																								14		6
7																								14		7
8																								14		8
9																								14		9
10																								14		10
11																								14		11
12																								14		12
13																								14		13
14																								14		14
15																								14		15
16																								14		16
17																								14		17
18																								14		18
19																								14		19
20																								14		20
21																								14		21
22																								14		22
23																								14		23
24																								14		24

FIELD SERVICES SECTION

Submitter: ____________ HM ____________

ELEMENT AND METHOD ANALYST ELEMENT AND METHOD ANALYST

Amesco 6-5

Amesco-6-5

Completion Date ____________

DATE:

FIELD NO.	TAG NO.								

REMARKS: G = Greater than value shown; H = Interference; - = Not looked for; N() = Not detected at limit of detection, or at value shown; L() = Detected, but below limit of determination, or below value shown; * = Usual limits of determinations do not apply due to use of dilution technique or different sample weight; INS = Indicates insufficient sample.
All values reported in parts per million unless otherwise noted.

Requestor:

Analyst:

F/A:

FIELD SERVICES SECTION

FIRE ASSAY

Page No.____ of____.

Film No.

Spec.:

AA:

HM

		Date	FIRE ASSAY---AA		FIRE ASSAY----SPECTROGRAPHIC				
			32 / 1	32 / 8	32 / 15	32 / 22	32 / 29	32 / 36	32 / 50
Field No.	Tag No.	Sample Weight	Au ppm	Ag ppm	Pt ppm	Pd ppm	Rh ppm	Ru ppm	Ir ppm

Aureco 6-6

FORM 9-1569
(SEPT. 1964)

Anexo 7-1

STANDARD USGS DATA FORM

RASS II • Jan. 1971
Location of analytical variables

Tag e Tipo de carta

	1 ± x x x x x	± ee	2 ±	± ee	3 ±	± ee	4 ±	± ee	5 ±	± ee	6 ±	± ee	7 ±	± ee	8 ±	± ee	9 ±	± ee	10 ±	± ee	71 72 73 74 75 76 77 78 79 80
	1 5	6 7	8 12	13 14	15 19	20 21	22 26	27 28	29 33	34 35	36 40	41 42	43 47	48 49	50 54	55 56	57 61	62 63	64 68	69 70	
Major Constituents %	SiO_2 %		Al_2O_3 %		Total Fe as Fe_2O_3 %		Fe_2O_3 %		FeO %		MgO %		CaO %		Na_2O %		K_2O %		Total H_2O %		8
	H_2O+ %		H_2O- %		TiO_2 %		P_2O_5 %		MnO %		ZrO_2 %		CO_2 %		SO_3 %		Cl %		F %		9
	S %		Cr_2O_3 %		V_2O_3 %		NiO %		BaO %		SrO %		Li_2O %		Total S as S %		open		open		10
	Fe %		Mg %		Ca %		Ti %		Mn ppm		Ag ppm		As ppm		Au ppm		B ppm		Ba ppm		11
Spectrographic Anal. % and ppm	Be ppm		Bi ppm		Cd ppm		Co ppm		Cr ppm		Cu ppm		La ppm		Mo ppm		Nb ppm		Ni ppm		12
	Pb ppm		Pd ppm		Pt ppm		Sb ppm		Sc ppm		Sn ppm		Sr ppm		Te ppm		U ppm		V ppm		13
	W ppm		Y ppm		Zn ppm		Zr ppm		Si %		Al %		Na %		K %		P %		Ce ppm		14
	Ga ppm		Ge ppm		Hf ppm		In ppm		Li ppm		Re ppm		Ta ppm		Th ppm		Tl ppm		Yb ppm		15
	Pr ppm		Nd ppm		Sm ppm		Eu ppm		Gd ppm		Tb ppm		Dy ppm		Ho ppm		Er ppm		Tm ppm		16
	Lu ppm		Ir ppm		Os ppm		Rh ppm		Ru ppm		Cs ppm		Rb ppm		F ppm		Hg ppm		open		17
	open		open		open		open		open		open		open		open		open		open		18
Other Rare E. and Assoc Oxides %	As_2O_5 %		B_2O_3 %		BeO %		CrO_3 %		Cs_2O %		CuO %		Mn_2O_3 %		MnO_2 %		MoO_3 %		NO_3 %		19
	Nb_2O_5 %		PbO %		Rb_2O %		SO_4 %		SnO_2 %		Ta_2O_5 %		ThO_2 %		UO_2 %		UO_3 %		V_2O_4 %		20
	V_2O_5 %		WO_3 %		ZnO %		open		open		open		open		open		open		open		21
	Sc_2O_3 %		Y_2O_3 %		La_2O_3 %		Ce_2O_3 %		Pr_2O_3 %		Nd_2O_3 %		Pm_2O_3 %		Sm_2O_3 %		Eu_2O_3 %		Gd_2O_3 %		22
	Tb_2O_3 %		Dy_2O_3 %		Ho_2O_3 %		Er_2O_3 %		Tm_2O_3 %		Yb_2O_3 %		Lu_2O_3 %		Total RE_2O_3 %		open		open		23
Elements %	Ag %		As %		Au %		Bi %		Br %		Total C as C %		Organic C as C %		Carbonate C as C %		Graphitic C as C %		Ca %		24
	Cd %		Co %		Cu %		Fe %		Ge %		Hg %		I %		K %		Mg %		Mo %		25
	Na %		Ni %		Pb %		Pt %		Si %		Sn %		Tl %		V %		Zn %		open		26

GPO 857-564

FORM 9-1569
(SEPT. 1964)

Anaco 7-2

STANDARD USGS DATA FORM

RASS II Jan. 1971
Location of analytical variables

	±	1 xxxxx	±	ee	±	2	±	ee	±	3	±	ee	±	4	±	ee	±	5	±	ee	±	6	±	ee	±	7	±	ee	±	8	±	ee	±	9	±	ee	±	10	±	ee	
		1 5		6 7		8 12		13 14		15 19		20 21		22 26		27 28		29 33		34 35		36 40		41 42		43 47		48 49		50 54		55 56		57 61		62 63		64 68		69 70	71 72 73 74 75 76 77 78 79 80
Elements (ppm)		As ppm				B ppm				Ba ppm				Be ppm				Bi ppm				Br ppm				Cd ppm				Co ppm				Cr ppm				Cs ppm			27
		Cu ppm				Ga ppm				Ge ppm				Hf ppm				Hg ppm				I ppm				In ppm				Li ppm				Mn ppm				Mo ppm			28
		Nb ppm				Ni ppm				Pb ppm				Rb ppm				Re ppm				Sb ppm				Se ppm				Sn ppm				Sr ppm				Ta ppm			29
		Te ppm				Th ppm				eTh ppm				Ti ppm				Tl ppm				U ppm				eU ppm				V ppm				W ppm				Zn ppm			30
		Zr ppm				open				open				open				open				open				open				open				open				open			31
Rare E. AP; and asso. Au; element Pt.		Ag ppm				Au ppm				Ir ppm				Os ppm				Pd ppm				Pt ppm				Rh ppm				Ru ppm				open				open			32
		Sc ppm				Y ppm				La ppm				Ce ppm				Pr ppm				Nd ppm				Pm ppm				Sm ppm				Eu ppm				Gd ppm			33
		Tb ppm				Dy ppm				Ho ppm				Er ppm				Tm ppm				Yb ppm				Lu ppm				open				open				open			34
																																									all fields open 35
																																									all fields open 36
Water		$CaCO_3$ - alkal. ppm				$CaCO_3$ - hard. ppm				$CaCO_3$ - hard, carb. ppm				$CaCO_3$ - hard, noncarb, ppm				Dis. solids ppm				Susp. solids ppm				Spec. cond. μmhos/cm 25°C				Dis. oxygen as O, ppm				CO_3 (carb.) ppm				HCO_3(bicarb.) ppm			37
		Total N ppm				Organic N ppm				NH_4(amonia) ppm				NO_2 (nitrate) ppm				NO_3(nitrate) ppm				Total P ppm				PO_4(orthophos.) ppm															38
Plant tab. analyses		Water sol. salts %				Ash %				Ca in ash %				Mg in ash %				Li in ash ppm				Na in ash %				K in ash %				I in ash %				P in ash ppm				F in ash %			39
		Cl in ash %				Br in ash ppm				As in ash ppm				Au in ash ppm				Cd in ash ppm				Cu in ash ppm				Mn in ash ppm				Pb in ash ppm				Se in ash ppm				Zn in ash ppm			40
		Ag in ash ppm				Bi in ash ppm				Co in ash ppm				Fe in ash ppm				Mo in ash ppm				Ni in ash ppm				Si in ash ppm				U in ash ppm				open				open			41
																																									all fields open 42
Misc		Powder dens. (gm/cc)				Bulk dens. (gm/cc)				Specific Gravity				LOI %				Acid insol. %				pH				open				open				open				open			43

GPO 857-564

Revised February 2, 1971

Page 6 Revised 8-25-71

KEYPUNCHING INSTRUCTIONS

for

Revised 8

RASS II COMPUTER PROGRAM

FIELD SERVICES SECTION

G Format will be used

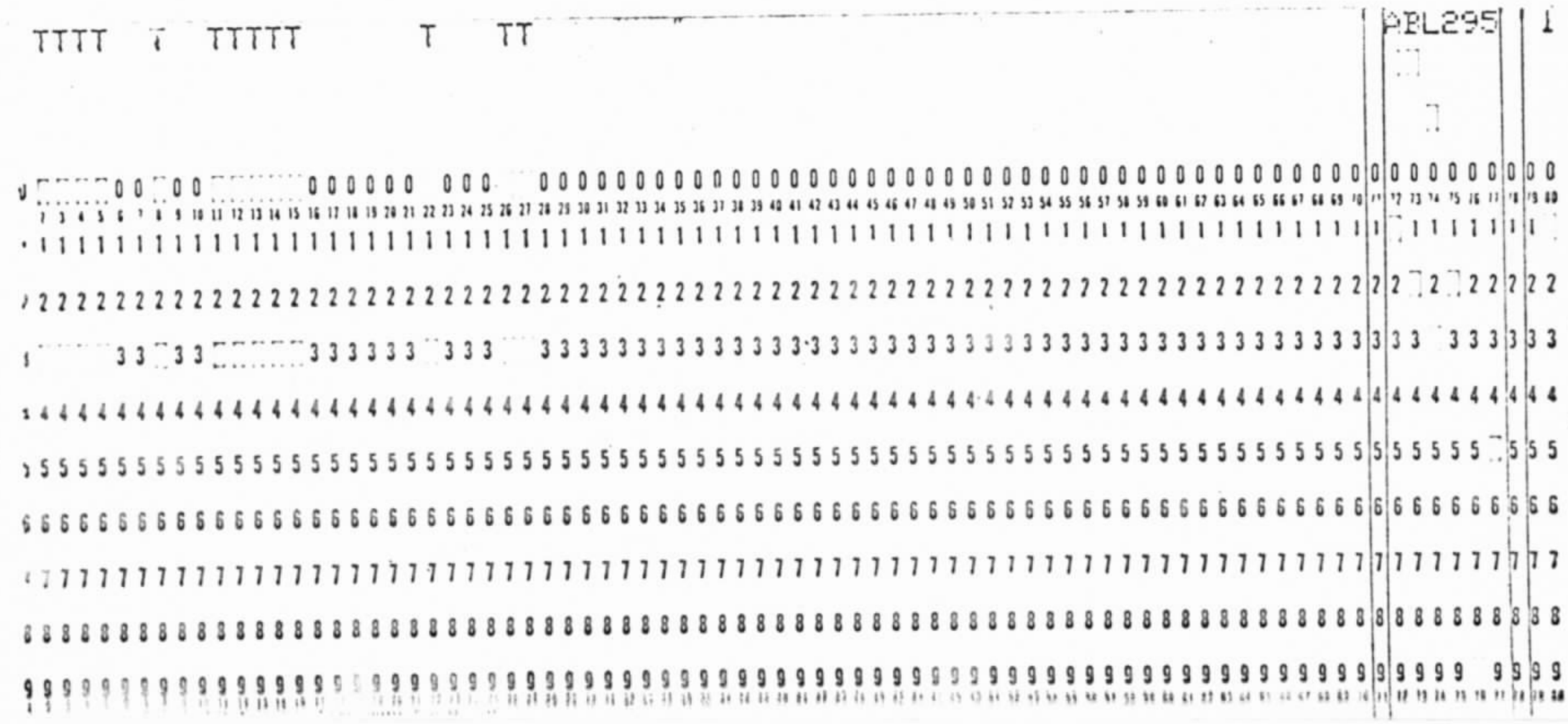
Alpha field - left justified (SEE EXCEPTION * ON PAGE 2)

Numeric/Integer field - right justified

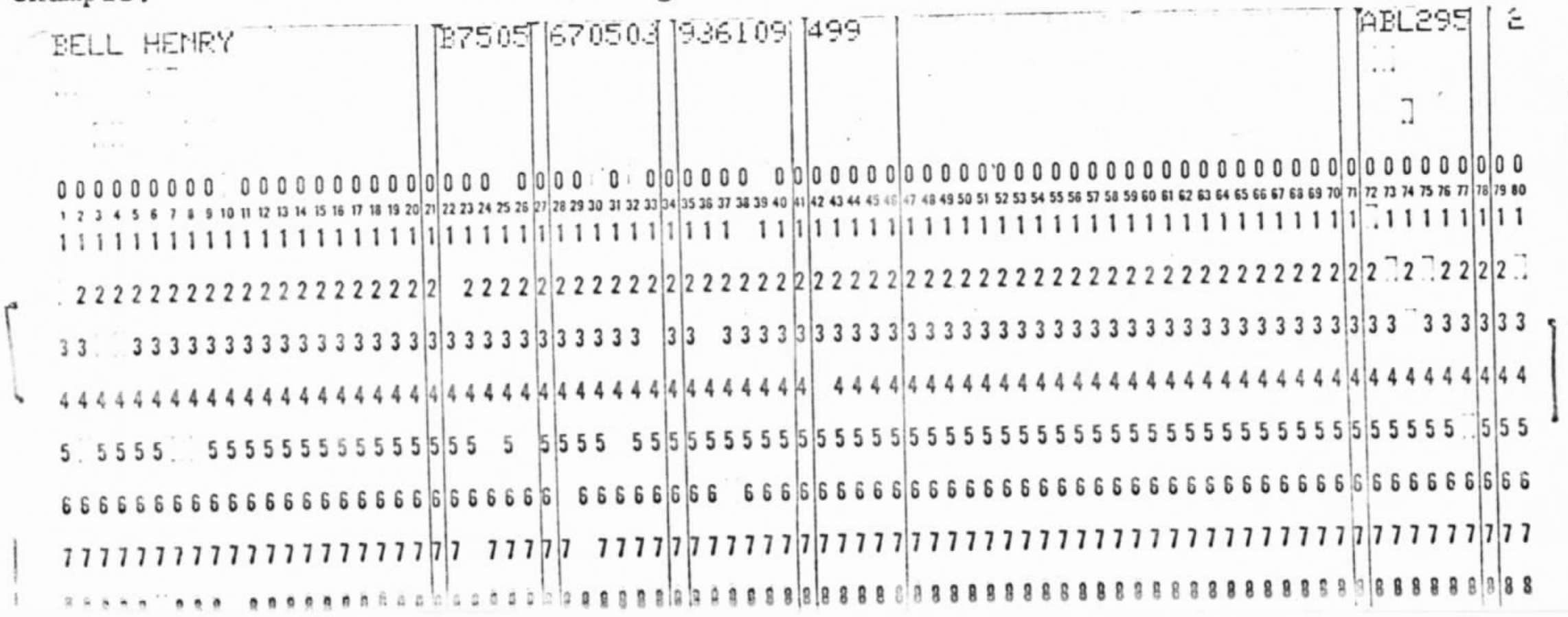
Real field - left justified (must contain a decimal point)

Card	Column	Field	Explanation
1	1	--	Blank
	2-5	alpha	Enter T in same number column for which a descriptive data card of the same number has been punched; e.g., if a 5 card is punched then a T must be punched in Col. 5 of the No. 1 Card, etc.
	6-7	--	Blank
	8-10	alpha	Enter T in same number column for which a chemical card of the same number has been punched.
	11-18	alpha	Enter T in same numbered column for which a spectrographic card of the same number has been punched.
	19-50	alpha	Enter T in same numbered column for which a chemical card of the same number has been punched.
	51-71	--	Blank
	72-77	alpha	Punch tag number.
	78	alpha	Punch suffix to tag number if shown.
	79	--	Blank
	80	numeric/integer	Punch 1 for card number.

See example:

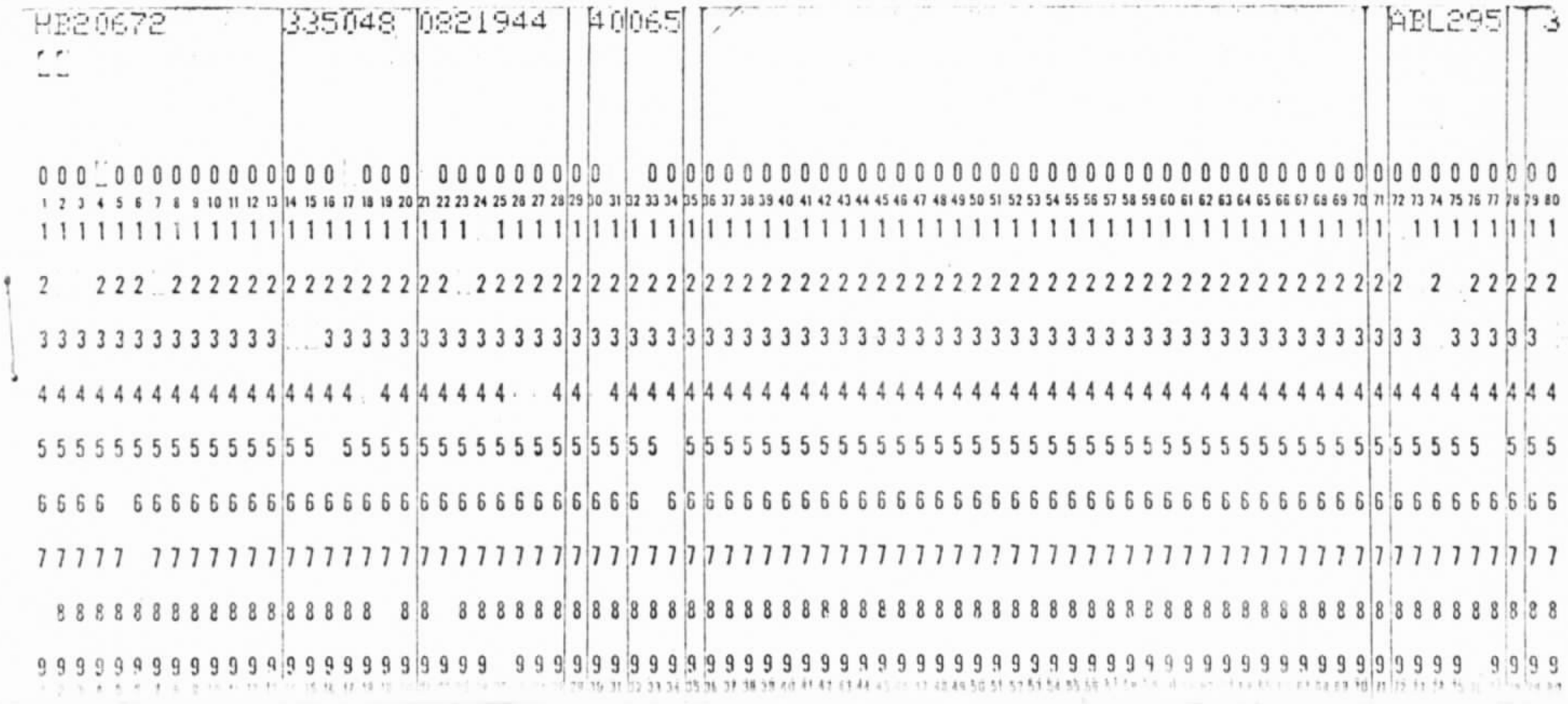


Card	Column	Field	Explanation
			(This information is taken from Request for Analysis Form)
2	1-20	alpha	Punch name of geologist (last name first). Do not use periods or commas in this field.
	21	--	Blank
	22	alpha	Punch release code in Col. 22.
	23-24	numeric/integer	Punch last two digits of year of release code in Cols. 23 and 24.
	25-26	numeric/integer	Punch two digits for month of release code; e.g., 01 for January, 02 for February, etc.
	27	--	Blank
	28-33	numeric/integer	Punch date samples were submitted. Punch last two digits of year in Cols. 28 and 29. Punch two digits for month in Cols. 30 and 31. Punch two digits for day in Cols. 32 and 33; e.g., 01, 02, 03, etc.
	34	--	Blank
	35-40	numeric/integer	Punch <u>project</u> number.
	41	--	Blank
	42-46	alpha	Punch <u>job</u> number. * Even though Job number is an alpha field, it is to be <u>RIGHT JUSTIFIED</u>.
	47-71	--	Blank
	72-77	alpha	Punch <u>tag</u> number.
	78	alpha	Punch suffix to tag number if shown.
	79	--	Blank
See example:	80	numeric/integer	Punch 2 for card number.



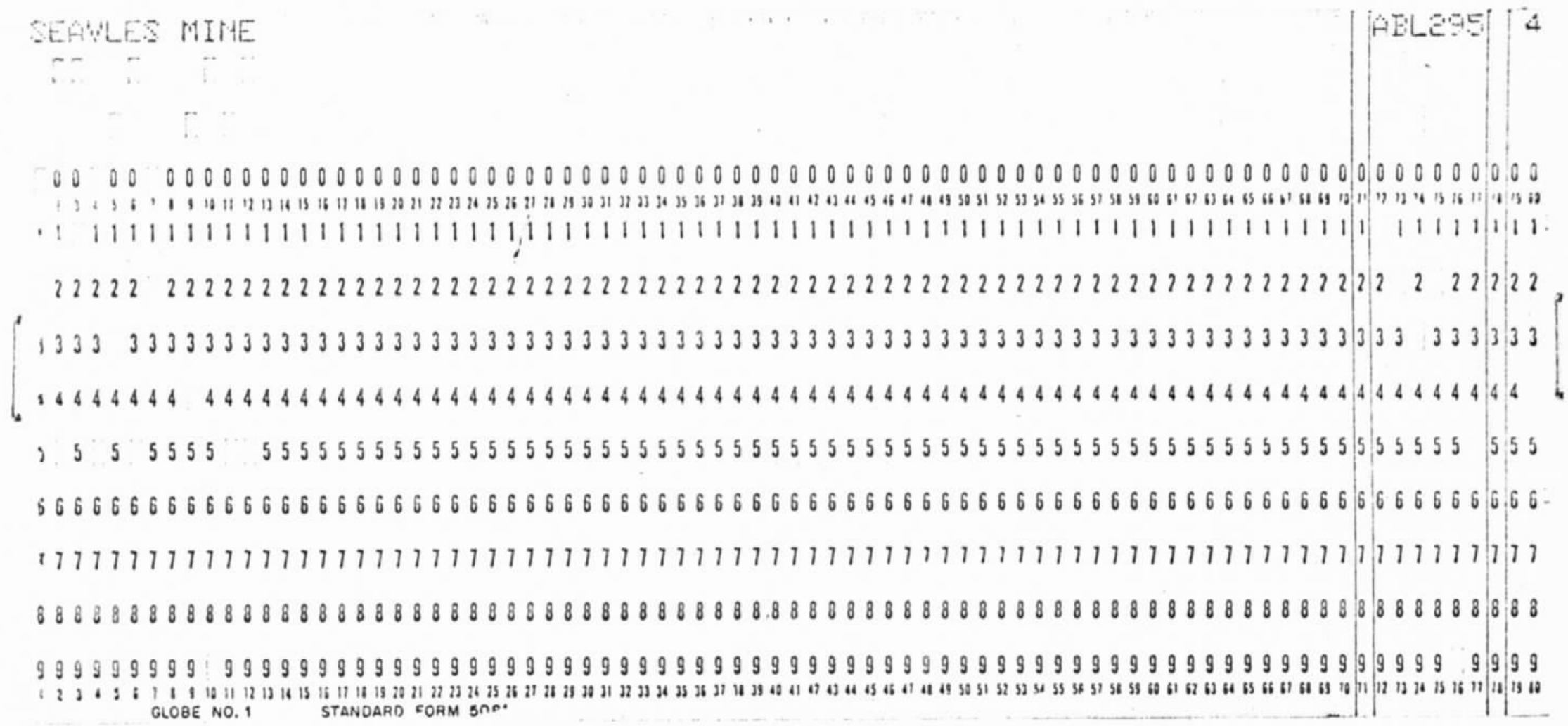
Card	Column	Field	Explanation
			(This information is taken from Request for Analysis Form)
3	1-13	alpha	Punch field number.
	14-19	numeric/integer	Punch latitude in Cols. 14 and 15 for degrees; Cols. 16 and 17 for minutes; Cols. 18 and 19 for seconds. (If X,Y coordinate is shown instead, enter X in Cols. 57-63 and Y in Cols. 64-70 on Card 18.
	20	alpha	Blank - as computer assumes direction is north.
	21-27	numeric/integer	Punch longitude in Cols. 21, 22, and 23 for degrees; e.g., 064, 065, etc. Cols. 24 and 25 for minutes; Cols. 26 and 27 for seconds.
	28	alpha	Blank - as computer assumes direction is west.
	29	--	Blank
	30-31	alpha	Punch state code.
	32-34	alpha	Punch county code if shown; e.g., 031, 032, etc; (or punch 999 for offshore).
	35	--	Blank
	36-70	alpha	Punch formation name.
	71	--	Blank
	72-77	alpha	Punch tag number.
	78	alpha	Punch suffix to tag number if shown.
	79	--	Blank
	80	numeric/integer	Punch 3 for card number.

See example:



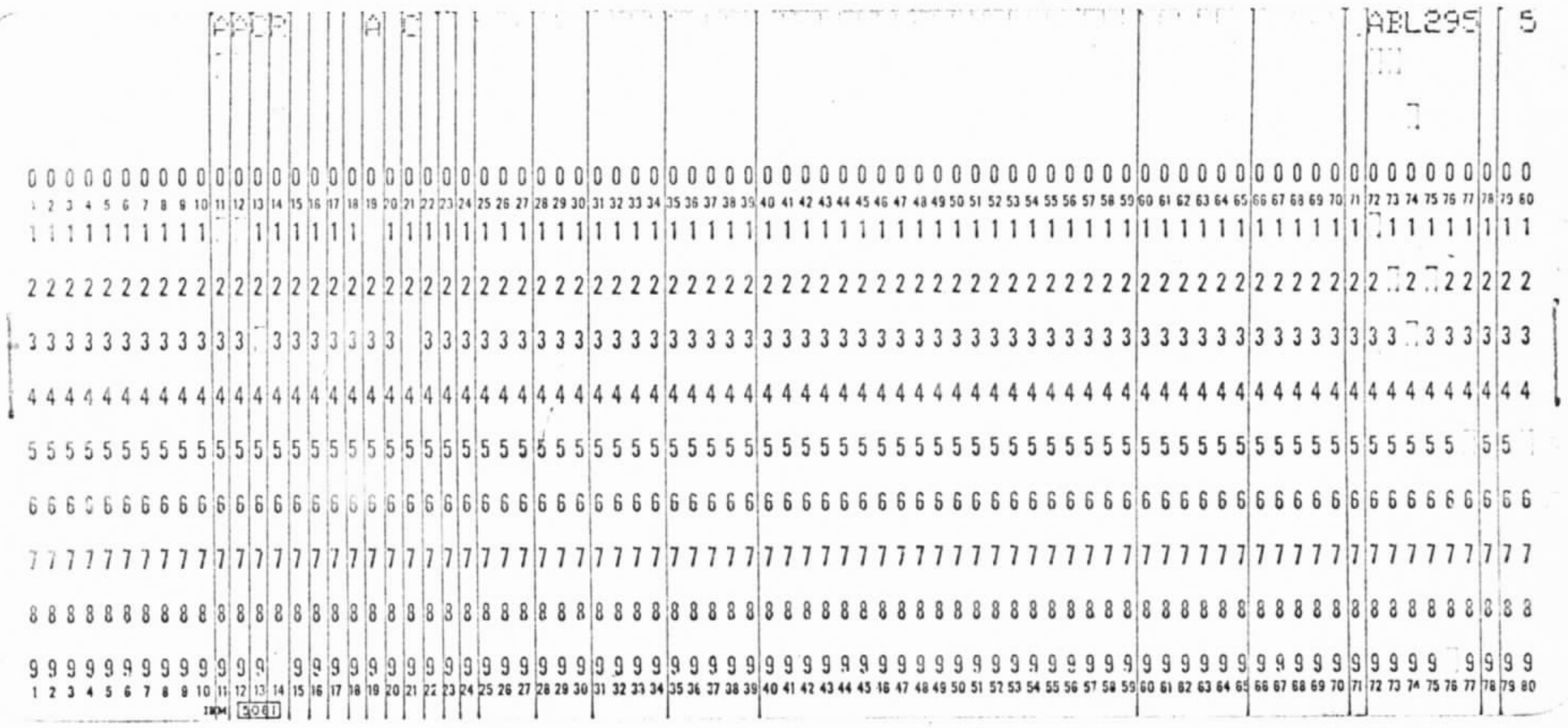
Card	Column	Field	Explanation
			(This information is taken from Request for Analysis Form)
4	1-70	alpha	Punch Comments.
	71	--	Blank
	72-77	alpha	Punch tag number.
	78	alpha	Punch suffix to tag number if shown.
	79	--	Blank
	80	numeric/integer	Punch 4 for card number.

See example:



Card	Column	Field	Explanation
			(This information is taken from Request for Analysis Form)
5	1-10	--	Blank
	11	alpha	Punch Material Class code.
	12	alpha	Punch Sample Type code.
	13	alpha	Punch Sample Source code.
	14	alpha	Punch Rock Type code.
	15	alpha	Punch Igneous Form code.
	16	alpha	Punch Structural Setting code.
	17	alpha	Punch Matrix code.
	18	--	Blank
	19	alpha	Punch Oxidation State code.
	20	alpha	Punch Alteration code.
	21	alpha	Punch Ore Minerals code.
	22	alpha	Punch Mineral Deposit Form code.
	23	--	Blank
	24	alpha	Punch Geologic Age code.
	25-27	alpha	Punch Rock Name code.
	28-30	alpha	Punch Free Coding.
	31-34	--	Blank
	35-39	alpha	Punch Free Coding.
	40-59	--	Blank
	60-65	alpha	Punch Free Coding.
	66-71	--	Blank
	72-77	alpha	Punch tag number.
	78	alpha	Punch suffix to tag number if shown.
	79	--	Blank
	80	numeric/integer	Punch 5 for card number.

See example - following page:



Chemical, Spectrographic and Fire Assay Data Cards

(NOTE: Chemical and Fire Assay values are entered on Cards 8 through 10 and 19 through 46. Spectrographic values are entered on Cards 11 through 18 (excluding columns 50 through 56 on Card 18 which are reserved for "Z COORDINATES" and are to be used for depth or height when necessary; columns 57 through 63 and 64 through 70 on Card 18 which are reserved for X, Y coordinates.)

Columns	Field	Explanation
1-70		There are 10 fields for punching analytical values. Each field contains seven columns. The first column in each field is reserved for the indeterminate code N, L, G, or H and is punched in alpha. The value is punched in the remaining six columns of each field and is numeric (real). Each whole value will be followed by a decimal and each fraction will be preceded by a decimal.

For example:

.5 will be punched .5
5 will be punched 5.
50 will be punched 50.
.500 will be punched 500.
L.5 will be punched L.5
N 5 will be punched N5.
G 500 will be punched G500.

71	--	Blank
72-77	alpha	Punch tag number.
78	--	Blank
79-80	numeric/integer	Punch the appropriate card number.

Note: Do not punch an "INS" if shown in place of a value on any chemical, spectrographic or Fire Assay report--leave that particular column blank.

See examples--following page:

SEMIQUANTITATIVE SPEC CARD A

GLOBE NO. 1 STANDARD FORM 5081

GLOBE NO. 1 STANDARD FORM 5081

GLOBE NO. 1 STANDARD FORM 5081

DISC

RASS II

Auerco 9

1-27-71

Corrections noted.

GLOBE NO. 1 STANDARD FORM 508

Alpha

Tag No.

Prefix

Suffix

Card No. 1

Alpha

Integer

L. just.

R. just.

GLOBE NO. 1 STANDARD FORM 508

SUBMITTER NAME

Alpha

26 alphabetical letters and blanks only (no punctuation)

Left justify

RELEASE CODE	DATE SUBMITTED	PROJECT NUMBER	JOB NUMBER	BLANK	TAG NO.	Prefix	Suffix	Card No. 2
Alpha	Integer	Integer	Alpha		Alpha			Integer
Yr Mo	Yr Mo Day							
1 2 3 4	5 6 7 8 9 10	11 12 13 14 15 16	17 18 19 20 21	22 23 24 25 26	27 28 29 30 31 32 33 34 35 36 37 38 39 40	41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70	71 72 73 74 75 76 77	78 79 80
R. just		Rt. justify	R. just		L. just			R. just.

IBM 5081

FIELD NUMBER
Alpha

LATITUDE
Integer
° ' "

LONGITUDE
Integer
° ' "

STATE
Alpha

COUNTY
Alpha

FORMATION
Alpha

TAG NUMBER
Alpha

Suffix

Card No. 3

SAMPLE NAME, DESCRIPTION & COMMENTS
Alpha

TAG NUMBER
Alpha

Card No. 4

GLOBE NO. 1 STANDARD FORM 509

BLANK

Alpha
Mat. Class

Alpha
Sample Type

Alpha
Rock Type

Alpha
Lithology

Alpha
Structure

Alpha
Matrix

Alpha
Acid Sele.

Alpha
Alteration

Alpha
Min. Dep.

Alpha
Class Age

Alpha
Rock Name Code

Alpha
FREE CODING

BLANK

Alpha
FREE CODING

BLANK

Alpha
FREE CODING

BLANK

TAG NUMBER
Alpha

Card No. 5

SiO_2 %	Al_2O_3 %	Total Fe_2O_3 %	Fe_2O_3 %	FeO %	MgO %	CaO %	Na_2O %	K_2O %	To H_2O %	TAG NUMBER ALPHA	8 INTEGER
ALPHA REAL	ALPHA REAL	ALPHA REAL	ALPHA REAL	ALPHA REAL	ALPHA REAL	ALPHA REAL	ALPHA REAL	ALPHA REAL	ALPHA REAL	ALPHA	INTEGER
0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0
1 2 3 4 5 6 7	8 9 10 11 12 13 14	15 16 17 18 19 20 21	22 23 24 25 26 27 28	29 30 31 32 33 34 35	36 37 38 39 40 41 42	43 44 45 46 47 48 49	50 51 52 53 54 55 56	57 58 59 60 61 62 63	64 65 66 67 68 69 70	71 72 73 74 75 76 77	78 79 80
1 1 1 1 1 1	1 1 1 1 1 1	1 1 1 1 1 1	1 1 1 1 1 1	1 1 1 1 1 1	1 1 1 1 1 1	1 1 1 1 1 1	1 1 1 1 1 1	1 1 1 1 1 1	1 1 1 1 1 1	1 1 1 1 1 1	1 1
2 2 2 2 2 2	2 2 2 2 2 2	2 2 2 2 2 2	2 2 2 2 2 2	2 2 2 2 2 2	2 2 2 2 2 2	2 2 2 2 2 2	2 2 2 2 2 2	2 2 2 2 2 2	2 2 2 2 2 2	2 2 2 2 2 2	2 2
← Justify	← Justify	← Justify	← Justify	← Justify	← Justify	← Justify	← Justify	← Justify	← Justify	← Justify	Justify →
3 3 3 3 3 3	3 3 3 3 3 3	3 3 3 3 3 3	3 3 3 3 3 3	3 3 3 3 3 3	3 3 3 3 3 3	3 3 3 3 3 3	3 3 3 3 3 3	3 3 3 3 3 3	3 3 3 3 3 3	3 3 3 3 3 3	3 3
4 4 4 4 4 4	4 4 4 4 4 4	4 4 4 4 4 4	4 4 4 4 4 4	4 4 4 4 4 4	4 4 4 4 4 4	4 4 4 4 4 4	4 4 4 4 4 4	4 4 4 4 4 4	4 4 4 4 4 4	4 4 4 4 4 4	4 4
5 5 5 5 5 5	5 5 5 5 5 5	5 5 5 5 5 5	5 5 5 5 5 5	5 5 5 5 5 5	5 5 5 5 5 5	5 5 5 5 5 5	5 5 5 5 5 5	5 5 5 5 5 5	5 5 5 5 5 5	5 5 5 5 5 5	5 5
6 6 6 6 6 6	6 6 6 6 6 6	6 6 6 6 6 6	6 6 6 6 6 6	6 6 6 6 6 6	6 6 6 6 6 6	6 6 6 6 6 6	6 6 6 6 6 6	6 6 6 6 6 6	6 6 6 6 6 6	6 6 6 6 6 6	6 6
7 7 7 7 7 7	7 7 7 7 7 7	7 7 7 7 7 7	7 7 7 7 7 7	7 7 7 7 7 7	7 7 7 7 7 7	7 7 7 7 7 7	7 7 7 7 7 7	7 7 7 7 7 7	7 7 7 7 7 7	7 7 7 7 7 7	7 7
8 8 8 8 8 8	8 8 8 8 8 8	8 8 8 8 8 8	8 8 8 8 8 8	8 8 8 8 8 8	8 8 8 8 8 8	8 8 8 8 8 8	8 8 8 8 8 8	8 8 8 8 8 8	8 8 8 8 8 8	8 8 8 8 8 8	8 8
9 9 9 9 9 9	9 9 9 9 9 9	9 9 9 9 9 9	9 9 9 9 9 9	9 9 9 9 9 9	9 9 9 9 9 9	9 9 9 9 9 9	9 9 9 9 9 9	9 9 9 9 9 9	9 9 9 9 9 9	9 9 9 9 9 9	9 9
1 2 3 4 5 6 7	8 9 10 11 12 13 14	15 16 17 18 19 20 21	22 23 24 25 26 27 28	29 30 31 32 33 34 35	36 37 38 39 40 41 42	43 44 45 46 47 48 49	50 51 52 53 54 55 56	57 58 59 60 61 62 63	64 65 66 67 68 69 70	71 72 73 74 75 76 77	78 79 80

GLOBE NO. 1 STANDARD FORM 5081

K_2O-%	H_2O-%	TiO_2 %	B_2O_3 %	MnO %	ZrO_2 %	CO_2 %	SO_3 %	Cl %	F %	TAG NUMBER ALPHA	9 INTEGER
ALPHA REAL	ALPHA REAL	ALPHA REAL	ALPHA REAL	ALPHA REAL	ALPHA REAL	ALPHA REAL	ALPHA REAL	ALPHA REAL	ALPHA REAL	ALPHA	INTEGER
0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0
1 2 3 4 5 6 7	8 9 10 11 12 13 14	15 16 17 18 19 20 21	22 23 24 25 26 27 28	29 30 31 32 33 34 35	36 37 38 39 40 41 42	43 44 45 46 47 48 49	50 51 52 53 54 55 56	57 58 59 60 61 62 63	64 65 66 67 68 69 70	71 72 73 74 75 76 77	78 79 80
1 1 1 1 1 1	1 1 1 1 1 1	1 1 1 1 1 1	1 1 1 1 1 1	1 1 1 1 1 1	1 1 1 1 1 1	1 1 1 1 1 1	1 1 1 1 1 1	1 1 1 1 1 1	1 1 1 1 1 1	1 1 1 1 1 1	1 1
2 2 2 2 2 2	2 2 2 2 2 2	2 2 2 2 2 2	2 2 2 2 2 2	2 2 2 2 2 2	2 2 2 2 2 2	2 2 2 2 2 2	2 2 2 2 2 2	2 2 2 2 2 2	2 2 2 2 2 2	2 2 2 2 2 2	2 2
3 3 3 3 3 3	3 3 3 3 3 3	3 3 3 3 3 3	3 3 3 3 3 3	3 3 3 3 3 3	3 3 3 3 3 3	3 3 3 3 3 3	3 3 3 3 3 3	3 3 3 3 3 3	3 3 3 3 3 3	3 3 3 3 3 3	3 3
4 4 4 4 4 4	4 4 4 4 4 4	4 4 4 4 4 4	4 4 4 4 4 4	4 4 4 4 4 4	4 4 4 4 4 4	4 4 4 4 4 4	4 4 4 4 4 4	4 4 4 4 4 4	4 4 4 4 4 4	4 4 4 4 4 4	4 4
5 5 5 5 5 5	5 5 5 5 5 5	5 5 5 5 5 5	5 5 5 5 5 5	5 5 5 5 5 5	5 5 5 5 5 5	5 5 5 5 5 5	5 5 5 5 5 5	5 5 5 5 5 5	5 5 5 5 5 5	5 5 5 5 5 5	5 5
6 6 6 6 6 6	6 6 6 6 6 6	6 6 6 6 6 6	6 6 6 6 6 6	6 6 6 6 6 6	6 6 6 6 6 6	6 6 6 6 6 6	6 6 6 6 6 6	6 6 6 6 6 6	6 6 6 6 6 6	6 6 6 6 6 6	6 6
7 7 7 7 7 7	7 7 7 7 7 7	7 7 7 7 7 7	7 7 7 7 7 7	7 7 7 7 7 7	7 7 7 7 7 7	7 7 7 7 7 7	7 7 7 7 7 7	7 7 7 7 7 7	7 7 7 7 7 7	7 7 7 7 7 7	7 7
8 8 8 8 8 8	8 8 8 8 8 8	8 8 8 8 8 8	8 8 8 8 8 8	8 8 8 8 8 8	8 8 8 8 8 8	8 8 8 8 8 8	8 8 8 8 8 8	8 8 8 8 8 8	8 8 8 8 8 8	8 8 8 8 8 8	8 8
9 9 9 9 9 9	9 9 9 9 9 9	9 9 9 9 9 9	9 9 9 9 9 9	9 9 9 9 9 9	9 9 9 9 9 9	9 9 9 9 9 9	9 9 9 9 9 9	9 9 9 9 9 9	9 9 9 9 9 9	9 9 9 9 9 9	9 9
1 2 3 4 5 6 7	8 9 10 11 12 13 14	15 16 17 18 19 20 21	22 23 24 25 26 27 28	29 30 31 32 33 34 35	36 37 38 39 40 41 42	43 44 45 46 47 48 49	50 51 52 53 54 55 56	57 58 59 60 61 62 63	64 65 66 67 68 69 70	71 72 73 74 75 76 77	78 79 80

GLOBE NO. 1 STANDARD FORM 5081

S %	Cr_2O_3 %	V_2O_3 %	NiO %	BaO %	SrO %	Li_2O %	Total Sass %	SO_4 %	open	TAG NUMBER	10
ALPHA REAL	ALPHA REAL	ALPHA REAL	ALPHA REAL	ALPHA REAL	ALPHA REAL	ALPHA REAL	ALPHA REAL	ALPHA REAL	ALPHA REAL	ALPHA	INTEGER
0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0
1 2 3 4 5 6 7	8 9 10 11 12 13 14	15 16 17 18 19 20 21	22 23 24 25 26 27 28	29 30 31 32 33 34 35	36 37 38 39 40 41 42	43 44 45 46 47 48 49	50 51 52 53 54 55 56	57 58 59 60 61 62 63	64 65 66 67 68 69 70	71 72 73 74 75 76 77	78 79 80
1 1 1 1 1 1	1 1 1 1 1 1	1 1 1 1 1 1	1 1 1 1 1 1	1 1 1 1 1 1	1 1 1 1 1 1	1 1 1 1 1 1	1 1 1 1 1 1	1 1 1 1 1 1	1 1 1 1 1 1	1 1 1 1 1 1	1 1
2 2 2 2 2 2	2 2 2 2 2 2	2 2 2 2 2 2	2 2 2 2 2 2	2 2 2 2 2 2	2 2 2 2 2 2	2 2 2 2 2 2	2 2 2 2 2 2	2 2 2 2 2 2	2 2 2 2 2 2	2 2 2 2 2 2	2 2
3 3 3 3 3 3	3 3 3 3 3 3	3 3 3 3 3 3	3 3 3 3 3 3	3 3 3 3 3 3	3 3 3 3 3 3	3 3 3 3 3 3	3 3 3 3 3 3	3 3 3 3 3 3	3 3 3 3 3 3	3 3 3 3 3 3	3 3
4 4 4 4 4 4	4 4 4 4 4 4	4 4 4 4 4 4	4 4 4 4 4 4	4 4 4 4 4 4	4 4 4 4 4 4	4 4 4 4 4 4	4 4 4 4 4 4	4 4 4 4 4 4	4 4 4 4 4 4	4 4 4 4 4 4	4 4
5 5 5 5 5 5	5 5 5 5 5 5	5 5 5 5 5 5	5 5 5 5 5 5	5 5 5 5 5 5	5 5 5 5 5 5	5 5 5 5 5 5	5 5 5 5 5 5	5 5 5 5 5 5	5 5 5 5 5 5	5 5 5 5 5 5	5 5
6 6 6 6 6 6	6 6 6 6 6 6	6 6 6 6 6 6	6 6 6 6 6 6	6 6 6 6 6 6	6 6 6 6 6 6	6 6 6 6 6 6	6 6 6 6 6 6	6 6 6 6 6 6	6 6 6 6 6 6	6 6 6 6 6 6	6 6
7 7 7 7 7 7	7 7 7 7 7 7	7 7 7 7 7 7	7 7 7 7 7 7	7 7 7 7 7 7	7 7 7 7 7 7	7 7 7 7 7 7	7 7 7 7 7 7	7 7 7 7 7 7	7 7 7 7 7 7	7 7 7 7 7 7	7 7
8 8 8 8 8 8	8 8 8 8 8 8	8 8 8 8 8 8	8 8 8 8 8 8	8 8 8 8 8 8	8 8 8 8 8 8	8 8 8 8 8 8	8 8 8 8 8 8	8 8 8 8 8 8	8 8 8 8 8 8	8 8 8 8 8 8	8 8
9 9 9 9 9 9	9 9 9 9 9 9	9 9 9 9 9 9	9 9 9 9 9 9	9 9 9 9 9 9	9 9 9 9 9 9	9 9 9 9 9 9	9 9 9 9 9 9	9 9 9 9 9 9	9 9 9 9 9 9	9 9 9 9 9 9	9 9
1 2 3 4 5 6 7	8 9 10 11 12 13 14	15 16 17 18 19 20 21	22 23 24 25 26 27 28	29 30 31 32 33 34 35	36 37 38 39 40 41 42	43 44 45 46 47 48 49	50 51 52 53 54 55 56	57 58 59 60 61 62 63	64 65 66 67 68 69 70	71 72 73 74 75 76 77	78 79 80

GLOBE NO. 1 STANDARD FORM 5081

Mg%

Ca%

Ti%

Mn ppm

Ag ppm

As ppm

Au ppm

B ppm

Ba ppm

D M W

Lab or Tag No.

11

SEMIQUANTITATIVE SPEC CARD A

Bi ppm

Cd ppm

Co ppm

Cr ppm

Cu ppm

La ppm

Mo ppm

Nb ppm

Ni ppm

D M W

Lab or Tag No.

12

SEMIQUANTITATIVE SPEC CARD B

Pb ppm

Pd ppm

Pt ppm

Sb ppm

Sc ppm

Sn ppm

Sr ppm

Te ppm

U ppm

V ppm

D M W

Lab or Tag No.

13

SEMIQUANTITATIVE SPEC CARD C

W ppm | Y ppm | Zn ppm | Zr ppm | Si% | Al% | Na% | K% | P% | Ce ppm | DMW | Lab or Tag No. | 14

SEMIQUANTITATIVE SPEC CARD D

Ga ppm | Ge ppm | Hf ppm | In ppm | Li ppm | Re ppm | Ta ppm | Th ppm | Tl ppm | Yb ppm | DMW | Lab or Tag No. | 15

SEMIQUANTITATIVE SPEC CARD E

All Spec.

Pr (Ceam) | Nd (Rheam) | Sm (Ceam) | Eu (Mgeo) | Gd (Mdeam) | Tb | Dy | Ho | Er | Tm | DMW | Lab or Tag No. | 16

SEMIQUANTITATIVE SPEC CARD F

LU	IY	OS	Rh	RU	Cs	Rb	F	Hg	open	TAG NO.	IT
real	real	real	real	real	real	real	real	real	real	alpha	integer

GLOBE NO. 1 STANDARD FORM 5081

open	open	open	open	open	open	open	open	X-coordinate	Y-coordinate	Tag No.	18
real	real	real	real	real	real	real	real	real	real	alpha	integer

GLOBE NO. 1 STANDARD FORM 5081

Ag %	As %	Au %	Bi %	Br %	Total C as C%	organic C as C%	carbonate C as C%	Graphitic C as C %	Ca %	Tag No.	Tag No. 19
← integer										← alpha	integer

GLOBE NO. 1 STANDARD FORM 5081

Cd %	CO %	Cu %	Fe %	P %	Hg %	I %	K %	Mg %	Mo %	Tag No.	Card No. 20
0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9

CLOSE NO. 1 STANDARD FORM 5081

Na %	Ni %	Pb %	Pt %	Si %	Sn %	Ba %	V %	Zn %	open	Tag No.	Card No. 21
0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9

CLOSE NO. 1 STANDARD FORM 5081

Au (P) (AA)	Au (AA) Sample Wt	Hg (Instr)	Te (AA)	As (AA)	Cu (AA) (P)	Pb (AA) (P)	Zn (AA) (P)	Ag (AA) (P)	Cd (AA) (P)	Tag No.	Card No. 22
0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9

CLOSE NO. 1 STANDARD FORM 5081

Co (Ah) (P)	Bi (Ah) (P)	Ni (Ah) (P)	Se (Ah) (P)	Sb (Ah) (P)	Mo (Ah) (P)	W (Ah) (P)	V (Ah) (P)	Li (AA)	Ca o/o (Ah)	Tag No.	Card # 23
0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9	9	9	9
1 2 3 4 5 6 7	8 9 10 11 12 13 14	15 16 17 18 19 20 21	22 23 24 25 26 27 28	29 30 31 32 33 34 35	36 37 38 39 40 41 42	43 44 45 46 47 48 49	50 51 52 53 54 55 56	57 58 59 60 61 62 63	64 65 66 67 68 69 70	71 72 73 74 75 76 77	78 79 80

GLOBE NO. 1 STANDARD FORM 5081

Mn o/o (Ah) (P)	K o/o (AA) (P)	Fe o/o (AA) (P)	Au (AA) (T)	Cu (AA) (T)	Pb (AA) (T)	Zn (AA) (T)	Ag (AA) (T)	Cd (AA) (T)	Co (AA) (T)	Tag No.	24
0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9	9	9	9
1 2 3 4 5 6 7	8 9 10 11 12 13 14	15 16 17 18 19 20 21	22 23 24 25 26 27 28	29 30 31 32 33 34 35	36 37 38 39 40 41 42	43 44 45 46 47 48 49	50 51 52 53 54 55 56	57 58 59 60 61 62 63	64 65 66 67 68 69 70	71 72 73 74 75 76 77	78 79 80

GLOBE NO. 1 STANDARD FORM 5081

Bi (Ah) (T)	Ni (AA) (T)	Se (AA) (T)	Sb (AA) (T)	Mo (AA) (T)	W (AA) (T)	V (AA) (T)	open (AA)	open	open	Tag No.	25
0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9	9	9	9
1 2 3 4 5 6 7	8 9 10 11 12 13 14	15 16 17 18 19 20 21	22 23 24 25 26 27 28	29 30 31 32 33 34 35	36 37 38 39 40 41 42	43 44 45 46 47 48 49	50 51 52 53 54 55 56	57 58 59 60 61 62 63	64 65 66 67 68 69 70	71 72 73 74 75 76 77	78 79 80

GLOBE NO. 1 STANDARD FORM 5081

CX (color)	CXHM (color)	AS (color)	Sb (color)	MO (color)	W (color)	U (color) ppm	MN (color) ppm	V (color)	CO (color)	TAG NOS.	CARD NO.
0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9	9	9	9
1 2 3 4 5 6 7	8 9 10 11 12 13 14	15 16 17 18 19 20 21	22 23 24 25 26 27 28	29 30 31 32 33 34 35	36 37 38 39 40 41 42	43 44 45 46 47 48 49	50 51 52 53 54 55 56	57 58 59 60 61 62 63	64 65 66 67 68 69 70	71 72 73 74 75 76 77	78 79 80

GLOBE NO. 1 STANDARD FORM 5081

CU (color) ppm	Pb (color) ppm	Zn (color) ppm	Ag (color)	Sn (color)	P (color) %	Ni (color)	Ba (color)	Te (color) ppm	Cr (color)	TAG NO.	CARD NO.
0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9	9	9	9
1 2 3 4 5 6 7	8 9 10 11 12 13 14	15 16 17 18 19 20 21	22 23 24 25 26 27 28	29 30 31 32 33 34 35	36 37 38 39 40 41 42	43 44 45 46 47 48 49	50 51 52 53 54 55 56	57 58 59 60 61 62 63	64 65 66 67 68 69 70	71 72 73 74 75 76 77	78 79 80

GLOBE NO. 1 STANDARD FORM 5081

GE (color)	FE (color) %	Hg (color)	Li (color) ppm	Ti (color) %	BE (color)	Bi (color)	B (color)	Cd (color)	SE (color) ppm	TAG NO.	CARD NO.
0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9	9	9	9
1 2 3 4 5 6 7	8 9 10 11 12 13 14	15 16 17 18 19 20 21	22 23 24 25 26 27 28	29 30 31 32 33 34 35	36 37 38 39 40 41 42	43 44 45 46 47 48 49	50 51 52 53 54 55 56	57 58 59 60 61 62 63	64 65 66 67 68 69 70	71 72 73 74 75 76 77	78 79 80

GLOBE NO. 1 STANDARD FORM 5081

Mn (Color)	I (Color)	Cl (Color)	F (Color)	Cs (Color)	Ga (Color)	He (Color)	In (Color)	Li (Color)	Pb (Color)	Rb (Color)	Card No. 29
0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9	9	9	9

GLOBE NO. 1 STANDARD FORM 5081

Ir (Color)	S (Color)	EXCO (Color)	U (Color T	Cu (Color) T	Pb (Color) T	Zn (Color) T	Te (Color T	Ni (Color T	Se (Color) T	Tag No	Card No. 30
0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9	9	9	9

GLOBE NO. 1 STANDARD FORM 5081

Nb (Color)	Ta (Color)	open	open	open	open	open	open	open	open	Tag No.	Card No. 31
0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9	9	9	9

GLOBE NO. 1 STANDARD FORM 5081

Au (Assay Spec)	Ag (Assay Spec)	Pt (Assay Spec)	Pd (Assay Spec)	Rh (Assay Spec)	RU (Assay Spec)	OS (Assay Spec)	Ir (Assay Spec)	open	open	Tag no.	32
real										alpha	type, or

GLOBE NO. 1 STANDARD FORM 5081

Au (AAA)	Ag (AAA)	Pt (AAA)	Pd (AAA)	Rh (AAA)	RU (AAA)	OS (AAA)	Ir (AAA)	open	open	Tag no.	33
real										alpha	integer

GLOBE NO. 1 STANDARD FORM 5081

F (Specific Ion)	Br (Specific Ion)	Cl (Specific Ion)	I (Specific Ion)	Cd (Specific Ion)	Ca (Specific Ion)	Pb (Specific Ion)	Na (Specific Ion)	Ag (Specific Ion)	Hg (AA)	TAG NO.	34
real										alpha	integer

GLOBE NO. 1 STANDARD FORM 5081

ZR (Activation)	HH (Activation)	HO (Activation)	NB (Activation)	W (Activation)	SE (Activation)	SM (Activation)	SR (Activation)	TA (Activation)	AG (Activation)	Tag NO.	35
alpha real										alpha	integer

CLOBE NO. 1 STANDARD FORM 5081

Th (Activation)	U (Activation)	V (Activation)	Pt (Activation)	Pd (Activation)	open	open	open	open	open	Tag NO	36
alpha real										alpha	integer

GLOBE NO. 1 STANDARD FORM 5081

SC	Y	La	Ce	Pr	Nd	PM	Sm	Eu	Gd	Tag NO	37
alpha real										alpha	integer

GLOBE NO. 1 STANDARD FORM 5081

Tb	Dy	Ho	Er	Tm	Yb	Lu					Tag No.	38
real											alpha	integer

Salt% (Water Soluble)	Ash%	Ash% eq	Ash% Mg	Ash% Li	Ash% Na	Ash% K	Ash% I	Ash% P	Ash% F		Tag No.	39
real											alpha	integer

Ash% Cl	Ash Br	Ash As	Ash Au	Ash Cd	Ash Cu	Ash Mn	Ash Pb	Ash Se			Tag No.	40
real											alpha	integer

GLOBE NO. 1 STANDARD FORM 5081

ASh Zn	open	ASh As	ASh Bi	ASh Co	ASh Fe	ASh Mo	ASh Ni	ASh Si	ASh U	Tag No.	41
alpha	real									alpha	integer

open	open	open	open	open	open	open	open	open	open	Tag No.	42
alpha	real									alpha	integer

POW-den	BIK-dan	Specific Gravity	eU	Activation Instrument o/o	pH pH	open	open	open	open	Tag No.	43
alpha	real									alpha	integer

GLOBE NO. 1 STANDARD FORM 5081

open | open | open | open | open | open | open | open | open | open | Tag NO. | 44

alpha | real | | | | | | | | | alpha | integer

RESERVED FOR SPECIFIC ACTIVATION

GLOBE NO 1 STANDARD FORM 5081

open | open | open | open | open | open | open | open | open | open | Tag NO. | 45

alpha | real | | | | | | | | | alpha | integer

RESERVED FOR SPECIFIC ACTIVATION

GLOBE NO 1 STANDARD FORM 5081

open | open | open | open | open | open | open | open | open | open | Tag NO. | 46

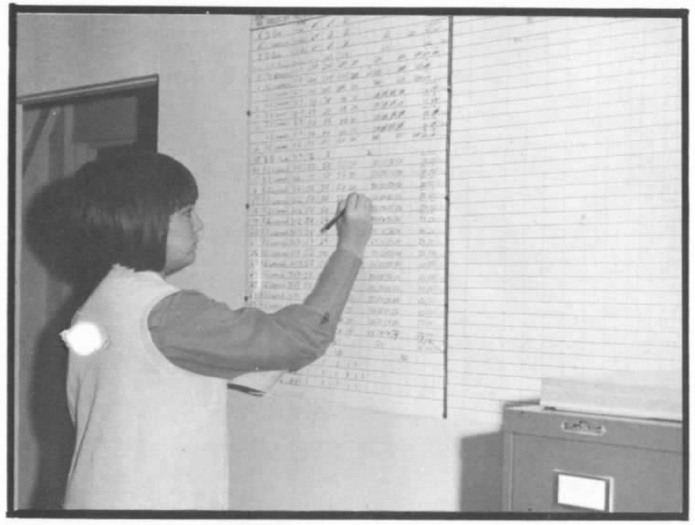
alpha | real | | | | | | | | | alpha | integer

RESERVED FOR SPECIFIC ACTIVATION

GLOBE NO 1 STANDARD FORM 5081

Spectrographic unit

The optical emission spectrographic unit, capable of providing analytical data for more than 30 elements in up to 100 samples a day, is equipped with a comparator-densitometer for making either visual or quantitative determinations, and a completely stocked dark room for developing spectrographic film.



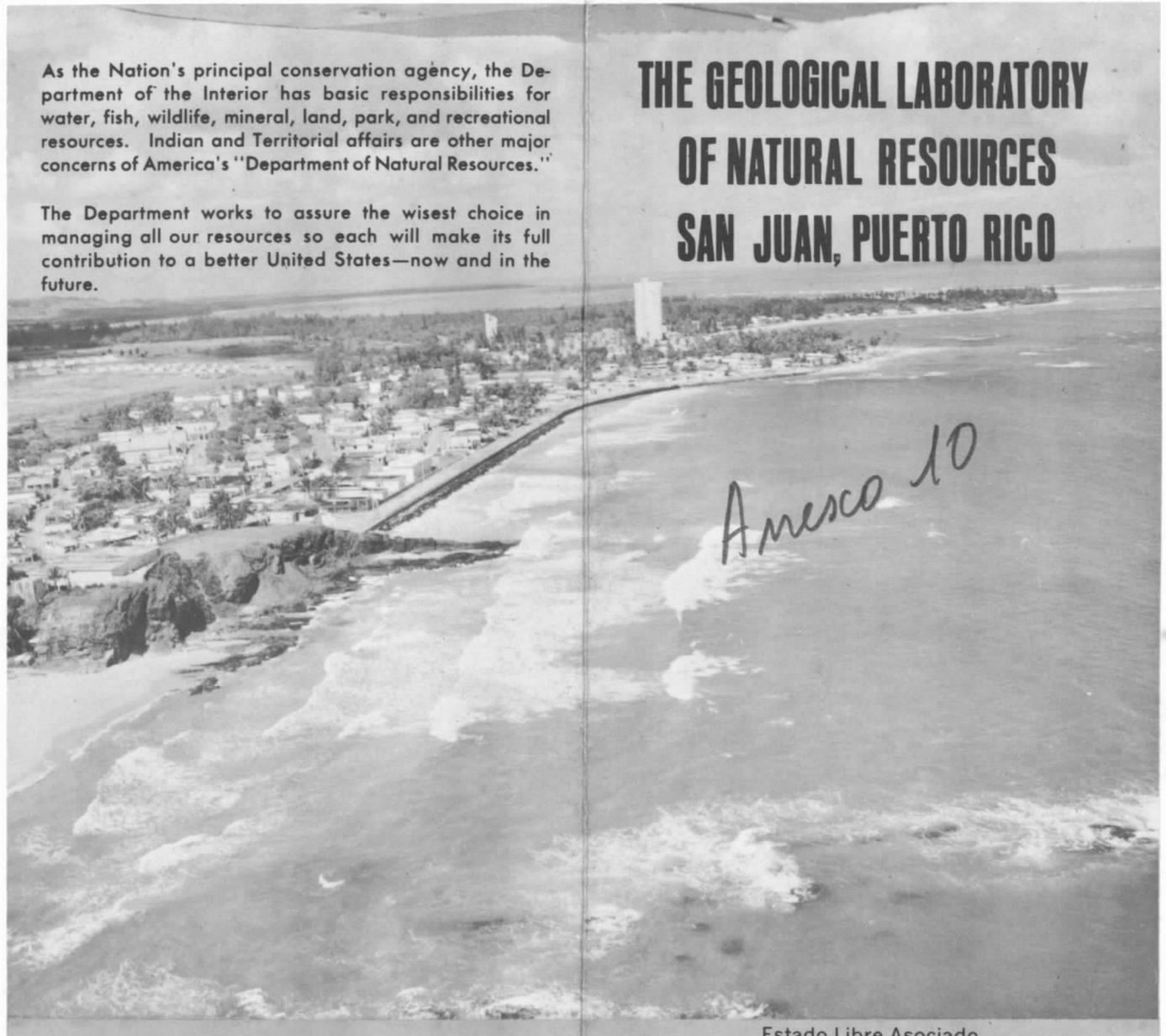
Computer data input unit

Analytical data from the several laboratory units are coded and fed by special equipment to a modern computerized data storage and retrieval system maintained by the Department of Public Works. From this vast reservoir of geologic information, many kinds of interpretive maps, charts, and graphs can be prepared to depict various aspects of the supplies, demands, and economics of the mineral raw materials of Puerto Rico.

As the Nation's principal conservation agency, the Department of the Interior has basic responsibilities for water, fish, wildlife, mineral, land, park, and recreational resources. Indian and Territorial affairs are other major concerns of America's "Department of Natural Resources."

The Department works to assure the wisest choice in managing all our resources so each will make its full contribution to a better United States—now and in the future.

THE GEOLOGICAL LABORATORY OF NATURAL RESOURCES SAN JUAN, PUERTO RICO



Amesco 10

Estado Libre Asociado
de Puerto Rico
Departmento de Obras Publicas
Area de Recursos Naturales

United States
Department of the Interior
Geological Survey

GPO 903-997

THE GEOLOGICAL LABORATORY OF NATURAL RESOURCES SAN JUAN, PUERTO RICO

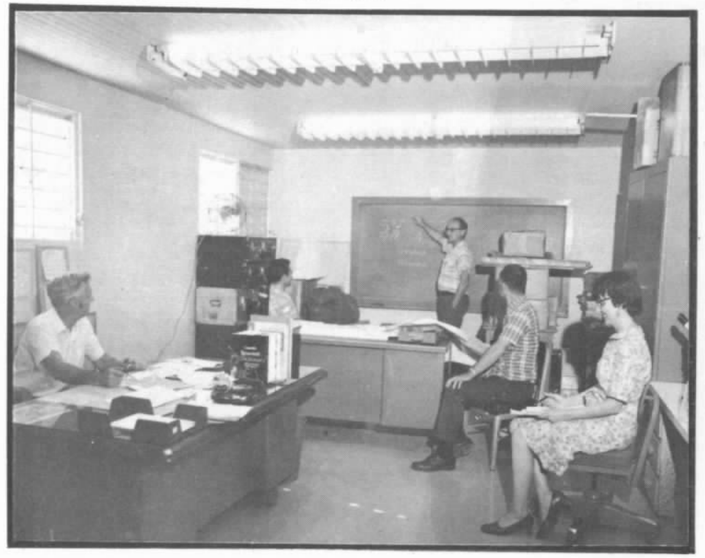
The Geological Laboratory of Natural Resources, located in the complex of the Department of Public Works, San Juan, Puerto Rico, is staffed and operated jointly by the Area of Natural Resources, Department of Public Works of the Commonwealth of Puerto Rico and the U. S. Geological Survey, Department of the Interior. Placed in operation in January 1970, the fully equipped 4,000 square-foot laboratory was installed to support a cooperative research program aimed at evaluating the mineral resource potential of Puerto Rico.

The economic growth of a country depends in part on the discovery, production, and wise use of its mineral resources. Obtaining the minerals and metals from the earth that are needed to fulfill the demand by consumers requires the combined efforts of well-trained scientific and technical staffs. To contribute to the training and involvement of Puerto Ricans in the scientific and technological development of the Commonwealth, the Area of Natural Resources and the U. S. Geological Survey are participating in a joint effort to provide on-the-job training in the field and in the laboratory as an integral part of a long-range research program.

Features of the research program include:

* Comprehensive studies of the nature and potential economic importance of mineral resources of the entire Commonwealth. Results of the studies will provide basic information needed to achieve the orderly development and utilization of the mineral raw materials.

* Field and laboratory studies of the origin and geologic environment of known deposits of copper, nickel, iron and various other metallic and nonmetallic mineral products in order to establish geologic criteria needed to identify exploration targets elsewhere in Puerto Rico.



* Field and laboratory studies of ore deposits under the special weathering conditions of a tropical environment in order to formulate basic principles of geochemical exploration in Puerto Rico.

* The training of scientific and technical staffs in modern analytical techniques and in methods of using analytical data to solve geologic problems.

The geological laboratory is equipped to analyze quickly and accurately the specimens of ores, soils, and rocks that are selected by geologists during their field studies. The results of the analyses are used by these scientists to determine the geologic environment of the area under study, and they also serve as guides for subsequent investigations.

Analytical Services

To obtain the analytical data needed to support the geologic investigations, the Geological Laboratory of Natural Resources is divided into four units:

Sample preparation unit

This unit is equipped with all the devices needed to pulverize and grind into powder rock materials for chemical and spectrographic analyses as well as to saw and polish thin slabs of rocks and ores for petrographic and mineralogic studies.

Analytical chemistry unit

This unit, equipped with the most modern atomic absorption and spectrophotometer instruments—as well as a complete wet chemistry section—is capable of measuring extremely tiny amounts (1×10^{-6} grams) of metallic elements such as copper, gold, lead, zinc, molybdenum, nickel, silver, and uranium. The distribution patterns of such trace amounts of elements in rocks and soils serve as guides in the search for new ore deposits and also reflect the geochemical conditions of the environment that may either enhance or adversely affect plant and animal life.

Branch of Analytical Laboratories
Summary of Project Allotments
Fiscal Year 1972

Account Number	Project Title	Project Leader	Fulltime Salaries	Temporary Salaries	Other Expenses	Total
977000	Technical Support	May				
977001	Computing	May				
977010	Analy. Serv. & Res. (Wash.)	Dinnin				
977020	Analy. Serv. & Res. (Denver)	Huffman				
977030	Analy. Serv. & Res. (Menlo)	Ingamells				
977050	Gen. Rock Analy. (Denver)	Peck				
977070	Rapid Rock Analy.	Shapiro				
977080	Radioisotope Dilution	Greenland				
977100	Organic Geochemistry	Breger				
977200	Spec. Serv. & Res. (Wash.)	Helz				
977210	Spec. Serv. & Res. (Denver)	Myers				
977220	Spec. Serv. & Res. (Menlo)	Bastron				
977300	X-ray Spec. (Wash.)	Rose				
977301	X-ray Spec. Wash. (NASA)	Rose				
977310	X-ray Spec. (Menlo)	Fabbi				
977400	Thin & Pol. Sect. (Wash.)	Miller				
977410	Thin & Pol. Sect. (Denver)	Jensen				
977420	Thin & Pol. Sect. (Menlo)	Held				
977430	Instr. Shop	Abell				
977440	Misc. Serv. & Supp. (Wash.)	Ramisch				
977450	Misc. Serv. & Supp. (Denver)	Riley				
977460	Misc. Serv. & Supp. (Menlo)	Bastron				
977500	Radioac. & Radioch. (Wash.)	Rowe				
977510	Radioac. & Radioch. (Denver)	Millard				
	Total Assessment Funds	ASSMT				
		NASA				

Anerco 11-1

OFFICE OF THE ACG FOR GEOCHEMISTRY & GEOPHYSICS - FISCAL YEAR 1971

BRANCH OF ANALYTICAL LABORATORIES - Financial Report as of Salaries Feb. 28 OE Mar. 18 Average Obligation Rate 71.6%

71.000 annual

ACCT NO	PROJECT TITLE	PROJECT LEADER	REG SALARIES ALLOT	REG SALARIES OBLIG	OTHER EXPENSES ALLOT	TEMP SAL OBLIG	OTHER OBLIG	% OBL	UNOBLIG BALANCE
977000 x	Tech. Support	~~Exhibit~~May	136,100	68,636	5,000	-	2,740CR	-	7,740
977001	Computing	~~Exhibit~~May	none	-	~~25,000~~ 25,800	-	20,605	82.4	4,395
977010 x	Anal.Ser. &Res.,Wash.	May	240,500	187,805	~~14,000~~ 13,500	48	8,785	63.1	→ 5,167
977020	Anal.Ser. & Res.,Denver	Huffman	195,500	134,447	10,800	-	8,403	77.8	2,397
977030	Anal.Ser. & Res.,Menlo	Ingamells	88,100	63,468	13,000	440	10,939	87.5	1,621
977040 •	Rock & Min.Anal.,Wash.	Fahey	81,000	59,699	~~2,500~~ 1,400	-	1,276	51.0	1,224
977050	Gen.Rock Anal.,Denver	Peck	77,000	52,515	2,000	-	710	35.5	→ 1,290
977070 •	Rapid Rock Anal.	Shapiro	108,500	72,503	4,400	-	4,090	93.0	310
977100	Organic Geochem.	Breger	46,000	40,552	9,050	-	1,694	18.7	→ 7,356
977200 •	Spec.Ser. & Res.,Wash.	Helz	149,200	102,689	~~23,600~~ 20,800	1,182	15,328	70.0	→ 7,090
977210	Spec.Ser. & Res.,Denver	Myers	174,000	120,516	14,300	-	8,430	59.0	→ 5,870
977220	Spec.Ser. & Res.,Menlo	Bastron	56,400	40,304	5,500	-	2,923	53.1	2,577
977300	X-ray Spec., Wash.	Rose	83,700	64,165	~~15,900~~ 14,400	-	11,787	74.1	4,113
977310	X-ray Spec., Menlo	Fabbi	25,000	18,119	7,700	-	6,388	83.0	1,312
977400	T & P Sections, Wash.	Miller	21,900	17,015	4,700	1,813	103	40.8	2,784
977410	T & P Sections, Denver	Cochran	30,700	19,069	none	-	-	0	0
977420	T & P Sections, Menlo	Held	26,100	20,774	~~16,500~~ 12,008	2,644	7,476	61.3	→ 6,380
977430	Instru. Shop, Wash.	Abell	110,400	76,710	7,700	-	6,889	89.5	811
977440	Misc. S & S, Wash.	Ramisch	125,400	84,582	~~47,500~~ 43,500	-	29,832	62.8	17,668
977450	Misc. S & S, Denver	Riley	60,400	35,819	~~42,000~~ 36,500	-	25,897	61.7	16,103
977460	Misc. S & S, Menlo	Bastron	15,600	10,886	~~15,700~~ 12,700	-	6,801	43.3	8,899
977500	Radioac.& Radioch.Wash.	Rowe	51,200	24,562	~~42,050~~ 41,550	2,958	25,493	67.7	→ 13,599
977510	Radioac.& Radioch.Den.	Millard	42,400	29,904	28,600	-	28,266	98.8	334
	Total ASSIT.		1,945,100	1,344,739	357,500	9,085	229,375	66.7	119,040
977051	Gen.Pk.Anal.Den. (NASA)	Peck	4,000	-	1,363	-	621	45.6	742
~~977052~~	~~Exhibit (NASA) Exhibit~~								
977201	Spec.S&R,Wash. (NASA)	Helz	16,000	3,534	2,105	-	1,671	79.4	434
977202	Spec.S&R,Wash. (NASA)	~~Exhibit~~May	* 4,200	-	~~none~~ 4,200	-	-	0	0
977301	X-Ray Spec.Wash. (NASA)	Rose	19,000	-	18,040	-	15,863	87.9	2,177
~~977302~~	~~Exhibit (NASA) Exhibit~~								
	Total NASA (LUNAR)		43,200	3,534	21,508	-	18,155	84.4	3,353
	TOTAL FUNDS		1,988,300	1,348,273	379,008	9,085	247,530	67.7	122,393

* Helz using 4200 for computer expense Aueco 11-2.

Analytical Laboratories Branch
Washington, D. C.
Completed April - June, 1971
by Branches

S = Samples D = Determinations

	Branches	Conv Rk (S)	Rapid Rk (S)	Mineral (S)	Chem Detns	Neutron Act. (D)	SQ Spec. (S)	Quant. Spec. (D)	X-ray (D)	Sections (S)
Mineral Resources	Alaska	-	116	-	-	-	4	-	-	-
	Pacific	-	45	-	-	9	-	-	-	-
	Expl Res	-	-	-	-	-	-	-	-	-
	O.F. C.S.	-	-	-	-	-	-	-	-	42
	Rocky Mtn	-	117	-	10	-	92	-	-	-
	Eastern	-	23	1	-	-	108	15	0	369
	Min Expl	-	-	-	-	-	-	-	-	-
	Internt'l	-	-	-	-	-	-	-	11	5
Environmental Geology	Atlantic	-	33	-	9	-	20	-	-	692
	Central	-	-	-	-	-	-	-	-	-
	RockyMtn	-	93	-	-	-	69	-	-	102
	Pacific	-	2	-	-	-	-	-	-	-
	Engng	-	-	-	-	-	-	-	-	-
	Special	-	16	-	-	-	18	-	-	-
	Military	-	-	-	-	-	-	-	-	-
	Astro	-	18	-	-	-	-	-	-	-
	Sur Plan	-	-	-	-	-	-	-	-	-
	P S	-	-	-	-	-	-	-	-	-
Geochemistry Geophysics	EG M	-	-	-	10	10	4	56	63	49
	FG P	-	96	-	-	7	-	456	-	4
	Reg Geoph	-	-	-	-	-	-	-	-	-
	Isotope	-	27	-	1	-	1	-	-	-
	RegGeoch	-	20	-	-	-	18	20	-	-
	Anal Lab	-	-	-	-	11	3	4	30	4
	HVO	-	-	-	-	-	-	-	-	-
Misc.	ER CS	-	-	-	-	-	-	-	-	-
	Marine	-	1	-	-	-	-	-	-	-
	WRD	-	31	-	8	-	-	-	-	-
	Cons Div	-	-	-	-	-	-	-	-	-
	AEC	-	-	-	-	-	-	-	-	-
	Misc	-	-	-	-	-	-	-	-	-
	Totals	-	638	1	38	37	337	551	104	1,267

Rusco 11-3

Analytical Laboratories Branch
Washington, D. C.
Work on Hand - June 20, 1971, by Branches

S = Samples D = Determinations

	Branches	Conv. Rk (S)	Rapid Rk (S)	Mineral (S)	Majors (D)	Neutron Act.(D)	SQ Spec. (S)	Quant. Spec.(D)	X-ray (D)	Sections (S)
Mineral Resources	Alaska	---	47	---	21	---	---	80	---	---
	Pacific	---	77	---	64	2	---	---	210	---
	Exploration	---	73	3	---	---	52	---	---	---
	Organic	---	---	---	---	---	---	---	---	---
	Rocky Mtn	---	17	---	----	---	152	265	10	---
	Eastern	---	10	5	78	6	113	---	65	257
	Min. Expl.	---	---	---	---	---	20	---	---	---
	Intern'l	39	---	---	19	---	74	150	168	35
Environmental Geol.	Atlantic	---	20	2	10	---	97	124	64	571
	Central	---	18	---	---	---	---	---	---	---
	Rocky Mtn.	---	25	---	24	---	111	240	---	---
	Pacific	---	23	---	---	---	---	---	---	---
	Engineering	---	---	---	42	---	16	---	---	---
	Special	---	---	---	---	---	18	---	---	---
	Military	---	---	---	6	---	---	---	2	---
	Astrogeol.	---	---	---	---	---	---	---	160	---
	Sur. Plane.	---	---	---	---	---	---	---	---	---
	P and S	---	---	---	---	---	---	---	---	17
Geochemistry & Geophysics	E.G. & M.	---	21	1	77	---	60	---	557	100
	F.G. & P.	---	12	---	52	44	10	2,685	564	---
	Reg. Geop.	---	---	---	16	---	---	---	---	16
	Isotope	---	---	---	---	---	2	37	---	---
	Reg. Geoch.	---	24	---	4,352	---	26	196	---	---
	Anal. Lab.	90	15	---	3,103	1	16	200	96	---
	H. V. O.	---	---	---	---	---	---	---	---	---
Miscel.	E.R. & C.S.	---	---	---	---	---	---	---	---	---
	Marine	---	5	---	25	---	5	---	---	---
	W.R.D.	---	---	---	---	---	---	---	---	3
	Cons. Div.	---	---	---	---	---	---	---	---	---
	A.E.C.	---	---	---	---	---	20	---	---	---
	Miscel.	---	4	---	11	---	4	---	---	---
	TOTALS	129	391	11	7,900	53	796	3,977	1,896	999

Anexo 11-4

Analytical Laboratories Branch
Denver, Colorado
Work completed, March - June, 1971 by Branches

(S) = Samples (D) = Determinations

	Branches	Conv. Rk. (S)	Rapid R. (S)	Mineral (S)	Majors (D)	Traces (D)	Neutron Act. (D)	SQ Spec. (S)	Quant. Spec. (D)	X-ray (D)	Sections (S)
Mineral Resources	Alaska	---	---	---	---	---	---	1	---	---	---
	Pacific	---	---	---	26	---	---	5	---	---	---
	Explor. R.	---	---	---	64	---	---	130	---	---	220
	Organic	---	---	---	444	---	---	158	---	366	21
	Rocky Mtn.	17	---	---	302	---	16	279	616	---	836
	Eastern	---	---	---	---	---	---	---	---	---	36
	Min. Expl.	---	---	---	---	---	---	---	---	---	---
	Int'l G.	---	---	---	84	---	---	10	---	---	21
Environmental Geol.	Atlantic	---	---	---	---	---	---	---	---	---	381
	Central	---	---	---	---	---	---	---	---	---	---
	Rocky Mtn.	---	---	---	11	---	---	15	---	---	358
	Pacific	2	---	---	---	---	---	---	77	---	---
	Eng.	---	---	---	---	---	---	---	---	---	1
	Special	---	---	---	---	---	---	---	---	---	231
	Military	---	---	---	---	---	---	---	---	---	---
	Astrogeol.	192	---	---	28	---	---	1	---	---	---
	Sur. Plane.	---	---	---	---	---	---	---	---	---	---
	P and S	---	---	---	---	---	---	---	---	---	---
Geochemistry & Geophysics	E. G. & M.	---	---	---	---	---	---	---	---	---	---
	F. G. & P.	21	---	---	131	---	---	20	75	20	12
	Reg. Geop.	---	---	---	---	---	---	---	---	---	---
	Isotope	---	---	---	64	---	141	---	---	---	20
	Reg. Geoch.	52	---	---	6192	---	---	1238	---	2240	8
	Anal. Lab.	---	---	---	24	---	12	20	---	---	---
	H. V. O.	16	---	---	---	---	---	---	---	---	---
Miscel.	E. R. & C. S.	---	---	---	---	---	---	---	---	---	---
	Marine	---	---	---	---	---	---	---	---	---	---
	W. R. D.	---	---	---	---	---	---	---	---	---	---
	Cons. Div.	---	---	---	---	---	---	---	---	---	---
	A. E. C.	---	---	---	---	---	---	---	---	---	---
	Miscel.	---	---	---	---	---	---	---	---	---	---
	TOTALS	300	---	---	7370	---	169	1877	768	2626	2145

Anerco 11-5T

Analytical Laboratories Branch
Denver, Colorado
Work on hand, June 1971 by Branches

(S) = Samples (D) = Determinations

	Branches	Conv. Rk. (S)	Rapid R. (S)	Mineral (S)	Majors (D)	Traces (D)	Neutron Act. (D)	SQ Spec. (S)	Quant. Spec. (D)	X-ray (D)	Sections (S)
Mineral Resources	Alaska	---	---	---	---	---	---	---	---	---	---
	Pacific	5	---	---	141	---	---	---	---	---	---
	Explor. R.	---	---	---	---	---	---	122	470	---	103
	Organic	---	---	---	27	---	---	---	---	---	---
	Rocky Mtn.	35	---	---	1303	---	46	688	576	2532	600
	Eastern	---	---	---	---	---	---	---	---	---	---
	Min. Expl.	---	---	---	---	---	---	---	---	---	---
	Int'l G.	---	---	---	24	---	---	8	---	---	---
Environmental Geol.	Atlantic	---	---	---	---	---	---	---	---	---	140
	Central	---	---	---	---	---	---	---	---	---	27
	Rocky Mtn.	4	---	---	---	---	---	---	---	---	288
	Pacific	---	---	---	1	---	---	---	---	---	---
	Eng.	---	---	---	---	---	---	---	---	---	---
	Special	---	---	---	---	---	---	---	---	---	62
	Military	---	---	---	---	---	---	---	---	---	---
	Astrogeol.	7	---	---	---	---	---	---	---	---	10
	Sur. Plane.	---	---	---	---	---	---	---	---	---	---
	P and S	---	---	---	---	---	---	---	---	---	---
Geochemistry & Geophysics	E. G. & M.	---	---	---	120	---	---	---	54	---	---
	F. G. & P.	45	---	---	484	---	---	4	---	20	4
	Reg. Geop.	---	---	---	---	---	---	---	---	---	---
	Isotope	---	---	---	74	---	---	---	---	---	12
	Reg. Geoch.	8	---	---	5957	---	200	1103	---	8022	---
	Anal. Lab.	---	---	---	47	---	4	2	---	78	---
	H. V. O.	---	---	---	---	---	---	---	---	---	---
Miscel.	E. R. & C. S.	---	---	---	---	---	---	---	---	---	---
	Marine	---	---	---	---	---	---	---	---	---	---
	W. R. D.	---	---	---	---	---	---	---	---	---	---
	Cons. Div.	---	---	---	---	---	---	---	---	---	---
	A. E. C.	---	---	---	---	---	---	---	---	---	---
	Miscel.	---	---	---	---	---	---	---	---	---	---
	TOTALS	104	---	---	8178	---	250	1927	1100	10652	1246

Anerco 11-6

Analytical Laboratories Branch
Menlo Park Laboratory
Work Completed, April - June, 1971, by Branches

(S) = Samples (D) = Determinations

		MC (S)	MRC (S)	MO (S)	MG (D)	MT (D)	MA (D)	MSQ (S)	MQS (D)	MF (D)	Sections (S)		
Mineral Resources	AMR							125			707		
	PMR			3	20			19	3	188	502		
	Expl R												
	OFCR							2			17		
	RMMR												
	EMR												
	OME												
	OIG												
Environmental	AEG												
	CEG												
	RMEG							6			124		
	PEG				33			18		18	462		
	Eng G										22		
	Sp Proj												
	Mil G												
	Astro							1	90		17		
	SP Expl												
	P & S										621		
Geochem. & Geophys.	EGM												
	FGP			4	98			51	252	115	133		
	R Geoph				2						2		
	Isotope				153			29		24	37		
	R Geoch												
	Anal Lab							13					
	HVO												
Miscl.	ERCS												
	Marine							1			103		
	WRD							3		12			
	Cons D												
	AEC												
	Miscl												
	Totals			7	306			268	345	357	2747		
		Conv. Rock	Rapid Rock	Mineral	Majors	Traces	Neutron Activ.	SQ Spec.	Quant. Spec.	X-ray	Sections		

Annual 11-7

Analytical Laboratories Branch
Menlo Park Laboratory
Work on Hand, June 20, 1971, by Branches

(S) = Samples (D) = Determinations

		MC (S)	MRC (S)	MO (S)	MG (D)	MT (D)	MA (D)	MSQ (S)	MQS (D)	MF (D)	Sections (S)		
Mineral Resources	AMR							114			31		
	PMR			2	65			92	400		75		
	Expl R												
	OFCR			20	13								
	RMMR												
	EMR												
	CME												
	OIG												
Environmental	AEG												
	CEG												
	RMEG			1									
	PEG							7	20				
	Eng G				2								
	Sp Proj												
	Mil G												
	Astro			15									
	SP Expl												
	P & S												
Geochem. & Geophys.	EGM			6	1039								
	FGP			16	104			36	200				
	R Geoph												
	Isotope			1	60			1	12	8			
	R Geoch								1340				
	Anal Lab	18							18				
	HVO												
Miscl.	ERCS												
	Marine												
	WRD	1											
	Cons D												
	AEC												
	Miscl												
	Totals	19		61	1283			250	1990	8	106		
		Conv. Rock	Rapid Rock	Mineral	Majors	Traces	Neutron Activ.	SQ Spec.	Quant. Spec.	X-ray	Sections		

Aveno 11-8

Analytical Laboratories Branch
Statistics on Work Completed, April - June, 1971

S = Samples D = Determinations

	Branches	Conv. Rk (S)	Rapid Rk (S)	Mineral (S)	Majors (D)	Neutron Act. (D)	SQ Spec. (S)	Quant. Spec. (D)	X-ray (D)	Sections (S)	Work Units	% of Service
Mineral Resources	Alaska	-	2320	-	-	-	910	-	-	707	3937	2.92
	Pacific	-	900	600	276	54	168	15	1128	502	3643	2.70
	Expl Res	-	-	-	384	-	910	-	-	220	1514	1.12
	O.F. C.S.	-	-	-	2664	-	1120	0	2196	80	6060	4.50
	Rocky Mtn	1275	2340	-	1872	96	2597	3080	-	836	12096	8.98
	Eastern	-	460	200	-	-	756	75	-	405	1896	1.41
	Min Expl	-	-	-	-	-	-	-	-	-	-	-
	Internt'l	-	-	-	504	-	70	-	66	26	666	.49
Environmental Geology	Atlantic	-	660	-	54	-	140	-	-	1073	1927	1.43
	Central	-	-	-	-	-	-	-	-	-	-	-
	Rocky Mtn	-	1860	-	66	-	630	-	-	584	3140	2.33
	Pacific	150	40	-	198	-	126	385	108	462	1469	1.09
	Engng	-	-	-	-	-	-	-	-	23	23	.02
	Special	-	320	-	-	-	126	-	-	231	677	.50
	Military	-	-	-	-	-	-	-	-	-	-	-
	Astro	14,400	360	-	168	-	14	450	-	17	15,409	11.43
	Sur Plan	-	-	-	-	-	-	-	-	-	-	-
	P & S	-	-	-	-	-	-	-	-	621	621	.46
Geochemistry & Geophysics	EG & M	-	-	-	60	60	28	280	378	49	855	.64
	FG & P	1575	1920	800	1374	42	497	3915	810	149	11,082	8.22
	Reg Geoph	-	-	-	12	-	-	-	-	2	14	.01
	Isotope	-	540	-	1308	846	210	-	144	57	3105	2.31
	Reg Geoch	3900	400	-	37,152	-	8792	100	13,440	8	63,792	47.34
	Anal Lab	-	-	-	144	138	252	20	180	4	738	.55
	HVO	1200	-	-	-	-	-	-	-	-	1200	.89
Misc.	ER CS	-	-	-	-	-	-	-	-	-	-	-
	Marine	-	20	-	-	-	7	-	-	103	130	.10
	WRD	-	620	-	48	-	21	-	72	-	761	.56
	Cons Div	-	-	-	-	-	-	-	-	-	-	-
	AEC	-	-	-	-	-	-	-	-	-	-	-
	Misc	-	-	-	-	-	-	-	-	-	-	-
	Totals	22,500	12,760	1,600	46,284	1,236	17,374	8,320	18,522	6,159	134,755	100.00
	Units	75/S	20/S	200/S	6/D	6/D	7/S	5/D	6/D	1/S		

Branch-11-9

Analytical Laboratories Branch
Work Completed for other Branches
Fiscal 1971
(Work Units)

	Branches	Conv. Rock	Rapid Rock	Mineral Anal	Chem Detns	NAA Rad Chem	SQ Spec	Quant Spec	X-ray	Sections	Total Units	% of Service
Mineral Resources	Alaska	375	9560	-	528	132	3668	7935	-	5080	27,278	7.00
	Pacific	2550	4260	600	4140	222	2891	11,080	3798	2866	32,407	8.03
	Expl Res	-	-	200	4728	-	4382	-	288	480	10,078	2.36
	O.F.& C.S.	300	5420	-	21,924	-	4319	2030	4668	502	39,073	8.68
	Rocky Mtn	2025	6320	600	9066	510	9093	4935	594	2760	35,903	8.22
	Eastern	600	1480	1200	5706	6	1288	125	-	1665	12,070	2.81
	Min Expl	-	-	-	36	-	-	-	-	-	36	.01
	Internt'l	-	1040	3000	5832	6	1694	-	1050	112	12,734	3.32
Environmental Geology	Atlantic	-	5880	-	84	408	1722	2695	-	3542	14,331	3.58
	Central	-	-	-	-	-	-	-	-	-	-	-
	RockyMtn	2250	4060	-	1296	-	1505	1530	-	2515	13,156	3.00
	Pacific	150	1540	200	726	-	679	385	108	1628	5416	1.29
	Engng	-	-	-	-	-	-	-	-	99	99	.02
	Special	225	660	-	378	-	378	210	-	897	2748	.67
	Military	-	-	-	-	-	-	-	-	-	-	-
	Astro	16,275	360	-	528	-	349	450	330	428	18,720	3.59
	Sur Plan	-	-	-	-	-	-	-	-	-	-	-
	P & S	-	-	-	-	-	-	1870	-	1432	3302	.80
Geochemistry & Geophysics	EG & M	675	20	2400	828	60	238	325	1062	234	5842	1.45
	FG & P	5100	4040	800	8868	192	2541	11,080	1998	1637	36,256	7.80
	Reg Geoph	-	-	-	462	-	-	-	204	134	800	.22
	Isotope	-	2560	-	8718	2490	924	80	144	299	15,215	3.55
	RegGeoch	6150	760	-	74,262	354	17,633	100	47,274	84	146,617	29.05
	Anal Lab	-	60	-	672	138	483	8220	228	37	9838	2.26
	HVO	2400	-	-	1302	-	112	-	-	-	3814	.97
Misc.	ER & CS	-	-	-	-	-	7	-	-	-	7	-
	Marine	-	60	-	-	-	1344	-	-	490	1894	.48
	WRD	-	620	-	96	-	21	-	72	9	818	.15
	Cons Div	-	100	-	30	-	35	-	-	-	165	.04
	AEC	-	560	-	1140	-	735	-	-	136	2571	.55
	Misc	-	-	-	192	-	28	-	132	-	352	.10
	Totals	39,075	49,360	9000	151,542	4,518	56,069	53,050	61,950	27,066	451,630	100.00

Anesco-11-10