A FINITE-ELEMENT, PLANAR-FLOW MODEL
OF CAMAS PRAIRIE, IDAHO

A Dissertation

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ABSTRACT

Modern digital computers and mathematical models have been applied to fluid flow problems since the 1960's. Through the use of these tools, problems can be approached where the solutions at discrete points within the field of interest are sufficient. In this study a finite-element, planar-flow model was applied to a ground-water basin in southern Idaho, using a program developed by Dr. R. L. Taylor of the University of California at Berkeley.

The area studied is an intermontane valley in Camas and Elmore counties, Idaho, and consists of a prairie of valley-fill material that partially fills a valley about 30 miles long and 8-10 miles wide. The valley sides and surrounding areas are composed mainly of igneous and volcanic rocks that are relatively impermeable. The basement rock beneath the valley floor is assumed to be of the same material as the sides.

The ground-water system consists of a shallow water table aquifer, a clay unit and 2 artesian aquifers separated by relatively impermeable silty clay.

The model program is fitted to the geologic and hydrologic conditions of the area. A finite-element mesh is developed corresponding to a geologic section parallel to the valley axis. Input parameters to the model program are annual precipitation, permeabilities of the various units, boundaries and the geometric positions of

positions of the mesh nodes with reference to a spatial coordinate system.

The program computes head, potential, flow velocities in 2 directions normal to each other, resultant flow velocity and resultant flow direction with respect to the coordinate system, for each element in the mesh.

The model seems to give an adequate representation of the ground-water system of the basin, based on comparison of computed hydraulic heads with actual measurements of water levels and artesian heads. Flow quantities are computed for underflow at the output end of the section, using average annual precipitation as input. Underflow is also computed for simulated situations of 3 and 6 inches more than and less than average annual precipitation. Changes in underflow equivalent to +0.03 and -0.05 feet of water input indicate that the artesian aquifers are essentially insulated from changes in annual precipitation in any given year.

This type model should have practical use not only for describing a flow system but also for simulating past, future and/or locally changed conditions.

INTRODUCTION

Since the early 1960's, hydrological study has been concerned with ground-water basins and what could be called the regional picture. This has led to various methods of developing and applying models representing ground-water flow systems. J. Toth (1962, 1963) contributed the concept that exact ground-water flow patterns could be obtained analytically as solutions to formal boundary problems. This gave a theoretical approach to complement the field techniques generally used. However, the formal analytical solutions were limited to homogeneous media, regular boundaries and the specific cases treated, and the mathematics involved was complex and cumbersome.

Freeze and Witherspoon (1966, 1967, 1968) developed a mathematical model using the more versatile and powerful method of numerical finite-difference solutions. Their use of the finite-difference technique and a modern, digital computer to handle the numerous, but relatively less complex, equations was a significant step toward avoiding the involved mathematics of the analytical methods as well as toward a method of handling more complex boundaries and heterogeneous and anisotropic conditions.

Mathematical models using digital computers to solve ground-water problems had been recommended earlier by several authors, particularly Walton (1962). Fayers and Sheldon (1962) and Tyson and Weber (1964) were the first to employ numerical solutions in connection with mathematical models of ground-water basins and aquifers.

The purpose of this study was to develop a mathematical model of a ground-water basin using a computer program developed by Dr. R. L. Taylor of the University of California at Berkeley. The program utilizes a matrix developed from a finite-element mesh to solve for pressure, potential, flow velocities in 2 directions normal to each other, resultant flow velocity and resultant flow direction at each point determined by the mesh. The program offers features for determining the location of a free-water surface and can be applied to either a planar or axisymmetric type of flow problem. Materials in the mesh may be non-homogeneous, anisotropic and/or inclined.

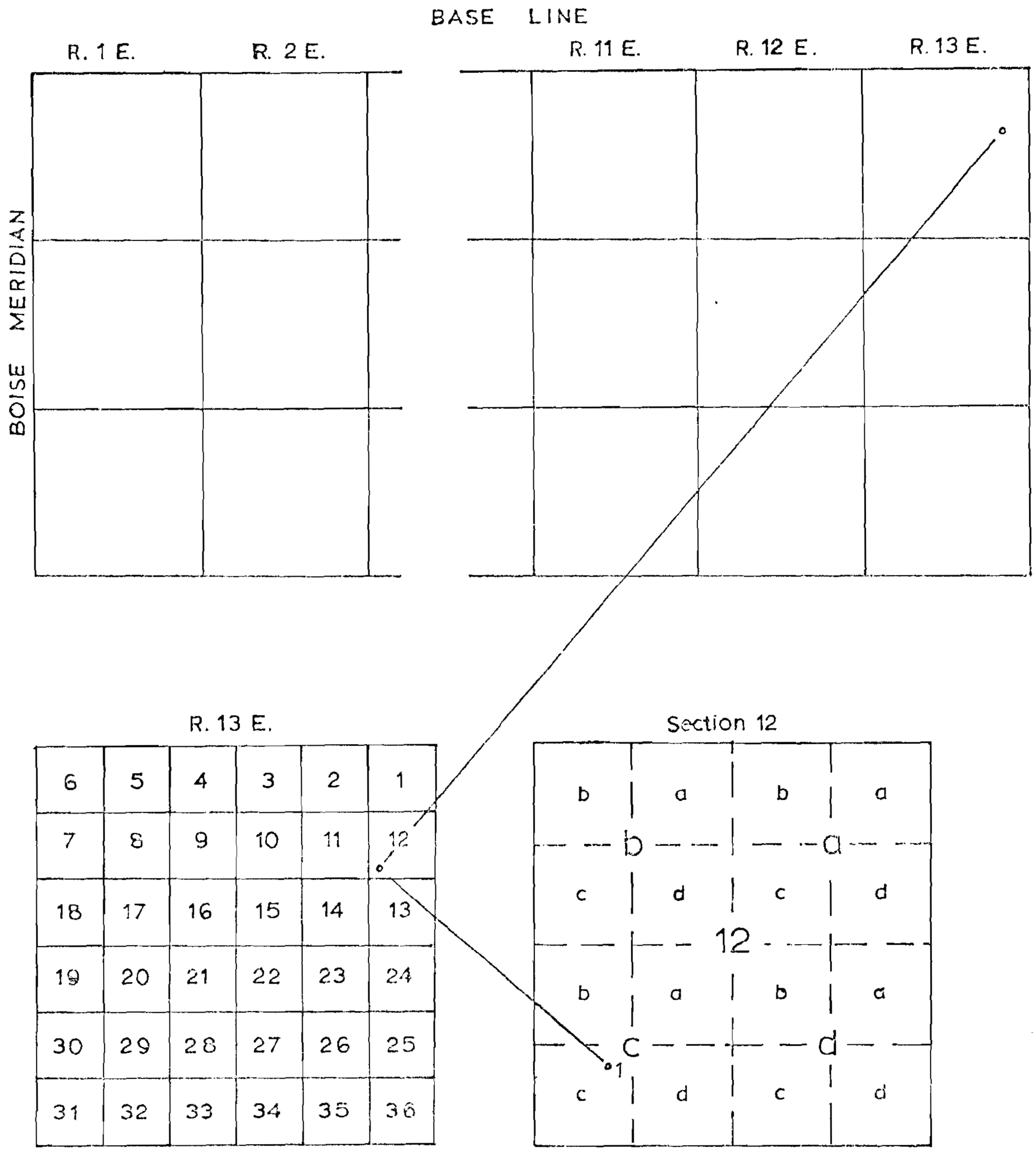
The program was obtained directly from Taylor by C. D. Kealy of the U.S. Bureau of Mines in Spokane, who used it while doing graduate study in the College of Mines at the University of Idaho. Kealy and Busch (1971) published the program in a U.S. Bureau of Mines report of investigation. Through the efforts of Dr. R. E. Williams of the University of Idaho, the program is now stored at the University Computer Center. The program is identified by FPM 500 but is stored under the title "FLØW".

This study is, to the author's knowledge, the first attempt to apply this program to a problem of this scale and one in which the flow in the ground-water system of a basin was to be modeled. The area of study is Camas Prairie, located in Camas and Elmore counties in southern Idaho. The ground-water system of the basin consists of 2 artesian aquifers and a shallow, water-table aquifer which is maintained in part by precipitation and in part by upward leakage from the artesian aquifers. The model is built primarily on the artesian system.

Field work was carried out during the summers of 1970 and 1971 and consisted of gathering field data to use with available published data to supply the necessary inputs to the model. Formation of the model is described in detail and the program output is compared to the actual field conditions. Water samples were collected from 23 selected wells and springs for chloride and fluoride determinations. Later, water samples were taken from 8 additional locations for fluoride determinations.

Well-Numbering System

The well-numbering system used in Idaho indicates the locations of wells within the official rectangular subdivisions of the public lands, with reference to the Boise base line and meridian. The first 2 segments of a number designate the township and range. The third segment gives the section and is followed by 2 letters and a number, which indicates the quarter section, the 40-acre tract, and the serial number of the well within the tract. Quarter sections are lettered a, b, c and d in counter-clockwise order, from the northeast quarter of each section. Within quarter sections 40-acre tracts are lettered in the same manner. A diagram showing the location of well 1S-13E-12cc1 or SW1/4 SW1/4 sec. 12, T. 1 S., R. 13 E., is given in Figure 1.



1S-13E-12cc1

IDAHO WELL-NUMBERING SYSTEM

FIGURE 1

CAMAS PRAIRIE

Location and Extent

Camas Prairie is located in the west-central part of southern Idaho. The center of the prairie is about 55 miles north of Twin Falls and about 75 miles east-southeast of Boise. The drainage area for Camas Prairie consists of about 650 square miles, nearly all of which is located in Camas county. Less than 100 square miles is located in Elmore county. The relatively flat surface of the prairie proper is about 215 square miles. The area is bounded by meridians 114° 30' - 115° 30' west and parallels 43° 10' - 43° 35' north. The location is shown in Figure 2.

Previous Investigations

A study of the ground-water conditions of Camas Prairie for irrigation was conducted by Arthur M. Piper in 1925. His report is essentially a reconnaisance report on the hydrogeologic conditions and was made within 2 years of the time when most of the original flowing wells in the prairie were drilled. Piper presented an interpretation of the geologic history of the area.

A more recent study was conducted of the ground-water resources of Camas and Elmore counties by William C. Walton in 1961, as

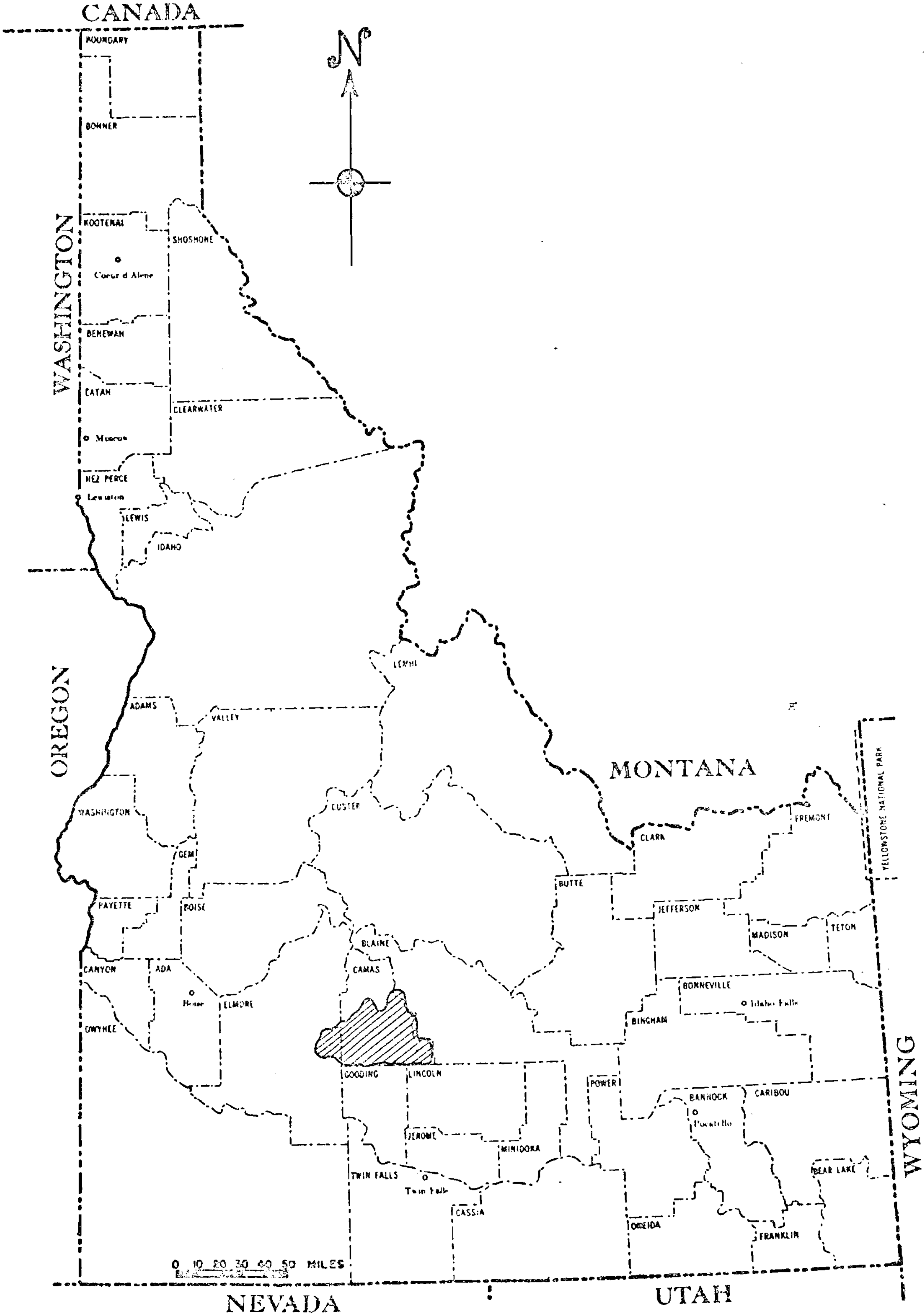


FIGURE 2

INDEX MAP SHOWING LOCATION OF CAMAS CREEK DRAINAGE AREA part of the investigations of areas in and adjacent to the Snake River Plain by the U.S. Geological Survey. The report was prepared for the U.S. Bureau of Reclamation; it describes the geology, ground-water resources, and quality and temperature of the ground water in Camas Prairie. Surface-water and ground-water discharge to streams were also appraised.

The records of wells drilled prior to 1960, listed in Appendix A, were taken from the above papers. The list of representative wells, Appendix A was brought up to date with records from the Idaho Department of Water Administration.

Geography

Economic Development

The city of Fairfield, located near the center of the prairie, is the county seat of Camas County and the business center of the prairie. The population was given by Walton (1961, p. 10) as 502 in 1950 and the city limit sign in 1972 reports 317 people. The water supply is unmetered. Corral, 8 miles west of Fairfield, is unincorporated and consists of a combination gas station, grocery store and branch post office. Hill City, 5 miles west of Corral, is similar. Blaine, Selby and Rands are railroad sidings with grain elevators. Soldier, 1 mile north of Fairfield, is a group of about 10 residences.

Camas Prairie is served by the Hill City Branch of the

Union Pacific Railroad and by State Highways 46 from the south and 68 from the east and west.

The economy of the area is mainly agricultural and based on alfalfa, wheat and barley. In 1971, slightly over 100,000 acres were under cultivation with 65-70,000 acres being in alfalfa. About 88,000 acres were cultivated dry land (without irrigation) and about 10,000 acres were irrigated more than once (Hazen, 1971).

Large numbers of sheep and cattle are grazed in the mountainous areas surrounding the prairie during the summer and on the prairie during autumn and winter.

Physiography and Drainage

Camas Prairie is located in the Northern Rocky Mountain physiographic province (Fenneman, 1931) and is an eastward-trending intermontane trough about 40 miles in length and about 8 miles in width. The trough is partially filled with detrital material carried in from adjacent mountains. The sediments were deposited during the time when the eastern outlet of the valley was dammed by lava flows, possibly beginning in Pliocene time and continuing into the Pleistocene (Walton, 1961, p. 10).

The prairie is a gently undulating plain that slopes south-eastward about 7 feet per mile from an altitude of 5200 feet above mean sea level at the west end. Broad, low, alluvial fans, formed by intermittent streams from the north, slope southward at about 40 feet per mile from the foot of the mountains.

To the north of Camas Prairie, Soldier Mountains rise in steep ridges to an altitude of 10,095 feet at Smoky Dome, 7 miles north of Fairfield, The Mount Bennett Hills, on the south, rise to an altitude of about 6,800 feet and consist of flat-topped, slightly-dissected ridges, separating the prairie from the basin of the South Fork of the Boise River.

Camas Prairie terminates 8 miles east of Fairfield against an undulating plain of basalt and in part against Quaternary alluvium slightly older than the valley fill. The older alluvium is slightly more consolidated and does not contain pebbles or cobbles of basalt (Piper, 1925, p. 9) and forms a series of low, gently rounded hills at the east end of the prairie. The basalt plain joins the main Snake River Plain 24 miles southeast of Fairfield at an altitude of about 4,900 feet above mean sea level.

Camas Creek is a sluggish, meandering stream which flows eastward along the southern margin of the prairie with a gradient of about 5 feet per mile between Hill City and Blaine. East of Blaine the creek flows in a deep canyon which it had cut into basalt. Camas Creek drains an area of about 650 square miles and discharges into the Big Wood River, a tributary to the Snake River.

Within the Camas Prairie basin, Elk, Deer, Soldier, Threemile, Corral, Chimney and Sheep Creeks drain the area on the north and are tributaries to Camas Creek. None of these streams are perennial and during the summer all lose their entire flow by infiltration along their channels across the alluvial fans at the foot of the northern mountains. In late autumn, the creeks begin to discharge water into Camas Creek again as a result of increased precipitation on the mountains and decreased evaportranspiration.

East of Blaine, Willow Creek is deeply incised into the older alluvium and has a small perennial flow. A few ephemeral streams drain the prairie-facing slope of the Mount Bennett Hills on the south.

Climate and Precipitation

The climate of Camas Prairie is semi-arid with low precipitation, high evapotranspiration and large daily temperature fluctuations.

Precipitation records have been kept by the U.S. Weather Bureau at stations at Hill City (1923 to present), Fairfield Ranger Station (1949 to present), Soldier (1895-1910) and Soldier Creek Ranger Station (1910-1948). Precipitation at the Soldier Creek Ranger Station, in the northern mountains, during the years of record was nearly 50 percent greater than at stations on the prairie.

The Hill City station was selected as most representative of the climatic conditions of the prairie because of its location and its length of record. The lowest annual precipitation recorded at Hill City was 6.67 inches in 1939 and the highest was 24.70 in 1970. The average over a 49-year period is 15.15 inches. Figure 3 shows the annual precipitation and cumulative departures from the average at Hill City for the period 1923-1970.

Data compiled by the U.S. Weather Bureau show January, February, March, May, November and December are the months of greatest precipitation with each having more than 1 inch. July, August and September are the months having the least precipitation,

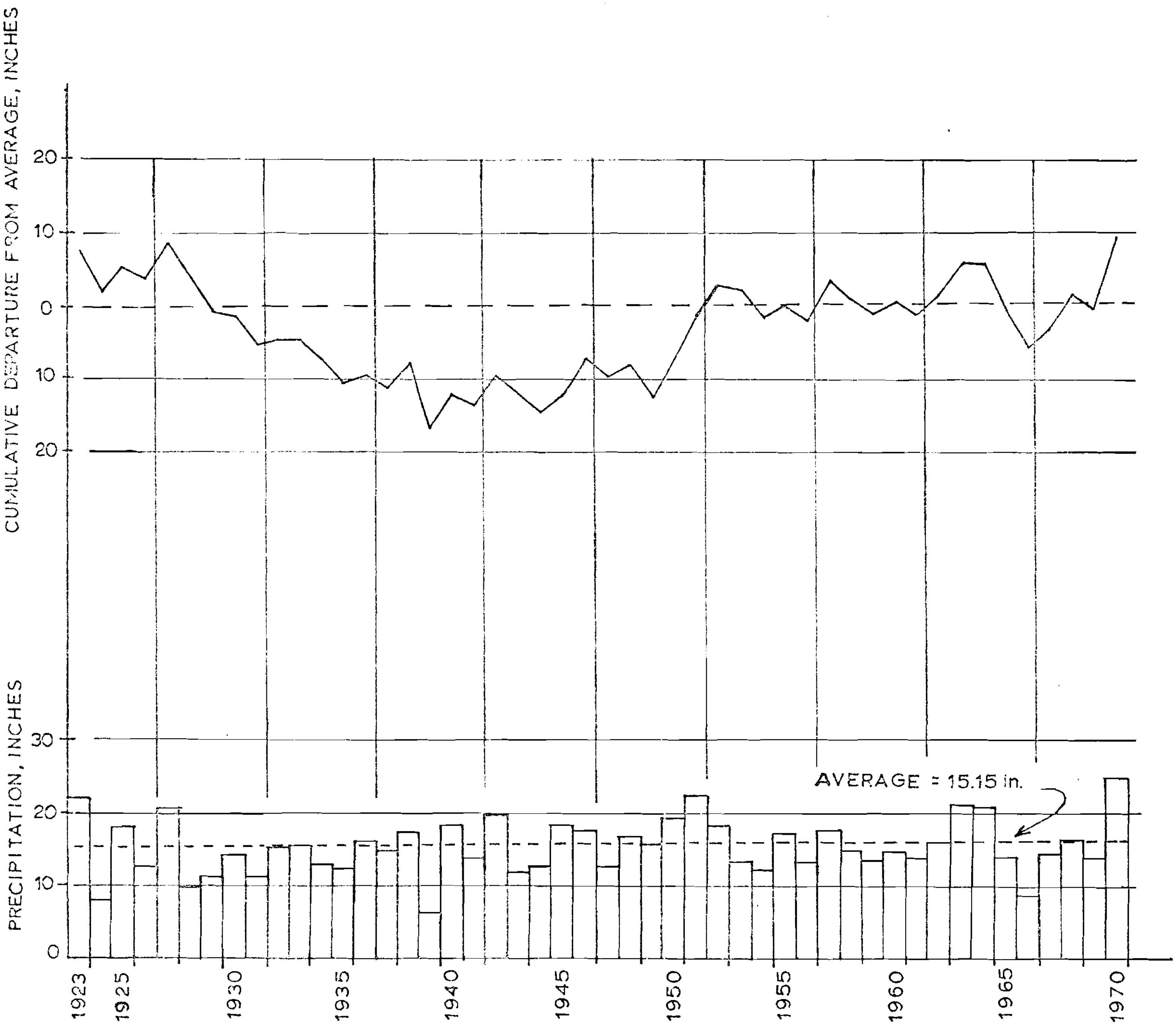


FIGURE 3.—ANNUAL PRECIPITATION AND CUMULATIVE DEPARTURE FROM AVERAGE, HILL CITY, 1923-70

generally less than 1 inch each.

Temperature records show January to be the coldest month and July the hottest. Extreme temperatures recorded at Fairfield are 96° F. and -35° F. and at the Hill City station, 102° F. and -44° F. The average annual temperature at Hill City is about 41° F.

Geology

History

By late Cretaceous to early Tertiary time, the southern edge of the Idaho batholith was exposed and by Eocene time most of the former cover had been eroded (Piper, 1925, p. 7; Ross and Savage, 1967, p. 80). The plutonic rocks thus exposed form the larger part of the Soldier Mountains on the north, as well as the cores of the ridges which bound Camas Prairie on the west and southwest.

The exposed plutonic rocks were uplifted and eroded during Oligocene time. During mid-tertiary, possible early miocene, the valleys formed during the Oligocene were flooded with lavas to depths of hundreds of feet (Piper, 1925, p. 7). These extrusives now form outcrops along the mountains at the northern edge of Camas Prairie and along the lower part of the Mount Bennett Hills which form the southern boundary.

The older, porphyritic Miocene lavas were followed after a considerable period of erosion by outpourings of rhyolitic lava, the Mount Bennett rhyolite, in probably late Miocene time (Piper, 1925, p. 8). North of Soldier, 2 miles north of Fairfield, the lavas are interbedded with fine-grained lacustrine sediments, indicating deposition in quiet water, probably ponded behind lava dams.

In the final stage of igneous extrusion, which affected the whole of southern Idaho, basaltic lavas inundated the Camas Prairie region. This inundation probably took place for the most part during Pliocene time, although some of the basalt is much younger and may be Pleistocene in age. The older of these lavas is exposed in the eastern end of the Mount Bennett Hills and in outcrops in the rolling terrane of the western end of Camas Prairie. The younger of these basalts forms, in part, the undulating eastern boundary of the Camas Prairie basin.

Structure

According to Piper (1925, p. 8):

> Camas Prairie occupies part of a zone within which recurrent adjustments have taken place in response to those regional earth stresses which have produced broad warpings in the Snake River plains to the south and extensive uplift of the central Idaho mountains mass to the north. Adjustment has been by high-angle faulting.

Structural adjustment probably followed each period of igneous activity or may have accompanied the extrusion of the basalts. Piper (1925, p. 9) feels that the structural adjustments led to a separating of the floor of the basin occupied by Camas Prairie into blocks, which were tilted and jostled at both ends of the present prairie. The older alluvium at the eastern end of the prairie, forming part of the eastern boundary, may be the result of a fault block that was uplifted relative to the present prairie, thus preserving the older alluvium as surface material unburied by more recent valley fill.

Smith (1966) made a detailed study of the eastern Mount Bennett Hills and gives support to the concept of fault control for the Camas Prairie basin. The Mount Bennett Hills are an east-west trending range forming the northern margin of the western Snake River Plains between Mountain Home and Magic Reservoir, north of Shoshone. The range breaks away from the southwest margin of the Idaho batholith about 22 miles northeast of Mountain Home, and is a complexly faulted, southerly and easterly tilted horst (Smith, 1966, p. 98). The core of the range is of Cretaceous to Miocene age rocks and plunges eastward beneath Pliocene and Pleistocene volcanics and sedimentary rocks. The Mount Bennett Hills merge with the Camas Prairie graben to the north and the Snake River graben to the south (Smith, 1966, p. 98).

Studies by Malde (1959) and Malde, Powers and Marshall (1963) along the northern margin of the western Snake River Plain indicate an east-west trending zone of intense, high-angle faulting along which up to 9,000 feet of cumulative down-to-the-south displacement has occurred since early Pliocene time.

Smith (1966, p. 99) found abundant stratigraphic evidence in the eastern Mount Bennett Hills for normal faulting and mapped 256 faults and fault segments which he divided into 2 roughly conjugate sets. The more northwesterly set bears a distinct <u>en echelon</u> relationship to the east-west trend of the range. This set, of probable early Pliocene age, with its largely dip-slip, down-to-the-north, nearly vertical movements, has a cumulative displacement in excess of over 1,000 feet (Smith, 1966, p. 108). This set forms the northern range front of the Mount Bennett Hills and the southern boundary of the Camas Prairie basin.

Smith (1966, p. 11) also mentions an area of east-west striking faults lying just north of the eastern Mount Bennett Hills range front. These faults are expressed as a series of scarps and scarplets, up to 25 feet in height, in the younger basalts. Their concentration in a narrow east-west trending zone may be indicative of movement along a major range-front fault, now buried beneath the basalts.

Right-lateral wrench faulting is postulated by Smith (1966, p. 119) along the Snake River Fault during Pliocene and Quaternary times, creating an upper-crustal tensional environment which resulted in a normal fault zone along the northern margin of the western Snake River Plain, thus forming the Mount Bennett Hills and the southern margin of the Camas Prairie basin.

Formations and Their Hydrologic Properties

Camas Prairie is considered to be a structural depression that has been partially filled with alluvial material, mostly of Pleistocene age (Walton, 1961, p. 10; Ross, 1970, p. 17). The alluvial material accumulated behind lavas of Pliocene and Pleistocene age that blocked the eastern outlet of the basin. The alluvium consists of a series of broad, alluvial fans that coalesce outward from the mouths of the stream canyons that drain the northern mountains. Drillers' logs of wells indicate that the valley fill is at least 500 feet thick at Fairfield and one well reports about 750 feet of alluvial fill.

With respect to their effect on the occurrence and movement of ground water, the rocks of Camas Prairie and the surrounding mountains are of 2 general types: igneous and consolidated sedimentary rocks, which form the sides and valley floor of the structural depression; and valley fill, consisting of alluvial and lake deposits.

Igneous and Consolidated Rocks

The rocks of the mountainous areas adjacent to the prairie are, for the most part, intrusive and extrusive igneous rocks of Cretaceous to Quaternary age, and presumably extend uninterruptedly beneath the valley fill. The igneous rocks bordering the prairie on the northwest, west and southwest are generally the rocks of the Idaho batholith and related rocks. These are medium- and coarse-grained crystalline rocks and include granite, quartz diorite, granodiorite and quartz monzonite. The ridges of the mountains on the north and northeast margins of the prairie are Challis volcanics and associated rocks such as andesite, dacite and rhyolite. The Mount Bennett Hills to the south are primarily silicic volcanic rocks such as dacite and latite and include beds of welded tuff and ignimbrites. The silicic volcanics are capped by basalt in places.

The oldest sedimentary rocks in the Camas Prairie drainage area are Carboniferous (?) calcareous sandstones and limestones (Piper, 1925, p. 7). Steeply dipping remnants of these rocks occur only in the northeast part of the area along Willow Creek at elevations of 600 to 800 feet above the present prairie. The rocks are intricately folded and faulted.

The rocks referred to above yield small to moderate amounts of ground water to wells and springs from weathered zones and complex systems of fractures, joints and crevices in what is otherwise relatively impermeable rock. Well yields are generally sufficient for domestic and stock use but rarely exceed 50 gallons per minute.

The ridges and rolling hills that bound Camas Prairie on the east, west and south are composed of Snake River basalt of Pliocene to Recent age. The rocks are fine-grained to dense, dark gray to black basaltic lava flows that were spread in successive sheets. The Snake River basalt extends from 1 to 3 miles beneath the valley fill northwestward from its exposed margin at the east end of the prairie. See Plate I in packet. The uppermost Snake River basalt is known from well 1S-15E-21ad1 to be 188 feet thick, is overlain by 92 feet of alluvial material and rests on clay at a depth of 280 feet.

A unit of unbroken basalt is relatively impermeable but porous and permeable zones may exist along joints, cooling cracks and between flows, and may yield large quantities of ground water to wells. Two wells near the eastern end of the prairie, 1S-15E-16db1 and 1S-15E-21ad1, both in the Snake River basalt, yielded 1280 gallons per minute with 35 feet of drawdown and 1350 gallons per minute with 12 feet of drawdown respectively (Walton, 1961, p. 11).

Valley-Fill Deposits

Large quantities of sedimentary material, derived mainly from plutonic rocks and rhyolitic and andesitic lavas of the mountains on the north during Pliocene and Pleistocene times, accumulated in the Camas Prairie basin while Camas Creek was cutting through the lava barriers to the east. The sediments are poorly sorted and range in size from clay to boulders. The materials were transported into the basin by streams and sheet runoff, with the coarse debris deposited near the foot of the mountains and finer material deposited farther out in the basin to the south.

The conditions of deposition were complex; consequently the character of the valley fill changes markedly from place to place, both horizontally and vertically. In general, the grain size is coarse near the foot of the northern mountains and becomes finer toward Camas Creek at the southern margin of the prairie (Walton, 1961, p. 13; Piper, 1925, p. 10). The valley fill contains numerous lenses and interfingering deposits of clay, silt, sand and gravel.

Most of the drillers' logs of wells in the prairie report a clay layer averaging 90 feet in thickness between average depths of 120 and 210 feet below the surface. The extensive clay deposit suggests that a lake of considerable extent must have existed in the Camas Creek basin, probably during Pleistocene time. Based on study of drillers' logs, relief on the upper and lower surfaces of the clay is less than 50 feet and the thickness decreases at the southern margin of the prairie beneath Camas Creek.

The precise thickness of the valley fill is unknown in most of the prairie. Two wells, 1S-14E-9db1 and 1S-15E-5db1, reportedly penetrated the valley fill and encountered bedrock at depths of 497 and 550 feet respectively. However, Fairfield City Well No. 4, approximately one-half mile from 1S-14E-9db1, was deepened in 1965 from an original depth of 352 feet to a depth of 760 feet and was still drilling in "brown, sandy clay" according to the driller's log. For this study the thickness of the valley fill is considered to be 350, 450 and 550 feet at Hill City, Corral and Fairfield respectively. These depths are considered to be minimum depths and were chosen because both artesian aquifers developed in the prairie are included and of the 3 wells deeper than 500 feet, 2 reportedly hit "granite".

Sand and gravel in the valley fill are important aquifers in Camas Prairie and yield sufficient water for irrigation and other large-scale uses. Permeable sand and gravel are found in 2 zones below the clay unit. Alternating beds of moderately permeable sand, sandy silt, silt and clay lie above the clay. Immediately above the clay is the "upper artesian aquifer," consisting of fine- to medium-grained sand and some gravel interbedded with relatively thin lenses of clay. The thickness is variable but averages about 50 feet.

Underlying the upper artesian aquifer are beds of sandy and silty clay that are relatively impermeable. The thickness of this unit varies, but averages about 90 feet. Below this unit is the "lower artesian aquifer" averaging about 50 feet in thickness and composed of permeable sand and gravel interbedded with lenses and layers of clay.

The 2 aquifers are fine-grained and their permeability is generally low. The average composition of the upper 250 feet of fill, from 26 wells in the prairie, is 30 percent sand and 70 percent clay (Piper, 1925, p. 10). The sand is locally coarse with pebbles, cobbles and boulders, and very little of the clay is free of sand.

THE FINITE-ELEMENT METHOD

Summary of Finite-Element Theory

The finite-element technique is a numerical method of analysis in which the region of interest is divided into discrete elements. The method was originally used in stress analysis, particularly in the field of structural engineering. A discrete solution to a differential equation provides values only at discrete points within the problem region rather than the continuous values obtained by an analytical solution. Discrete solutions are adequate in many cases and permit treatment of complex boundary conditions; they also provide approximate solutions to problems which cannot be handled by analytical means. Further discussion of this method can be found in Zienkiewicz (1965, 1966, 1967).

The first application of finite-element techniques to seepage problems was made by Zienkiewicz in 1965. This work provided the basic theory on which subsequent seepage studies and computer programs were based. The accuracy of the finite-element technique has compared favorably with analytical methods in a number of water flow problems (Tomlin, 1966; Zienkiewicz, 1966; Zienkiewicz, 1967).

In 1967, both Finn (1967), at the University of Vancouver, and Taylor and Brown (1967), of the University of California at Berkeley, used a matrix and the finite-element method to locate the phreatic surface. Taylor later developed a technique for finding the phreatic surface without the trial-and-error location of the exit point, which was required with Finn's method.

Darcy's Law in Terms of Pressure and Gravitational Potential

The following derivations are modified from Kealy and Busch (1971).

The theory of waterflow through porous media is based in part on the classical experiment originally performed by Darcy in 1856. Most deterministic mathematical models may be validly used only if Darcy's assumptions hold true (Davis and DeWiest, 1966, p. 174).

Darcy's law is expressed as follows (Davis and DeWiest, 1966, p. 158,162):

$$q = -ki \qquad (1)$$

where

q = unit flow (L/T),

k = coefficient of permeability (L/T),

$i = dh/dl = h/L$ = hydraulic gradient (dimensionless),

L = length (L),

T = time (T),

and h = hydraulic head (L).

In order to use the finite-element technique, Darcy's law must be expressed in the form:

$$q = -K(\partial P/\partial x + \rho g), \qquad (2)$$

where

K = coefficient of permeability/ρg (TL^3/M) = computer coefficient of permeability,

P = pressure (M/LT^2)

ρ = fluid density (M/L^3),

and g = gravity (L/T^2).

This expression can be derived in the manner shown in equations 3 through 16. The additional notation used consists of the following:

θ = fluid potential (L^2/T^2).

Z = elevation above a standard datum (L).

P = pressure at a point in the porous medium where θ is desired (M/LT^2).

P_o = pressure at the standard datum (M/LT^2).

k = saturated hydraulic conductivity (coefficient of permeability) (L/T).

q_y = rate of flow in y direction (L/T).

Using Hubbert's approach (1940),

$$h = \theta/g = Z + 1/\rho g \int_{P_o}^{P} dp, \tag{3}$$

provided ρ and g are considered constant. Now, consider for example the potential gradient in the vertical direction (y direction):

$$\partial h/\partial y = \partial Z/\partial y + 1/\rho g(\partial p/\partial y); \tag{4}$$

therefore,

$$\partial h/\partial y = 1 + (1/\rho g)\ (\partial p/\partial y), \tag{5}$$

or

$$\rho g(\partial h/\partial y) = \rho g + \partial p/\partial y. \tag{6}$$

Consequently,

$$\partial h/\partial y = (\rho g + \partial p/\partial y)/\rho g. \tag{7}$$

According to Darcy's law,

$$q_y = -k(\partial h/\partial y), \tag{8}$$

where k = saturated hydraulic conductivity. By substitution,

$$q_y = -k\,\frac{\rho g + \partial p/\partial y}{\rho g}\,, \tag{9}$$

or

$$q_y = -k/\rho g\;(\rho g + \partial p/\partial y). \tag{10}$$

Now let $-K = -k/\rho g$; then,

$$q_y = -K_y(\rho g + \partial p/\partial y). \tag{11}$$

By similar reasoning, $q_x = -K_x(\partial p/\partial x + 0)$ (g = 0 in x direction), where K is the method of expressing permeability in a manner convenient for use in the computer.

It is known that pressure

$$p = \rho g h; \tag{12}$$

therefore, by substitution,

$$q_y = -K\ (\rho g + \rho g[\partial h/\partial y]). \quad (13)$$

Thus,

$$q_y = -\rho g K\ (1 + \partial h/\partial y), \quad (14)$$

or in terms of actual coefficient of permeability, k,

$$q_y = -\rho g K/\rho g\ (\partial h/\partial y + 1) = -k\ (\partial h/\partial y + 1). \quad (15)$$

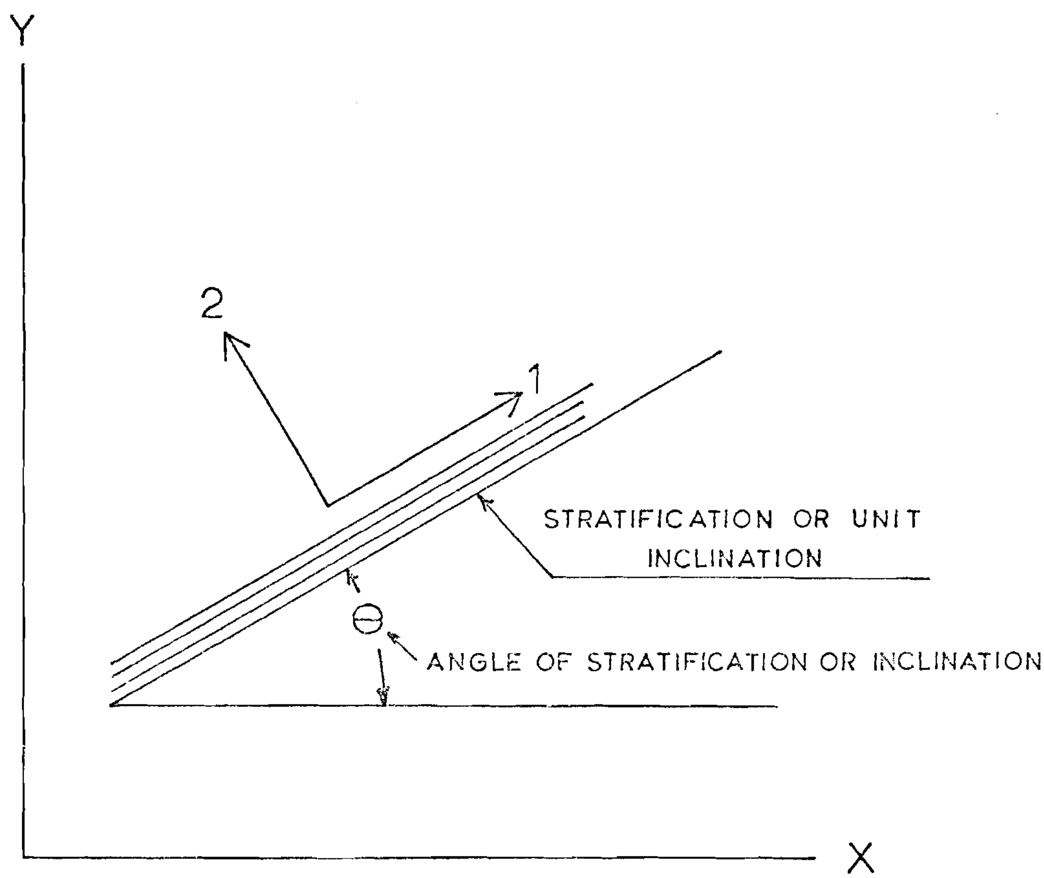
Consequently, if all nodal pressures are expressed in terms of hydrostatic head and if $\rho g = 1$, then K (computer) can be replaced by k (measured). If program input pressures are in feet of water and if nodal coordinates are in feet, then q will have the same units as the input k units. Equation 2 can be expressed in matrix form as

$$\{q\} = -\{k\}\{\partial P/\partial x + \rho g\}, \quad (16)$$

where $\{q\}$ is a matrix of the flow velocities, $\{k\}$ is a matrix of the coefficients of permeability, P is the fluid pressure at a point $\{x\}$, and ρg is the gravitational term.

Directional Relationships: Theory and Application

Two sets of coordinates are required, designated (x,y) and (1,2) (See figure 4). Directional permeabilities are specified in the (1,2) coordinate system as K_1 and K_2 or K_h and K_v for horizontal and vertical, respectively. The stratification angle is specified in the coordinate system (x,y).



COORDINATE SYSTEMS FOR ORIENTATION OF INCLINED UNITS (1,2 DIRECTIONS)
AND ELEMENTS OF MESH (X,Y DIRECTIONS)
FIGURE 4

$$\begin{Bmatrix} q_1 \\ q_2 \end{Bmatrix} = - \begin{vmatrix} K_1 & 0 \\ 0 & K_2 \end{vmatrix} \begin{vmatrix} (\partial P/\partial x)_1 + \rho g \\ (\partial P/\partial x)_2 + \rho g \end{vmatrix} \tag{17}$$

Note that K must be measured in the field in the (1,2) system.

Using standard transformation techniques (Zienkiewicz and Cheung, 1965), it can be shown that

$$\begin{Bmatrix} q_x \\ q_y \end{Bmatrix} = \begin{vmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{vmatrix} \begin{vmatrix} q_1 \\ q_2 \end{vmatrix} \tag{18}$$

and

$$\begin{Bmatrix} (\partial P/\partial x)_1 + \rho g \\ (\partial P/\partial x)_2 + \rho g \end{Bmatrix} = \begin{vmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{vmatrix} \begin{Bmatrix} \partial P/\partial x + \rho g_x \\ \partial P/\partial y + \rho g_y \end{Bmatrix} . \tag{19}$$

Combine all of the above transformations to rewrite Darcy's law in terms of global coordinates x,y:

$$\begin{Bmatrix} q_x \\ q_y \end{Bmatrix} = - \begin{vmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{vmatrix} \begin{vmatrix} K_1 & 0 \\ 0 & K_2 \end{vmatrix} \begin{vmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{vmatrix} \begin{Bmatrix} \partial P/\partial x + \rho g_x \\ \partial P/\partial y + \rho g_y \end{Bmatrix} . \tag{20}$$

Note that the permeability matrix in x,y is

$$\begin{vmatrix} K_{xx} & K_{xy} \\ K_{yx} & K_{yy} \end{vmatrix} = \begin{vmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{vmatrix} \begin{vmatrix} K_1 & 0 \\ 0 & K_2 \end{vmatrix} \begin{vmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{vmatrix} . \tag{21}$$

Therefore, the working equation in matrix form becomes

$$\begin{Bmatrix} q_x \\ q_y \end{Bmatrix} = - \begin{vmatrix} K_{xx} & K_{xy} \\ K_{yx} & K_{yy} \end{vmatrix} \begin{Bmatrix} \partial P/\partial x + \rho g_x \\ \partial P/\partial y + \rho g_y \end{Bmatrix} . \tag{22}$$

Linear Pressure Variations: Basic Assumption

With Darcy's law in the form of equation 22 and with the assumptions necessary for its use, it can be employed in flow analysis. However, an additional assumption is necessary: In each finite element (triangle) in the model, the pressure varies linearly with the distance from nodes. Therefore, from equation 2, it can be seen that the fluid (water) velocities will be constant in time since the permeability and the gravity term ρg are constant for any element.

Since the boundary node pressures are known in any solution, it becomes advantageous to work in terms of node values. In any triangular element, the linear pressure variation can be expressed in terms of the pressures at the vertices i, j, and k of the triangle; these are called nodal pressures.

Derivation of Linear Pressure Distribution in Terms of Nodal Pressure

The following derivation is after Taylor and Brown (1967). For a general linear spatial variation of pressure in a plane, the following applies:

$$P = A_1 + A_2X + A_3Y. \qquad (23)$$

The constants A_1, A_2, and A_3 can be expressed in terms of the nodal pressures located at the vertices i, j, and k, respectively, of a plane triangle by evaluating equation 23 at each node. Accordingly,

$$\begin{Bmatrix} P_i \\ P_j \\ P_k \end{Bmatrix} = \begin{vmatrix} 1 & X_i & Y_i \\ 1 & X_j & Y_j \\ 1 & X_k & Y_k \end{vmatrix} \begin{Bmatrix} A_1 \\ A_2 \\ A_3 \end{Bmatrix} . \qquad (24)$$

Equation 24 may be solved for the value of A_1. Thus,

$$\begin{Bmatrix} A_1 \\ A_2 \\ A_3 \end{Bmatrix} = 1/\Delta \begin{vmatrix} D_{jk} & D_{ik} & D_{ij} \\ (Y_j-Y_k) & (Y_k-Y_i) & (Y_i-Y_j) \\ (X_k-X_j) & (X_i-X_k) & (X_j-X_i) \end{vmatrix} \begin{Bmatrix} P_i \\ P_j \\ P_k \end{Bmatrix} , \qquad (25)$$

where $\Delta = D_{jk} + D_{ik} + D_{ij}$,

and $D_{jk} = X_j Y_k - X_k Y_j$,

$D_{ik} = X_k Y_i - X_i Y_k$,

and $D_{ij} = X_i Y_j - X_j Y_i$.

Using equations 23 and 25, then

$$P = \langle 1XY \rangle \begin{Bmatrix} A_1 \\ A_2 \\ A_3 \end{Bmatrix} . \qquad (26)$$

Differentiating with respect to X and Y,

$$\begin{Bmatrix} \partial P/\partial x \\ \partial P/\partial y \end{Bmatrix} = \begin{vmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \end{vmatrix} \begin{Bmatrix} A_1 \\ A_2 \\ A_3 \end{Bmatrix} . \qquad (27)$$

Thus the pressure gradients are constant in space for any element. From equation 2 is derived

$$\begin{Bmatrix} q_x \\ q_y \end{Bmatrix} = \begin{vmatrix} K_{xx} & K_{xy} \\ K_{yx} & K_{yy} \end{vmatrix} \begin{Bmatrix} \partial P/\partial x - \rho g_x \\ \partial P/\partial y - \rho g_y \end{Bmatrix} . \quad (28)$$

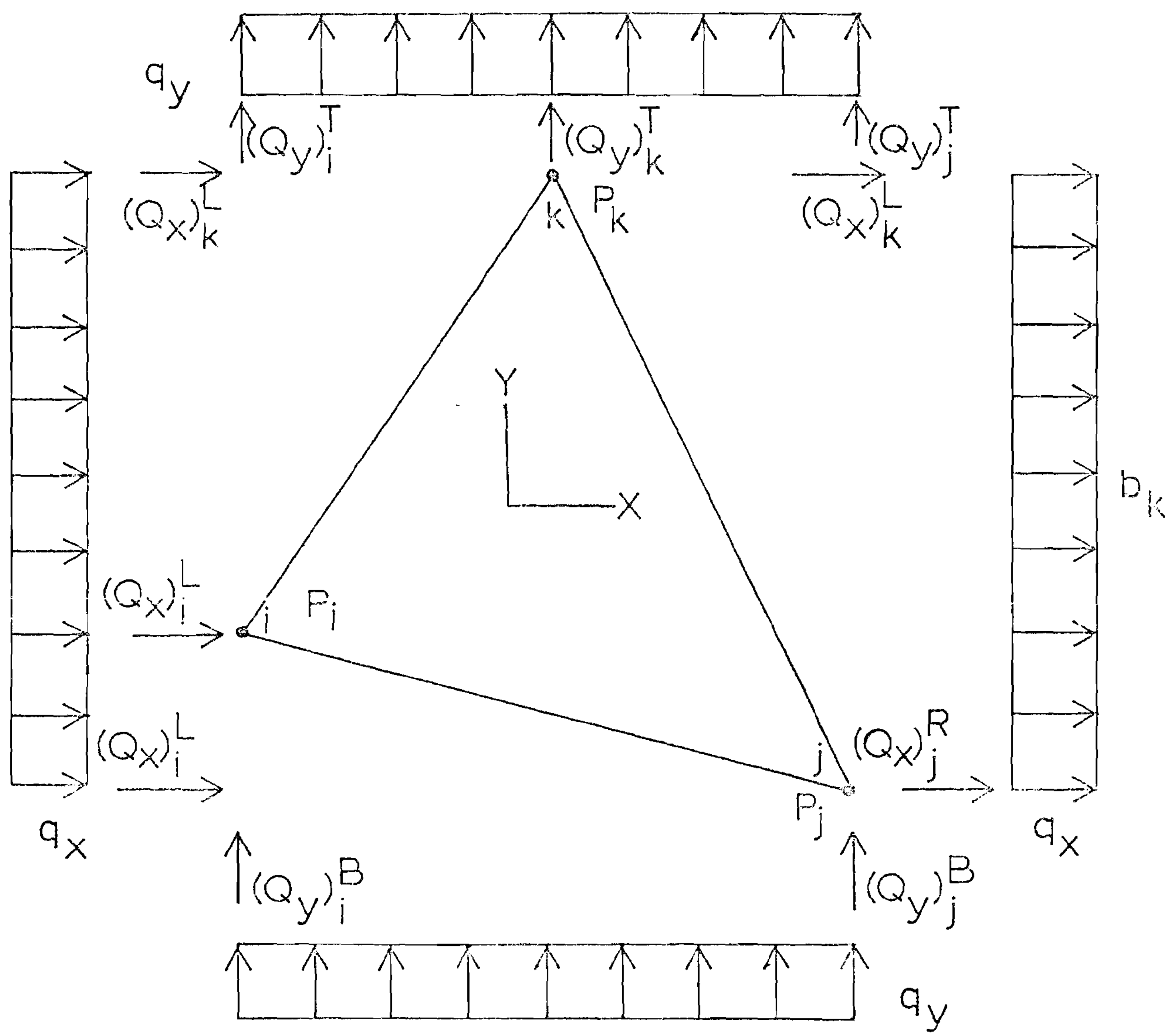
Consequently, for constant permeabilities {K} and gravitational term {ρg}, the flow rates {q} will also be constant. Therefore, the flow problem is steady state, and the right-hand side of the continuity equation can subsequently be set equal to zero.

Continuity Equation

If no fluid is placed in or derived from storage in each element, then the continuity equation must be expressed for steady-state conditions; specifically, the flow into the region of study must equal the flow out of the region. If this concept is used on a single element of the region being studied and if a linear spatial-pressure distribution within the element is assumed, one can construct an approximate solution. Further, taking a dense array of elements in the region of interest makes possible very accurate approximations.

A single element with nodal pressures, nodal volume rate of flow, element velocities, and element dimensions is portrayed in figure 5. The element velocities q_x and q_y, computed from the Darcy equation (2) are expressed in terms of the nodal pressures at the vertices i, j, and k, which are denoted by P_i, P_j, and P_k, respectively. Once q_x and q_y are known, equivalent nodal flows Q can be computed; that is,

$$(Q_x)_k^R = (Q_x)_j^R = 1/2\ q_x\ (P_i,\ P_j,\ P_k) b_k . \quad (29)$$



ELEMENT NODAL FLOWS

FIGURE 5

(Superscripts denote the following: R is right, L is left, T is top; and B is bottom.)

Treating the total fluid exiting at nodes $(Q_i Q_j, Q_k)$ as positive gives

$$Q_i = (Q_y)_i^T - (Q_y)_i^B - (Q_x)_i^L,$$

$$Q_j = (Q_y)_j^T - (Q_y)_j^B + (Q_x)_j^R - (Q_x)_j^L,$$

and

$$Q_k = (Q_y)_k^T - (Q_x)_k^L + (Q_x)_k^R. \qquad (30)$$

By considering each element connected to any node M, continuity of flow at the node is insured by

$$\sum_{i=1}^{m} Q_M^i = 0, \qquad (31)$$

where m is the number of elements connected to node M and i is the particular element from which Q_M^i is computed. Computing equation 31 for each node in the finite-element model requires a set of simultaneous algebraic equations in terms of the nodal pressures P_M. (Recall that q_x and q_y are expressed for each element in terms of the element's nodal pressures; consequently, each Q_M^i in equation (31) will also be in terms of the nodal pressures.) The algebraic equations are developed by considering each element in turn. Before the algebraic equations are solved simultaneously, the equation for each node at which the pressure is known is modified to produce this pressure as the solution. The value of all other nodal pressures is obtained from the solution to the simultaneous equations. Once the pressure distribution is ascertained, the flow velocities in each element can be computed from Darcy's equations. Further, if pressure distribution is known, then the potentials, or hydraulic head, can easily be calculated and the flow net derived.

Determination of Location of Free Water Surface*

In many real problems, the location of the free-water surface is not known. Being able to handle this situation is one of the main advantages of this particular numerical solution: With only minimal known boundary conditions, one can analyze an anisotropic flow system, as well as establish the locations of the phreatic surface.

In order to locate the free water surface, the investigator must be able to select the position of the surface that has both zero flow normal to it and zero atmospheric pressure on it. Using finite-element estimation, one should specify these two conditions at only the nodal points along the free surfaces. The final node location of the free water surface is not known beforehand in any problem where this option is used.

The two foregoing conditions are specified for any node on the free surface as

$P \to 0$ (where 0 is taken as atmospheric pressure)

and q (normal to free surface) $\equiv 0$.

---

*NOTE: This aspect of the finite-element solution is optional. The phreatic surface can be fixed and the remainder of the approach continues to be valid.

The free water surface is finally located at those nodes where $q = 0$ and where P approaches 0.

It is not possible initially to specify correctly all three of the foregoing conditions because the node location at which the flow will be zero (and where the pressure will be atmospheric) is not known; therefore, the node location along the free surface must be assumed. Further, because of the number of unknowns and equations to be solved, one must set either $P = 0$ or $q = 0$. In this analysis q is always set equal to zero. Once so positioned, the initially located free surface nodes can be allowed to move until they reach points where $P \to 0$. This procedure provides the final location of the free surface nodes since all three conditions are satisfied ($P \to 0$, $q = 0$, and free surface nodes are specified).

Isolation of Study Region and Boundary Conditions for Model

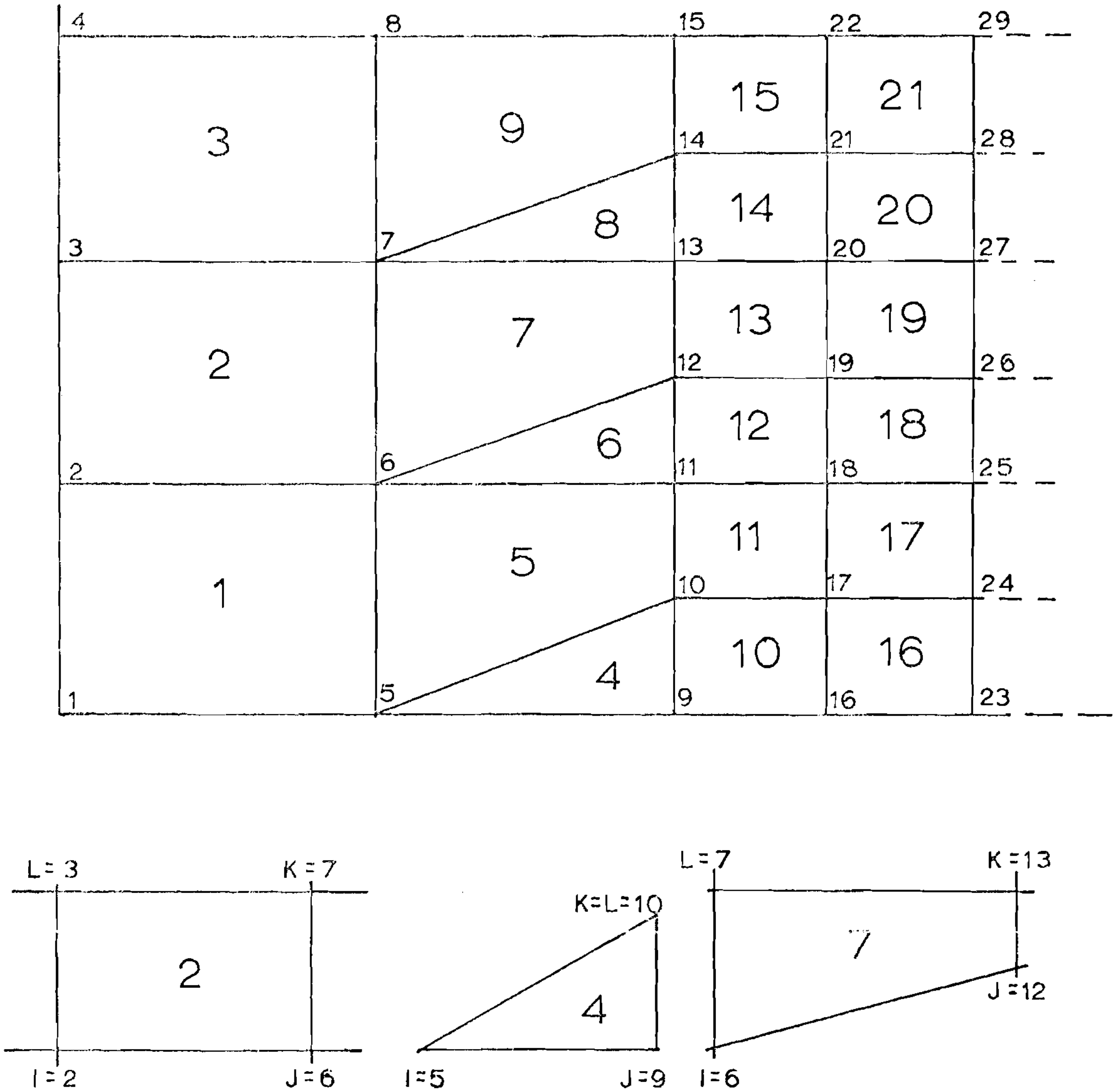
The first step in applying this technique is to define the region of study in terms of its boundary conditions. The effects of these conditions on flow and the relationship of the various elements can then be determined. Boundaries are specified by the geometry of the problem and may include such things as one or more impermeable boundaries, a hydrostatic upstream equipotential line, an estimated location of the free-water surface and/or a downstream equipotential line.

The flow region is divided by the program into elements consisting of plane triangles with nodes at each vertex. The finite-element mesh may be constructed of quadrilateral elements for convenience in forming it initially, since the program automatically divides the quadrilaterals into triangular elements. (See figure 6).

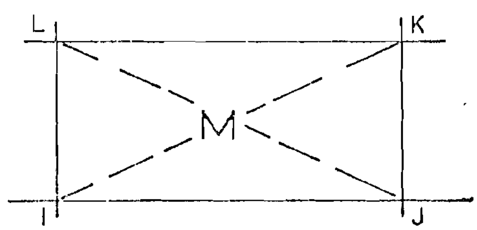
The elements should be numbered sequentially beginning at the lower left and numbering upward in each column of elements in the mesh. The nodes must be numbered sequentially upward in each column, beginning at the left edge of the mesh. No element can have more than four nodes, thus to change mesh size requires construction of triangular elements in the transition column as shown in figure 6.

The program is designed for application to either a planar or axisymmetric type of flow problem. The planar option was used to model an east-west section through Camas Prairie. The section to be modeled is about 30 miles long and 375-550 feet in height, and is oriented approximately parallel to Camas Creek, which flows in a westerly direction along a trough in the piezometric surface. (See Plate II in pocket).

To isolate the region of study, the various boundaries and boundary conditions had to be described. The topographic surface was used as the upper boundary because the depth to water averages less than 10 feet over the entire valley bottom and this depth, relative to the total thickness of the section, is insignificant. The lower boundary, the relatively impermeable basement, was



A. INPUT MESH NOTATION



B. PROGRAM DIVISION OF QUADRILATERAL AND PLACEMENT OF NODE "M"

FIGURE 6

determined from well-drillers' logs and estimates by Piper (1925) and Walton (1961). The western, upstream, input end of the section was placed by consideration of the surface geology. The valley-fill sediments terminate against basalt and there are no wells from this point west to the drainage divide. Since sub-surface information was lacking in this area, the western boundary was placed as vertical and impermeable.

The eastern boundary was determined from well logs and what is known of the sub-surface geology. The valley fill terminates against basalt lava flows and relatively impermeable older alluvium. The eastern section boundary was therefore placed in the more permeable basalt, through which most of the underflow from the prairie occurs.

The discharge area was at first represented by assigning zero pressure to the 10 surface boundary nodes at the east end of the section. Pressures were not known for this vertical boundary of the section; therefore it was automatically treated as impermeable in the program. This arrangement caused all the flow to come to the surface at the discharge nodes and flow at the vertical end boundary was vertical. This configuration was later abandoned because flow which occurs through the end of the section, representing the underflow from the prairie, was desired in the program output.

The final representation of the outflow end of the section was made by adding 5 columns of elements beyond the point where the flows were to be computed. This was done to avoid the impermeable-end effect. Zero pressure was assigned to the surface boundary node at the point where the section intersects the perennial part of Camas Creek. The pressures on the surface boundary nodes downstream from this point were assigned values corresponding to the gradient of Camas Creek--about 5 feet per mile. The pressures on these nodes were therefore negative, representing feet of water below each node.

The Finite-Element Mesh

A geologic section was constructed from information on drillers' logs along the line chosen for the model section and from this section the finite-element mesh was developed (see Plate III). The geologic section was 5 hydrologic units in height. Each element of the mesh was made with height equal to the thickness of the unit it represented, thus element upper and lower boundaries correspond to hydrologic unit upper and lower boundaries.

Each hydrologic unit was made 1 element high. Because of limitations on storage allocated by the program for the mesh, element length to height was made in the ratio of 50 to 1, using the height of the first element in the thinnest hydrologic unit. Each element at the beginning of the mesh was made 2,000 feet long, determined by the 40-foot thickness of the thinnest unit at the west end of the section. The 2,000-foot element length was maintained for about 20 miles of the section length. In the part of the mesh corresponding to the last 10 miles, the discharge-outflow portion, each element was divided into 4 elements. This was done to give more nodal points for computation in the area where the underflow from the prairie occurs and where the geology of the prairie is more complex (see Plate IV).

Input to the Model

The input to the model consists of recharge in the form of annual precipitation, permeabilities of the various units, boundary conditions and the geometric location of the finite-element mesh nodal points.

Precipitation

U.S. Weather Bureau records for the Hill City station were taken as being typical of the prairie and the 49-year average of 15.15 inches was used. An additional 2 inches was added as an estimate of the effects due to runoff from the higher, surrounding areas. This figure, 17 inches, is called the average annual precipitation.

Delineation of Recharge Areas

Because recharge occurs over only a part of the prairie, it was necessary to separate the recharge and discharge areas to determine the volume of water to use as input. The final result was a combination of 3 methods.

First, during the summer of 1970, a field map was made by noting such things as water in the grader ditches, cattails, marshy areas in the fields, clumps of willows and aspens--in short, anything that might indicate that a particular area was showing a net gain or loss of water with respect to the ground-water body.

Second, maps were made of the piezometric surface and water table for late July, 1970, and these maps were compared. Areas where the water table was at a higher altitude than the piezometric surface were considered recharge areas and, conversely, areas with the piezometric surface higher were considered discharge areas.

Third, under the direction of Dr. W. B. Hall, University of Idaho, 9 rolls of color-infrared film were used to take low-oblique stereo aerial photographs of the area. Spectral sensitivities of infrared film extend from 0.36 to 0.9 μ. Infrared film is less sensitive than panchromatic film to the green part of the spectrum, but its sensitivity extends beyond the red into the reflective portion of the infrared (Meyers, 1970, p. 256). Color-infrared film is used with a yellow or orange filter which prevents blue light from exposing the film, thus only green, red and infrared reach the emulsion.

Healthy, broad-leaved vegetation is highly infrared reflective and appears bright red when color-infrared transparencies are viewed by white light (Heller, 1970; Gates, 1965). When broad-leaved vegetation begins to die, it loses infrared reflectance, particularly in the near-infrared or 0.78 to 3.0 μ range, and appears darker in tone. Moisture-stressed plants show as lighter in tone than healthy, non-stressed plants (Parry, 1971).

The stereo-pair transparencies were examined and the infrared reflectance characteristics of the vegetation used to help delineate the discharge areas. In swampy, marshy areas and areas where the water table was near enough to the surface to supply adequate moisture, the vegetation appears bright red. These areas are considered to be areas where there is a net loss through evapotranspiration and therefore are called discharge areas.

This method was especially useful in delineating margins of streams, recognizing drainageways and springs and establishing the boundary between the more permeable sediments and the relatively impermeable igneous rocks at the prairie margin. (See figure 7).

The recharge-discharge boundary was established for late June-early July, 1970, and the area of recharge determined to be approximately 80 square miles, or 51,200 acres. The recharge occurs mostly on the northern and western margin of the prairie between the Boise base line and the exposed igneous rocks of the higher areas. Precipitation on the igneous rock was considered to run off since these rocks are practically impermeable, except very near the ground surface.

Use of the annual precipitation as input to the planar flow section required that it be applied to the up-gradient end of the section. This was accomplished by using the westernmost portion of the recharge area and applying the entire volume of recharge water to this smaller area, through which the model section

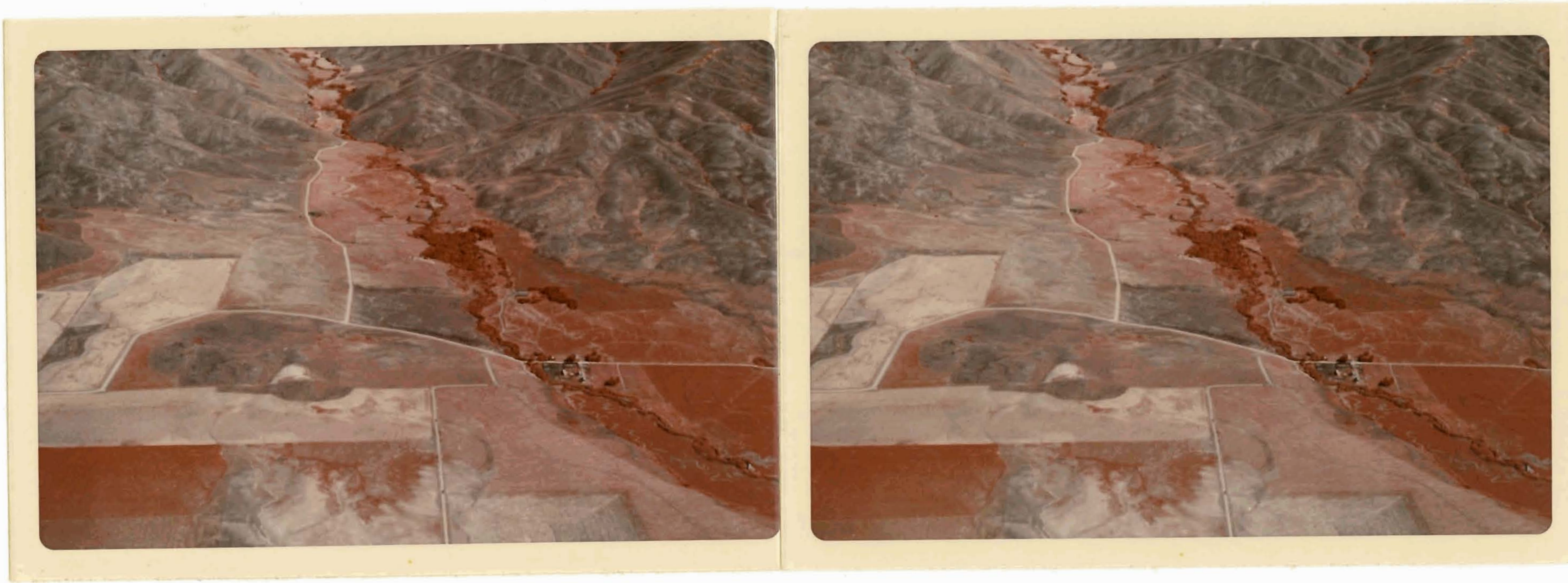


FIGURE 7– PRINTS MADE FROM COLOR INFRARED STEREO TRANSPARENCIES

was taken. This area is at the western end of section A-A' and includes the part of the prairie west of point "a" on A-A'. (See Plate III). The area used is about 2.5 miles by 1.5 miles and is approximately rectangular. The width, 2.5 miles, is also approximately equal to the width of the Snake River basalt at the discharge end of the section through which underflow from the prairie occurs.

The annual amount of water available is 17 inches on the intake area of 51,200 acres or about 72,200 acre-feet. The recharge area through which the model section is taken is about 3.75 square miles or 2,400 acres. The 72,200 acre-feet applied to this area is equivalent to a depth of about 30 feet of water. This depth of water is the input used for the model program.

The flow within the input area is nearly all parallel to the section, as can be seen from the piezometric surface contours, and there are no data available on the flow rates of the ephemeral streams from the north in the recharge area. Therefore, applying the entire recharge volume to the input area is felt to be justified.

Permeability

Although the program will accept anisotropic materials and inclined units, the units were considered homogeneous and isotropic, as well as horizontal, for this model. This was done partly because of lack of data, particularly for the deeper units, and partly in an attempt to keep the model simple and avoid storage problems within the program. The slope of the top of the upper artesian aquifer, over 24 miles, is less than 1 degree. The permeabilities are expressed as velocities with units of centimeters per year.

The only available pump-test data were from a single pumping test given in Walton's study (1961, p. 18). Transmissibility of a 126-foot interval of the lower artesian aquifer was computed to be about 30,000 gallons per day per foot. This gives a permeability at this location of 238 gallons per day per square foot or 35,500 centimeters per year for the lower artesian aquifer.

Walton (1961, p. 19) assumes the transmissibility of the 126-foot interval to be typical of the entire thickness below the clay unit, including both artesian aquifers and the silty, sandy, clay unit that separates them. He assigns this entire thickness a transmissibility of 70,000 gallons per day per foot. Walton (1961, p. 20) also estimated the amount of vertical leakage and underflow from consideration of the flow through the upper and lower artesian aquifers between 2 sets of isopiestic contours. From this computation he determined the vertical field permeability of the confining clay unit to be 0.2 gallons per day per foot. This figure, converted to 298 centimeters per year, was used as the permeability for the clay unit. The unit between the artesian aquifers was assigned an initial permeability of approximately 10 times that of the clay unit, or 3,000 centimeters per year.

Using Walton's estimate of transmissibility for the total thickness below the clay and the above estimate for the unit between the artesian aquifers, an initial permeability of 726 gallons per day per square foot or 1,080,000 centimeters per year was computed for the upper artesian aquifer. A permeability for the surface unit of the prairie was computed from a 3-hour pumping test conducted by the author on a new, 120-foot well to be 19.1 gallons per day per square foot or 28,400 centimeters per year (see figure 8).

The basalt unit forming the eastern boundary of Camas Prairie has been penetrated by 1 well and has several others drilled into it. Data from these wells suggest that the upper 180-200 feet of the basalt have a transmissibility of roughly 3 times that of the combined artesian aquifers (Walton, 1961, p. 25). Using a transmissibility of 210,000 gallons per day per foot and a thickness of 200 feet gives a permeability of 1,050 gallons per day per square foot or 1,560,000 centimeters per year. The basalt below the 200-foot upper permeable part was arbitrarily assigned a low permeability of 30 centimeters per year to make it relatively impermeable and to keep it as part of the model.

<u>Location of Mesh Nodes</u>

To describe the location of the nodes a coordinate system was established. A zero datum plane was placed at an elevation of 4400 feet above mean sea level, about 700 feet below the highest elevation along the section. All node elevations were picked from the geologic section and were referred to this datum. Horizontal distances were measured eastward from the west end of the section. The geologic section with the datum plane and relative elevations

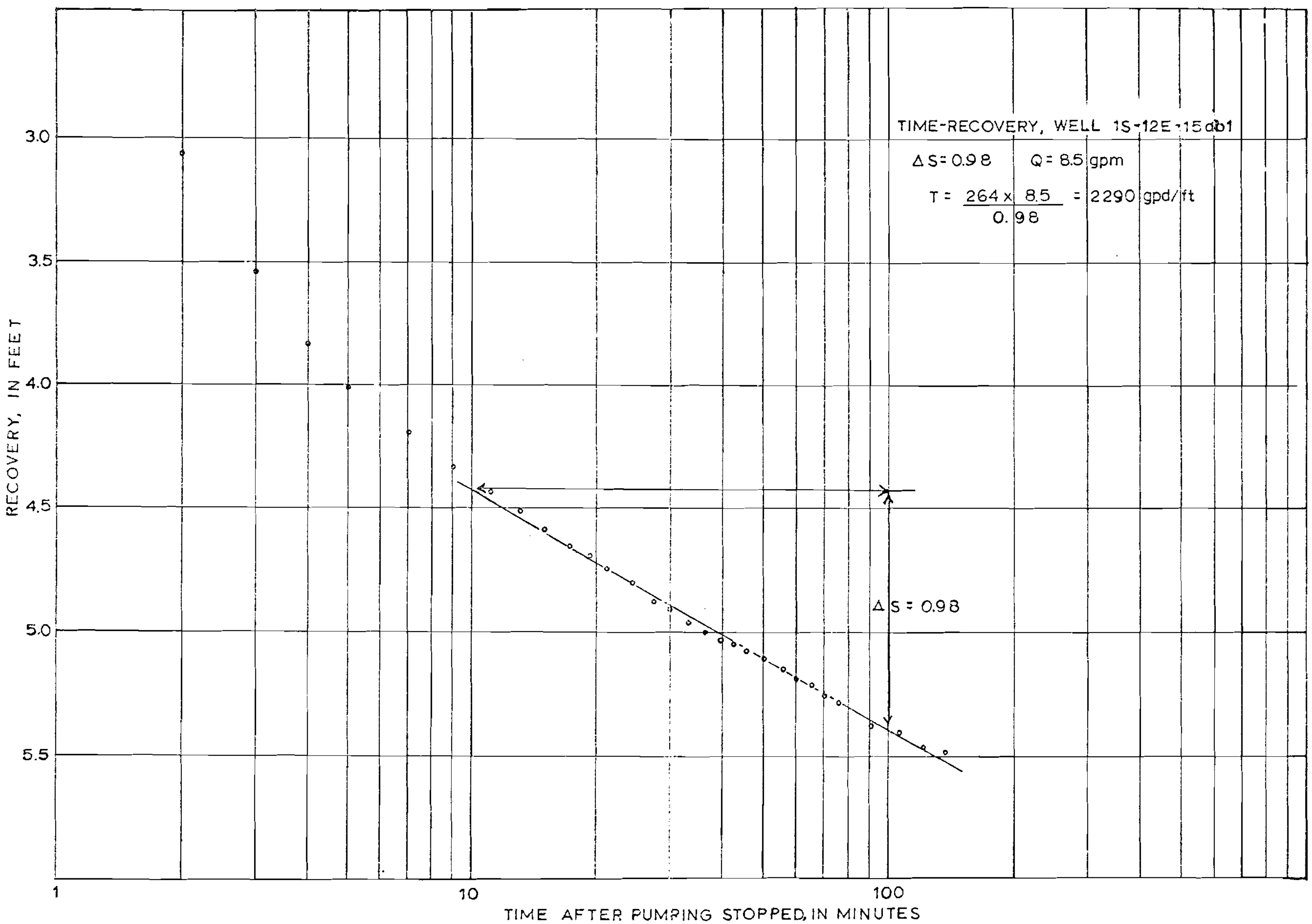


FIGURE 8.—TIME-RECOVERY GRAPH FOR WELL 1S-12E-15db1

from it are shown in Plate III.

Plate IV (in pocket) is a plot of the finite-element mesh drawn by a Calcomp plotter at the U.S. Bureau of Mines Spokane Mining Research Laboratory using a program developed there. The mesh-plotting program is designed to use the input deck of punched cards for the program and construct the mesh with elements and nodes numbered as they will go into the program. The mesh-plotting program is especially valuable to use before the program is run for solutions to the flow equations, since it will reveal any errors in mesh coordinates or element simulation.

Method of Input

Because the recharge to the area occurs downward through the surface of the prairie, it was considered realistic to apply the input to the model section at the upper surface. The 30 feet of water, equivalent to the volume of precipitation on the recharge area, was applied to the first 8 surface nodes at the west end of the section. These nodes, numbered 6, 12, 18, 24 and 30, represent distances eastward along the model section of 0, 2,000, 4,000, 6,000 and 8,000 feet respectively. The 8,000 feet is approximately that part of the section that is recharge area, or the part between the impermeable basalt to the west and the area of flowing wells to the east (see Plate IV).

Program Output

The output of the program consists of a listing of all input data, including each element and each node of the finite-element mesh with the respective coordinates. The output from the computations is in 2 parts. The first is a tabular presentation of each node in sequence with the corresponding pressure and potential. Pressure is in the units of the input pressures, feet of water in this case, and potential is given as a decimal representing the percentage of the difference between values supplied as input on the control card (see Appendix E).

The second part of the output is a tabular presentation of each element in sequence, the coordinates of the program-placed center of each element, flow as a velocity in both the X or 1 and the Y or 2 direction (see figure 4), angle of inclination if the units are not horizontal, resultant flow velocity from the center of each element and resultant flow direction at the center of the element with respect to the positive X or R direction. The element flow directions for the average annual precipitation example are plotted on Plate IV.

RESULTS

The output of the program was utilized in 2 ways. First, 12 nodes were put into the finite-element mesh at various distances along the model section that were in addition to the regular uniformly-spaced nodes. These represent check-points within the geologic section. The check-points are bottom of casing at some locations and bottom or mid-point of an uncased interval in others, in wells along or near the line of section. In these check-point wells, the artesian pressure or water level is known from field measurements. The computed values of pressure at the check-points were compared to the measured values as an indication of how well the model section fit the actual situation. These data are presented in Appendix B.

Five of the 12 check-points are from wells in the upper artesian aquifer, which is the most developed aquifer in the prairie. The computed values for these 5 wells are within 10 percent of the measured values and with 5 percent for 3 of them. Computed values for 3 wells in the lower artesian aquifer and 2 wells in the basalt aquifer are all within 6 percent of the measured values.

In addition to the above, 2 wells in the water-table aquifer were included because the shallow water table is maintained partly by leakage upward through the clay unit. These 2 wells show the greatest discrepancy between computed and measured values as was expected, since the model represents essentially the deeper artesian system and the hydraulic connection to the water table is only indirect. Values for both wells were about 13 percent different than the measured values. These differences were considered acceptable, considering the fact that a 1-foot difference in a shallow well represents a larger percentage than in a deeper well.

The second way in which the program output was used was in computation of quantitative results for amount of flow through the end of the section. The volume of water available annually for recharge was applied to an area of approximately 2,400 acres at the western end of the prairie and the model section was carried through this area. The section is of unit width, the units being feet, and is therefore 1 foot wide. The surface area of the model section through which the input is applied is about 8,000 feet by 1 foot, or 0.184 acres. The 30 feet of water on this area is a volume of 5.52 acre-feet.

Elements 526, 527 and 528 were placed in the mesh as the end of the actual model. These elements are the column in the section at the point where Camas Creek has cut a canyon deep enough to be perennial. Elements 528-549 were added to reduce the boundary effects of the impermeable end of the section. Flows were computed on a volume basis, converted to equivalent feet of water on the recharge area at the input end of the section and referred to the initial 30 feet of water input for comparison. Since the units are considered horizontal, the 1 direction corresponds to the positive X, and the 2 direction to the positive Y direction.

Element 526 is 300 feet in height, 1000 feet in length and has a resultant flow velocity of 0.0647 centimeters per year. This represents such a small annual flow that it was disregarded, since most of the flow occurs through the elements representing the more permeable basalt.

Element 527 is 100 feet in height, 1,000 feet in length and has flow velocities in the 1 or X direction of 3355.5 centimeters per year, equivalent to 0.253 acre-feet, and in the 2 or Y direction of 42.3 centimeters per year, equivalent to 0.031 acre-feet.

Element 528 has an average height of 74 feet, a length of 1,000 feet, and has flow velocities in the 1 or X direction of 3382.4 centimeters per year, equivalent to 0.189 acre-feet, and in the 2 or Y direction of 93.6 centimeters per year, equivalent to 0.071 acre-feet.

These figures give a total outflow at this point in the section of 0.545 acre-feet, equivalent to 2.96 feet, or about 3 feet of water on the input end of the model section. According to the model, this represents the part of the 30 feet of water input that is underflow from the prairie.

Walton (1961, p. 20,21) computed underflow and leakage at a location slightly west of where the model section ends and concluded that leakage and underflow were nearly equal. Assuming this to be true and using the figure computed here for underflow gives a figure of 6 feet of water for underflow and leakage combined. This figure also represents the amount of the 30-foot input that is annual recharge to the artesian aquifers, since the recharge must balance the underflow and leakage to maintain the aquifers.

Camas Creek is perennial in the eastern end of the prairie and the flow, adjusted to the 1952-1967 base period, is given by the U.S. Geological Survey (1969) as 165 cubic feet per second. The only gaging station for the prairie is located downstream from the actual prairie in the basalt canyon and below the point where the perennial flow from Willow Creek enters Camas Creek. The base-period flow is equal to 3.45 inches on the drainage area of Camas Creek. To estimate the contribution to streamflow from the recharge area, this figure was applied to the recharge area and the volume represented was referred to the section input. The 3.45 inches on 80 square miles of recharge area is equal to 14,700 acre-feet, or the equivalent of 6.1 feet of the section input.

Therefore, of the 30 feet of water applied to the model as input, representing the equivalent of 17 inches of water on 80 square miles of recharge area, underflow and leakage plus runoff to streamflow account for 12.1 feet. The remaining 17.9 feet are assumed to be lost by evapotranspiration.

These figures in terms of the 17 inches available annually on the Camas Prairie recharge area are: underflow and leakage, 3.4 inches; runoff and streamflow, 3.5 inches; and evapotranspiration, 10.1 inches. Evapotranspiration therefore amounts to about 60 percent of the water available annually to the recharge area.

After the program output was giving results consistent with the observed field observations for the case of average annual precipitation, 4 additional inputs were used that represented departures from average conditions. These inputs were made to represent changes of 3 and 6 inches less than and more than the average 17 inches of precipitation. The output flow velocities were converted to volumes and referred to the outputs of elements 527 and 528 under average precipitation conditions for comparison.

Using 11 inches as annual precipitation, 6 inches less than average, gave an input of 19.5 feet of water to the section input area. This corresponds to a dry year with about 35 percent less precipitation than is normal. Under this condition the model gives for element 527 flow velocities in the X or 1 direction of 3310.6 centimeters per year and in the Y or 2 direction 39.9 centimeters per year, equivalent to 0.249 and 0.030 acre-feet respectively on the model section input area. Element 528 had flow velocities of 3336.9 centimeters per year in the X or 1 direction and 91.7 centimeters per year in the Y or 2 direction, equivalent to 0.188 and 0.069 acre-feet respectively. These figures give a total outflow from the section of 0.536 acre-feet, equivalent to 2.91 feet of the input to the model section.

Using 14 inches as annual precipitation, 3 inches less than the annual average, gave an input of 24.4 feet of water to the section input area. Element 527 had flow velocities of 3340.5 centimeters per year in the X or 1 direction and 40.7 centimeters per year in the Y or 2 direction, equivalent to 0.252 and 0.031 acre-feet respectively. Element 528 had flow velocities of 3367.3 centimeters per year in the X or 1 direction and 93.6 centimeters per year in the Y or 2 direction, equivalent to

0.188 and 0.071 acre-feet respectively. These figures give a total outflow from the section under this condition of 0.542 acre-feet equivalent to 2.94 feet of the input to the model section.

To simulate conditions wetter than normal, an input of 20 inches was used, giving an input of 35.2 feet of water to the model input area. Element 527 had flow velocities of 3373.5 centimeters per year in the X or 1 direction and 42.5 centimeters per year in the Y or 2 direction, equivalent to 0.254 and 0.032 acre-feet respectively. Element 528 had flow velocities of 3400.7 centimeters per year in the X or 1 direction and 95.0 centimeters per year in the Y or 2 direction, equivalent to 0.190 and 0.072 acre-feet respectively. The total outflow from the section was 0.548 acre-feet or 2.98 feet of water input to the model section.

Using 23 inches of annual precipitation, an increase of about 35 percent over the normal annual average, gave an input of 40.5 feet of water to the model input area. Element 527 had a flow velocity in the X or 1 direction of 3387.0 centimeters per year and in the Y or 2 direction of 42.5 centimeters per year, equivalent to 0.255 and 0.032 acre-feet respectively. Element 528 had a flow velocity in the X or 1 direction of 3414.3 centimeters per year and in the Y or 2 direction of 95.7 centimeters per year, equivalent to 0.190 and 0.073 acre-feet respectively. The total outflow from the section under this condition was 0.550 acre-feet or equivalent to 2.99 feet of the input to the model section.

The computed underflow from the model represents a change equivalent to only +0.03 feet of water for the simulated increased precipitation and -0.05 feet of water for the simulated decreased precipitation from the average precipitation case. This indicates that annual changes in precipitation do not greatly affect the artesian aquifers in any one year, probably because of relatively low permeability of the aquifers and poor hydraulic connection with the shallower deposits. Since underflow changes very little with changes in annual precipitation, the changes must be reflected in the more shallow and surface phenomena of streamflow and evapotranspiration.

If one assumes that streamflow changes directly with changes in precipitation, the 2 extreme cases considered leave 5.2 inches and 14.3 inches of annual precipitation to be accounted for by evapotranspiration, or 47 and 62 percent of the annual precipitation. In all cases, the simulated evapotranspiration is high and accounts for from about half to nearly two-thirds of the annual precipitation.

WATER SAMPLES

Water samples were taken to determine if the fluoride and chloride concentrations would show any justification for delineating flow systems within the prairie. The samples were analyzed for fluoride and chloride content and the electrical conductivity was measured. The 23 samples taken for chloride analysis were acidified in the field by adding a few milliliters (ml) of dilute sulphuric acid, since they would be stored for some time before the analyses were made. Analysis for chloride concentration was made by standard wet-chemical methods. The samples were left overnight in the lab for the temperatures to stabilize. The pH was checked and, when necessary to bring the pH into the 7-10 range, 1N NaOH was added. Samples of 100 ml were used, 1 ml of K_2CrO_4 was added and the mixture was titrated against a 0.5N solution of $AgNO_3$ to the point of color change. Concentrations are reported in parts per million (ppm).

Fluoride analysis and conductivity measurements were made in the field. Fluoride concentration was measured directly with a Model 401 Ionalyzer, manufactured by Orion Research, using a single-junction reference electrode Model 90-01 and fluoride electrode Model 94-09. Calibration was made for ranges 0.01-0.10, 0.10-1.0 and 1.0-10.0 ppm. Temperatures were taken at the time of measurement and the temperature correction applied to the instrument.

Conductivity measurements were made with a Model RB3 338 Solu-Bridge, manufactured by Beckman Instruments Incorporated, using a conductivity cell CEL VS2. Temperature corrections were applied at the time of measurement.

These data are presented in Appendix C.

Chloride concentrations in 21 of the 23 samples varied from 2.2 to 9.2 ppm. The lowest concentration, in well 1N-14E-22ad1, was found at a location high on the alluvial fans near the foot of the northern mountains. Samples from 1S-13E-34cb1 and 1S-13E-22cc1 had chloride concentrations of 16.8 and 18.4 ppm respectively. These 2 samples were taken from a spring with a temperature greater than 120° Fahrenheit (F) and from a flowing well, approximately 1 mile from the spring, with a temperature of 83° F. However, well 1S-12E-31cb1, also with a temperature of 83° F, had a chloride concentration of only 7.7 ppm.

Fluoride concentrations varied from less than 0.1 to greater than 10.0 ppm. Of the 3 samples having greater than 10.0 ppm, 2 are the ones mentioned above with high chloride, and the third is from a well approximately midway between them. The third sample is from a flowing well with a temperature of 96° F.

Conductivity measurements varied from 110 to 430 μmhos, with the highest values being associated with the higher values of chloride concentrations or higher values of fluoride concentrations, or both.

In general, the shallow water-table wells are higher in chlorides than those that reach either of the artesian aquifers.

From examination of these wells, this is felt to be due in part to the constructional features of the wells--poor or no casing, the casing doesn't extend above the surface or being located where surface water may enter the well. Salt and alkalai accumulation is evident on the surface of the western and central part of the prairie in late summer and poorly cased or uncased wells are likely to be contaminated from this source as well as from agricultural additives of the surrounding fields. The samples from the 2 locations with the highest chlorides are both from thermal waters. These are discussed below. In all samples, the chloride concentration is well below the 150 ppm maximum recommended by the Public Health Service (1962).

The fluoride content of the Camas Prairie water is generally below the 1-3 ppm recommended as a maximum. The exceptions are notable and, in all cases, are from locations where the water temperature is higher than the 52-54° F average. Samples from locations 1N-13E-32aa1 and 1S-13E-34cb1 are from springs with temperatures over 100° F, and samples from locations 1S-13E-ac1 and 1S-13E-27cc1 are from flowing wells with water temperatures of 83 and 96° F respectively. These thermal wells and springs are located in a northwest-southeast trending zone through the western end of the prairie and are probably related to the fact that the temperature gradient in the valley-fill material is greater (about 6° F per 100 feet) than average for sedimentary material (Walton, 1961, p. 40). Well 1S-14E-9da5, Fairfield City Well No. 4, also is warm (80° F) and has a fluoride concentration of 3.3 ppm.

The reason for the abnormal gradient is not known. In general, the deeper, warmer water and the water from the zone of thermal wells and springs is higher in fluoride and chloride content. The 5 wells mentioned are above the recommended levels of fluoride for domestic use and, with the exception of 1S-14E-9da5, are not so used. Well 1S-14E-9da5 is pumped into a standpipe with water from 2 other wells and the mixture was measured as having a fluoride concentration of 2.2 ppm.

Total dissolved solids, based on conductivity measurements, varies from about 60 to 250 ppm and is considerably less than the recommended maximum of 1,000 ppm.

Camas Prairie is here considered to contain essentially a single flow system. Based on the analyses of water samples for fluoride, chloride and total dissolved solids, there is no reason to separate the ground-water body into separate flow systems. The system is oriented in a generally east-west direction with water movement eastward. Components enter in a southeasterly direction, mostly from the north, and move eastward in the main system. The lower artesian aquifer is of a low enough permeability and isolated well enough that water moves slowly under and out of the prairie. Where the flow is deep and where it crosses or flows through areas of higher temperature, the water is warmed and enriched in fluoride and, possibly, chloride. It is possible that hot, mineralized water is added to the Camas Prairie system through deep circulation of water from the igneous and volcanic rocks surrounding the area.

The upper artesian aquifer is of higher permeability than the lower and water in this part of the system moves at a higher velocity and is not quite so well isolated from the shallower waters. The temperature and mineral content is generally lower, with local exceptions where upward-moving thermal waters warm it and increase the fluoride and chloride content.

The shallow water is slightly cooler and has a lower fluoride content than water from either of the artesian aquifers, especially near the foot of the northern mountains at the edge of the recharge area. Here, high on the alluvial fans where the permeability and gradient are relatively high, the water moves rapidly into the prairie. Farther out in the center and southern edge of the prairie, the permeability and gradient are lower, and the shallow water moves slowly. During the late summer, some of this water, like Camas Creek, does not move at all, or moves upward.

The differences in fluoride and chloride content and differences in electrical conductivity are considered to be minor enough that, disregarding the local exceptions, the waters and flow lines belong to one system. This is the ground-water flow system of Camas Prairie and the Camas Creek drainage basin.

SUMMARY AND CONCLUSIONS

Mathematical models are applied today to an ever increasing number of problems and situations. The advent of high-speed, digital computers with their capability to handle large numbers of complex equations has led to a systems approach to problems in many fields. With this approach has come the building and use of conceptual models. Where formal analytical solutions were formerly used, the method of numerical analysis, with its solutions at discrete points within the field of interest, has become a useful tool.

The primary purpose of this study is to apply a finite-element, planar-flow model developed by Dr. R. L. Taylor of the University of California at Berkeley, to a ground-water basin in southern Idaho.

A detailed description of the geologic setting of the basin under study is given, including history, structure, types of formations and their hydrologic properties. Maps of the surface geology, water table and piezometric surface are included, showing such features as the area of flowing artesian wells and the recharge-discharge boundary for the area.

A brief summary of the finite-element theory is presented and references to some of the early work and development of the technique are given. Basic Darcian theory in terms of pressure and elevation is presented and the continuity equation is considered. It is shown how, assuming a linear pressure distribution, one can develop the numerical analysis for a finite-element solution in terms of potential and flow velocities. The method of isolating the study region by its boundary conditions is discussed. The program feature which can locate the phreatic surface in a seepage problem is discussed briefly.

The computer program and documentation are given in the appendix.

The finite-element mesh and its construction are discussed in detail. The inputs to the model program are recharge in the form of annual precipitation, permeabilities of the various units and geometrical positioning of the mesh nodes. The methods used for determining the inputs are described and supported with data from the field and other information on the area.

The method of input to the program and the form of the output are described and the program output for the case of average annual precipitation as input is given in the appendix.

The results are discussed and the computed heads are compared to actual field measurements. In addition, flow quantities are computed and the results are examined for cases where the annual precipitation is approximately 15 and 30 percent greater and less than the average annual precipitation.

A brief section is given discussing the sampling of selected wells and springs and the analyses for fluoride, chloride and electrical conductance as a method of determining if more than a single flow system exists in the basin.

All computer work was done on the University of Idaho IBM 360-40 (32K). A machine-plotted mesh, drawn by a Calcomp pen plotter is shown in Plate IV. This was plotted at the Spokane Mining Research Lab, U.S. Bureau of Mines, using a mesh plotting program developed there.

Based on the results presented, the following conclusions are drawn:

1. From comparison of the actual values of water levels measured in the field with values computed by the model, the model is considered an acceptable representation of the actual conditions. In this first attempt to model the complex ground-water system with a planar flow model, a number of simplifications were necessarily introduced. Some of these could undoubtedly be made more realistic with further work.

2. Flow quantities are considered to be of the right magnitude. The input as precipitation is considered accurate and valid. The permeabilities are, for the most part, estimates based on the limited amount of data available. The assumption of isotropy and homogeneity with respect to permeability is probably the least realistic of those made for the inputs. The clay unit, for example, is undoubtedly more permeable horizontally than vertically, and it is known that the sediments of the prairie become finer-grained southward from the foot of the northern mountains. If more data become available with regard to permeability values, the input permeabilities could be made more realistic and the computed

flows could be refined.

3. A model developed by the finite-element technique can have wide applications in any situation where pressure, flow direction and flow velocity can be of use at various points, since these quantities are computed for all elements in the mesh. This can be of value in ground-water studies of flow systems and water budgets as well as being applicable to problems such as flow through the sides of unlined irrigation canals.

4. Once a finite-element model of a system or basin is developed, any of the input parameters may be readily modified or changed if new information is made available or conditions change. In this study, for example, the changes in annual precipitation were introduced by punching 7 cards to replace those originally used.

5. Past or future conditions may be simulated within a system by use of a model of this type, or conditions that vary from the normal or average situation may be considered. Here, using the average annual precipitation as input, cases were also considered using inputs of 3 and 6 inches less than and more than the average annual precipitation.

6. Inferences can be developed or verified by the use of a finite-element model. In the example used here of changing the annual precipitation input, it appears that annual changes are most likely to be reflected in shallow, water-table and surface phenomena such as water levels in shallow wells, surface runoff and streamflow as well as evapotranspiration.

7. At its present state of development, the program used to generate the model has storage limitations that affect the size of the problem that can be handled. This can be partly compensated for by using larger elements, as was done here, but there is a possibility of some smoothing or averaging effect. This is particularly true near boundaries of the mesh and between units of different characteristics within the mesh. This effect should be examined but storage limitations prevented it in a study of this size.

8. There is no reason for separating the ground-water system into separate flow systems within Camas Prairie. This is based on the analysis of water samples for fluoride, chloride and electrical conductivity as well as on the consideration of the computed flow directions within each element by the model program. Treating Camas Prairie as a single, large flow system is considered justified.

CONSIDERATIONS WHEN USING THIS PROGRAM

Anyone planning to use this program should consider the following:

1. A sound knowledge of fluid mechanics and soil mechanics is required to apply realistic boundary conditions and input parameters.

2. A graphic description of the problem to be solved is necessary to enable the user to construct the finite-element mesh that suitably represents the physical situation.

3. Input units and dimensions for the study region and model must be a consistent set of units. For example, in this study pressure is expressed as head (length), permeability as velocity (length/time) and flow as a velocity (length/time). If "1" is used for the density of the fluid and velocities are in centimeters/ time, the computed pressures are in feet of water. Originally the program was designed to use only "1" as density and using any other figure gave flows in mixed units. I have modified the program to use density in any units and, if velocity units are consistent with density units, the flow units will be consistent. Density must NOT be set equal to zero as the program listing states when density is not known.

4. Output listed as "Total Flow" is the resultant flow velocity from the center of the element.

5. The program allows no flow across any boundary node of the area enclosed by the mesh unless pressure distribution is known and assigned. Any boundary node without a pressure is considered impermeable.

6. A zero pressure may be assigned to any boundary node known to have no pressure other than atmospheric. This should be done with care, for it is possible to open a "drain" in the mesh and fluid will disappear from the mesh. The gradient may be changed by this operation and flow move toward the "drain" from all directions in the mesh.

7. A pressure may either be assigned to an interior node or the program will compute it.

8. If pressures are assigned, care should be taken to see that they are realistic, since the program forces the pressure distribution to conform to those supplied as input.

9. The program considers all material included within the mesh to be saturated. However, a free-water surface may be established in the mesh by making use of the free-surface feature of the program, in which the program determines the upper surface of the saturated zone within a zone specified by the user. The use of the free-surface feature involves some limitations and restrictions on placing the free-surface nodes. This feature was not used in the present study and is not discussed. Kealy (1970) and Kealy and Busch (1971) used the program to locate the free surface and describe the application with several examples.

10. There are features built into the program for generating

nodes, boundary conditions and elements. These features can be used after developing some experience in mesh construction and can save considerable time in constructing models. Details are given in Appendix D.

11. In a problem with a large number of nodes and/or elements there is a possibility of exceeding the allocated storage. The following formula was obtained from Michael M. McDonald, research engineer at the Spokane Mining Research Laboratory, U.S. Bureau of Mines, Spokane, and will enable a user to determine the number of words of storage required, which must be less than or equal to 20,000:

$$1 + 2(\text{No. of materials}) + 6(\text{No. of nodes}) + 6(\text{No. of elements}) + (\text{Maxband times No. of nodes}) \leq 20{,}000$$

Maxband is equal to (highest node number - lowest node number) + 1

12. A general "rule of thumb" in determining the element length to height ratio has been to make the ratio 6 to 1, or less (McDonald, 1971). In this study the ratio was 50 to 1 in the upper, input end of the section and 25 to 1 in the lower or discharge part. This was necessary to reduce the number of elements and nodes to the point where the total would not exceed the storage allocated by the program. However, it is felt that for a preliminary, reconnaissance model of regional size the element ratios used give an adequate representation. A method is being developed

which will allow overlapping portions of a single, large problem to be used, with each portion being capable of utilizing the full allocated storage, with its output being the input of the following portion (McDonald, 1971). However, this method is not developed to the point of being usable at present.

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APPENDIX A

RECORDS OF REPRESENTATIVE WELLS

Compiled from Walton (1961), Piper (1925), Reports of well drillers from Idaho Dept. of Water Administration and personal measurements and contact with owners.

Well	Owner	Altitude Above Mean Sea Level, feet	Year Drilled	Depth, feet	Casing Depth, feet
1N-13E-14ca1	B. A. Smith	5,296	1956	110	- -
25bd1	D. E. Hallowell	- -	1966	121	98
32db1	John Hobdey	5,123	1949	43	43
33cd1	Edward Harkness	5,112	1949	96	96
1N-14E-4cc1	Murray Mull	- -	1968	80	50
4cc2	Otto Florence, Jr.	- -	1968	59	59
16ac1	D. O. Bundy	- -	1911	22	- -
21dd1	Roland Pond	5,209	1917	200	100
22bc1	Olga Naser	5,243	1911	105	- -
24dc1	F. H. Wilson	5,240	1934	105	105
29cc1	Raymond Dehmel	5,128	- -	19	19
32db1	Clifford Hallowell	5,102	- -	- -	- -
33bb1	Allen McCann	5,135	1927	72	72
33dd1	O. W. Prock	5,097	1953	13	13
1N-15E-29bc1	E. G. Commons	5,236	1916	400	- -
31ca1	E. J. Pearson	5,105	1947	306	225
34bc1	Fred Walton	5,122	1951	325	325
34bc2	Fred Walton	5,123	- -	12	- -
35bd1	W. D. Simon	- -	1968	202	195
35ca2	W. D. Simon	5,158	- -	30	- -
36cd1	Florence Gaskill	5,112	1947	60	60
1N-16E-32ab1	Angus Brooks	5,140	1948	55	55
33db1	G. E. Coates	- -	1955	174	- -
1S-11E-25dd1	Floyd Tracy	5,102	1947	375	- -
35cc1	School Dist. 8	5,092	- -	16	- -
36dc1	J. W. Bolt	5,086	1947	60	20

Well	Owner	Altitude Above Mean Sea Level, feet	Year Drilled	Depth, feet	Casing Depth, feet
1S-12E-1db1	Harry Kunkel	5,104	- -	18	- -
8dc1	Zane Harrison	5,169	1943	67	51
11cb1	John Humphries	5,105	1909	16	- -
13ad1	Mrs. Abe Lowen	5,085	1969	210	195
13ba1	H. E. Miller	5,090	1925	435	135
13ba3	H. E. Miller	5,091	1932	18	18
14ba1	John Humphries	5,096	1957	240	238
15ab1	Zane Harrison	- -	1970	80	80
20ab1	Everett Trader	- -	1970	120	69
22bb1	James Yamamoto	5,118	1942	30	30
22bb2	James Yamamoto	5,121	1950	160	- -
24aa1	Blanc Loerven	5,112	1924	170	90
26cc1	Jess Howard	5,065	1955	54	54
28bb1	Frank Mink	5,118	1950	80	15
29cd1	Gwinn Rice	- -	1970	180	78
29dc1	School Dist. 121	5,121	- -	- -	- -
29dd1	Gwin Rice	- -	1955	69	69
30dc1	Charles Olsen	5,115	1956	100	100
31ad1	K. B. Strom	5,099	1957	72	70
31cb1	Floyd Tracy	5,082	1947	400	- -
33ab1	Leslie Ruby	- -	1970	75	22
34dc1	Earl Wilson	5,051	- -	180	- -
35aa1	Gill and Martin	5,052	- -	- -	- -
35bb1	Everett Trader	- -	1941	254	254
1S-13E-1aa1	W. L. Tucker	5,095	1949	105	105
2dd1	Fred Orr	5,076	- -	26	26
3aa1	Clifford Hallowell	5,116	- -	50	50
3cc1	Fred Orr	5,110	1924	40	- -
3dd1	Fred Orr	5,092	- -	10	- -
8cc2	C. N. Ashmead	5,089	1942	150	- -
8cc3	Earl Wilson	- -	1969	82	77
9dd1	K. Babington	5,096	1951	77	- -
12dd1	Minnie Bottcher	5,067	1924	230	130
12dd2	Minnie Bottcher	5,072	1917	10	- -
13da1	E. M. Thompson	5,046	- -	250	150
14da1	Ernst Fields	5,040	1924	300	140
14da2	Ernst Fields	4,044	- -	47	- -
15dd1	L. L. Barron	5,072	1924	228	130
19ad1	Mannie Shaw	5,056	1946	240	240
20ad1	C. D. Thornton	5,075	1946	220	220
20ad2	C. D. Thornton	- -	1924	194	120
21da1	Lloyd Barron	- -	1924	170	90

Well	Owner	Altitude Above Mean Sea Level, feet	Year Drilled	Depth, feet	Casing Depth, feet
1S-13E-22cc1	Elsie Burns	5,066	- -	- -	- -
23ba1	Hidden Paradise Grazing Assoc.	- -	1970	158	48
25dc1	C. W. Stewart	5,042	1924	218	108
27cc1	Ernst Mizer	5,056	1924	190	110
33cc1	Lloyd Barron	5,107	- -	167	- -
35dc1	Lloyd Barron	5,061	1924	22	- -
1S-14E-1bb1	Walton and Schaefer	5,092	1924	- -	- -
2bb1	A. A. Knowlton	5,109	1946	280	- -
4dd1	Emil Pauls	- -	1971	311	311
6aa1	A. Carmon	5,097	1955	67	67
7dd1	Wokersien & Tucker	5,075	- -	15	- -
8dd1	Minnie Bottcher	5,069	1924	320	140
9aa1	F. M. Tucker	5,079	1924	256	160
9aa2	F. M. Tucker	5,078	1937	35	- -
9bb1	Clifford Hallowell	5,082	- -	- -	- -
9da1	City of Fairfield, Well No. 1	- -	1940	300	- -
9da2	City of Fairfield, Well No. 2	- -	1941	300	- -
9da3	Elden Ryals	5,063	1932	164	- -
9da4	City of Fairfield	- -	1924	224	140
9da5	City of Fairfield, Well No. 4	- -	1965	762	760
9db1	LDS Church	5,075	1954	535	495
10aa1	G. R. White	- -	1924	256	160
10ad1	G. R. White	5,078	1924	273	185
10cc1	City of Fairfield, Well No. 3	- -	1950	300	- -
11cc1	Harry Giesler	5,061	1955	76	76
12cc1	Harry Giesler	- -	1924	247	160
13ad1	I. J. Baldwin	5,046	1928	212	- -
13bb1	Howard St. Clair	- -	1924	126	116
14cb1	Ben Lasswell	5,054	1924	240	130
15aa1	State Hwy. Dept.	- -	1968	227	218
15ba1	D. O. Reynolds	- -	1923	226	130
15ba2	D. O. Reynolds	- -	1923	245	140
20cd1	C. A. Andrews	5,039	1924	192	82
22bb1	Hannah Wyler	5,045	1924	250	145
22db1	C. W. Stewart	5,030	1953	434	434
25bb1	Ed. Reagan	5,025	1950	205	185
25bb2	Ed. Reagan	5,026	- -	11	- -

Well	Owner	Altitude Above Mean Sea Level, feet	Year Drilled	Depth, feet	Casing Depth, feet
1S-14E-27ad1	Dan Perkins	- -	1923	240	140
33dd1	Carrie Reedy	- -	1968	220	220
36ab1	Harold Lee	5,024	1955	175	90
36ba1	School Dist. 121	5,019	- -	21	- -
1S-15E-5db1	W. D. Simon	5,069	1953	578	578
7dd1	Don Bouscher	5,042	1920	- -	- -
9dc1	Walter Pearson	5,036	1947	360	325
11cb1	G. Schmidt	5,016	- -	10	- -
14db1	Ben Krahn	5,007	- -	35	- -
15bc1	Newell Brooks	5,015	1954	155	122
16db1	George Petrie	5,015	1953	122	120
19bb1	Tom Spackman	5,023	1947	11	- -
19cc1	A. R. Frostenson	- -	- -	209	131
21ad1	Bahr & Stokes	5,013	1953	283	101
21cc1	Edward Krahn	5,007	1952	115	- -
22aa1	Ben Krahn	4,994	- -	39	- -
22ad1	Ben Krahn	4,982	1936	15	15
27ba1	Stokes & Bahr	- -	1954	97	44
30bc1	W. J. Packham	5,011	1935	350	- -
32dd1	James Kevan	5,006	- -	11	- -
1S-16E-3dc1	J. E. Coates	5,044	1955	324	324
4cb1	W. D. Simon	5,068	1955	208	208
18ba1	L. E. Koonce	4,989	- -	9	- -
2S-11E-4dd1	George Tracy	5,097	- -	175	- -
10ba1	Floyd Tracy	5,091	- -	250	250
2S-12E-1da1	Leslie Ruby	5,097	1950	270	100
2dd1	Leslie Ruby	- -	1969	220	157
5bb1	K. B. Strom	5,082	1937	280	- -
6ab1	Gwinn Rice	5,080	1967	173	129
6cb1	Gwinn Rice	- -	1970	212	211
9cc1	Ralph Faulkner	5,093	1957	326	326
9cc2	Ralph Faulkner	5,092	- -	- -	- -
11bd1	H. F. Petrick	5,085	1952	40	32
16ca1	Ralph Faulkner	- -	1956	266	250
2S-13E-1da1	Floyd Barron	5,089	- -	- -	- -
2aa1	Lee Barron	- -	1971	310	32
3cc1	Neil A. Wolfe	- -	1971	108	108

Well	Owner	Altitude Above Mean Sea Level, feet	Year Drilled	Depth, feet	Casing Depth, feet
2S-13E-9dd1	Lela L. Wolfe	5,099	1950	116	- -
10ca1	I. B. Wolfe	5,059	- -	14	14
2S-14E-1ba1	J. E. Painter	5,011	- -	17	- -
4aa1	State Fish & Game	- -	1971	35	35
11da1	F. L. Clutter	5,114	1953	533	166
11da3	F. L. Clutter	5,123	- -	28	- -
35ba1	Charles Kast	- -	1968	406	78
2S-15E-4bb1	Bill Simon	5,009	1935	247	- -
2S-17E-2dc1	Glen Croft	4,832	1955	226	226
11db1	Glen Croft	4,809	1955	100	67
11db2	Glen Croft	4,797	1955	525	- -

APPENDIX B

CHECK-POINT WELLS

Well	Altitude Above Mean Sea Level, feet	Node No.	Distance, feet	Well Depth, feet	Casing Depth, feet	Water Level From Surface, feet	Head At Node, feet of Water	Unit
2S-11E-10ba1	5,091	38	12,000	250	250	+5.2	255.2	L. Artesian
1S-11E-36dc1	5,086	79	24,000	60	20	0	60.0	Water Table
2S-12E-6ab1	5,080	90	28,000	170	170	+2.5	172.5	U. Artesian
2S-12E-5bb1	5,082	101	32,000	300	- -	+5.9	305.9	L. Artesian
1S-12E-34dc1	5,051	146	46,000	180	- -	+6.0	186.0	U. Artesian
1S-12E-26cc1	5,065	155	48,000	54	54	-9.0	45*	Water Table
1S-12E-13ac1	5,085	184	58,000	210	195	+2.5	212.5	U. Artesian
1S-13E-20ad1	5,075	227	72,000	220	220	+3.5	223.5	U. Artesian
1S-13E-25dc1	5,042	270	86,000	218	108	+2.7	220.7	U. Artesian
1S-14E-22db1	5,030	335	108,000	434	434	+5.0	439.0	L. Artesian
1S-15E-21ad1	5,013	488	136,000	263	101	-15.0	248	Basalt
1S-15E-15bc1	5,015	508	138,000	155	122	-18.0	137	Basalt

*Adjusted to 53 feet to compensate for altitude difference at well and at line of section

MEASURED HEAD AND COMPUTED HEADS
AT CHECK-POINT NODES FOR VARIOUS INPUTS

Node	Measured Head, feet	Computed Heads, feet For Annual Precipitation Input, inches 11	14	17	20	23
38	255.2	256.2	260.1	265.0	269.1	273.8
79	60.0	45.2	48.0	51.9	54.8	58.6
90	172.5	156.0	158.5	162.3	164.8	168.4
101	305.9	282.1	284.5	288.1	290.3	293.8
146	186.0	183.6	185.6	188.8	190.2	193.1
155	53.0	57.2	59.2	62.3	63.6	66.4
184	212.5	209.3	211.1	213.9	214.7	217.3
227	223.5	212.3	213.8	216.2	216.7	218.9
270	220.7	235.3	236.6	238.6	239.0	240.5
335	439.0	434.5	435.1	436.4	436.8	437.5
488	248.0	244.7	244.9	245.0	245.2	245.3
508	137.0	135.3	135.4	135.5	135.6	135.7

APPENDIX C

WATER SAMPLE DATA

Well	Owner	Depth, feet	Unit	Chloride ppm	Fluoride ppm	Conductivity µmhos	Temp. ° F
1S-14E-13bb1	H. St.Clair	126	U. Artesian	5.1	0.16	110	53
1S-12E-22bb2	R. Wolf	30	Water Table	7.7	0.60	420	50
1S-11E-25da1	Wilson Spring	- -	- -	5.3	0.14	130	- -
1S-12E-31cb1	F. Tracy	400	L. Artesian	7.4	1.50	150	83
1S-13E-17bc1	R. Ashmead	93	Water Table	5.1	0.40	180	- -
1S-13E-19ad1	M. Shaw	240	U. Artesian	4.1	0.90	200	58
2S-12E-1da1	L. Ruby	279	L. Artesian	5.1	1.10	160	- -
1S-13E-6ad1	W. Wilson	118	U. Artesian	6.7	0.70	160	54
1S-14E-26ba1	E. Reagan	15	Water Table	9.2	0.40	230	- -
1S-15E-15bc1	N. Brooks	155	Basalt	4.6	0.40	220	56
1S-15E-19bb1	T. Spackman	11	Water Table	9.2	0.25	300	56
1N-14E-22ad1	D. Osburne	80	Water Table	2.2	<0.1	160	- -
1N-14E-36cc1	D. Cluer	75	Water Table	4.6	0.20	140	- -
1S-15E-5ba1	W. Simon	240	U. Artesian	4.1	0.40	160	- -
1S-14E-8dd1	M. Bottcher	320	U. Artesian	2.6	0.12	120	62
1S-12E-11cb2	J. Humphries	221	U. Artesian	4.6	0.60	140	56

Well	Owner	Depth, feet	Unit	Chloride ppm	Fluoride ppm	Conductivity µmhos	Temp. ° F
1S-12E-26cc1	L. Trader	54	Water Table	5.6	0.90	200	- -
1S-12E-13dd1	N. Tate	210	U. Artesian	6.7	2.10	270	60
1S-14E-10ad1	I. White	273	U. Artesian	7.7	<0.1	125	58
1S-14E-14cb1	D. Reynolds	240	U. Artesian	3.6	0.12	140	59
1S-13E-34cb1	Barron Spring	- -	- -	16.8	>10.+	430	>>120
1S-13E-22cc1	School House	175	U. Artesian	18.4	10.+	380	83
1S-13E-22ac1	E. Taylor	228	U. Artesian	3.6	- -	- -	59
1S-13E-27cc1	E. Mizer	190	U. Artesian	- -	10.+	400	96
Composite	Fairfield City	- -	- -	- -	2.2	180	- -
1N-13E-32ac1	J. McCarter	50	Water Table	- -	0.7	220	- -
1N-13E-32aa1	Hot Spr. Ranch	- -	- -	- -	4.4	240	145
1S-14E-9ba1	J. Ganzle	15	Water Table	- -	0.13	250	54
1S-14E-9da5	Fairfield City Well #4	762	L. Artesian	- -	3.3	180	80
2S-12E-2dd1	L. Ruby	220	U. Artesian	- -	2.6	200	58
1S-12E-11aa1	Arnold Spring	- -	- -	- -	0.36	125	52

APPENDIX D

EQUATIONS FOR COMPUTATION OF "HITE" AND "HEAD"

The program control card requires values for the variables "HITE" and "HEAD" where:

HITE = height for potential reference

HEAD = total available head

To compute HITE and HEAD, the following equations are used:

$$PSI_u = P_u + RO\ (Y_u - HITE)/HEAD \qquad 0<PSI<100\%$$

$$PSI_d = P_d + RO\ (Y_d - HITE)/HEAD$$

where:

PSI = percentage of available head at upstream node and downstream node

P_u = pressure at upstream node

P_d = pressure at downstream node, node picked where $P_d = 0.0$

RO = density of fluid

Y_u = elevation above datum of upstream node

Y_d = elevation above datum of downstream node.

Then

$$100.0 = P_u + RO\ (Y_u - HITE)/HEAD$$

$$0.0 = 0.0 + RO\ (Y_d - HITE)/HEAD \quad \text{or} \quad Y_d = HITE$$

and

$$100.0 = P_u + RO\ (Y_u - Y_d)/HEAD$$

Solve for HEAD.

FPM500 PROGRAM DOCUMENTATION AND PROGRAM LISTING

Program Documentation

Program stored on disk, University of Idaho, December 1969, stored under name "FLØW".

IBM 360-40.

Identification.--FPM500--Axisymmetric and Plane Flow in Porous Media. Programmed by R. L. Taylor, University of California, July 1968.

Purpose.--The purpose of this computer program is to determine pressures and flows in two-dimensional flow problems governed by Darcy's law. Flow and pressure boundary conditions may be considered; in addition, the program has facilities to determine the location of free surface boundaries.

Input Data.--The first step in the analysis is to select a finite-element representation for the region of interest. If a free surface is involved, an estimate of the location must be made to expedite the computations. Elements and nodal points are then numbered in two numerical sequences, each starting with one. The following group of punched cards numerically define the region to be analyzed:

A. Identification Card (12A6).

Columns 1 to 6 must contain FPM500.
Columns 7 to 72 of this card contain information to be printed as title with results.

B. Control Card (6I5,4F10.0,I5,F5.0).

Columns	Item	Format
1-5	Number of nodes	I
6-10	Number of elements	I
11-15	Number of materials	I
16-20	Number of free surface correction nodes	I
21-25	Type of problem . . . . 0 = Axisymmetric flow 1 = Plane flow	-
26-30	Number of flow cards	I
31-40	Unit weight of fluid	F
41-50	Height for equipotential reference . .	F
51-60	Total available head	F
61-70	Free surface correction factor . . .	F
71-75	Number of iterations for free surface	I
76-80	Error tolerance	F

C. Material Identification Cards (I5,2F10.0). One card for each material (12).

Columns	Item	Format
1-5	Material number	I
6-15	Principal permeability 1	F
16-25	Principal permeability 2	F

The 1 axis is measured with respect to X (or R).

D. Nodal Cards (I5,I2,I3,3F10.0). One card for each node with the information.

Columns	Item	Format
1-5	Node	I
6-7	See below	I
8-10	Boundary condition	I
11-20	X (or R) ordinate	F
21-30	Y (or Z) ordinate	F
31-40	F	F

If the number in column 10 is--

Negative, F is the amount of fluid added at a node.
Zero, no fluid is lost or gained.
Positive, F is the pressure at the node.

Nodal cards must be in numerical sequence. If cards are omitted, the omitted nodal points are generated at equal intervals along a straight line between the defined nodal points. The boundary code and F are set equal to zero. An auxiliary nonzero punch in column 7 causes the boundary code of the node defined to be reproduced until the next node is defined. F is distributed on a straight line with equal increments.

E. Element Cards (6I5,F10.0). One card for each element.

Columns	Item	Format
1-5	Element	I
6-10	Node I	I
11-15	Node J	I
16-20	Node K	I
21-25	Node L	I
26-30	Material identification	I
31-40	Angle in degrees from X (or R) to 1 direction	F

Element cards must be in element sequence. If element cards are omitted, program automatically generates the omitted information by incrementing the node values of the preceding element by one. The material identification and angle are the same as the preceding element. The last element card must always be supplied. The maximum difference in node values must be less than 23. Nodal sequencing I, J, K, and L is counterclockwise around the element. Triangular elements are permitted by setting node K equal to node L.

F. Distributed Flow Cards (2I5,F10.0). One card per element boundary where flow rate is prescribed.

Columns	Item	Format
1-5	Node I	I
6-10	Node J	I
11-20	Flow rate along boundary	F

G. Free Surface Description. One card for each node whose position on free surface is unknown.

Columns	Item	Format
1-5	Node number	I
6-15	Correction direction in degrees with respect to x-axis	F

H. Output Information. The following information is developed and printed by the program:

1. Reprint of input data.
2. Nodal point pressures and equipotential values.
3. Element flow rates at the center of each element.
4. For free surface problems each mesh correction is printed after each iteration.

```
C
C               MAXIT = MAXIMUM NUMBER OF ITERATIONS TO LOCATE PHREATIC
C                       SURFACE.  THE PROGRAM DOES STOP AUTOMATICALLY (ON TOL
C                       WHEN A CLOSE APPROXIMATION TO FREATIC SURFACE IS FOUN
C
C               TOL   = ERROR TOLERANCE IN TOTAL CHANGE OF DISTANCE FOR AL
C                       NODES ON THE PHREATIC SURFACE.
C
C               STOP AFTER LAST PROBLEM.  TO PREVENT AN ABNORMAL EXIT
C                       AFTER LAST PROBLEM ADD A CARD WITH THE WORD STOP IN
C                       COLUMNS 1 TO 4.
C
      COMMON/CONTRL/HED(18),NUMNP,NUMEL,NUMMAT,NUMFSC,NCMP,NTYPE,RO,
     X BETA,HITE,HEAD,TOL,MAXIT,MAXMSH,NFLOC,PI
      COMMON C(20000)
      MMAX=20000
      DATA WORD1,WORD2/'FPM5','STOP'/
C
C**** SEARCH FOR START OF PROBLEM AND INPUT/OUTPUT CONTROL DATA
C
   30 READ(5,1006) HED
      IF(HED(1).EQ.WORD1) GO TO 33
      IF(HED(1).EQ.WORD2) STOP
      GO TO 30
   33 READ(5,1000) NUMNP,NUMEL,NUMMAT,NUMFSC,NTYPE,NFLOC,RO,HITE,HEAD
     X,BETA,MAXIT ,TOL
      PUNCH 1006, HED
      PUNCH 1000, NUMNP,NUMEL,NUMMAT,NUMFSC,NTYPE,NFLOC,RO,HITE,HEAD,
     *BETA,MAXIT,TOL
      WRITE(6,2000) HED,NUMNP,NUMEL,NUMMAT,RO,HITE,HEAD,BETA,TOL
      IF (NTYPE.EQ.0) WRITE(6,2001)
      IF (NTYPE.EQ.1) WRITE(6,2002)
C
C**** SET UP VARIABLE DIMENSIONING ADDRESSES
C
      NO=1
      N1=NO+NUMMAT
      N2=N1+NUMMAT
      N3=N2+NUMFSC
      N4=N3+NUMFSC
      N5=N4+NUMNP
      N6=N5+NUMNP
      N7=N6+NUMNP
      N8=N7+NUMNP
      N9=N8+NUMNP
      N10=N9+NUMEL
      N11=N10+NUMEL*5
      N12=N11+NUMNP
C
C**** INPUT MESH FOR FIRST ITERATION
C
      CALL MESHIN(MAXEAN,C(NO),C(N1),C(N2),C(N3),C(N4),C(N5),C(N6),
     X C(N7),C(N8),C(N9),C(N10))
      IF(NCMP.NE.0) GO TO 30
C
C**** CHECK ON SIZE OF REQUIRED STORAGE FOR PROBLEM AND COMPARE TO AVAIL
```

```
      BKEND    F.FLOW

C     PROGRAM FPM500(INPUT,OUTPUT,PUNCH,TAPE5=INPUT,TAPE6=OUTPUT)
C
C              ARBITRARY PLANE AND AXISYMMETRIC FLOW IN POROUS MEDIA
C
C          THE FOLLOWING INTERNAL VARIABLES SERVE TO PROVIDE CONTROL OF IN
C
C              HED  =  TITLE , PRINTED AS HEADINGS WITH OUTPUT.
C
C                   NOTE * * * PROGRAM USES FIRST WORD OF TITLE CARD AS
C                   A SEARCH FOR THE BEGINNING OF EACH PROBLEM.  FIRST 6
C                   COLUMNS MUST CONTAIN  FPM500 .
C
C              NUMNP = NUMBER OF NODES IN FINITE ELEMENT MESH
C
C              NUMEL = NUMBER OF ELEMENTS IN FINITE ELEMENT MESH
C
C              NUMMAT = NUMBER OF DIFFERENT MATERIALS
C
C              NUMFSC = NUMBER OF VARIABLE POSITION NODES ON PHREATIC
C                   SURFACE
C
C              NTYPE = TYPE OF PROBLEM CONSIDERED (1=PLANE FLOW PROBLEM,
C                   0=AXISYMMETRIC FLOW PROBLEM)
C
C              NFLOD = NUMBER OF ELEMENT BOUNDARY SURFACES WHERE THE FLOW
C                   RATE IS KNOWN AND HENCE MAY BE INITIALLY SPECIFIED
C
C              RO  =  FLUID UNIT WEIGHT (IF MISSING SET TO 0.0)
C
C              HITE = REFERENCE LEVEL TO DETERMINE PRESELECTED
C                   POTENTIAL RANGE OF VALUES
C
C              HEAD = TOTAL AVAILABLE HEAD OF FLUID , USED WITH HITE
C                   TO CONTROL THE VALUE OF THE POTENTIALS
C
C                   NOTE * * * THE VALUES USED FOR HITE AND HEAD IN NO WA
C                   AFFECT THE OPERATION OF THE BASIC PROGRAM.  THEY
C                   ARE USED ONLY IN THE COMPUTATION OF POTENTIALS.
C
C                   PSI IS POTENTIAL FUNCTION COMPUTED FROM
C
C                   PSI = (R(N)+RO*(Y(N)-HITE))/HEAD
C
C                   WHERE, R(N) IS THE PRESSURE AT NODE N
C                          Y(N) IS THE Y COORDINATE OF NODE N.
C
C              BETA = UNDERRELAXATION FACTOR FOR THE ITERATION PROCESS
C                   OF FINDING THE PHREATIC SURFACE. THE VALUE OF BETA
C                   SHOULD BE SET LESS THAN 1.0 * * * * * THE SPEED OF
C                   CONVERGENCE IS STRONGLY AFFECTED BY THE CHOICE OF BET
C                   INSTABILITY OF LOCATION FOR PHREATIC SURFACE WILL OCC
C                   IF BETA EXCEEDS 1.0 .
```

```
C
      N13=N12+MAXBAN*NUMNP
      WRITE(6,3000) N13,MMAX
      IF(N13.GE.MMAX) GO TO 30
C
C**** SET UP FLOW PROPERTIES AND SOLVE FOR PHREATIC SURFACE LOCATION
C
      CALL FORM(MAXBAN,C(NO),C(N1),C(N2),C(N3),C(N4),C(N5),C(N6),C(N7),
     X C(N8),C(N9),C(N10),C(N11),C(N12))
      GO TO 30
C
C**** FORMATS
C
 1000 FORMAT(6I5,4F10.3,I5,F5.2)
 1006 FORMAT(18A4)
 2000 FORMAT (1H1,18A4/
     1            30H0 NUMBER OF NODAL POINTS------ I3/
     2            30H0 NUMBER OF ELEMENTS---------- I3/
     3            30H0 NUMBER OF DIFF. MATERIALS--- I3/
     4            30H0 UNIT WEIGHT OF FLUID-------- E12.4/
     4            30H0 REFERENCE FOR POTENTIALS---- E12.4/
     5            30H0 AVAILABLE HEAD-------------- E12.4/
     6            30H0 CORRECTION FACTOR----------- F10.5/
     7            30H0 ERROR TOLERANCE------------- F10.5/)
 2001 FORMAT (27H0 AXISYMMETRIC FLOW PROBLEM/)
 2002 FORMAT (20H0 PLANE FLOW PROBLEM/)
 3000 FORMAT(19H REQUIRED STORAGE = I10, 21H, ALLOCATED STORAGE = I10/)
      END
      SUBROUTINE MESHIN(MAXBAN,XK1,XK2,NPFS,ALPHA,MESH,X,Y,NBC,FX,ANG,
     X NP)
C
C**** SUBROUTINE INPUTS ALL DATA DESCRIBING MESH CONFIGURATION
C
      COMMON/CONTRL/HED(18),NUMNP,NUMEL,NUMMAT,NUMFSC,NDMP,NTYPE,RO,
     X BETA,HITE,HEAD,TOL,MAXIT,MAXMSH,NFLOD,PI
      DIMENSION XK1(1),XK2(1),X(1),Y(1),NBC(1),FX(1),ANG(1),NP(5,1)
      DIMENSION MESH(1),ALPHA(1),NPFS(1)
      NDMP=0
C
C**** INPUT MATERIAL PERMEABILITIES
C
      READ(5,1001) (N,XK1(N),XK2(N),N=1,NUMMAT)
      WRITE(6,2003)(N,XK1(N),XK2(N),N=1,NUMMAT)
C
C**** READ AND PRINT NODAL INFORMATION
C
      M=0
      MMM=0
   60 READ(5,1002) N,IN,NBC(N),X(N),Y(N),FX(N)
      IF(N.LE.M) GO TO 64
      MMM=MMM+1
      MESH(MMM)=N
      IF(N.LE.1) GO TO 161
      NMM=N-M
      XNMM=NMM
      DX=(X(N)-X(M))/XNMM
```

```
      DY=(Y(N)-Y(M))/XNMM
      DF=(FX(N)-FX(M))/XNMM
      MP1=M+1
      IF(MP1.GE.N) GO TO 161
      NM1=N-1
      DO 61 NN=MP1,NM1
      X(NN)=X(NN-1)+DX
      Y(NN)=Y(NN-1)+DY
      NBC(NN)=0
      FX(NN)=0.0
      IF (IM.EQ.0) GO TO 61
      NBC(NN)=NBC(M)
      FX(NN)=FX(NN-1)+DF
   61 CONTINUE
  161 IF (N.GE.NUMNP) GO TO 63
      M=N
      IM=IN
      GO TO 60
   64 WRITE(6,2012) N
      NDMP=1
      GO TO 60
   63 CALL WRMESH(X,Y,NBC,FX)
      MAXMSH=MMM
C
C**** READ ELEMENT CARDS
C
      K=0
      M=0
   70 READ(5,1003) N,(NP(I,N),I=1,5),ANG(N)
      IF(N.LE.M) GO TO 74
      DO 440 I1=1,4
      DO 440 L1=I1,4
      KK=IABS(NP(I1,N)-NP(L1,N))
      IF(KK.GT.K) K=KK
  440 CONTINUE
      MP1=M+1
      IF (MP1.GE.N) GO TO 171
      NM1=N-1
      DO 71 NN=MP1,NM1
      DO 72 I=1,4
   72 NP(I,NN)=NP(I,NN-1)+1
      NP(5,NN)=NP(5,M)
      ANG(NN)=ANG(M)
   71 CONTINUE
  171 IF(N.GE.NUMEL) GO TO 73
      M=N
      GO TO 70
   74 WRITE(6,2013) N
      NDMP=1
      GO TO 70
   73 IF(NDMP.NE.0) RETURN
      IN=1
   75 IM=IN+49
      IF(IM.GT.NUMEL) IM=NUMEL
      WRITE(6,2005) HED,(N,(NP(I,N),I=1,5),ANG(N),N=IN,IM)
      IF(IM.GE.NUMEL) GO TO 76
```

```
      IN=IM+1
      GO TO 75
   76 CONTINUE
C
C**** SET BANDWIDTH FOR PROBLEM
C
      MAXBAN=K+1
      IF(NFLCD.LE.0) GO TO 78
C
C**** READ DISTRIBUTED FLOW INPUT CARDS
C
      DO 77 N=1,NFLCD
      READ(5,1004) I,J,QIJ
      SIJ=SQRT((X(J)-X(I))**2+(Y(J)-Y(I))**2)
      IF(NBC(I).NE.1) FX(I)=FX(I)+0.5*QIJ*SIJ
      IF(NBC(J).NE.1) FX(J)=FX(J)+0.5*QIJ*SIJ
   77 CONTINUE
C
C**** READ PHREATIC SURFACE DESCRIPTION
C
   78 IF(NUMFSC.LE.0) RETURN
      WRITE(6,2006)
      READ(5,1005) (NPFS(I),ALPHA(I),I=1,NUMFSC)
      WRITE(6,2007)(NPFS(I),ALPHA(I),I=1,NUMFSC)
      RETURN
C
C**** FORMATS
C
 1001 FORMAT (I5,2F10.0)
 1002 FORMAT (I5,I2,I3,3F10.0)
 1003 FORMAT (6I5,F10.0)
 1004 FORMAT (2I5,F10.0)
 1005 FORMAT (I5,F10.0)
 2003 FORMAT (28HOMATERIAL      PERMEABILITIES//
     1      55H   MATERIAL                  K1                 K2                 //
     2 (I10,2E15.4))
 2005 FORMAT(1H1,18A4//
     2              65H ELMT              I            J            K            L            MAT
     1      ANGLE//(I5,5I10,F10.3))
 2006 FORMAT (13H1FREE SURFACE//
     1              25H0        NODE     CORR. ANGLE//)
 2007 FORMAT (I10,F15.4)
 2012 FORMAT(21H NODAL CARD ERROR, N= , I3/)
 2013 FORMAT(23H ELEMENT CARD ERROR, N= , I3/)
      END
      SUBROUTINE WRMESH(X,Y,NBC,FX)
C
C**** SUBROUTINE PRINTS NODAL POSITIONS
C
      COMMON/CONTRL/HED(18),NUMNP,NUMEL,NUMMAT,NUMFSC,NCMP,NTYPE,RC,
     X BETA,HITE,HEAD,TOL,MAXIT,MAXMSH,NFLCD,PI
      DIMENSION X(1),Y(1),NBC(1),FX(1)
      IN=1
   75 IM=IN+49
      IF(IM.GT.NUMNP) IM=NUMNP
      WRITE(6,2004) HED,(N,NBC(N),X(N),Y(N),FX(N),N=IN,IM)
```

```
      IF(IM.GE.NUMNP) RETURN
      IN=IM+1
      GO TO 75
 2004 FORMAT(1H1,18A4//
    2        51H NODE   BC              X ORD              Y ORD              F//
    1       (2I5,3F15.4))
      END
      SUBROUTINE FORM(MAXBAN,XK1,XK2,NPFS,ALPHA,MESH,X,Y,NBC,FX,ANG,NP,
     X R,C)
C
C**** SUBROUTINE FORMS FLOW MATRICES, MODIFIES FOR PRESCRIBED PRESSURES,
C**** SOLVES EQUATIONS AND COMPUTES ELEMENT FLOWS
C
      COMMON/CONTRL/HED(18),NUMNP,NUMEL,NUMMAT,NUMFSC,NDMP,NTYPE,RO,
     X BETA,HITE,HEAD,TOL,MAXIT,MAXMSH,NFLOD,PI
      DIMENSION XK1(1),XK2(1),NPFS(1),ALPHA(1),MESH(1),X(1),Y(1),NBC(1)
     X ,NP(5,1),R(1),C(MAXBAN,1)
      DIMENSION ANG(1),FX(1)
      PI=3.1415926/180.0
      NUMIT=0
C
C**** INITIALIZATION
C
  700 DO 80 II=1,NUMNP
      R(II)=0.0
      DO 80 JJ=1,MAXBAN
   80 C(JJ,II)=0.0
C
C**** FORM MATRICES FOR SOLUTION
C
      CALL QDFLOW(MAXBAN,XK1,XK2,X,Y,ANG,NP,R,C)
      IF(NDMP.NE.0) CALL WRMESH(X,Y,NBC,FX)
      IF(NDMP.NE.0) RETURN
C
C****  MODIFY FOR BOUNDARY CONDITIONS
C
      CALL MODIFY(MAXBAN,NBC,FX,R,C)
C
C**** SOLVE EQUATIONS
C
      CALL SYMBC(C,R,NUMNP,MAXBAN,MAXBAN)
C
C**** PRINT OUTPUT OF PRESSURES AND POTENTIALS
C
      MCOUNT=0
      DO 204 N=1,NUMNP
      PSI=0.
      IF(HEAD.NE.0.0) PSI=(R(N)+RO*(Y(N)-HITE))/HEAD
      MCOUNT=MCOUNT-1
      IF(MCOUNT.GT.0) GO TO 204
      MCOUNT=50
      WRITE(6,2008) HED
  204 WRITE(6,2011) N,X(N),Y(N),R(N),PSI
C
C**** CORRECT NODAL POSITIONS ALONG PHREATIC SURFACE
C
```

```
      NUMIT=NUMIT+1
      IF(NUMIT.GE.MAXIT) GO TO 203
      ERROR=0.0
      DO 800  II=1,NUMFSC
      M=NPFS(II)
      ALP=ALPHA(II)*PI
      DX=BETA*R(M)*COS(ALP)/RO
      DY=BETA*R(M)*SIN(ALP)/RO
      ERROR=ERROR+DX*DX+DY*DY
      X(M)=X(M)+DX
  800 Y(M)=Y(M)+DY
      ERROR=SQRT(ERROR)
      IF(ERROR.LE.TOL) GO TO 203
C
C**** REGENERATE MESH
C
      M=MESH(1)
      DO 600 I=2,MAXMSH
      N=MESH(I)
      XNMM=N-M
      DX=(X(N)-X(M))/XNMM
      DY=(Y(N)-Y(M))/XNMM
      MP1=M+1
      DO 601 NN=MP1,N
      X(NN)=X(NN-1)+DX
  601 Y(NN)=Y(NN-1)+DY
      M=N
  600 CONTINUE
      GO TO 700
C
C**** SOLVE FOR ELEMENT FLOWS
C
  203 DO 300 I=1,NUMNP
      PSI=0.
      IF (HEAD.NE.0.0) PSI=(R(I)+ RO*(Y(I)-HITE))/HEAD
      PUNCH 2012, I,X(I),Y(I), R(I),PSI,FX(I),NBC(I)
  300 CONTINUE
      DO 801 J=1,NUMEL
  801 PUNCH 2016, J,(NP(I,J),I=1,5)
 2016 FORMAT(6I5)
      CALL ELFLOW(XK1,XK2,X,Y,ANG,NP,R)
   32 WRITE(6,2015)
      RETURN
C
C**** OUTPUT FORMATS
C
 2008 FORMAT(1H1,18A4//5X,5H NODE,5X,5HX-ORD,5X,5HY-ORD,12X,8HPRESSURE,
     X 11X,9HPOTENTIAL/   )
 2010 FORMAT(18A4)
 2011 FORMAT (5X,I5,2F10.2,2E20.5)
 2012 FORMAT(I5,4F10.2,F10.0,I5)
 2015 FORMAT (15H1END OF PROBLEM/)
      END
      SUBROUTINE QDFLOW(MAXBAN,XK1,XK2,X,Y,ANG,NP,R,C)
C
C**** SUBROUTINE COMPUTES FLOW MATRICES FOR QUADRILATERAL OR TRIANGULAR
```

```
C**** ELEMENTS AND ADDS TO GLOBAL FLOW MATRICES
C
      COMMON/CONTRL/HED(18),NUMNP,NUMEL,NUMMAT,NUMFSC,NDMP,NTYPE,RO,
     X BETA,HITE,HEAD,TOL,MAXIT,MAXMSH,NFLOD,PI
      COMMON/ELMT/ XX(5),YY(5),S(5,5),GG(5),XK11,XK22,XK12,NN
      DIMENSION XK1(1),XK2(1),X(1),Y(1),ANG(1),NP(5,1),R(1),C(MAXBAN,1)
      DO 300 NN=1,NUMEL
C
C**** INITIALIZE MATRICES
C
      DO 201 II=1,5
      GG(II)=0.0
      DO 201 JJ=1,5
  201 S(II,JJ)=0.0
      XK3=ANG(NN)*PI
      MAT=NP(5,NN)
      CC=COS(XK3)
      SS=SIN(XK3)
      XK11=XK1(MAT)*CC*CC+XK2(MAT)*SS*SS
      XK22=XK2(MAT)*CC*CC+XK1(MAT)*SS*SS
      XK12=SS*CC*(XK1(MAT)-XK2(MAT))
      D=4.0
      XX(5)=0.0
      YY(5)=0.0
      DO 100 J=1,4
      I=NP(J,NN)
      XX(J)=X(I)
      YY(J)=Y(I)
      XX(5)=XX(5)+X(I)/D
  100 YY(5)=YY(5)+Y(I)/D
      IF(NP(3,NN).EQ.NP(4,NN)) GO TO 110
C
C**** FORM QUADRILATERAL FLOW MATRICES FROM TRIANGLES
C
      MM=4
      CALL TRIFL(1,2,5)
      CALL TRIFL(2,3,5)
      CALL TRIFL(3,4,5)
      CALL TRIFL(4,1,5)
      IF(NDMP.NE.0) GO TO 300
C
C**** REDUCE CENTER NODE
C
      DO 200 II=1,4
      COM=S(II,5)/S(5,5)
      GG(II)=GG(II)-COM*GG(5)
      DO 200 JJ=1,4
  200 S(II,JJ)=S(II,JJ)-COM*S(5,JJ)
      GO TO 250
  110 CONTINUE
C
C**** FORM MATRICES FOR SINGLE TRIANGLE
C
      MM=3
      CALL TRIFL(1,2,3)
      IF(NDMP.NE.0) GO TO 300
```

```
C
C**** ADD ELEMT MATRICES TO GLOBAL MATRICES
C
  250 CONTINUE
      DO 202 II=1,MM
      L1=NP(II,NN)
      R(L1)=R(L1)+GG(II)
      DO 202 JJ=1,MM
      K2=NP(JJ,NN)-L1+1
      IF(K2.LE.0) GO TO 202
      C(K2,L1)=C(K2,L1)+S(II,JJ)
  202 CONTINUE
  300 CONTINUE
      RETURN
      END
      SUBROUTINE TRIFL(I,J,K)
C
C**** SUBROUTINE COMPUTES FLOW MATRICES FOR TRIANGULAR ELEMENT
C
      COMMON/CONTRL/HED(18),NUMNP,NUMEL,NUMMAT,NUMFSC,NDMP,NTYPE,RO,
     X BETA,HITE,HEAD,TOL,MAXIT,MAXMSH,NFLOC,PI
      COMMON/ELMT/ XX(5),YY(5),S(5,5),GG(5),XK11,XK22,XK12,NN
      A1=0.5
      P21=YY(J)-YY(K)
      P22=YY(K)-YY(I)
      P23=YY(I)-YY(J)
      P31=XX(K)-XX(J)
      P32=XX(I)-XX(K)
      P33=XX(J)-XX(I)
      D=P33*P22-P23*P32
      IF(NDMP.NE.0)   RETURN
      IF(D.LE.0.0) GO TO 500
      IF(NTYPE.NE.1) A1=(XX(I)+XX(J)+XX(K))/6.0
      T11=XK11*P21+XK12*P31
      T12=XK11*P22+XK12*P32
      T13=XK11*P23+XK12*P33
      T21=XK12*P21+XK22*P31
      T22=XK12*P22+XK22*P32
      T23=XK12*P23+XK22*P33
      COM=A1/D
      S(I,I)=S(I,I)+COM*(P21*T11+P31*T21)
      S(I,J)=S(I,J)+COM*(P21*T12+P31*T22)
      S(I,K)=S(I,K)+COM*(P21*T13+P31*T23)
      S(J,J)=S(J,J)+COM*(P22*T12+P32*T22)
      S(J,K)=S(J,K)+COM*(P22*T13+P32*T23)
      S(K,K)=S(K,K)+COM*(P23*T13+P33*T23)
      S(J,I)=S(I,J)
      S(K,I)=S(I,K)
      S(K,J)=S(J,K)
      COM=A1*RO
      GG(I)=GG(I)-T21*COM
      GG(J)=GG(J)-T22*COM
      GG(K)=GG(K)-T23*COM
      RETURN
  500 WRITE(6,3000) NN
      NDMP=1
```

```
      RETURN
C
C**** ERROR MESSAGE
C
 3000 FORMAT (30H ZERO OR NEGATIVE AREA ELEMT,   I3/)
      END
      SUBROUTINE MODIFY(MM,NBC,FX,R,C)
C
C**** SUBROUTINE MODIFIES EQUATIONS OF NODES WITH PRESCRIBED PRESSURES
C**** OR FLOWS
C
      COMMON/CONTRL/HED(18),NUMNP,NUMEL,NUMMAT,NUMFSC,NCMP,NTYPE,RO,
     X BETA,HITE,HEAD,TOL,MAXIT,MAXMSH,NFLCC,PI
      DIMENSION FX(1),R(1),C(MM,1),NBC(1)
      DO 70 N=1,NUMNP
      IF(NBC(N).GT.0) GO TO 72
      R(N)=R(N)+FX(N)
      GO TO 70
   72 N1=N+1
      DO 73 K=2,MM
      N2=N1-K
      IF (N2.LE.0) GO TO 74
      R(N2)=R(N2)-C(K,N2)*FX(N)
      C(K,N2)=0.0
   74 M=N+K-1
      IF (M.GT.NUMNP) GO TO 73
      R(M)=R(M)-C(K,N)*FX(N)
      C(K,N)=0.0
   73 CONTINUE
      C(1,N)=0.0
      R(N)=FX(N)
   70 CONTINUE
      RETURN
      END
      SUBROUTINE SYMBC(A,B,NN,MB,MMAX)
C
C**** SOLUTION OF SYMMETRIC BANDED EQUATIONS IN SINGLE SUBSCRIPT ARITH.
C**** SYMMETRIC, BAND MATRIC WITH DIMENSIONS  K(MMAX,NN) IS STORED IN
C**** VECTOR A.
C
      DIMENSION A(1),B(1)
      MB1=MB-1
      NNN=NN-1
C
C**** TRIANGULARICE MATRIX BY GAUSS ELIMINATION WITHOUT PIVOTS
C
      II=1
      DO 300 N=1,NNN
      CC=A(II)
      IF(CC.EQ.0.0) GO TO 250
      J1=II+1
      J2=II+MB1
      NE=NN-N
      IF(NE.LT.MB1) J2=II+NE
      M=II-1
      DO 200 J=J1,J2
```

```
      M=M+MMAX
      C=A(J)/CC
      IF(C.EQ.0.0) GC TC 200
      K=M
      DC 100 I=J,J2
      K=K+1
  100 A(K)=A(K)-C*A(I)
      A(J)=C
  200 CONTINUE
  250 CCNTINUE
      II=II+MMAX
  300 CCNTINUE
C
C**** REDUCE FORCE VECTOR
C
      II=1
      DC 500 N=1,NNN
      CC=A(II)
      IF(CC.EQ.0.0) GC TC 450
      J1=II+1
      J2=II+MB1
      NE=NN-N
      IF(NE.LT.MB1) J2=II+NE
      C=B(N)
      L=N
      DC 400 J=J1,J2
      L=L+1
  400 B(L)=B(L)-A(J)*C
      B(N)=C/CC
  450 CONTINUE
      II=II+MMAX
  500 CONTINUE
      CC=A(II)
      IF(CC.NE.0.0) B(NN)=B(NN)/CC
C
C**** BACKSUBSTITUTE  EQUATICNX
C
      N=NN
      II=MMAX*(NN-2)+1
      DO 700 I=2,NN
      N=N-1
      IF(A(II).EQ.0.C) GO TO 650
      J1=II+1
      J2=II+MB1
      NE=NN-N
      IF(NE.LT.MB1) J2=II+NE
      C=B(N)
      L=N
      DO 600 J=J1,J2
      L=L+1
  600 C=C-A(J)*B(L)
      B(N)=C
  650 CCNTINUE
      II=II-MMAX
  700 CONTINUE
      RETURN
```

```
      END
      SUBROUTINE ELFLOW(XK1,XK2,X,Y,ANG,NP,R)
C**** SUBROUTINE COMPUTES FLOW VELOCITIES IN ELEMENTS
C
      COMMON/CONTRL/HED(18),NUMNP,NUMEL,NUMMAT,NUMFSC,NDMP,NTYPE,RO,
     X BETA,HITE,HEAD,TOL,MAXIT,MAXMSH,NFLOD,PI
      DIMENSION XK1(1),XK2(1),X(1),Y(1),ANG(1),NP(5,1),R(1),YY(6)
      MCOUNT=0
      DO 400  N=1,NUMEL
      IF(NP(3,N).EQ.NP(4,N)) GO TO 200
      XM=0.
      YM=0.
      RM=0.0
      DO 100 J=1,4
      I=NP(J,N)
      RM=RM+0.25*R(I)
      XM=XM+0.25*X(I)
  100 YM=YM+0.25*Y(I)
      MM=4
      GO TO 250
  200 XM = 0.0
      YM = 0.0
      RM = 0.0
      DO 500 J=1,3
      I = NP(J,N)
      XM = XM + X(I) / 3.0
      RM = RM + R(I) / 3.0
  500 YM = YM + Y(I) / 3.0
      MM = 3
  250 CONTINUE
      MAT=NP(5,N)
      XK3=ANG(N)*PI
      CC=COS(XK3)
      SN=SIN(XK3)
      Y1K=CC*XM+SN*YM
      Y2K=CC*YM-SN*XM
      Q1=0.0
      Q2=0.0
      D1=0.0
C
C**** LOOP ON ELEMENTS FOR QUADRILATERAL ELEMENT
C
      J=NP(4,N)
      DO 300 NN=1,MM
      I=J
      J=NP(NN,N)
      Y1I=CC*X(I)+SN*Y(I)
      Y1J=CC*X(J)+SN*Y(J)
      Y2I=CC*Y(I)-SN*X(I)
      Y2J=CC*Y(J)-SN*X(J)
      YY(1)  =Y2J-Y2K
      YY(2)  =Y2K-Y2I
      YY(3)  =Y2I-Y2J
      YY(4)  =Y1K-Y1J
      YY(5)  =Y1I-Y1K
      YY(6)  =Y1J-Y1I
```

```
      D=YY(6)*YY(2)-YY(3)*YY(5)
      D1=D1+D
      Q1=Q1-XK1(MAT)*(YY(1)*R(I)+YY(2)*R(J)+YY(3)*RM+SN*RO*D)
      Q2=Q2-XK2(MAT)*(YY(4)*R(I)+YY(5)*R(J)+YY(6)*RM+CC*RO*D)
  300 CONTINUE
C
C**** OUTPUT FLOWS
C
      Q1 = Q1/(D1*RO)
      Q2 = Q2/(D1*RO)
      Q3=SQRT(Q1**2+Q2**2)
      Q4=ATAN2(Q2,Q1)/PI+ANG(N)
      MCOUNT=MCOUNT-1
      IF(MCOUNT.GT.0) GO TO 350
      MCOUNT=25
      WRITE(6,2000) HED
  350 WRITE(6,2001) N,XM,YM,Q1,Q2,ANG(N),Q3,Q4
  400 CONTINUE
      RETURN
C
C**** FORMATS
C
 2000 FORMAT(1H1,18A4//5X,5H ELMT,5X,5HX-CRD,5X,5HY-CRD,14X,6H1-FLOW
     X 14X,6H2-FLOW,10X,5HANGLE,10X,10HTOTAL FLOW,6X,9HDIRECTION/)
 2001 FORMAT(5X,I5,  2F10.2,  2E20.5,    F15.4,    E20.5,    F15.4/)
      END
%*
 INCLUDE ILFGHTAB
%*

         BKEND
```

APPENDIX E

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

NUMBER OF NODAL POINTS------603

NUMBER OF ELEMENTS----------549

NUMBER OF DIFF. MATERIALS--- 7

UNIT WEIGHT OF FLUID-------- 0.1000E 01

REFERENCE FOR POTENTIALS---- 0.5650E 03

AVAILABLE HEAD-------------- 0.1650E 01

CORRECTION FACTOR----------- 0.0

ERROR TOLERANCE------------- 0.0

PLANE FLOW PROBLEM

MATERIAL PERMEABILITIES

MATERIAL	K1	K2
1	0.3640E 06	0.3640E 06
2	0.3000E 04	0.3000E 04
3	0.1020E 07	0.1020E 07
4	0.2980E 03	0.2980E 03
5	0.2840E 05	0.2840E 05
6	0.1520E 07	0.1520E 07
7	0.3000E 02	0.3000E 02

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

NODE	BC	X ORD	Y ORD	F
1	0	0.0	438.0000	0.0
2	0	0.0	508.0000	0.0
3	0	0.0	556.0000	0.0
4	0	0.0	596.0000	0.0
5	0	0.0	636.0000	0.0
6	1	0.0	700.0000	30.0000
7	0	2000.0000	428.0000	0.0
8	0	2000.0000	500.0000	0.0
9	0	2000.0000	548.0000	0.0
10	0	2000.0000	591.0000	0.0
11	0	2000.0000	632.0000	0.0
12	1	2000.0000	700.0000	30.0000
13	0	4000.0000	418.0000	0.0
14	0	4000.0000	490.0000	0.0
15	0	4000.0000	542.0000	0.0
16	0	4000.0000	587.0000	0.0
17	0	4000.0000	628.0000	0.0
18	1	4000.0000	700.0000	30.0000
19	0	6000.0000	412.0000	0.0
20	0	6000.0000	484.0000	0.0
21	0	6000.0000	538.0000	0.0
22	0	6000.0000	580.0000	0.0
23	0	6000.0000	623.0000	0.0
24	1	6000.0000	698.0000	30.0000
25	0	8000.0000	405.0000	0.0
26	0	8000.0000	480.0000	0.0
27	0	8000.0000	533.0000	0.0
28	0	8000.0000	577.0000	0.0
29	0	8000.0000	620.0000	0.0
30	1	8000.0000	695.0000	30.0000
31	0	10000.0000	399.0000	0.0
32	0	10000.0000	474.0000	0.0
33	0	10000.0000	529.0000	0.0
34	0	10000.0000	571.0000	0.0
35	0	10000.0000	618.0000	0.0
36	0	10000.0000	691.0000	0.0
37	0	12000.0000	391.0000	0.0
38	0	12000.0000	433.0000	0.0
39	0	12000.0000	468.0000	0.0
40	0	12000.0000	523.0000	0.0
41	0	12000.0000	567.0000	0.0
42	0	12000.0000	612.0000	0.0
43	0	12000.0000	688.0000	0.0
44	0	14000.0000	386.0000	0.0
45	0	14000.0000	462.0000	0.0
46	0	14000.0000	519.0000	0.0
47	0	14000.0000	563.0000	0.0
48	0	14000.0000	610.0000	0.0
49	0	14000.0000	687.0000	0.0
50	0	16000.0000	378.0000	0.0

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

NODE	BC	X ORD	Y ORD	F
51	0	16000.0000	456.0000	0.0
52	0	16000.0000	514.0000	0.0
53	0	16000.0000	560.0000	0.0
54	0	16000.0000	607.0000	0.0
55	0	16000.0000	687.0000	0.0
56	0	18000.0000	370.0000	0.0
57	0	18000.0000	449.0000	0.0
58	0	18000.0000	508.0000	0.0
59	0	18000.0000	555.0000	0.0
60	0	18000.0000	602.0000	0.0
61	0	18000.0000	682.0000	0.0
62	0	20000.0000	362.0000	0.0
63	0.	20000.0000	442.0000	0.0
64	0	20000.0000	503.0000	0.0
65	0	20000.0000	550.0000	0.0
66	0	20000.0000	598.0000	0.0
67	0	20000.0000	682.0000	0.0
68	0	22000.0000	357.0000	0.0
69	0	22000.0000	438.0000	0.0
70	0	22000.0000	498.0000	0.0
71	0	22000.0000	547.0000	0.0
72	0	22000.0000	595.0000	0.0
73	0	22000.0000	683.0000	0.0
74	0	24000.0000	350.0000	0.0
75	0	24000.0000	430.0000	0.0
76	0	24000.0000	492.0000	0.0
77	0	24000.0000	542.0000	0.0
78	0	24000.0000	592.0000	0.0
79	0	24000.0000	625.0000	0.0
80	0	24000.0000	685.0000	0.0
81	0	26000.0000	342.0000	0.0
82	0	26000.0000	424.0000	0.0
83	0	26000.0000	488.0000	0.0
84	0	26000.0000	538.0000	0.0
85	0	26000.0000	583.0000	0.0
86	0	26000.0000	680.0000	0.0
87	0	28000.0000	335.0000	0.0
88	0	28000.0000	418.0000	0.0
89	0	28000.0000	480.0000	0.0
90	0	28000.0000	510.0000	0.0
91	0	28000.0000	532.0000	0.0
92	0	28000.0000	584.0000	0.0
93	0	28000.0000	680.0000	0.0
94	0	30000.0000	330.0000	0.0
95	0	30000.0000	412.0000	0.0
96	0	30000.0000	475.0000	0.0
97	0	30000.0000	530.0000	0.0
98	0	30000.0000	582.0000	0.0
99	0	30000.0000	679.0000	0.0
100	0	32000.0000	324.0000	0.0

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

NODE	BC	X ORD	Y ORD	F
101	0	32000.0000	380.0000	0.0
102	0	32000.0000	406.0000	0.0
103	0	32000.0000	470.0000	0.0
104	0	32000.0000	526.0000	0.0
105	0	32000.0000	582.0000	0.0
106	0	32000.0000	680.0000	0.0
107	0	34000.0000	318.0000	0.0
108	0	34000.0000	400.0000	0.0
109	0	34000.0000	463.0000	0.0
110	0	34000.0000	525.0000	0.0
111	0	34000.0000	578.0000	0.0
112	0	34000.0000	676.0000	0.0
113	0	36000.0000	310.0000	0.0
114	0	36000.0000	392.0000	0.0
115	0	36000.0000	458.0000	0.0
116	0	36000.0000	516.0000	0.0
117	0	36000.0000	571.0000	0.0
118	0	36000.0000	680.0000	0.0
119	0	38000.0000	306.0000	0.0
120	0	38000.0000	390.0000	0.0
121	0	38000.0000	455.0000	0.0
122	0	38000.0000	512.0000	0.0
123	0	38000.0000	570.0000	0.0
124	0	38000.0000	666.0000	0.0
125	0	40000.0000	300.0000	0.0
126	0	40000.0000	380.0000	0.0
127	0	40000.0000	450.0000	0.0
128	0	40000.0000	507.0000	0.0
129	0	40000.0000	568.0000	0.0
130	0	40000.0000	658.0000	0.0
131	0	42000.0000	295.0000	0.0
132	0	42000.0000	375.0000	0.0
133	0	42000.0000	445.0000	0.0
134	0	42000.0000	502.0000	0.0
135	0	42000.0000	565.0000	0.0
136	0	42000.0000	655.0000	0.0
137	0	44000.0000	290.0000	0.0
138	0	44000.0000	370.0000	0.0
139	0	44000.0000	440.0000	0.0
140	0	44000.0000	500.0000	0.0
141	0	44000.0000	560.0000	0.0
142	0	44000.0000	652.0000	0.0
143	0	46000.0000	278.0000	0.0
144	0	46000.0000	360.0000	0.0
145	0	46000.0000	430.0000	0.0
146	0	46000.0000	470.0000	0.0
147	0	46000.0000	495.0000	0.0
148	0	46000.0000	560.0000	0.0
149	0	46000.0000	650.0000	0.0
150	0	48000.0000	272.0000	0.0

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

NODE	BC	X ORD	Y ORD	F
151	0	48000.0000	354.0000	0.0
152	0	48000.0000	428.0000	0.0
153	0	48000.0000	491.0000	0.0
154	0	48000.0000	560.0000	0.0
155	0	48000.0000	596.0000	0.0
156	0	48000.0000	650.0000	0.0
157	0	50000.0000	265.0000	0.0
158	0	50000.0000	348.0000	0.0
159	0	50000.0000	421.0000	0.0
160	0	50000.0000	490.0000	0.0
161	0	50000.0000	560.0000	0.0
162	0	50000.0000	652.0000	0.0
163	0	52000.0000	260.0000	0.0
164	0	52000.0000	342.0000	0.0
165	0	52000.0000	418.0000	0.0
166	0	52000.0000	484.0000	0.0
167	0	52000.0000	553.0000	0.0
168	0	52000.0000	651.0000	0.0
169	0	54000.0000	254.0000	0.0
170	0	54000.0000	335.0000	0.0
171	0	54000.0000	412.0000	0.0
172	0	54000.0000	480.0000	0.0
173	0	54000.0000	550.0000	0.0
174	0	54000.0000	651.0000	0.0
175	0	56000.0000	244.0000	0.0
176	0	56000.0000	328.0000	0.0
177	0	56000.0000	408.0000	0.0
178	0	56000.0000	475.0000	0.0
179	0	56000.0000	550.0000	0.0
180	0	56000.0000	650.0000	0.0
181	0	58000.0000	235.0000	0.0
182	0	58000.0000	322.0000	0.0
183	0	58000.0000	404.0000	0.0
184	0	58000.0000	440.0000	0.0
185	0	58000.0000	470.0000	0.0
186	0	58000.0000	542.0000	0.0
187	0	58000.0000	650.0000	0.0
188	0	60000.0000	230.0000	0.0
189	0	60000.0000	318.0000	0.0
190	0	60000.0000	400.0000	0.0
191	0	60000.0000	469.0000	0.0
192	0	60000.0000	541.0000	0.0
193	0	60000.0000	650.0000	0.0
194	0	62000.0000	228.0000	0.0
195	0	62000.0000	312.0000	0.0
196	0	62000.0000	398.0000	0.0
197	0	62000.0000	468.0000	0.0
198	0	62000.0000	542.0000	0.0
199	0	62000.0000	649.0000	0.0
200	0	64000.0000	220.0000	0.0

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

NODE	BC	X ORD	Y ORD	F
201	0	64000.0000	304.0000	0.0
202	0	64000.0000	392.0000	0.0
203	0	64000.0000	462.0000	0.0
204	0	64000.0000	542.0000	0.0
205	0	64000.0000	649.0000	0.0
206	0	66000.0000	215.0000	0.0
207	0	66000.0000	300.0000	0.0
208	0	66000.0000	390.0000	0.0
209	0	66000.0000	455.0000	0.0
210	0	66000.0000	540.0000	0.0
211	0	66000.0000	650.0000	0.0
212	0	68000.0000	208.0000	0.0
213	0	68000.0000	294.0000	0.0
214	0	68000.0000	385.0000	0.0
215	0	68000.0000	454.0000	0.0
216	0	68000.0000	535.0000	0.0
217	0	68000.0000	649.0000	0.0
218	0	70000.0000	204.0000	0.0
219	0	70000.0000	292.0000	0.0
220	0	70000.0000	381.0000	0.0
221	0	70000.0000	454.0000	0.0
222	0	70000.0000	535.0000	0.0
223	0	70000.0000	651.0000	0.0
224	0	72000.0000	195.0000	0.0
225	0	72000.0000	282.0000	0.0
226	0	72000.0000	378.0000	0.0
227	0	72000.0000	430.0000	0.0
228	0	72000.0000	450.0000	0.0
229	0	72000.0000	537.0000	0.0
230	0	72000.0000	652.0000	0.0
231	0	74000.0000	186.0000	0.0
232	0	74000.0000	278.0000	0.0
233	0	74000.0000	371.0000	0.0
234	0	74000.0000	445.0000	0.0
235	0	74000.0000	540.0000	0.0
236	0	74000.0000	650.0000	0.0
237	0	76000.0000	180.0000	0.0
238	0	76000.0000	276.0000	0.0
239	0	76000.0000	370.0000	0.0
240	0	76000.0000	440.0000	0.0
241	0	76000.0000	535.0000	0.0
242	0	76000.0000	650.0000	0.0
243	0	78000.0000	178.0000	0.0
244	0	78000.0000	272.0000	0.0
245	0	78000.0000	364.0000	0.0
246	0	78000.0000	438.0000	0.0
247	0	78000.0000	531.0000	0.0
248	0	78000.0000	643.0000	0.0
249	0	80000.0000	169.0000	0.0
250	0	80000.0000	268.0000	0.0

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

NODE	BC	X ORD	Y ORD	F
251	0	80000.0000	360.0000	0.0
252	0	80000.0000	430.0000	0.0
253	0	80000.0000	530.0000	0.0
254	0	80000.0000	646.0000	0.0
255	0	82000.0000	162.0000	0.0
256	0	82000.0000	265.0000	0.0
257	0	82000.0000	357.0000	0.0
258	0	82000.0000	429.0000	0.0
259	0	82000.0000	530.0000	0.0
260	0	82000.0000	647.0000	0.0
261	0	84000.0000	158.0000	0.0
262	0	84000.0000	262.0000	0.0
263	0	84000.0000	352.0000	0.0
264	0	84000.0000	427.0000	0.0
265	0	84000.0000	528.0000	0.0
266	0	84000.0000	643.0000	0.0
267	0	86000.0000	151.0000	0.0
268	0	86000.0000	255.0000	0.0
269	0	86000.0000	348.0000	0.0
270	0	86000.0000	400.0000	0.0
271	0	86000.0000	421.0000	0.0
272	0	86000.0000	525.0000	0.0
273	0	86000.0000	642.0000	0.0
274	0	88000.0000	148.0000	0.0
275	0	88000.0000	251.0000	0.0
276	0	88000.0000	342.0000	0.0
277	0	88000.0000	420.0000	0.0
278	0	88000.0000	523.0000	0.0
279	0	88000.0000	640.0000	0.0
280	0	90000.0000	142.0000	0.0
281	0	90000.0000	247.0000	0.0
282	0	90000.0000	340.0000	0.0
283	0	90000.0000	415.0000	0.0
284	0	90000.0000	520.0000	0.0
285	0	90000.0000	638.0000	0.0
286	0	92000.0000	138.0000	0.0
287	0	92000.0000	241.0000	0.0
288	0	92000.0000	335.0000	0.0
289	0	92000.0000	410.0000	0.0
290	0	92000.0000	518.0000	0.0
291	0	92000.0000	638.0000	0.0
292	0	94000.0000	130.0000	0.0
293	0	94000.0000	237.0000	0.0
294	0	94000.0000	330.0000	0.0
295	0	94000.0000	403.0000	0.0
296	0	94000.0000	516.0000	0.0
297	0	94000.0000	636.0000	0.0
298	0	96000.0000	126.0000	0.0
299	0	96000.0000	235.0000	0.0
300	0	96000.0000	328.0000	0.0

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

NODE	BC	X ORD	Y ORD	F
301	0	96000.0000	400.0000	0.0
302	0	96000.0000	515.0000	0.0
303	0	96000.0000	638.0000	0.0
304	0	98000.0000	123.0000	0.0
305	0	98000.0000	233.0000	0.0
306	0	98000.0000	324.0000	0.0
307	0	98000.0000	398.0000	0.0
308	0	98000.0000	515.0000	0.0
309	0	98000.0000	636.0000	0.0
310	0	100000.0000	122.0000	0.0
311	0	100000.0000	231.0000	0.0
312	0	100000.0000	320.0000	0.0
313	0	100000.0000	392.0000	0.0
314	0	100000.0000	512.0000	0.0
315	0	100000.0000	633.0000	0.0
316	0	102000.0000	121.0000	0.0
317	0	102000.0000	230.0000	0.0
318	0	102000.0000	319.0000	0.0
319	0	102000.0000	391.0000	0.0
320	0	102000.0000	510.0000	0.0
321	0	102000.0000	633.0000	0.0
322	0	104000.0000	120.0000	0.0
323	0	104000.0000	228.0000	0.0
324	0	104000.0000	317.0000	0.0
325	0	104000.0000	386.0000	0.0
326	0	104000.0000	510.0000	0.0
327	0	104000.0000	627.0000	0.0
328	0	106000.0000	118.0000	0.0
329	0	106000.0000	226.0000	0.0
330	0	106000.0000	316.0000	0.0
331	0	106000.0000	384.0000	0.0
332	0	106000.0000	510.0000	0.0
333	0	106000.0000	624.0000	0.0
334	0	108000.0000	118.0000	0.0
335	0	108000.0000	187.0000	0.0
336	0	108000.0000	226.0000	0.0
337	0	108000.0000	314.0000	0.0
338	0	108000.0000	382.0000	0.0
339	0	108000.0000	511.0000	0.0
340	0	108000.0000	621.0000	0.0
341	0	110000.0000	116.0000	0.0
342	0	110000.0000	224.0000	0.0
343	0	110000.0000	313.0000	0.0
344	0	110000.0000	381.0000	0.0
345	0	110000.0000	510.0000	0.0
346	0	110000.0000	618.0000	0.0
347	0	112000.0000	113.0000	0.0
348	0	112000.0000	223.0000	0.0
349	0	112000.0000	312.0000	0.0
350	0	112000.0000	381.0000	0.0

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

NODE	BC	X ORD	Y ORD	F
351	0	112000.0000	509.0000	0.0
352	0	112000.0000	615.0000	0.0
353	0	114000.0000	111.0000	0.0
354	0	114000.0000	223.0000	0.0
355	0	114000.0000	311.0000	0.0
356	0	114000.0000	380.0000	0.0
357	0	114000.0000	509.0000	0.0
358	0	114000.0000	612.0000	0.0
359	0	116000.0000	110.0000	0.0
360	0	116000.0000	223.0000	0.0
361	0	116000.0000	310.0000	0.0
362	0	116000.0000	379.0000	0.0
363	0	116000.0000	508.0000	0.0
364	0	116000.0000	609.0000	0.0
365	0	118000.0000	110.0000	0.0
366	0	118000.0000	222.0000	0.0
367	0	118000.0000	310.0000	0.0
368	0	118000.0000	378.0000	0.0
369	0	118000.0000	508.0000	0.0
370	0	118000.0000	607.0000	0.0
371	0	120000.0000	109.0000	0.0
372	0	120000.0000	222.0000	0.0
373	0	120000.0000	309.0000	0.0
374	0	120000.0000	378.0000	0.0
375	0	120000.0000	506.0000	0.0
376	0	120000.0000	604.0000	0.0
377	0	122000.0000	109.0000	0.0
378	0	122000.0000	222.0000	0.0
379	0	122000.0000	308.0000	0.0
380	0	122000.0000	377.0000	0.0
381	0	122000.0000	505.0000	0.0
382	0	122000.0000	605.0000	0.0
383	0	124000.0000	108.0000	0.0
384	0	124000.0000	222.0000	0.0
385	0	124000.0000	308.0000	0.0
386	0	124000.0000	376.0000	0.0
387	0	124000.0000	502.0000	0.0
388	0	124000.0000	604.0000	0.0
389	0	126000.0000	107.0000	0.0
390	0	126000.0000	223.0000	0.0
391	0	126000.0000	309.0000	0.0
392	0	126000.0000	376.0000	0.0
393	0	126000.0000	500.0000	0.0
394	0	126000.0000	600.0000	0.0
395	0	128000.0000	106.0000	0.0
396	0	128000.0000	160.0000	0.0
397	0	128000.0000	223.0000	0.0
398	0	128000.0000	260.0000	0.0
399	0	128000.0000	307.0000	0.0
400	0	128000.0000	343.0000	0.0

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

NODE	BC	X ORD	Y ORD	F
401	0	128000.0000	373.0000	0.0
402	0	128000.0000	455.0000	0.0
403	0	128000.0000	500.0000	0.0
404	0	128000.0000	530.0000	0.0
405	0	128000.0000	560.0000	0.0
406	0	128000.0000	600.0000	0.0
407	0	129000.0000	106.0000	0.0
408	0	129000.0000	160.0000	0.0
409	0	129000.0000	223.0000	0.0
410	0	129000.0000	260.0000	0.0
411	0	129000.0000	307.0000	0.0
412	0	129000.0000	377.0000	0.0
413	0	129000.0000	500.0000	0.0
414	0	129000.0000	535.0000	0.0
415	0	129000.0000	570.0000	0.0
416	0	129000.0000	600.0000	0.0
417	0	130000.0000	106.0000	0.0
418	0	130000.0000	160.0000	0.0
419	0	130000.0000	223.0000	0.0
420	0	130000.0000	260.0000	0.0
421	0	130000.0000	306.0000	0.0
422	0	130000.0000	400.0000	0.0
423	0	130000.0000	498.0000	0.0
424	0	130000.0000	526.0000	0.0
425	0	130000.0000	560.0000	0.0
426	0	130000.0000	580.0000	0.0
427	0	130000.0000	601.0000	0.0
428	0	131000.0000	105.0000	0.0
429	0	131000.0000	159.0000	0.0
430	0	131000.0000	222.0000	0.0
431	0	131000.0000	260.0000	0.0
432	0	131000.0000	305.0000	0.0
433	0	131000.0000	400.0000	0.0
434	0	131000.0000	499.0000	0.0
435	0	131000.0000	525.0000	0.0
436	0	131000.0000	560.0000	0.0
437	0	131000.0000	580.0000	0.0
438	0	131000.0000	601.0000	0.0
439	0	132000.0000	104.0000	0.0
440	0	132000.0000	159.0000	0.0
441	0	132000.0000	222.0000	0.0
442	0	132000.0000	260.0000	0.0
443	0	132000.0000	305.0000	0.0
444	0	132000.0000	400.0000	0.0
445	0	132000.0000	499.0000	0.0
446	0	132000.0000	525.0000	0.0
447	0	132000.0000	560.0000	0.0
448	0	132000.0000	580.0000	0.0
449	0	132000.0000	602.0000	0.0
450	0	133000.0000	104.0000	0.0

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

NODE	BC	X ORD	Y ORD	F
451	0	133000.0000	159.0000	0.0
452	0	133000.0000	222.0000	0.0
453	0	133000.0000	260.0000	0.0
454	0	133000.0000	305.0000	0.0
455	0	133000.0000	400.0000	0.0
456	0	133000.0000	500.0000	0.0
457	0	133000.0000	526.0000	0.0
458	0	133000.0000	560.0000	0.0
459	0	133000.0000	580.0000	0.0
460	0	133000.0000	602.0000	0.0
461	0	134000.0000	103.0000	0.0
462	0	134000.0000	159.0000	0.0
463	0	134000.0000	222.0000	0.0
464	0	134000.0000	260.0000	0.0
465	0	134000.0000	305.0000	0.0
466	0	134000.0000	400.0000	0.0
467	0	134000.0000	500.0000	0.0
468	0	134000.0000	526.0000	0.0
469	0	134000.0000	560.0000	0.0
470	0	134000.0000	580.0000	0.0
471	0	134000.0000	603.0000	0.0
472	0	135000.0000	103.0000	0.0
473	0	135000.0000	159.0000	0.0
474	0	135000.0000	222.0000	0.0
475	0	135000.0000	260.0000	0.0
476	0	135000.0000	304.0000	0.0
477	0	135000.0000	400.0000	0.0
478	0	135000.0000	500.0000	0.0
479	0	135000.0000	525.0000	0.0
480	0	135000.0000	560.0000	0.0
481	0	135000.0000	580.0000	0.0
482	0	135000.0000	605.0000	0.0
483	0	136000.0000	102.0000	0.0
484	0	136000.0000	158.0000	0.0
485	0	136000.0000	221.0000	0.0
486	0	136000.0000	260.0000	0.0
487	0	136000.0000	304.0000	0.0
488	0	136000.0000	340.0000	0.0
489	0	136000.0000	399.0000	0.0
490	0	136000.0000	501.0000	0.0
491	0	136000.0000	526.0000	0.0
492	0	136000.0000	560.0000	0.0
493	0	136000.0000	579.0000	0.0
494	0	136000.0000	605.0000	0.0
495	0	137000.0000	102.0000	0.0
496	0	137000.0000	220.0000	0.0
497	0	137000.0000	260.0000	0.0
498	0	137000.0000	304.0000	0.0
499	0	137000.0000	399.0000	0.0
500	0	137000.0000	503.0000	0.0

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

NODE	BC	X ORD	Y ORD	F
501	0	137000.0000	526.0000	0.0
502	0	137000.0000	560.0000	0.0
503	0	137000.0000	580.0000	0.0
504	0	137000.0000	602.0000	0.0
505	0	138000.0000	101.0000	0.0
506	0	138000.0000	302.0000	0.0
507	0	138000.0000	400.0000	0.0
508	0	138000.0000	447.0000	0.0
509	0	138000.0000	507.0000	0.0
510	0	138000.0000	527.0000	0.0
511	0	138000.0000	562.0000	0.0
512	0	138000.0000	581.0000	0.0
513	0	138000.0000	602.0000	0.0
514	0	139000.0000	101.0000	0.0
515	0	139000.0000	310.0000	0.0
516	C	139000.0000	400.0000	0.0
517	0	139000.0000	515.0000	0.0
518	0	139000.0000	531.0000	0.0
519	0	139000.0000	564.0000	0.0
520	0	139000.0000	583.0000	0.0
521	0	139000.0000	608.0000	0.0
522	0	140000.0000	101.0000	0.0
523	0	140000.0000	318.0000	0.0
524	0	140000.0000	418.0000	0.0
525	0	140000.0000	522.0000	0.0
526	0	140000.0000	541.0000	0.0
527	0	140000.0000	564.0000	0.0
528	0	140000.0000	584.0000	0.0
529	0	140000.0000	611.0000	0.0
530	0	141000.0000	100.0000	0.0
531	0	141000.0000	332.0000	0.0
532	0	141000.0000	442.0000	0.0
533	0	141000.0000	528.0000	0.0
534	0	141000.0000	550.0000	0.0
535	0	141000.0000	568.0000	0.0
536	0	141000.0000	588.0000	0.0
537	0	141000.0000	607.0000	0.0
538	0	142000.0000	100.0000	0.0
539	0	142000.0000	344.0000	0.0
540	0	142000.0000	451.0000	0.0
541	0	142000.0000	533.0000	0.0
542	0	142000.0000	550.0000	0.0
543	0	142000.0000	568.0000	0.0
544	0	142000.0000	586.0000	0.0
545	0	142000.0000	605.0000	0.0
546	0	143000.0000	100.0000	0.0
547	0	143000.0000	358.0000	0.0
548	0	143000.0000	471.0000	0.0
549	0	143000.0000	552.0000	0.0
550	0	143000.0000	569.0000	0.0

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

NODE	BC	X ORD	Y ORD	F
551	0	143000.0000	583.0000	0.0
552	0	143000.0000	598.0000	0.0
553	0	144000.0000	100.0000	0.0
554	0	144000.0000	368.0000	0.0
555	0	144000.0000	476.0000	0.0
556	0	144000.0000	570.0000	0.0
557	0	144000.0000	581.0000	0.0
558	0	144000.0000	595.0000	0.0
559	0	145000.0000	100.0000	0.0
560	0	145000.0000	380.0000	0.0
561	0	145000.0000	485.0000	0.0
562	0	145000.0000	588.0000	0.0
563	0	145000.0000	600.0000	0.0
564	0	146000.0000	100.0000	0.0
565	0	146000.0000	400.0000	0.0
566	0	146000.0000	498.0000	0.0
567	0	146000.0000	608.0000	0.0
568	0	147000.0000	100.0000	0.0
569	0	147000.0000	400.0000	0.0
570	0	147000.0000	500.0000	0.0
571	0	147000.0000	582.0000	0.0
572	0	148000.0000	100.0000	0.0
573	0	148000.0000	400.0000	0.0
574	0	148000.0000	500.0000	0.0
575	1	148000.0000	565.0000	0.0
576	0	149000.0000	100.0000	0.0
577	0	149000.0000	400.0000	0.0
578	0	149000.0000	500.0000	0.0
579	1	149000.0000	570.0000	-6.0000
580	0	150000.0000	100.0000	0.0
581	0	150000.0000	400.0000	0.0
582	0	150000.0000	500.0000	0.0
583	1	150000.0000	575.0000	-12.0000
584	0	151000.0000	100.0000	0.0
585	0	151000.0000	400.0000	0.0
586	0	151000.0000	500.0000	0.0
587	1	151000.0000	600.0000	-38.0000
588	0	152000.0000	100.0000	0.0
589	0	152000.0000	400.0000	0.0
590	0	152000.0000	500.0000	0.0
591	1	152000.0000	600.0000	-32.0000
592	0	153000.0000	100.0000	0.0
593	0	153000.0000	400.0000	0.0
594	0	153000.0000	500.0000	0.0
595	1	153000.0000	600.0000	-40.0000
596	0	154000.0000	100.0000	0.0
597	0	154000.0000	400.0000	0.0
598	0	154000.0000	500.0000	0.0
599	1	154000.0000	600.0000	-41.0000
600	0	155000.0000	100.0000	0.0

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

NODE	BC	X ORD	Y ORD	F
601	0	155000.0000	400.0000	0.0
602	0	155000.0000	500.0000	0.0
603	1	155000.0000	600.0000	-42.0000

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

NODE	X-ORD	Y-ORD	PRESSURE	POTENTIAL
1	0.0	438.00	0.28855E 03	0.97912E 02
2	0.0	508.00	0.21855E 03	0.97912E 02
3	0.0	556.00	0.17063E 03	0.97955E 02
4	0.0	596.00	0.13063E 03	0.97956E 02
5	0.0	636.00	0.93944E 02	0.99966E 02
6	0.0	700.00	0.30000E 02	0.10000E 03
7	2000.00	428.00	0.29815E 03	0.97669E 02
8	2000.00	500.00	0.22616E 03	0.97670E 02
9	2000.00	548.00	0.17823E 03	0.97714E 02
10	2000.00	591.00	0.13523E 03	0.97714E 02
11	2000.00	632.00	0.97936E 02	0.99961E 02
12	2000.00	700.00	0.30000E 02	0.10000E 03
13	4000.00	418.00	0.30669E 03	0.96782E 02
14	4000.00	490.00	0.23469E 03	0.96783E 02
15	4000.00	542.00	0.18280E 03	0.96848E 02
16	4000.00	587.00	0.13780E 03	0.96848E 02
17	4000.00	628.00	0.10190E 03	0.99942E 02
18	4000.00	700.00	0.30000E 02	0.10000E 03
19	6000.00	412.00	0.30955E 03	0.94878E 02
20	6000.00	484.00	0.23755E 03	0.94880E 02
21	6000.00	538.00	0.18374E 03	0.94996E 02
22	6000.00	580.00	0.14174E 03	0.94997E 02
23	6000.00	623.00	0.10489E 03	0.98721E 02
24	6000.00	698.00	0.30000E 02	0.98788E 02
25	8000.00	405.00	0.31133E 03	0.91715E 02
26	8000.00	480.00	0.23633E 03	0.91717E 02
27	8000.00	533.00	0.18357E 03	0.91862E 02
28	8000.00	577.00	0.13957E 03	0.91863E 02
29	8000.00	620.00	0.10484E 03	0.96870E 02
30	8000.00	695.00	0.30000E 02	0.96970E 02
31	10000.00	399.00	0.31039E 03	0.87509E 02
32	10000.00	474.00	0.23539E 03	0.87509E 02
33	10000.00	529.00	0.18026E 03	0.87428E 02
34	10000.00	571.00	0.13826E 03	0.87428E 02
35	10000.00	618.00	0.90928E 02	0.87229E 02
36	10000.00	691.00	0.17910E 02	0.87218E 02
37	12000.00	391.00	0.31204E 03	0.83660E 02
38	12000.00	438.00	0.26504E 03	0.83660E 02
39	12000.00	468.00	0.23504E 03	0.83661E 02
40	12000.00	523.00	0.17994E 03	0.83600E 02
41	12000.00	567.00	0.13594E 03	0.83600E 02
42	12000.00	612.00	0.90939E 02	0.83620E 02
43	12000.00	638.00	0.14992E 02	0.83632E 02
44	14000.00	386.00	0.31120E 03	0.80123E 02
45	14000.00	462.00	0.23520E 03	0.80124E 02
46	14000.00	519.00	0.17810E 03	0.80061E 02
47	14000.00	562.00	0.13410E 03	0.80061E 02
48	14000.00	610.00	0.87135E 02	0.80082E 02
49	14000.00	637.00	0.10135E 02	0.80082E 02
50	16000.00	378.00	0.31391E 03	0.76918E 02

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

NODE	X-ORD	Y-ORD	PRESSURE	POTENTIAL
51	16000.00	456.00	0.23592E 03	0.76918E 02
52	16000.00	514.00	0.17780E 03	0.76847E 02
53	16000.00	560.00	0.13130E 03	0.76847E 02
54	16000.00	607.00	0.84846E 02	0.76877E 02
55	16000.00	687.00	0.48471E 01	0.76877E 02
56	18000.00	370.00	0.31720E 03	0.74060E 02
57	18000.00	449.00	0.23820E 03	0.74060E 02
58	18000.00	508.00	0.17907E 03	0.73984E 02
59	18000.00	555.00	0.13207E 03	0.73984E 02
60	18000.00	602.00	0.85127E 02	0.74016E 02
61	18000.00	682.00	0.51276E 01	0.74017E 02
62	20000.00	362.00	0.32113E 03	0.71596E 02
63	20000.00	442.00	0.24113E 03	0.71597E 02
64	20000.00	503.00	0.17999E 03	0.71507E 02
65	20000.00	550.00	0.13299E 03	0.71508E 02
66	20000.00	598.00	0.85040E 02	0.71539E 02
67	20000.00	682.00	0.10408E 01	0.71540E 02
68	22000.00	357.00	0.32274E 03	0.69540E 02
69	22000.00	438.00	0.24174E 03	0.69539E 02
70	22000.00	498.00	0.18157E 03	0.69437E 02
71	22000.00	547.00	0.13257E 03	0.69437E 02
72	22000.00	595.00	0.84639E 02	0.69478E 02
73	22000.00	683.00	-0.33607E 01	0.69478E 02
74	24000.00	350.00	0.32705E 03	0.67907E 02
75	24000.00	430.00	0.24705E 03	0.67907E 02
76	24000.00	492.00	0.18493E 03	0.67834E 02
77	24000.00	542.00	0.13493E 03	0.67834E 02
78	24000.00	592.00	0.84989E 02	0.67872E 02
79	24000.00	625.00	0.51990E 02	0.67873E 02
80	24000.00	685.00	-0.80101E 01	0.67873E 02
81	26000.00	342.00	0.33278E 03	0.66531E 02
82	26000.00	424.00	0.25078E 03	0.66531E 02
83	26000.00	488.00	0.18675E 03	0.66517E 02
84	26000.00	538.00	0.13675E 03	0.66517E 02
85	26000.00	588.00	0.86717E 02	0.66495E 02
86	26000.00	680.00	-0.52827E 01	0.66495E 02
87	28000.00	335.00	0.32739E 03	0.65084E 02
88	28000.00	418.00	0.25439E 03	0.65034E 02
89	28000.00	480.00	0.19231E 03	0.65037E 02
90	28000.00	510.00	0.16231E 03	0.65037E 02
91	28000.00	532.00	0.14031E 03	0.65037E 02
92	28000.00	584.00	0.88339E 02	0.65054E 02
93	28000.00	680.00	-0.76611E 01	0.65054E 02
94	30000.00	330.00	0.34016E 03	0.63736E 02
95	30000.00	412.00	0.25817E 03	0.63737E 02
96	30000.00	475.00	0.19515E 03	0.63730E 02
97	30000.00	530.00	0.14015E 03	0.63730E 02
98	30000.00	582.00	0.88140E 02	0.63721E 02
99	30000.00	679.00	-0.88601E 01	0.63721E 02
100	32000.00	324.00	0.34416E 03	0.62520E 02

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

NODE	X-ORD	Y-ORD	PRESSURE	POTENTIAL
101	32000.00	330.00	0.28316E 03	0.62521E 02
102	32000.00	406.00	0.26216E 03	0.62521E 02
103	32000.00	470.00	0.19790E 03	0.62366E 02
104	32000.00	526.00	0.14190E 03	0.62366E 02
105	32000.00	532.00	0.85921E 02	0.62376E 02
106	32000.00	680.00	-0.12079E 02	0.62377E 02
107	34000.00	318.00	0.34788E 03	0.61139E 02
108	34000.00	400.00	0.26538E 03	0.61139E 02
109	34000.00	463.00	0.20278E 03	0.61076E 02
110	34000.00	525.00	0.14078E 03	0.61076E 02
111	34000.00	579.00	0.87806E 02	0.61095E 02
112	34000.00	676.00	-0.10193E 02	0.61095E 02
113	36000.00	310.00	0.35409E 03	0.60055E 02
114	36000.00	392.00	0.27209E 03	0.60056E 02
115	36000.00	458.00	0.20596E 03	0.59978E 02
116	36000.00	516.00	0.14796E 03	0.59978E 02
117	36000.00	571.00	0.93017E 02	0.60010E 02
118	36000.00	680.00	-0.15982E 02	0.60011E 02
119	38000.00	306.00	0.35657E 03	0.59133E 02
120	38000.00	390.00	0.27257E 03	0.59133E 02
121	38000.00	455.00	0.20749E 03	0.59087E 02
122	38000.00	512.00	0.15049E 03	0.59087E 02
123	38000.00	570.00	0.92510E 02	0.59097E 02
124	38000.00	666.00	-0.34896E 01	0.59097E 02
125	40000.00	300.00	0.36114E 03	0.58264E 02
126	40000.00	380.00	0.28114E 03	0.58264E 02
127	40000.00	450.00	0.21096E 03	0.58157E 02
128	40000.00	507.00	0.15396E 03	0.58157E 02
129	40000.00	568.00	0.93044E 02	0.58209E 02
130	40000.00	658.00	0.30453E 01	0.58209E 02
131	42000.00	295.00	0.36511E 03	0.57643E 02
132	42000.00	375.00	0.28511E 03	0.57643E 02
133	42000.00	445.00	0.21496E 03	0.57553E 02
134	42000.00	502.00	0.15796E 03	0.57552E 02
135	42000.00	565.00	0.95013E 02	0.57583E 02
136	42000.00	655.00	0.50130E 01	0.57584E 02
137	44000.00	290.00	0.36942E 03	0.57224E 02
138	44000.00	370.00	0.28942E 03	0.57224E 02
139	44000.00	440.00	0.21930E 03	0.57151E 02
140	44000.00	500.00	0.15930E 03	0.57151E 02
141	44000.00	560.00	0.99332E 02	0.57171E 02
142	44000.00	652.00	0.73322E 01	0.57171E 02
143	46000.00	278.00	0.38093E 03	0.56930E 02
144	46000.00	360.00	0.29893E 03	0.56930E 02
145	46000.00	430.00	0.22886E 03	0.56882E 02
146	46000.00	470.00	0.18886E 03	0.56882E 02
147	46000.00	495.00	0.16386E 03	0.56882E 02
148	46000.00	560.00	0.98858E 02	0.56884E 02
149	46000.00	650.00	0.88578E 01	0.56883E 02
150	48000.00	272.00	0.38642E 03	0.56620E 02

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

NODE	X-ORD	Y-ORD	PRESSURE	POTENTIAL
151	48000.00	354.00	0.30442E 03	0.56620E 02
152	48000.00	428.00	0.23041E 03	0.56613E 02
153	48000.00	491.00	0.16741E 03	0.56612E 02
154	48000.00	560.00	0.98370E 02	0.56588E 02
155	48000.00	596.00	0.62370E 02	0.56588E 02
156	48000.00	650.00	0.83696E 01	0.56588E 02
157	50000.00	265.00	0.39267E 03	0.56166E 02
158	50000.00	348.00	0.30967E 03	0.56166E 02
159	50000.00	421.00	0.23664E 03	0.56144E 02
160	50000.00	490.00	0.16764E 03	0.56144E 02
161	50000.00	560.00	0.97624E 02	0.56136E 02
162	50000.00	652.00	0.56238E 01	0.56136E 02
163	52000.00	260.00	0.39685E 03	0.55664E 02
164	52000.00	342.00	0.31485E 03	0.55665E 02
165	52000.00	418.00	0.23831E 03	0.55640E 02
166	52000.00	484.00	0.17231E 03	0.55640E 02
167	52000.00	553.00	0.10373E 03	0.55625E 02
168	52000.00	651.00	0.57809E 01	0.55625E 02
169	54000.00	254.00	0.40191E 03	0.55098E 02
170	54000.00	335.00	0.32091E 03	0.55098E 02
171	54000.00	412.00	0.24381E 03	0.55036E 02
172	54000.00	480.00	0.17581E 03	0.55036E 02
173	54000.00	550.00	0.10582E 03	0.55042E 02
174	54000.00	651.00	0.48194E 01	0.55042E 02
175	56000.00	244.00	0.41095E 03	0.54513E 02
176	56000.00	328.00	0.32695E 03	0.54513E 02
177	56000.00	408.00	0.24687E 03	0.54469E 02
178	56000.00	475.00	0.17987E 03	0.54469E 02
179	56000.00	550.00	0.10439E 03	0.54472E 02
180	56000.00	650.00	0.48735E 01	0.54472E 02
181	58000.00	235.00	0.41901E 03	0.53944E 02
182	58000.00	322.00	0.33201E 03	0.53945E 02
183	58000.00	404.00	0.24994E 03	0.53904E 02
184	58000.00	440.00	0.21394E 03	0.53904E 02
185	58000.00	470.00	0.18394E 03	0.53904E 02
186	58000.00	542.00	0.11194E 03	0.53906E 02
187	58000.00	650.00	0.39447E 01	0.53906E 02
188	60000.00	230.00	0.42308E 03	0.53381E 02
189	60000.00	318.00	0.33508E 03	0.53381E 02
190	60000.00	400.00	0.25305E 03	0.53366E 02
191	60000.00	469.00	0.18405E 03	0.53366E 02
192	60000.00	541.00	0.11202E 03	0.53345E 02
193	60000.00	650.00	0.30184E 01	0.53344E 02
194	62000.00	228.00	0.42401E 03	0.52734E 02
195	62000.00	312.00	0.34001E 03	0.52734E 02
196	62000.00	398.00	0.25393E 03	0.52687E 02
197	62000.00	468.00	0.18393E 03	0.52687E 02
198	62000.00	542.00	0.10993E 03	0.52684E 02
199	62000.00	649.00	0.29279E 01	0.52684E 02
200	64000.00	220.00	0.43085E 03	0.52032E 02

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

NODE	X-ORD	Y-ORD	PRESSURE	POTENTIAL
201	64000.00	304.00	0.34685E 03	0.52033E 02
202	64000.00	392.00	0.25872E 03	0.51950E 02
203	64000.00	462.00	0.18872E 03	0.51950E 02
204	64000.00	542.00	0.10877E 03	0.51979E 02
205	64000.00	649.00	0.17661E 01	0.51979E 02
206	66000.00	215.00	0.43484E 03	0.51420E 02
207	66000.00	300.00	0.34984E 03	0.51420E 02
208	66000.00	390.00	0.25976E 03	0.51370E 02
209	66000.00	455.00	0.19476E 03	0.51370E 02
210	66000.00	540.00	0.10975E 03	0.51365E 02
211	66000.00	650.00	-0.24799E 00	0.51365E 02
212	68000.00	208.00	0.44078E 03	0.50774E 02
213	68000.00	294.00	0.35478E 03	0.50774E 02
214	68000.00	385.00	0.26375E 03	0.50758E 02
215	68000.00	454.00	0.19475E 03	0.50758E 02
216	68000.00	535.00	0.11372E 03	0.50738E 02
217	68000.00	649.00	-0.28286E 00	0.50738E 02
218	70000.00	204.00	0.44351E 03	0.50067E 02
219	70000.00	292.00	0.35561E 03	0.50068E 02
220	70000.00	381.00	0.26660E 03	0.50058E 02
221	70000.00	454.00	0.19360E 03	0.50059E 02
222	70000.00	535.00	0.11256E 03	0.50035E 02
223	70000.00	651.00	-0.34428E 01	0.50035E 02
224	72000.00	195.00	0.45133E 03	0.49239E 02
225	72000.00	282.00	0.36433E 03	0.49239E 02
226	72000.00	378.00	0.26824E 03	0.49234E 02
227	72000.00	430.00	0.21624E 03	0.49234E 02
228	72000.00	450.00	0.19624E 03	0.49234E 02
229	72000.00	537.00	0.10928E 03	0.49261E 02
230	72000.00	652.00	-0.57196E 01	0.49261E 02
231	74000.00	186.00	0.45911E 03	0.48554E 02
232	74000.00	278.00	0.36712E 03	0.48555E 02
233	74000.00	371.00	0.27409E 03	0.48539E 02
234	74000.00	445.00	0.20009E 03	0.48539E 02
235	74000.00	540.00	0.10508E 03	0.48530E 02
236	74000.00	650.00	-0.49247E 01	0.48530E 02
237	76000.00	180.00	0.46390E 03	0.47919E 02
238	76000.00	276.00	0.36790E 03	0.47920E 02
239	76000.00	370.00	0.27384E 03	0.47781E 02
240	76000.00	440.00	0.20384E 03	0.47781E 02
241	76000.00	535.00	0.10985E 03	0.47786E 02
242	76000.00	650.00	-0.61522E 01	0.47787E 02
243	78000.00	178.00	0.46475E 03	0.47119E 02
244	78000.00	272.00	0.37075E 03	0.47119E 02
245	78000.00	364.00	0.27865E 03	0.47060E 02
246	78000.00	438.00	0.20465E 03	0.47060E 02
247	78000.00	531.00	0.11169E 03	0.47085E 02
248	78000.00	648.00	-0.53093E 01	0.47085E 02
249	80000.00	169.00	0.47266E 03	0.46459E 02
250	80000.00	268.00	0.37366E 03	0.46460E 02

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

NODE	X-ORD	Y-ORD	PRESSURE	POTENTIAL
251	80000.00	360.00	0.28165E 03	0.46454E 02
252	80000.00	430.00	0.21165E 03	0.46454E 02
253	80000.00	530.00	0.11165E 03	0.46452E 02
254	80000.00	646.00	-0.43540E 01	0.46452E 02
255	82000.00	162.00	0.47860E 03	0.45818E 02
256	82000.00	265.00	0.37560E 03	0.45819E 02
257	82000.00	357.00	0.28360E 03	0.45818E 02
258	82000.00	429.00	0.21160E 03	0.45818E 02
259	82000.00	530.00	0.11061E 03	0.45826E 02
260	82000.00	647.00	-0.63864E 01	0.45826E 02
261	84000.00	158.00	0.48162E 03	0.45223E 02
262	84000.00	262.00	0.37762E 03	0.45223E 02
263	84000.00	352.00	0.28759E 03	0.45208E 02
264	84000.00	427.00	0.21259E 03	0.45208E 02
265	84000.00	528.00	0.11160E 03	0.45215E 02
266	84000.00	643.00	-0.33952E 01	0.45215E 02
267	86000.00	151.00	0.48765E 03	0.44634E 02
268	86000.00	255.00	0.38365E 03	0.44635E 02
269	86000.00	348.00	0.29062E 03	0.44617E 02
270	86000.00	400.00	0.23862E 03	0.44618E 02
271	86000.00	421.00	0.21762E 03	0.44618E 02
272	86000.00	525.00	0.11362E 03	0.44618E 02
273	86000.00	642.00	-0.33807E 01	0.44618E 02
274	88000.00	148.00	0.48963E 03	0.44018E 02
275	88000.00	251.00	0.38663E 03	0.44019E 02
276	88000.00	342.00	0.29567E 03	0.44044E 02
277	88000.00	420.00	0.21767E 03	0.44044E 02
278	88000.00	523.00	0.11461E 03	0.44005E 02
279	88000.00	640.00	-0.23928E 01	0.44004E 02
280	90000.00	142.00	0.49447E 03	0.43313E 02
281	90000.00	247.00	0.38947E 03	0.43314E 02
282	90000.00	340.00	0.29643E 03	0.43290E 02
283	90000.00	415.00	0.22143E 03	0.43291E 02
284	90000.00	520.00	0.11644E 03	0.43298E 02
285	90000.00	638.00	-0.15589E 01	0.43298E 02
286	92000.00	138.00	0.49727E 03	0.42589E 02
287	92000.00	241.00	0.39427E 03	0.42590E 02
288	92000.00	336.00	0.29925E 03	0.42578E 02
289	92000.00	410.00	0.22525E 03	0.42578E 02
290	92000.00	518.00	0.11726E 03	0.42583E 02
291	92000.00	639.00	-0.27334E 01	0.42583E 02
292	94000.00	130.00	0.50409E 03	0.41875E 02
293	94000.00	237.00	0.39710E 03	0.41876E 02
294	94000.00	330.00	0.30410E 03	0.41880E 02
295	94000.00	403.00	0.23110E 03	0.41880E 02
296	94000.00	516.00	0.11908E 03	0.41864E 02
297	94000.00	636.00	-0.19244E 01	0.41864E 02
298	96000.00	126.00	0.50686E 03	0.41124E 02
299	96000.00	235.00	0.39736E 03	0.41125E 02
300	96000.00	328.00	0.30433E 03	0.41110E 02

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

NODE	X-ORD	Y-ORD	PRESSURE	POTENTIAL
301	96000.00	400.00	0.23283E 03	0.41111E 02
302	96000.00	515.00	0.11782E 03	0.41101E 02
303	96000.00	638.00	-0.51835E 01	0.41101E 02
304	98000.00	123.00	0.50858E 03	0.40350E 02
305	98000.00	233.00	0.39858E 03	0.40350E 02
306	98000.00	324.00	0.30754E 03	0.40327E 02
307	98000.00	398.00	0.23354E 03	0.40328E 02
308	98000.00	515.00	0.11652E 03	0.40312E 02
309	98000.00	636.00	-0.44847E 01	0.40312E 02
310	100000.00	122.00	0.50819E 03	0.39509E 02
311	100000.00	231.00	0.39919E 03	0.39509E 02
312	100000.00	320.00	0.31014E 03	0.39477E 02
313	100000.00	392.00	0.23814E 03	0.39477E 02
314	100000.00	512.00	0.11814E 03	0.39476E 02
315	100000.00	633.00	-0.28648E 01	0.39476E 02
316	102000.00	121.00	0.50777E 03	0.38650E 02
317	102000.00	230.00	0.39877E 03	0.38650E 02
318	102000.00	319.00	0.30976E 03	0.38642E 02
319	102000.00	391.00	0.23776E 03	0.38642E 02
320	102000.00	510.00	0.11874E 03	0.38629E 02
321	102000.00	633.00	-0.42610E 01	0.38629E 02
322	104000.00	120.00	0.50725E 03	0.37726E 02
323	104000.00	228.00	0.39925E 03	0.37727E 02
324	104000.00	317.00	0.31032E 03	0.37768E 02
325	104000.00	386.00	0.24132E 03	0.37768E 02
326	104000.00	510.00	0.11722E 03	0.37707E 02
327	104000.00	627.00	0.21537E 00	0.37706E 02
328	106000.00	118.00	0.50741E 03	0.36612E 02
329	106000.00	226.00	0.39941E 03	0.36613E 02
330	106000.00	316.00	0.30946E 03	0.36643E 02
331	106000.00	384.00	0.24146E 03	0.36644E 02
332	106000.00	510.00	0.11538E 03	0.36596E 02
333	106000.00	624.00	0.13827E 01	0.36596E 02
334	108000.00	118.00	0.50544E 03	0.35421E 02
335	108000.00	187.00	0.43645E 03	0.35422E 02
336	108000.00	226.00	0.39745E 03	0.35422E 02
337	108000.00	314.00	0.30931E 03	0.35338E 02
338	108000.00	382.00	0.24131E 03	0.35339E 02
339	108000.00	511.00	0.11225E 03	0.35305E 02
340	108000.00	621.00	0.22539E 01	0.35305E 02
341	110000.00	116.00	0.50493E 03	0.33899E 02
342	110000.00	224.00	0.39693E 03	0.33900E 02
343	110000.00	313.00	0.30796E 03	0.33916E 02
344	110000.00	381.00	0.23996E 03	0.33917E 02
345	110000.00	510.00	0.11090E 03	0.33879E 02
346	110000.00	618.00	0.28996E 01	0.33879E 02
347	112000.00	113.00	0.50528E 03	0.32291E 02
348	112000.00	223.00	0.39528E 03	0.32292E 02
349	112000.00	312.00	0.30628E 03	0.32294E 02
350	112000.00	381.00	0.23729E 03	0.32294E 02

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

NODE	X-ORD	Y-ORD	PRESSURE	POTENTIAL
351	112000.00	509.00	0.10928E 03	0.32292E 02
352	112000.00	615.00	0.32820E 01	0.32292E 02
353	114000.00	111.00	0.50455E 03	0.30637E 02
354	114000.00	223.00	0.39255E 03	0.30637E 02
355	114000.00	311.00	0.30452E 03	0.30621E 02
356	114000.00	380.00	0.23552E 03	0.30621E 02
357	114000.00	509.00	0.10654E 03	0.30630E 02
358	114000.00	612.00	0.35398E 01	0.30630E 02
359	116000.00	110.00	0.50274E 03	0.28931E 02
360	116000.00	223.00	0.33974E 03	0.28931E 02
361	116000.00	310.00	0.30277E 03	0.28954E 02
362	116000.00	379.00	0.23378E 03	0.28955E 02
363	116000.00	508.00	0.10474E 03	0.28932E 02
364	116000.00	609.00	0.37371E 01	0.28932E 02
365	118000.00	110.00	0.49976E 03	0.27126E 02
366	118000.00	222.00	0.38776E 03	0.27126E 02
367	118000.00	310.00	0.29930E 03	0.27152E 02
368	118000.00	378.00	0.23180E 03	0.27153E 02
369	118000.00	508.00	0.10175E 03	0.27123E 02
370	118000.00	607.00	0.27537E 01	0.27123E 02
371	120000.00	109.00	0.49755E 03	0.25180E 02
372	120000.00	222.00	0.38455E 03	0.25181E 02
373	120000.00	309.00	0.29756E 03	0.25190E 02
374	120000.00	378.00	0.22856E 03	0.25190E 02
375	120000.00	506.00	0.10053E 03	0.25173E 02
376	120000.00	604.00	0.25350E 01	0.25173E 02
377	122000.00	109.00	0.49419E 03	0.23145E 02
378	122000.00	222.00	0.38119E 03	0.23145E 02
379	122000.00	308.00	0.29524E 03	0.23175E 02
380	122000.00	377.00	0.22624E 03	0.23175E 02
381	122000.00	505.00	0.98173E 02	0.23135E 02
382	122000.00	605.00	-0.18270E 01	0.23135E 02
383	124000.00	108.00	0.49163E 03	0.20985E 02
384	124000.00	222.00	0.37763E 03	0.20986E 02
385	124000.00	308.00	0.29166E 03	0.21006E 02
386	124000.00	376.00	0.22366E 03	0.21006E 02
387	124000.00	502.00	0.97667E 02	0.21010E 02
388	124000.00	604.00	-0.43325E 01	0.21011E 02
389	126000.00	107.00	0.48905E 03	0.18918E 02
390	126000.00	223.00	0.37305E 03	0.18918E 02
391	126000.00	309.00	0.28699E 03	0.18783E 02
392	126000.00	376.00	0.21999E 03	0.18783E 02
393	126000.00	500.00	0.96220E 02	0.18921E 02
394	126000.00	600.00	-0.37890E 01	0.18921E 02
395	128000.00	106.00	0.48669E 03	0.16783E 02
396	128000.00	160.00	0.43269E 03	0.16784E 02
397	128000.00	223.00	0.36969E 03	0.16784E 02
398	128000.00	260.00	0.33258E 03	0.16716E 02
399	128000.00	307.00	0.28540E 03	0.16609E 02
400	128000.00	342.00	0.24941E 03	0.16609E 02

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

NODE	X-ORD	Y-ORD	PRESSURE	POTENTIAL
401	128000.00	373.00	0.21941E 03	0.16609E 02
402	128000.00	455.00	0.13768E 03	0.16777E 02
403	128000.00	500.00	0.92857E 02	0.16883E 02
404	128000.00	530.00	0.62958E 02	0.16944E 02
405	128000.00	560.00	0.32959E 02	0.16945E 02
406	128000.00	600.00	-0.70406E 01	0.16945E 02
407	129000.00	106.00	0.48538E 03	0.15989E 02
408	129000.00	160.00	0.43138E 03	0.15989E 02
409	129000.00	223.00	0.36838E 03	0.15989E 02
410	129000.00	260.00	0.33124E 03	0.15900E 02
411	129000.00	307.00	0.28405E 03	0.15789E 02
412	129000.00	377.00	0.21405E 03	0.15787E 02
413	129000.00	500.00	0.91465E 02	0.16039E 02
414	129000.00	535.00	0.56584E 02	0.16111E 02
415	129000.00	570.00	0.21584E 02	0.16112E 02
416	129000.00	600.00	-0.84153E 01	0.16112E 02
417	130000.00	106.00	0.48435E 03	0.15364E 02
418	130000.00	160.00	0.43035E 03	0.15364E 02
419	130000.00	223.00	0.36735E 03	0.15365E 02
420	130000.00	260.00	0.32031E 03	0.15338E 02
421	130000.00	306.00	0.28425E 03	0.15303E 02
422	130000.00	400.00	0.19025E 03	0.15303E 02
423	130000.00	498.00	0.92246E 02	0.15301E 02
424	130000.00	526.00	0.64329E 02	0.15351E 02
425	130000.00	560.00	0.30431E 02	0.15413E 02
426	130000.00	580.00	0.10431E 02	0.15413E 02
427	130000.00	601.00	-0.10569E 02	0.15413E 02
428	131000.00	105.00	0.48449E 03	0.14843E 02
429	131000.00	159.00	0.43049E 03	0.14843E 02
430	131000.00	222.00	0.36749E 03	0.14845E 02
431	131000.00	260.00	0.32953E 03	0.14868E 02
432	131000.00	305.00	0.28458E 03	0.14996E 02
433	131000.00	400.00	0.18953E 03	0.14997E 02
434	131000.00	499.00	0.90580E 02	0.14997E 02
435	131000.00	525.00	0.64583E 02	0.14899E 02
436	131000.00	560.00	0.29587E 02	0.14901E 02
437	131000.00	580.00	0.95863E 01	0.14901E 02
438	131000.00	601.00	-0.11413E 02	0.14901E 02
439	132000.00	104.00	0.48470E 03	0.14361E 02
440	132000.00	159.00	0.42970E 03	0.14362E 02
441	132000.00	222.00	0.36670E 03	0.14363E 02
442	132000.00	260.00	0.32876E 03	0.14400E 02
443	132000.00	305.00	0.28383E 03	0.14444E 02
444	132000.00	400.00	0.18883E 03	0.14444E 02
445	132000.00	499.00	0.89833E 02	0.14444E 02
446	132000.00	525.00	0.63830E 02	0.14443E 02
447	132000.00	560.00	0.28827E 02	0.14441E 02
448	132000.00	580.00	0.88274E 01	0.14441E 02
449	132000.00	602.00	-0.13173E 02	0.14441E 02
450	133000.00	104.00	0.48385E 03	0.13847E 02

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

NODE	X-ORD	Y-ORD	PRESSURE	POTENTIAL
451	133000.00	159.00	0.42885E 03	0.13849E 02
452	133000.00	222.00	0.36585E 03	0.13849E 02
453	133000.00	260.00	0.32792E 03	0.13892E 02
454	133000.00	305.00	0.28300E 03	0.13942E 02
455	133000.00	400.00	0.18801E 03	0.13943E 02
456	133000.00	500.00	0.38006E 02	0.13943E 02
457	133000.00	526.00	0.62000E 02	0.13939E 02
458	133000.00	560.00	0.27993E 02	0.13935E 02
459	133000.00	580.00	0.79926E 01	0.13935E 02
460	133000.00	602.00	-0.14007E 02	0.13935E 02
461	134000.00	103.00	0.48399E 03	0.13327E 02
462	134000.00	159.00	0.42799E 03	0.13327E 02
463	134000.00	222.00	0.36499E 03	0.13329E 02
464	134000.00	260.00	0.32705E 03	0.13363E 02
465	134000.00	305.00	0.28211E 03	0.13403E 02
466	134000.00	400.00	0.18712E 03	0.13404E 02
467	134000.00	500.00	0.87116E 02	0.13404E 02
468	134000.00	526.00	0.61106E 02	0.13397E 02
469	134000.00	560.00	0.27092E 02	0.13389E 02
470	134000.00	580.00	0.70925E 01	0.13389E 02
471	134000.00	603.00	-0.15907E 02	0.13389E 02
472	135000.00	103.00	0.48314E 03	0.12813E 02
473	135000.00	159.00	0.42714E 03	0.12814E 02
474	135000.00	222.00	0.36414E 03	0.12815E 02
475	135000.00	260.00	0.32515E 03	0.12816E 02
476	135000.00	304.00	0.28215E 03	0.12817E 02
477	135000.00	400.00	0.18615E 03	0.12818E 02
478	135000.00	500.00	0.86149E 02	0.12818E 02
479	135000.00	525.00	0.61137E 02	0.12811E 02
480	135000.00	560.00	0.26122E 02	0.12801E 02
481	135000.00	580.00	0.61218E 01	0.12801E 02
482	135000.00	605.00	-0.18378E 02	0.12801E 02
483	136000.00	102.00	0.48337E 03	0.12348E 02
484	136000.00	158.00	0.42737E 03	0.12347E 02
485	136000.00	221.00	0.36437E 03	0.12346E 02
486	136000.00	260.00	0.32523E 03	0.12260E 02
487	136000.00	304.00	0.28107E 03	0.12161E 02
488	136000.00	340.00	0.24507E 03	0.12162E 02
489	136000.00	399.00	0.18607E 03	0.12162E 02
490	136000.00	501.00	0.84067E 02	0.12162E 02
491	136000.00	526.00	0.59063E 02	0.12159E 02
492	136000.00	560.00	0.25053E 02	0.12156E 02
493	136000.00	579.00	0.60530E 01	0.12156E 02
494	136000.00	605.00	-0.19942E 02	0.12156E 02
495	137000.00	102.00	0.48246E 03	0.11795E 02
496	137000.00	220.00	0.36447E 03	0.11902E 02
497	137000.00	260.00	0.32419E 03	0.11633E 02
498	137000.00	304.00	0.27989E 03	0.11446E 02
499	137000.00	399.00	0.18439E 03	0.11446E 02
500	137000.00	503.00	0.80885E 02	0.11446E 02

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

NODE	X-ORD	Y-ORD	PRESSURE	POTENTIAL
501	137000.00	526.00	0.57831E 02	0.11443E 02
502	137000.00	560.00	0.23875E 02	0.11440E 02
503	137000.00	580.00	0.38753E 01	0.11440E 02
504	137000.00	602.00	-0.18125E 02	0.11440E 02
505	138000.00	101.00	0.48157E 03	0.10649E 02
506	138000.00	302.00	0.28056E 03	0.10641E 02
507	138000.00	400.00	0.18256E 03	0.10641E 02
508	138000.00	447.00	0.13556E 03	0.10641E 02
509	138000.00	507.00	0.75557E 02	0.10641E 02
510	138000.00	527.00	0.55547E 02	0.10635E 02
511	138000.00	562.00	0.20530E 02	0.10624E 02
512	138000.00	581.00	0.15296E 01	0.10624E 02
513	138000.00	602.00	-0.19470E 02	0.10624E 02
514	139000.00	101.00	0.48015E 03	0.97890E 01
515	139000.00	310.00	0.27116E 03	0.97921E 01
516	139000.00	400.00	0.18116E 03	0.97920E 01
517	139000.00	515.00	0.66155E 02	0.97910E 01
518	139000.00	531.00	0.50141E 02	0.97827E 01
519	139000.00	564.00	0.17114E 02	0.97663E 01
520	139000.00	583.00	-0.18857E 01	0.97662E 01
521	139000.00	608.00	-0.26886E 02	0.97661E 01
522	140000.00	101.00	0.47366E 03	0.88845E 01
523	140000.00	318.00	0.26166E 03	0.88860E 01
524	140000.00	418.00	0.16166E 03	0.88856E 01
525	140000.00	522.00	0.57660E 02	0.88848E 01
526	140000.00	541.00	0.38657E 02	0.88832E 01
527	140000.00	564.00	0.15655E 02	0.88820E 01
528	140000.00	584.00	-0.43448E 01	0.88820E 01
529	140000.00	611.00	-0.31345E 02	0.88820E 01
530	141000.00	100.00	0.47806E 03	0.79173E 01
531	141000.00	332.00	0.24607E 03	0.79201E 01
532	141000.00	442.00	0.13607E 03	0.79195E 01
533	141000.00	528.00	0.50066E 02	0.79190E 01
534	141000.00	550.00	0.28077E 02	0.79256E 01
535	141000.00	568.00	0.10087E 02	0.79312E 01
536	141000.00	588.00	-0.99134E 01	0.79313E 01
537	141000.00	607.00	-0.28913E 02	0.79313E 01
538	142000.00	100.00	0.47635E 03	0.68765E 01
539	142000.00	344.00	0.23235E 03	0.68782E 01
540	142000.00	451.00	0.12535E 03	0.68769E 01
541	142000.00	533.00	0.43345E 02	0.68755E 01
542	142000.00	550.00	0.26356E 02	0.68824E 01
543	142000.00	568.00	0.83663E 01	0.68887E 01
544	142000.00	586.00	-0.96336E 01	0.68887E 01
545	142000.00	605.00	-0.28633E 02	0.68888E 01
546	143000.00	100.00	0.47455E 03	0.57886E 01
547	143000.00	358.00	0.21655E 03	0.57891E 01
548	143000.00	471.00	0.10355E 03	0.57875E 01
549	143000.00	552.00	0.22547E 02	0.57858E 01
550	143000.00	569.00	0.55648E 01	0.57969E 01

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

NODE	X-ORD	Y-ORD	PRESSURE	POTENTIAL
551	143000.00	583.00	-0.84350E 01	0.57969E 01
552	143000.00	598.00	-0.23435E 02	0.57970E 01
553	144000.00	100.00	0.47275E 03	0.46971E 01
554	144000.00	368.00	0.20475E 03	0.46972E 01
555	144000.00	476.00	0.96748E 02	0.46958E 01
556	144000.00	570.00	0.27455E 01	0.46942E 01
557	144000.00	581.00	-0.82545E 01	0.46943E 01
558	144000.00	595.00	-0.22255E 02	0.46942E 01
559	145000.00	100.00	0.47097E 03	0.36158E 01
560	145000.00	380.00	0.19097E 03	0.36160E 01
561	145000.00	485.00	0.85963E 02	0.36139E 01
562	145000.00	588.00	-0.17041E 02	0.36115E 01
563	145000.00	600.00	-0.29041E 02	0.36114E 01
564	146000.00	100.00	0.46917E 03	0.25275E 01
565	146000.00	400.00	0.16918E 03	0.25318E 01
566	146000.00	498.00	0.71176E 02	0.25308E 01
567	146000.00	608.00	-0.38825E 02	0.25304E 01
568	147000.00	100.00	0.46721E 03	0.13364E 01
569	147000.00	400.00	0.16723E 03	0.13492E 01
570	147000.00	500.00	0.67229E 02	0.13511E 01
571	147000.00	582.00	-0.14764E 02	0.13551E 01
572	148000.00	100.00	0.46509E 03	0.55634E-01
573	148000.00	400.00	0.16502E 03	0.14352E-01
574	148000.00	500.00	0.65016E 02	0.95714E-02
575	148000.00	565.00	0.0	0.0
576	149000.00	100.00	0.46399E 03	-0.61154E 00
577	149000.00	400.00	0.16400E 03	-0.60307E 00
578	149000.00	500.00	0.63998E 02	-0.60739E 00
579	149000.00	570.00	-0.60000E 01	-0.60606E 00
580	150000.00	100.00	0.46300E 03	-0.12115E 01
581	150000.00	400.00	0.16300E 03	-0.12115E 01
582	150000.00	500.00	0.63001E 02	-0.12117E 01
583	150000.00	575.00	-0.12000E 02	-0.12121E 01
584	151000.00	100.00	0.46200E 03	-0.18180E 01
585	151000.00	400.00	0.16200E 03	-0.18179E 01
586	151000.00	500.00	0.62000E 02	-0.18180E 01
587	151000.00	600.00	-0.38000E 02	-0.18182E 01
588	152000.00	100.00	0.46100E 03	-0.24242E 01
589	152000.00	400.00	0.16100E 03	-0.24240E 01
590	152000.00	500.00	0.61000E 02	-0.24241E 01
591	152000.00	600.00	-0.39000E 02	-0.24242E 01
592	153000.00	100.00	0.46000E 03	-0.30293E 01
593	153000.00	400.00	0.16000E 03	-0.30294E 01
594	153000.00	500.00	0.60001E 02	-0.30296E 01
595	153000.00	600.00	-0.40000E 02	-0.30303E 01
596	154000.00	100.00	0.45893E 03	-0.36457E 01
597	154000.00	400.00	0.15899E 03	-0.36407E 01
598	154000.00	500.00	0.58995E 02	-0.36396E 01
599	154000.00	600.00	-0.41000E 02	-0.36364E 01
600	155000.00	100.00	0.45816E 03	-0.41462E 01

1500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

NODE	X-ORD	Y-ORD	PRESSURE	POTENTIAL
601	155000.00	400.00	0.15805E 03	-0.42101E 01
602	155000.00	500.00	0.58040E 02	-0.42181E 01
603	155000.00	600.00	-0.42000E 02	-0.42424E 01

ELMT	I	J	K	L	MAT	ANGLE
1	1	7	8	2	1	0.0
2	2	8	9	3	2	0.0
3	3	9	10	4	3	0.0
4	4	10	11	5	4	0.0
5	5	11	12	6	5	0.0
6	7	13	14	8	1	0.0
7	8	14	15	9	2	0.0
8	9	15	16	10	3	0.0
9	10	16	17	11	4	0.0
10	11	17	18	12	5	0.0
11	13	19	20	14	1	0.0
12	14	20	21	15	2	0.0
13	15	21	22	16	3	0.0
14	16	22	23	17	4	0.0
15	17	23	24	18	5	0.0
16	19	25	26	20	1	0.0
17	20	26	27	21	2	0.0
18	21	27	28	22	3	0.0
19	22	28	29	23	4	0.0
20	23	29	30	24	5	0.0
21	25	31	32	26	1	0.0
22	26	32	33	27	2	0.0
23	27	33	34	28	3	0.0
24	28	34	35	29	4	0.0
25	29	35	36	30	5	0.0
26	31	37	38	38	1	0.0
27	31	38	32	32	1	0.0
28	32	38	39	39	1	0.0
29	32	39	40	33	2	0.0
30	33	40	41	34	3	0.0
31	34	41	42	35	4	0.0
32	35	42	43	36	5	0.0
33	37	44	38	38	1	0.0
34	38	44	45	45	1	0.0
35	38	45	39	39	1	0.0
36	39	45	46	40	2	0.0
37	40	46	47	41	3	0.0
38	41	47	48	42	4	0.0
39	42	48	49	43	5	0.0
40	44	50	51	45	1	0.0
41	45	51	52	46	2	0.0
42	46	52	53	47	3	0.0
43	47	53	54	48	4	0.0
44	48	54	55	49	5	0.0
45	50	56	57	51	1	0.0
46	51	57	58	52	2	0.0
47	52	58	59	53	3	0.0
48	53	59	60	54	4	0.0
49	54	60	61	55	5	0.0
50	56	62	63	57	1	0.0

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ELMT	I	J	K	L	MAT	ANGLE
51	57	63	64	58	2	0.0
52	58	64	65	59	3	0.0
53	59	65	66	60	4	0.0
54	60	66	67	61	5	0.0
55	62	68	69	63	1	0.0
56	63	69	70	64	2	0.0
57	64	70	71	65	3	0.0
58	65	71	72	66	4	0.0
59	66	72	73	67	5	0.0
60	68	74	75	69	1	0.0
61	69	75	76	70	2	0.0
62	70	76	77	71	3	0.0
63	71	77	78	72	4	0.0
64	72	78	79	79	5	0.0
65	72	79	73	73	5	0.0
66	73	79	80	80	5	0.0
67	74	81	82	75	1	0.0
68	75	82	83	76	2	0.0
69	76	83	84	77	3	0.0
70	77	84	85	78	4	0.0
71	78	85	79	79	5	0.0
72	79	85	86	86	5	0.0
73	79	86	80	80	5	0.0
74	81	87	88	82	1	0.0
75	82	88	89	83	2	0.0
76	83	89	90	90	3	0.0
77	83	90	84	84	3	0.0
78	84	90	91	91	3	0.0
79	84	91	92	85	4	0.0
80	85	92	93	86	5	0.0
81	87	94	95	88	1	0.0
82	88	95	96	89	2	0.0
83	89	96	90	90	3	0.0
84	90	96	97	97	3	0.0
85	90	97	91	91	3	0.0
86	91	97	98	92	4	0.0
87	92	98	99	93	5	0.0
88	94	100	101	101	1	0.0
89	94	101	95	95	1	0.0
90	95	101	102	102	1	0.0
91	95	102	103	96	2	0.0
92	96	103	104	97	3	0.0
93	97	104	105	98	4	0.0
94	98	105	106	99	5	0.0
95	100	107	101	101	1	0.0
96	101	107	108	108	1	0.0
97	101	108	102	102	1	0.0
98	102	108	109	103	2	0.0
99	103	109	110	104	3	0.0
100	104	110	111	105	4	0.0

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

ELMT	I	J	K	L	MAT	ANGLE
101	105	111	112	106	5	0.0
102	107	113	114	108	1	0.0
103	108	114	115	109	2	0.0
104	109	115	116	110	3	0.0
105	110	116	117	111	4	0.0
106	111	117	118	112	5	0.0
107	113	119	120	114	1	0.0
108	114	120	121	115	2	0.0
109	115	121	122	116	3	0.0
110	116	122	123	117	4	0.0
111	117	123	124	118	5	0.0
112	119	125	126	120	1	0.0
113	120	126	127	121	2	0.0
114	121	127	128	122	3	0.0
115	122	128	129	123	4	0.0
116	123	129	130	124	5	0.0
117	125	131	132	126	1	0.0
118	126	132	133	127	2	0.0
119	127	133	134	128	3	0.0
120	128	134	135	129	4	0.0
121	129	135	136	130	5	0.0
122	131	137	138	132	1	0.0
123	132	138	139	133	2	0.0
124	133	139	140	134	3	0.0
125	134	140	141	135	4	0.0
126	135	141	142	136	5	0.0
127	137	143	144	138	1	0.0
128	138	144	145	139	2	0.0
129	139	145	146	146	3	0.0
130	139	146	140	140	3	0.0
131	140	146	147	147	3	0.0
132	140	147	148	141	4	0.0
133	141	148	149	142	5	0.0
134	143	150	151	144	1	0.0
135	144	151	152	145	2	0.0
136	145	152	146	146	3	0.0
137	146	152	153	153	3	0.0
138	146	153	147	147	3	0.0
139	147	153	154	148	4	0.0
140	148	154	155	155	5	0.0
141	148	155	149	149	5	0.0
142	149	155	156	156	5	0.0
143	150	157	158	151	1	0.0
144	151	158	159	152	2	0.0
145	152	159	160	153	3	0.0
146	153	160	161	154	4	0.0
147	154	161	155	155	5	0.0
148	155	161	162	162	5	0.0
149	155	162	156	156	5	0.0
150	157	163	164	158	1	0.0

ELMT	I	J	K	L	MAT	ANGLE
151	158	164	165	159	2	0.0
152	159	165	166	160	3	0.0
153	160	166	167	161	4	0.0
154	161	167	168	162	5	0.0
155	163	169	170	164	1	0.0
156	164	170	171	165	2	0.0
157	165	171	172	166	3	0.0
158	166	172	173	167	4	0.0
159	167	173	174	168	5	0.0
160	169	175	176	170	1	0.0
161	170	176	177	171	2	0.0
162	171	177	178	172	3	0.0
163	172	178	179	173	4	0.0
164	173	179	180	174	5	0.0
165	175	181	182	176	1	0.0
166	176	182	183	177	2	0.0
167	177	183	184	184	3	0.0
168	177	184	178	178	3	0.0
169	178	184	185	185	3	0.0
170	178	185	186	179	4	0.0
171	179	186	187	180	5	0.0
172	181	188	189	182	1	0.0
173	182	189	190	183	2	0.0
174	183	190	184	184	3	0.0
175	184	190	191	191	3	0.0
176	184	191	185	185	3	0.0
177	185	191	192	186	4	0.0
178	186	192	193	187	5	0.0
179	188	194	195	189	1	0.0
180	189	195	196	190	2	0.0
181	190	196	197	191	3	0.0
182	191	197	198	192	4	0.0
183	192	198	199	193	5	0.0
184	194	200	201	195	1	0.0
185	195	201	202	196	2	0.0
186	196	202	203	197	3	0.0
187	197	203	204	198	4	0.0
188	198	204	205	199	5	0.0
189	200	206	207	201	1	0.0
190	201	207	208	202	2	0.0
191	202	208	209	203	3	0.0
192	203	209	210	204	4	0.0
193	204	210	211	205	5	0.0
194	206	212	213	207	1	0.0
195	207	213	214	208	2	0.0
196	208	214	215	209	3	0.0
197	209	215	216	210	4	0.0
198	210	216	217	211	5	0.0
199	212	218	219	213	1	0.0
200	213	219	220	214	2	0.0

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ELMT	I	J	K	L	MAT	ANGLE
201	214	220	221	215	3	0.0
202	215	221	222	216	4	0.0
203	216	222	223	217	5	0.0
204	218	224	225	219	1	0.0
205	219	225	226	220	2	0.0
206	220	226	227	227	3	0.0
207	220	227	221	221	3	0.0
208	221	227	228	228	3	0.0
209	221	228	229	222	4	0.0
210	222	229	230	223	5	0.0
211	224	231	232	225	1	0.0
212	225	232	233	226	2	0.0
213	226	233	227	227	3	0.0
214	227	233	234	234	3	0.0
215	227	234	228	228	3	0.0
216	228	234	235	229	4	0.0
217	229	235	236	230	5	0.0
218	231	237	238	232	1	0.0
219	232	238	239	233	2	0.0
220	233	239	240	234	3	0.0
221	234	240	241	235	4	0.0
222	235	241	242	236	5	0.0
223	237	243	244	238	1	0.0
224	238	244	245	239	2	0.0
225	239	245	246	240	3	0.0
226	240	246	247	241	4	0.0
227	241	247	248	242	5	0.0
228	243	249	250	244	1	0.0
229	244	250	251	245	2	0.0
230	245	251	252	246	3	0.0
231	246	252	253	247	4	0.0
232	247	253	254	248	5	0.0
233	249	255	256	250	1	0.0
234	250	256	257	251	2	0.0
235	251	257	258	252	3	0.0
236	252	258	259	253	4	0.0
237	253	259	260	254	5	0.0
238	255	261	262	256	1	0.0
239	256	262	263	257	2	0.0
240	257	263	264	258	3	0.0
241	258	264	265	259	4	0.0
242	259	265	266	260	5	0.0
243	261	267	268	262	1	0.0
244	262	268	269	263	2	0.0
245	263	269	270	270	3	0.0
246	263	270	264	264	3	0.0
247	264	270	271	271	3	0.0
248	264	271	272	265	4	0.0
249	265	272	273	266	5	0.0
250	267	274	275	268	1	0.0

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

ELMT	I	J	K	L	MAT	ANGLE
251	268	275	276	269	2	0.0
252	269	276	270	270	3	0.0
253	270	276	277	277	3	0.0
254	270	277	271	271	3	0.0
255	271	277	278	272	4	0.0
256	272	278	279	273	5	0.0
257	274	280	281	275	1	0.0
258	275	281	282	276	2	0.0
259	276	282	283	277	3	0.0
260	277	283	284	278	4	0.0
261	278	284	285	279	5	0.0
262	280	286	287	281	1	0.0
263	281	287	288	282	2	0.0
264	282	288	289	283	3	0.0
265	283	289	290	284	4	0.0
266	284	290	291	285	5	0.0
267	286	292	293	287	1	0.0
268	287	293	294	288	2	0.0
269	288	294	295	289	3	0.0
270	289	295	296	290	4	0.0
271	290	296	297	291	5	0.0
272	292	298	299	293	1	0.0
273	293	299	300	294	2	0.0
274	294	300	301	295	3	0.0
275	295	301	302	296	4	0.0
276	296	302	303	297	5	0.0
277	298	304	305	299	1	0.0
278	299	305	306	300	2	0.0
279	300	306	307	301	3	0.0
280	301	307	308	302	4	0.0
281	302	308	309	303	5	0.0
282	304	310	311	305	1	0.0
283	305	311	312	306	2	0.0
284	306	312	313	307	3	0.0
285	307	313	314	308	4	0.0
286	308	314	315	309	5	0.0
287	310	316	317	311	1	0.0
288	311	317	318	312	2	0.0
289	312	318	319	313	3	0.0
290	313	319	320	314	4	0.0
291	314	320	321	315	5	0.0
292	316	322	323	317	1	0.0
293	317	323	324	318	2	0.0
294	318	324	325	319	3	0.0
295	319	325	326	320	4	0.0
296	320	326	327	321	5	0.0
297	322	328	329	323	1	0.0
298	323	329	330	324	2	0.0
299	324	330	331	325	3	0.0
300	325	331	332	326	4	0.0

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

ELMT	I	J	K	L	MAT	ANGLE
301	326	332	333	327	5	0.0
302	328	334	335	335	1	0.0
303	328	335	329	329	1	0.0
304	329	335	336	336	1	0.0
305	329	336	337	330	2	0.0
306	330	337	338	331	3	0.0
307	331	338	339	332	4	0.0
308	332	339	340	333	5	0.0
309	334	341	335	335	1	0.0
310	335	341	342	342	1	0.0
311	335	342	336	336	1	0.0
312	336	342	343	337	2	0.0
313	337	343	344	338	3	0.0
314	338	344	345	339	4	0.0
315	339	345	346	340	5	0.0
316	341	347	348	342	1	0.0
317	342	348	349	343	2	0.0
318	343	349	350	344	3	0.0
319	344	350	351	345	4	0.0
320	345	351	352	346	5	0.0
321	347	353	354	348	1	0.0
322	348	354	355	349	2	0.0
323	349	355	356	350	3	0.0
324	350	356	357	351	4	0.0
325	351	357	358	352	5	0.0
326	353	359	360	354	1	0.0
327	354	360	361	355	2	0.0
328	355	361	362	356	3	0.0
329	356	362	363	357	4	0.0
330	357	363	364	358	5	0.0
331	359	365	366	360	1	0.0
332	360	366	367	361	2	0.0
333	361	367	368	362	3	0.0
334	362	368	369	363	4	0.0
335	363	369	370	364	5	0.0
336	365	371	372	366	1	0.0
337	366	372	373	367	2	0.0
338	367	373	374	368	3	0.0
339	368	374	375	369	4	0.0
340	369	375	376	370	5	0.0
341	371	377	378	372	1	0.0
342	372	378	379	373	2	0.0
343	373	379	380	374	3	0.0
344	374	380	381	375	4	0.0
345	375	381	382	376	5	0.0
346	377	383	384	378	1	0.0
347	378	384	385	379	2	0.0
348	379	385	386	380	3	0.0
349	380	386	387	381	4	0.0
350	381	387	388	382	5	0.0

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

ELMT	I	J	K	L	MAT	ANGLE
351	383	389	390	384	1	0.0
352	384	390	391	385	2	0.0
353	385	391	392	386	3	0.0
354	386	392	393	387	4	0.0
355	387	393	394	388	5	0.0
356	389	395	396	396	1	0.0
357	389	396	397	390	1	0.0
358	390	397	398	398	2	0.0
359	390	398	399	391	2	0.0
360	391	399	400	400	3	0.0
361	391	400	401	392	3	0.0
362	392	401	402	402	4	0.0
363	392	402	403	393	4	0.0
364	393	403	404	404	4	0.0
365	393	404	405	394	5	0.0
366	394	405	406	406	5	0.0
367	395	407	408	396	1	0.0
368	396	408	409	397	1	0.0
369	397	409	410	398	2	0.0
370	398	410	411	399	2	0.0
371	399	411	412	412	6	0.0
372	399	412	400	400	3	0.0
373	400	412	401	401	3	0.0
374	401	412	413	402	4	0.0
375	402	413	403	403	4	0.0
376	403	413	414	404	4	0.0
377	404	414	415	405	5	0.0
378	405	415	416	406	5	0.0
379	407	417	418	408	1	0.0
380	408	418	419	409	1	0.0
381	409	419	420	410	2	0.0
382	410	420	421	411	2	0.0
383	411	421	422	412	6	0.0
384	412	422	423	423	6	0.0
385	412	423	424	413	4	0.0
386	413	424	425	414	4	0.0
387	414	425	426	415	5	0.0
388	415	426	427	416	5	0.0
389	417	428	429	418	1	0.0
390	418	429	430	419	1	0.0
391	419	430	431	420	2	0.0
392	420	431	432	421	2	0.0
393	421	432	433	422	6	0.0
394	422	433	434	423	6	0.0
395	423	434	435	424	4	0.0
396	424	435	436	425	4	0.0
397	425	436	437	426	5	0.0
398	426	437	438	427	5	0.0
399	428	439	440	429	1	0.0
400	429	440	441	430	1	0.0

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

ELMT	I	J	K	L	MAT	ANGLE
401	430	441	442	431	2	0.0
402	431	442	443	432	2	0.0
403	432	443	444	433	6	0.0
404	433	444	445	434	6	0.0
405	434	445	446	435	4	0.0
406	435	446	447	436	4	0.0
407	436	447	448	437	5	0.0
408	437	448	449	438	5	0.0
409	439	450	451	440	1	0.0
410	440	451	452	441	1	0.0
411	441	452	453	442	2	0.0
412	442	453	454	443	2	0.0
413	443	454	455	444	6	0.0
414	444	455	456	445	6	0.0
415	445	456	457	446	4	0.0
416	446	457	458	447	4	0.0
417	447	458	459	448	5	0.0
418	448	459	460	449	5	0.0
419	450	461	462	451	1	0.0
420	451	462	463	452	1	0.0
421	452	463	464	453	2	0.0
422	453	464	465	454	2	0.0
423	454	465	466	455	6	0.0
424	455	466	467	456	6	0.0
425	456	467	468	457	4	0.0
426	457	468	469	458	4	0.0
427	458	469	470	459	5	0.0
428	459	470	471	460	5	0.0
429	461	472	473	462	1	0.0
430	462	473	474	463	1	0.0
431	463	474	475	464	2	0.0
432	464	475	476	465	2	0.0
433	465	476	477	466	6	0.0
434	466	477	478	467	6	0.0
435	467	478	479	468	4	0.0
436	468	479	480	469	4	0.0
437	469	480	481	470	5	0.0
438	470	481	482	471	5	0.0
439	472	483	484	473	1	0.0
440	473	484	485	474	1	0.0
441	474	485	486	475	2	0.0
442	475	486	487	476	2	0.0
443	476	487	488	488	6	0.0
444	476	488	489	477	6	0.0
445	477	489	490	478	6	0.0
446	478	490	491	479	4	0.0
447	479	491	492	480	4	0.0
448	480	492	493	481	5	0.0
449	481	493	494	482	5	0.0
450	483	495	496	496	7	0.0

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

ELMT	I	J	K	L	MAT	ANGLE
451	483	496	484	484	1	0.0
452	484	496	485	485	1	0.0
453	485	496	497	486	2	0.0
454	486	497	498	487	2	0.0
455	487	498	488	488	6	0.0
456	488	498	499	489	6	0.0
457	489	499	500	490	6	0.0
458	490	500	501	491	4	0.0
459	491	501	502	492	4	0.0
460	492	502	503	493	5	0.0
461	493	503	504	494	5	0.0
462	495	505	506	496	7	0.0
463	496	506	497	497	2	0.0
464	497	506	498	498	2	0.0
465	498	506	507	499	6	0.0
466	499	507	508	508	6	0.0
467	499	508	509	500	6	0.0
468	500	509	510	501	4	0.0
469	501	510	511	502	4	0.0
470	502	511	512	503	5	0.0
471	503	512	513	504	5	0.0
472	505	514	515	506	7	0.0
473	506	515	516	507	6	0.0
474	507	516	508	508	6	0.0
475	508	516	517	509	6	0.0
476	509	517	518	510	4	0.0
477	510	518	519	511	4	0.0
478	511	519	520	512	5	0.0
479	512	520	521	513	5	0.0
480	514	522	523	515	7	0.0
481	515	523	524	516	6	0.0
482	516	524	525	517	6	0.0
483	517	525	526	518	4	0.0
484	518	526	527	519	4	0.0
485	519	527	528	520	5	0.0
486	520	528	529	521	5	0.0
487	522	530	531	523	7	0.0
488	523	531	532	524	6	0.0
489	524	532	533	525	6	0.0
490	525	533	534	526	4	0.0
491	526	534	535	527	4	0.0
492	527	535	536	528	5	0.0
493	528	536	537	529	5	0.0
494	530	538	539	531	7	0.0
495	531	539	540	532	6	0.0
496	532	540	541	533	6	0.0
497	533	541	542	534	4	0.0
498	534	542	543	535	4	0.0
499	535	543	544	536	5	0.0
500	536	544	545	537	5	0.0

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

ELMT	I	J	K	L	MAT	ANGLE
501	538	546	547	539	7	0.0
502	539	547	548	540	6	0.0
503	540	548	549	541	6	0.0
504	541	549	542	542	4	0.0
505	542	549	550	543	4	0.0
506	543	550	551	544	5	0.0
507	544	551	552	545	5	0.0
508	546	553	554	547	7	0.0
509	547	554	555	548	6	0.0
510	548	555	556	549	6	0.0
511	549	556	550	550	4	0.0
512	550	556	557	551	5	0.0
513	551	557	558	552	5	0.0
514	553	559	560	554	7	0.0
515	554	560	561	555	6	0.0
516	555	561	562	556	6	0.0
517	556	562	563	557	5	0.0
518	557	563	558	558	5	0.0
519	559	564	565	560	7	0.0
520	560	565	566	561	6	0.0
521	561	566	567	562	6	0.0
522	562	567	563	563	5	0.0
523	564	568	569	565	7	0.0
524	565	569	570	566	6	0.0
525	566	570	571	567	6	0.0
526	568	572	573	569	7	0.0
527	569	573	574	570	6	0.0
528	570	574	575	571	6	0.0
529	572	576	577	573	7	0.0
530	573	577	578	574	6	0.0
531	574	578	579	575	6	0.0
532	576	580	581	577	7	0.0
533	577	581	582	578	6	0.0
534	578	582	583	579	6	0.0
535	580	584	585	581	7	0.0
536	581	585	586	582	6	0.0
537	582	586	587	583	6	0.0
538	584	588	589	585	7	0.0
539	585	589	590	586	6	0.0
540	586	590	591	587	6	0.0
541	588	592	593	589	7	0.0
542	589	593	594	590	6	0.0
543	590	594	595	591	6	0.0
544	592	596	597	593	7	0.0
545	593	597	598	594	6	0.0
546	594	598	599	595	6	0.0
547	596	600	601	597	7	0.0
548	597	601	602	598	6	0.0
549	598	602	603	599	6	0.0

REQUIRED STORAGE = 15369, ALLOCATED STORAGE = 20000

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

ELMT	X-ORD	Y-ORD	1-FLOW	2-FLOW	ANGLE	TOTAL FLOW	DIRECTION
1	1000.00	468.50	0.72758E 02	-0.41655E 01	0.0	0.72877E 02	-3.2767
2	1000.00	528.00	0.58049E 00	-0.44863E 01	0.0	0.45237E 01	-82.6273
3	1000.00	572.75	0.20306E 03	-0.16130E 02	0.0	0.20370E 03	-4.5416
4	1000.00	613.75	-0.27867E-01	-0.25845E 02	0.0	0.25845E 02	-90.0619
5	1000.00	667.00	0.33099E-01	-0.25791E 02	0.0	0.25791E 02	-89.9265
6	3000.00	459.00	0.26641E 03	-0.63194E 01	0.0	0.26649E 03	-1.3588
7	3000.00	520.00	0.21482E 01	-0.53869E 01	0.0	0.57994E 01	-68.2583
8	3000.00	567.00	0.72868E 03	-0.19560E 02	0.0	0.72895E 03	-1.5376
9	3000.00	609.50	0.44790E-01	-0.32023E 02	0.0	0.32023E 02	-89.9198
10	3000.00	665.00	0.19545E 00	-0.32495E 02	0.0	0.32496E 02	-89.6554
11	5000.00	451.00	0.57152E 03	-0.88472E 01	0.0	0.57159E 03	-0.8869
12	5000.00	513.50	0.46252E 01	-0.84746E 01	0.0	0.96546E 01	-61.3758
13	5000.00	561.75	0.15579E 04	-0.25647E 02	0.0	0.15581E 04	-0.9432
14	5000.00	604.50	0.25798E 00	-0.39904E 02	0.0	0.39905E 02	-89.6296
15	5000.00	662.25	0.28436E 02	-0.40028E 02	0.0	0.49100E 02	-54.6102
16	7000.00	445.25	0.94986E 03	-0.11143E 02	0.0	0.94992E 03	-0.6721
17	7000.00	508.75	0.77657E 01	-0.12110E 02	0.0	0.14386E 02	-57.3301
18	7000.00	557.00	0.26372E 04	-0.37805E 02	0.0	0.26375E 04	-0.8213
19	7000.00	600.00	0.53785E 00	-0.49916E 02	0.0	0.49919E 02	-89.3826
20	7000.00	659.00	0.42902E 02	-0.52197E 02	0.0	0.67566E 02	-50.5820
21	9000.00	439.50	0.12633E 04	-0.83417E 01	0.0	0.12634E 04	-0.3783
22	9000.00	504.00	0.10687E 02	-0.29253E 01	0.0	0.11080E 02	-15.3090
23	9000.00	552.50	0.37317E 04	-0.23721E 02	0.0	0.37318E 04	-0.3642
24	9000.00	596.50	0.16773E 01	-0.26268E 02	0.0	0.26322E 02	-86.3455
25	9000.00	656.00	0.22714E 03	-0.28220E 02	0.0	0.22888E 03	-7.0823

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

ELMT	X-ORD	Y-ORD	1-FLOW	2-FLOW	ANGLE	TOTAL FLOW	DIRECTION
26	11333.33	409.33	0.11558E 04	-0.94388E 01	0.0	0.11559E 04	-0.4679
27	10666.66	437.00	0.11557E 04	-0.53082E 01	0.0	0.11559E 04	-0.2632
28	11333.33	460.00	0.11557E 04	-0.79625E 01	0.0	0.11557E 04	-0.3948
29	11000.00	498.50	0.95188E 01	0.64057E 01	0.0	0.11473E 02	33.9385
30	11000.00	547.50	0.32212E 04	-0.22238E 01	0.0	0.32212E 04	-0.0396
31	11000.00	592.00	0.91529E 00	0.90392E 00	0.0	0.12864E 01	44.6419
32	11000.00	652.25	0.84195E 02	0.26685E 01	0.0	0.84237E 02	1.8153
33	12666.66	405.00	0.10620E 04	-0.95598E 01	0.0	0.10620E 04	-0.5158
34	13333.33	428.67	0.10621E 04	-0.42099E 01	0.0	0.10621E 04	-0.2271
35	12666.66	456.00	0.10622E 04	-0.83417E 01	0.0	0.10622E 04	-0.4500
36	13000.00	493.00	0.87701E 01	0.54609E 01	0.0	0.10331E 02	31.9094
37	13000.00	543.00	0.29779E 04	-0.14489E 01	0.0	0.29779E 04	-0.0279
38	13000.00	588.00	0.87071E 00	-0.26946E 00	0.0	0.91145E 00	-17.1956
39	13000.00	649.25	0.83146E 02	-0.67288E 00	0.0	0.83149E 02	-0.4637
40	15000.00	420.50	0.96251E 03	-0.42841E 01	0.0	0.96252E 03	-0.2550
41	15000.00	487.75	0.79592E 01	0.57587E 01	0.0	0.98240E 01	35.8867
42	15000.00	539.00	0.27043E 04	-0.14167E 01	0.0	0.27043E 04	-0.0300
43	15000.00	585.00	0.78065E 00	-0.26115E 00	0.0	0.83077E 00	-18.3212
44	15000.00	647.75	0.75095E 02	-0.18654E 00	0.0	0.75095E 02	-0.1423
45	17000.00	413.25	0.85834E 03	-0.36226E 01	0.0	0.85835E 03	-0.2418
46	17000.00	481.75	0.71004E 01	0.62115E 01	0.0	0.94340E 01	41.1798
47	17000.00	534.25	0.24092E 04	-0.27419E 01	0.0	0.24092E 04	-0.0652
48	17000.00	591.00	0.70273E 00	-0.31921E 00	0.0	0.77142E 00	-24.3618
49	17000.00	644.50	0.67017E 02	-0.33836E 00	0.0	0.67017E 02	-0.2893
50	19000.00	405.75	0.73977E 03	-0.28616E 01	0.0	0.73977E 03	-0.2216

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

ELMT	X-ORD	Y-ORD	1-FLOW	2-FLOW	ANGLE	TOTAL FLOW	DIRECTION
51	19000.00	475.50	0.61341E 01	0.68000E 01	0.0	0.91579E 01	47.9472
52	19000.00	529.00	0.20843E 04	-0.20345E 01	0.0	0.20843E 04	-0.0559
53	19000.00	576.25	0.60319E 00	-0.32974E 00	0.0	0.69184E 00	-28.4665
54	19000.00	641.00	0.58031E 02	-0.28681E 00	0.0	0.58032E 02	-0.2832
55	21000.00	399.75	0.61770E 03	-0.98913E 00	0.0	0.61770E 03	-0.0917
56	21000.00	470.25	0.51255E 01	0.78347E 01	0.0	0.93624E 01	56.8069
57	21000.00	524.50	0.17423E 04	0.66406E 00	0.0	0.17423E 04	0.0218
58	21000.00	572.50	0.50736E 00	-0.37366E 00	0.0	0.63011E 00	-36.3710
59	21000.00	639.50	0.48300E 02	-0.24251E 00	0.0	0.48301E 02	-0.2877
60	23000.00	393.75	0.49018E 03	-0.15543E 01	0.0	0.49018E 03	-0.1817
61	23000.00	464.50	0.40273E 01	0.71198E 01	0.0	0.31793E 01	60.4990
62	23000.00	519.75	0.13487E 04	0.19316E 01	0.0	0.13487E 04	0.0021
63	23000.00	569.00	0.39359E 00	-0.39645E 00	0.0	0.55864E 00	-45.2074
64	23333.33	604.00	0.37619E 02	-0.29751E 00	0.0	0.37620E 02	-0.4531
65	22666.66	634.33	0.37618E 02	-0.23511E 00	0.0	0.37619E 02	-0.3581
66	23333.33	664.33	0.37622E 02	-0.11001E 00	0.0	0.37622E 02	-0.1675
67	25000.00	386.50	0.41322E 03	-0.37917E 01	0.0	0.41324E 03	-0.5257
68	25000.00	458.50	0.33422E 01	0.34494E 01	0.0	0.48030E 01	45.9039
69	25000.00	515.00	0.11088E 04	-0.63750E 00	0.0	0.11088E 04	-0.0329
70	25000.00	565.00	0.33108E 00	-0.81577E-01	0.0	0.34098E 00	-13.8419
71	24666.66	601.67	0.32264E 02	-0.29920E 00	0.0	0.32265E 02	-0.5313
72	25333.33	631.00	0.32269E 02	-0.60292E-02	0.0	0.32269E 02	-0.0107
73	24666.66	663.33	0.32272E 02	-0.11186E 00	0.0	0.32272E 02	-0.1986
74	27000.00	379.75	0.43448E 03	-0.31712E 01	0.0	0.43449E 03	-0.4182
75	27000.00	452.50	0.36302E 01	0.24435E 01	0.0	0.43759E 01	33.9443

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

ELMT	X-ORD	Y-ORD	1-FLOW	2-FLOW	ANGLE	TOTAL FLOW	DIRECTION
76	27333.33	492.67	0.12452E 04	-0.21250E 01	0.0	0.12452E 04	-0.0978
77	26666.66	512.00	0.12451E 04	-0.31875E 01	0.0	0.12451E 04	-0.1467
78	27333.33	526.67	0.12452E 04	-0.57955E 01	0.0	0.12452E 04	-0.2667
79	27000.00	560.50	0.35916E 00	0.23190E-01	0.0	0.35991E 00	3.6943
80	27000.00	633.00	0.33775E 02	-0.80253E-01	0.0	0.33775E 02	-0.1361
81	29000.00	373.75	0.40473E 03	-0.30333E 01	0.0	0.40474E 03	-0.4294
82	29000.00	446.25	0.32916E 01	0.21630E 01	0.0	0.39387E 01	33.3100
83	28666.66	488.33	0.11001E 04	-0.21250E 01	0.0	0.11001E 04	-0.1107
84	29333.33	505.00	0.11002E 04	0.0	0.0	0.11002E 04	0.0
85	28666.66	524.00	0.11002E 04	-0.57955E 01	0.0	0.11003E 04	-0.3018
86	29000.00	557.00	0.32447E 00	-0.33041E-01	0.0	0.32691E 00	-5.8609
87	29000.00	631.25	0.31222E 02	-0.59780E-01	0.0	0.31222E 02	-0.1097
88	31333.33	344.67	0.36518E 03	-0.95723E 01	0.0	0.36531E 03	-1.5015
89	30666.66	374.00	0.36502E 03	-0.31645E 01	0.0	0.36504E 03	-0.4967
90	31333.33	399.33	0.36487E 03	-0.10063E 02	0.0	0.36501E 03	-1.5797
91	31000.00	440.75	0.32035E 01	0.63322E 01	0.0	0.70985E 01	63.1290
92	31000.00	500.25	0.11474E 04	0.17230E 01	0.0	0.11474E 04	0.0860
93	31000.00	555.00	0.33290E 00	-0.94850E-02	0.0	0.33304E 00	-1.6320
94	31000.00	630.75	0.31504E 02	-0.54615E-01	0.0	0.31504E 02	-0.0993
95	32666.66	340.67	0.41477E 03	-0.97246E 01	0.0	0.41489E 03	-1.3431
96	33333.33	366.00	0.41498E 03	-0.20374E 01	0.0	0.41493E 03	-0.2813
97	32666.66	395.33	0.41509E 03	-0.10063E 02	0.0	0.41521E 03	-1.3887
98	33000.00	434.75	0.33343E 01	0.85025E 01	0.0	0.91329E 01	68.5872
99	33000.00	496.00	0.10853E 04	0.21610E 01	0.0	0.10853E 04	0.1141
100	33000.00	552.75	0.31592E 00	-0.13055E 00	0.0	0.34183E 00	-22.4518

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

ELMT	X-ORD	Y-ORD	1-FLOW	2-FLOW	ANGLE	TOTAL FLOW	DIRECTION
101	33000.00	629.00	0.30027E 02	-0.12679E 00	0.0	0.30029E 02	-0.2419
102	35000.00	355.00	0.32530E 03	-0.27744E 01	0.0	0.32531E 03	-0.4887
103	35000.00	428.25	0.27171E 01	0.53924E 01	0.0	0.60383E 01	63.2575
104	35000.00	490.50	0.92410E 03	0.53125E 00	0.0	0.92410E 03	0.0329
105	35000.00	547.50	0.26733E 00	-0.23023E 00	0.0	0.35284E 00	-40.7294
106	35000.00	626.25	0.25409E 02	-0.18007E 00	0.0	0.25409E 02	-0.4060
107	37000.00	349.50	0.27702E 03	-0.27410E 01	0.0	0.27703E 03	-0.5669
108	37000.00	423.75	0.22503E 01	0.46861E 01	0.0	0.51984E 01	64.3495
109	37000.00	485.25	0.74988E 03	0.55435E 00	0.0	0.74988E 03	0.0424
110	37000.00	542.25	0.22159E 00	-0.18246E 00	0.0	0.28704E 00	-39.4693
111	37000.00	621.75	0.21402E 02	-0.18183E 00	0.0	0.21403E 02	-0.4868
112	39000.00	344.00	0.26106E 03	-0.15259E 01	0.0	0.26107E 03	-0.3349
113	39000.00	418.75	0.22430E 01	0.56153E 01	0.0	0.60485E 01	68.1322
114	39000.00	481.00	0.78266E 03	0.16776E 01	0.0	0.78267E 03	0.1228
115	39000.00	539.25	0.22306E 00	-0.25465E 00	0.0	0.33352E 00	-48.7832
116	39000.00	615.50	0.20906E 02	-0.20995E 00	0.0	0.20907E 02	-0.5781
117	41000.00	337.50	0.18646E 03	-0.15641E 01	0.0	0.18647E 03	-0.4806
118	41000.00	412.50	0.15338E 01	0.69804E 01	0.0	0.71469E 01	77.6071
119	41000.00	476.00	0.50874E 03	0.22368E 01	0.0	0.50875E 03	0.2519
120	41000.00	535.50	0.15054E 00	-0.32789E 00	0.0	0.36080E 00	-65.3397
121	41000.00	611.50	0.14656E 02	-0.21594E 00	0.0	0.14659E 02	-0.8481
122	43000.00	332.50	0.12585E 03	-0.15641E 01	0.0	0.12586E 03	-0.7120
123	43000.00	407.50	0.10298E 01	0.57710E 01	0.0	0.58621E 01	79.8821
124	43000.00	471.75	0.33764E 03	0.10997E 01	0.0	0.33765E 03	0.1849
125	43000.00	531.75	0.99675E-01	-0.20185E 00	0.0	0.22512E 00	-63.7192

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

ELMT	X-ORD	Y-ORD	1-FLOW	2-FLOW	ANGLE	TOTAL FLOW	DIRECTION
126	43000.00	608.00	0.96658E 01	-0.14629E 00	0.0	0.96669E 01	-0.8671
127	45000.00	324.50	0.88299E 02	-0.15448E 01	0.0	0.88313E 02	-1.0023
128	45000.00	400.00	0.71836E 00	0.42629E 01	0.0	0.43230E 01	80.4348
129	45333.33	446.67	0.22664E 03	0.39844E 01	0.0	0.22668E 03	1.0072
130	44666.66	470.00	0.22664E 03	0.0	0.0	0.22664E 03	0.0
131	45333.33	438.33	0.22654E 03	-0.12750E 01	0.0	0.22654E 03	-0.3225
132	45000.00	528.75	0.68318E-01	-0.83142E-01	0.0	0.10761E 00	-50.5900
133	45000.00	605.50	0.67344E 01	-0.73146E-01	0.0	0.67348E 01	-0.6223
134	47000.00	316.00	0.92985E 02	-0.33293E 01	0.0	0.93045E 02	-2.0506
135	47000.00	393.00	0.72028E 00	0.19154E 01	0.0	0.20463E 01	69.3911
136	46666.66	442.67	0.22670E 03	0.31875E 01	0.0	0.22672E 03	0.8056
137	47333.33	463.00	0.22667E 03	0.15179E 01	0.0	0.22667E 03	0.3837
138	46666.66	485.33	0.22674E 03	-0.12750E 01	0.0	0.22674E 03	-0.3222
139	47000.00	526.50	0.69561E-01	0.84785E-01	0.0	0.10967E 00	50.6333
140	47333.33	572.00	0.69281E 01	0.11248E 00	0.0	0.69290E 01	0.9301
141	46666.66	602.00	0.69300E 01	0.24653E-02	0.0	0.69300E 01	0.0204
142	47333.33	632.00	0.69325E 01	0.99639E-01	0.0	0.69332E 01	0.8234
143	49000.00	309.75	0.13640E 03	-0.33091E 01	0.0	0.13644E 03	-1.3899
144	49000.00	387.75	0.11455E 01	0.10064E 01	0.0	0.15248E 01	41.3000
145	49000.00	457.50	0.39440E 03	0.19318E 01	0.0	0.39440E 03	0.2806
146	49000.00	525.25	0.11323E 00	0.11604E 00	0.0	0.16213E 00	45.7028
147	48666.66	572.00	0.10594E 02	0.13405E 00	0.0	0.10595E 02	0.7249
148	49333.33	602.67	0.10592E 02	0.84409E-02	0.0	0.10592E 02	0.0457
149	48666.66	632.67	0.10590E 02	0.62659E-01	0.0	0.10590E 02	0.3390
150	51000.00	303.75	0.15052E 03	-0.26197E 01	0.0	0.15054E 03	-0.9971

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

ELMT	X-ORD	Y-ORD	1-FLOW	2-FLOW	ANGLE	TOTAL FLOW	DIRECTION
151	51000.00	332.25	0.12467E 01	0.15428E 01	0.0	0.19936E 01	51.0590
152	51000.00	453.25	0.42363E 03	0.94444E 00	0.0	0.42364E 03	0.1277
153	51000.00	521.75	0.12495E 00	0.83873E-01	0.0	0.15049E 00	33.8747
154	51000.00	604.00	0.11968E 02	0.93421E-02	0.0	0.11968E 02	0.0447
155	53000.00	297.75	0.17011E 03	-0.26518E 01	0.0	0.17013E 03	-0.8931
156	53000.00	376.75	0.14579E 01	0.27941E 01	0.0	0.31516E 01	62.4448
157	53000.00	448.50	0.50849E 03	0.95149E 00	0.0	0.50849E 03	0.1072
158	53000.00	516.75	0.14599E 00	0.34302E-01	0.0	0.14996E 00	13.2227
159	53000.00	601.25	0.13655E 02	-0.89195E-02	0.0	0.13655E 02	-0.0374
160	55000.00	290.25	0.17564E 03	-0.22061E 01	0.0	0.17565E 03	-0.7196
161	55000.00	370.75	0.14347E 01	0.33463E 01	0.0	0.36409E 01	66.7937
162	55000.00	443.75	0.47710E 03	0.14167E 01	0.0	0.47710E 03	0.1701
163	55000.00	513.75	0.13976E 00	-0.28516E-01	0.0	0.14264E 00	-11.5315
164	55000.00	600.25	0.13362E 02	-0.52985E-01	0.0	0.13362E 02	-0.2272
165	57000.00	282.25	0.17078E 03	-0.26608E 01	0.0	0.17080E 03	-0.8926
166	57000.00	365.50	0.14090E 01	0.25787E 01	0.0	0.29386E 01	61.3471
167	57333.33	417.33	0.47525E 03	0.35417E 01	0.0	0.47526E 03	0.4270
168	56666.66	441.00	0.47533E 03	0.56495E 00	0.0	0.47533E 03	0.0681
169	57333.33	461.67	0.47530E 03	0.31875E 01	0.0	0.47531E 03	0.3842
170	57000.00	509.25	0.13896E 00	-0.13430E-01	0.0	0.13961E 00	-5.5204
171	57000.00	598.00	0.13259E 02	-0.59736E-01	0.0	0.13259E 02	-0.2581
172	59000.00	276.25	0.16928E 03	-0.29900E 01	0.0	0.16931E 03	-1.0119
173	59000.00	361.00	0.13679E 01	0.16818E 01	0.0	0.21679E 01	50.8753
174	58666.66	414.67	0.45351E 03	0.35417E 01	0.0	0.45352E 03	0.4474
175	59333.33	436.33	0.45335E 03	-0.46196E 01	0.0	0.45338E 03	-0.5838

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

ELMT	X-ORD	Y-ORD	1-FLOW	2-FLOW	ANGLE	TOTAL FLOW	DIRECTION
176	58666.66	459.67	0.45330E 03	0.31875E 01	0.0	0.45331E 03	0.4029
177	59000.00	505.50	0.13523E 00	0.66869E-01	0.0	0.15086E 00	26.3122
178	59000.00	595.75	0.13151E 02	0.40899E-02	0.0	0.13151E 02	0.0178
179	61000.00	272.00	0.19417E 03	-0.19840E 01	0.0	0.19418E 03	-0.5854
180	61000.00	357.00	0.16435E 01	0.13415E 01	0.0	0.24683E 01	48.2520
181	61000.00	433.75	0.57082E 03	-0.41277E 01	0.0	0.57084E 03	-0.4143
182	61000.00	505.00	0.16464E 00	0.83430E-01	0.0	0.18459E 00	26.8725
183	61000.00	595.50	0.15486E 02	0.20544E-01	0.0	0.15486E 02	0.0760
184	63000.00	266.00	0.21070E 03	-0.10833E 01	0.0	0.21070E 03	-0.2946
185	63000.00	351.50	0.17936E 01	0.36918E 01	0.0	0.41044E 01	64.0883
186	63000.00	430.00	0.62049E 03	-0.22768E 01	0.0	0.62049E 03	-0.2102
187	63000.00	503.50	0.17712E 00	-0.81756E-01	0.0	0.19508E 00	-24.7774
188	63000.00	595.50	0.16501E 02	-0.62208E-01	0.0	0.16501E 02	-0.2160
189	65000.00	259.75	0.18399E 03	-0.21538E 01	0.0	0.18401E 03	-0.6707
190	65000.00	346.50	0.14816E 01	0.36994E 01	0.0	0.39851E 01	68.1743
191	65000.00	424.75	0.48817E 03	-0.23611E 01	0.0	0.48817E 03	-0.2771
192	65000.00	499.75	0.14666E 00	-0.72395E-01	0.0	0.16353E 00	-26.2602
193	65000.00	595.25	0.14398E 02	-0.69528E-01	0.0	0.14398E 02	-0.2767
194	67000.00	254.25	0.19401E 03	-0.26608E 01	0.0	0.19403E 03	-0.7858
195	67000.00	342.25	0.15621E 01	0.18201E 01	0.0	0.23985E 01	49.3619
196	67000.00	421.00	0.51519E 03	-0.14272E 01	0.0	0.51519E 03	-0.1587
197	67000.00	496.00	0.15246E 00	0.73378E-01	0.0	0.16920E 00	25.7018
198	67000.00	593.50	0.14693E 02	0.11986E-01	0.0	0.14693E 02	0.0462
199	69000.00	249.50	0.21206E 03	-0.35302E 01	0.0	0.21209E 03	-0.9537
200	69000.00	338.00	0.17401E 01	0.71042E 00	0.0	0.18795E 01	22.2086

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

ELMT	X-ORD	Y-ORD	1-FLOW	2-FLOW	ANGLE	TOTAL FLOW	DIRECTION
201	69000.00	418.50	0.58821E 03	-0.53873E 01	0.0	0.58823E 03	-0.5248
202	69000.00	494.50	0.17230E 00	0.13244E 00	0.0	0.21732E 00	37.5497
203	69000.00	592.50	0.16470E 02	0.61739E-01	0.0	0.16470E 02	0.2148
204	71000.00	243.25	0.23373E 03	-0.35100E 01	0.0	0.23376E 03	-0.8604
205	71000.00	333.25	0.19894E 01	0.17412E 01	0.0	0.26433E 01	41.1930
206	71333.31	396.33	0.69376E 03	-0.15976E 02	0.0	0.69394E 03	-1.3192
207	70666.63	421.67	0.69364E 03	-0.12171E 02	0.0	0.69374E 03	-1.0053
208	71333.31	444.67	0.69369E 03	-0.47813E 01	0.0	0.69370E 03	-0.3949
209	71000.00	494.00	0.19650E 00	-0.70952E-02	0.0	0.19663E 00	-2.0680
210	71000.00	593.75	0.18135E 02	0.0	0.0	0.18135E 02	0.0
211	73000.00	235.25	0.22062E 03	-0.34316E 01	0.0	0.22065E 03	-0.8911
212	73000.00	327.25	0.17747E 01	0.18829E 01	0.0	0.25874E 01	46.6958
213	72666.63	393.00	0.58514E 03	-0.16550E 02	0.0	0.58537E 03	-1.6202
214	73333.31	415.33	0.58538E 03	-0.86149E 01	0.0	0.58544E 03	-0.8431
215	72666.63	441.67	0.58536E 03	-0.47813E 01	0.0	0.58538E 03	-0.4680
216	73000.00	493.00	0.17525E 00	-0.48609E-01	0.0	0.18187E 00	-15.5022
217	73000.00	594.75	0.17111E 02	-0.43389E-01	0.0	0.17111E 02	-0.1453
218	75000.00	230.00	0.22069E 03	-0.37513E 01	0.0	0.22072E 03	-0.9738
219	75000.00	323.75	0.18483E 01	0.14639E 01	0.0	0.23578E 01	38.3808
220	75000.00	406.50	0.63748E 03	-0.84115E 01	0.0	0.63754E 03	-0.7560
221	75000.00	490.00	0.18461E 00	0.80382E-02	0.0	0.18478E 00	2.4932
222	75000.00	593.75	0.17431E 02	-0.35500E-01	0.0	0.17432E 02	-0.1167
223	77000.00	226.50	0.21035E 03	-0.28737E 01	0.0	0.21037E 03	-0.7827
224	77000.00	320.50	0.17656E 01	0.26190E 01	0.0	0.31585E 01	56.0131
225	77000.00	403.00	0.60678E 03	-0.70833E 01	0.0	0.60682E 03	-0.6688

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

ELMT	X-ORD	Y-ORD	1-FLOW	2-FLOW	ANGLE	TOTAL FLOW	DIRECTION
226	77000.00	486.00	0.17474E 00	-0.79057E-01	0.0	0.19179E 00	-24.3429
227	77000.00	591.00	0.16432E 02	-0.80334E-01	0.0	0.16432E 02	-0.2801
228	79000.00	221.75	0.19814E 03	-0.33005E 01	0.0	0.19817E 03	-0.9543
229	79000.00	316.00	0.15695E 01	0.17486E 01	0.0	0.23497E 01	48.0894
230	79000.00	398.00	0.50968E 03	-0.75260E 01	0.0	0.50973E 03	-0.8460
231	79000.00	482.25	0.15212E 00	-0.57902E-01	0.0	0.16277E 00	-20.8380
232	79000.00	588.75	0.14832E 02	-0.53326E-01	0.0	0.14833E 02	-0.2060
233	81000.00	216.00	0.19246E 03	-0.40545E 01	0.0	0.19250E 03	-1.2069
234	81000.00	312.50	0.15806E 01	0.17221E 00	0.0	0.15900E 01	6.2180
235	81000.00	394.00	0.53544E 03	-0.71831E 01	0.0	0.53549E 03	-0.7686
236	81000.00	479.75	0.15514E 00	-0.14919E-01	0.0	0.15586E 00	-5.4927
237	81000.00	588.25	0.14661E 02	-0.15236E-01	0.0	0.14661E 02	-0.0595
238	83000.00	211.75	0.17873E 03	-0.39565E 01	0.0	0.17877E 03	-1.2681
239	83000.00	309.00	0.14921E 01	0.44299E 00	0.0	0.15565E 01	16.5358
240	83000.00	391.25	0.51303E 03	-0.69388E 01	0.0	0.51308E 03	-0.7749
241	83000.00	478.50	0.15005E 00	-0.36226E-01	0.0	0.15437E 00	-13.5761
242	83000.00	587.00	0.14325E 02	-0.38254E-01	0.0	0.14325E 02	-0.1530
243	85000.00	206.50	0.17667E 03	-0.39375E 01	0.0	0.17672E 03	-1.2767
244	85000.00	304.25	0.14614E 01	0.89652E 00	0.0	0.17145E 01	31.5271
245	85333.31	366.67	0.49703E 03	-0.12949E 02	0.0	0.49720E 03	-1.4924
246	84666.63	393.00	0.49693E 03	-0.34203E 01	0.0	0.49700E 03	-0.9708
247	85333.31	416.00	0.49699E 03	-0.45536E 01	0.0	0.49701E 03	-0.5250
248	85000.00	475.25	0.14597E 00	-0.15445E-01	0.0	0.14678E 00	-6.0401
249	85000.00	584.50	0.13994E 02	-0.38254E-01	0.0	0.13994E 02	-0.1566
250	87000.00	201.25	0.18515E 03	-0.42862E 01	0.0	0.18520E 03	-1.3262

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

ELMT	X-ORD	Y-ORD	1-FLOW	2-FLOW	ANGLE	TOTAL FLOW	DIRECTION
251	87000.00	299.00	0.14726E 01	-0.19565E 00	0.0	0.14855E 01	-7.5681
252	86666.63	363.33	0.48282E 03	-0.12873E 02	0.0	0.48299E 03	-1.5272
253	87333.31	387.33	0.48288E 03	-0.93990E 01	0.0	0.48297E 03	-1.1151
254	86666.63	413.67	0.48275E 03	-0.45536E 01	0.0	0.48277E 03	-0.5404
255	87000.00	472.25	0.14599E 00	0.93935E-01	0.0	0.17360E 00	32.7592
256	87000.00	582.50	0.14370E 02	0.15171E-01	0.0	0.14370E 02	0.0605
257	89000.00	197.00	0.21162E 03	-0.33906E 01	0.0	0.21165E 03	-0.9179
258	89000.00	295.00	0.18046E 01	-0.40761E-01	0.0	0.18051E 01	-1.2939
259	89000.00	379.25	0.63396E 03	-0.10417E 02	0.0	0.63404E 03	-0.9414
260	89000.00	469.50	0.17966E 00	0.76918E-01	0.0	0.19543E 00	23.1773
261	89000.00	580.25	0.16561E 02	0.15106E-01	0.0	0.16561E 02	0.0523
262	91000.00	192.00	0.21741E 03	-0.35000E 01	0.0	0.21744E 03	-0.9223
263	91000.00	291.00	0.17739E 01	0.94348E 00	0.0	0.20145E 01	27.9265
264	91000.00	375.25	0.59975E 03	-0.85570E 01	0.0	0.59981E 03	-0.8174
265	91000.00	465.75	0.17546E 00	-0.27457E-01	0.0	0.17759E 00	-8.8938
266	91000.00	578.50	0.16750E 02	-0.33561E-01	0.0	0.16750E 02	-0.1148
267	93000.00	186.50	0.21435E 03	-0.39000E 01	0.0	0.21439E 03	-1.0423
268	93000.00	286.00	0.17475E 01	0.22241E 00	0.0	0.17616E 01	7.2529
269	93000.00	369.75	0.58698E 03	-0.99745E 01	0.0	0.58707E 03	-0.9735
270	93000.00	461.75	0.17412E 00	0.25367E-01	0.0	0.17596E 00	8.2898
271	93000.00	577.00	0.16339E 02	-0.18490E-01	0.0	0.16339E 02	-0.0629
272	95000.00	182.00	0.22552E 03	-0.29491E 01	0.0	0.22554E 03	-0.7492
273	95000.00	282.50	0.18822E 01	0.29133E 00	0.0	0.19047E 01	8.7983
274	95000.00	365.25	0.64778E 03	-0.13190E 02	0.0	0.64792E 03	-1.1664
275	95000.00	458.50	0.18849E 00	0.55793E-01	0.0	0.19657E 00	16.4899

FP4500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

ELMT	X-ORD	Y-ORD	1-FLOW	2-FLOW	ANGLE	TOTAL FLOW	DIRECTION
276	95000.00	576.25	0.17878E 02	0.10957E-01	0.0	0.17878E 02	0.0351
277	97000.00	179.25	0.23265E 03	-0.24931E 01	0.0	0.23266E 03	-0.6140
278	97000.00	280.00	0.19239E 01	0.10119E 01	0.0	0.21782E 01	27.5915
279	97000.00	362.50	0.65873E 03	-0.91695E 01	0.0	0.65879E 03	-0.7975
280	97000.00	457.00	0.19321E 00	0.52503E-01	0.0	0.20022E 00	15.2025
281	97000.00	576.00	0.18478E 02	0.36373E-02	0.0	0.18478E 02	0.0113
282	99000.00	177.25	0.25252E 03	-0.23893E 01	0.0	0.25253E 03	-0.5421
283	99000.00	277.00	0.20957E 01	0.15260E 01	0.0	0.25925E 01	36.0609
284	99000.00	358.50	0.71581E 03	-0.10043E 02	0.0	0.71588E 03	-0.8038
285	99000.00	454.25	0.20746E 00	0.34264E-01	0.0	0.21027E 00	9.3783
286	99000.00	574.00	0.19599E 02	-0.25671E-01	0.0	0.19599E 02	-0.0751
287	101000.00	176.00	0.25796E 03	-0.19829E 01	0.0	0.25797E 03	-0.4404
288	101000.00	275.00	0.20965E 01	0.11397E 01	0.0	0.23863E 01	28.5300
289	101000.00	355.50	0.70244E 03	-0.10625E 02	0.0	0.70252E 03	-0.8666
290	101000.00	451.25	0.20672E 00	0.29145E-01	0.0	0.20876E 00	8.0254
291	101000.00	572.00	0.19836E 02	-0.14549E-01	0.0	0.19836E 02	-0.0420
292	103000.00	174.75	0.27729E 03	-0.29355E 01	0.0	0.27730E 03	-0.6065
293	103000.00	273.50	0.22229E 01	-0.90906E 00	0.0	0.24016E 01	-22.2424
294	103000.00	353.25	0.73539E 03	-0.76862E 01	0.0	0.73542E 03	-0.5988
295	103000.00	449.25	0.22104E 00	0.15107E 00	0.0	0.26773E 00	34.3509
296	103000.00	570.00	0.21622E 02	0.51771E-01	0.0	0.21622E 02	0.1372
297	105000.00	173.00	0.33451E 03	-0.37917E 01	0.0	0.33453E 03	-0.6494
298	105000.00	271.75	0.27691E 01	-0.19672E 01	0.0	0.33967E 01	-35.3905
299	105000.00	350.75	0.94647E 03	-0.97719E 01	0.0	0.94652E 03	-0.5915
300	105000.00	447.50	0.27490E 00	0.21560E 00	0.0	0.34937E 00	38.1066

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

ELMT	X-ORD	Y-ORD	1-FLOW	2-FLOW	ANGLE	TOTAL FLOW	DIRECTION
301	105000.00	567.75	0.26025E 02	0.76840E-01	0.0	0.26025E 02	0.1692
302	107333.31	141.00	0.35778E 03	-0.50281E 01	0.0	0.35781E 03	-0.8052
303	106666.63	177.00	0.35772E 03	-0.31597E 01	0.0	0.35773E 03	-0.5061
304	107333.31	213.00	0.35766E 03	-0.67083E 01	0.0	0.35772E 03	-1.0745
305	107000.00	270.50	0.30892E 01	0.14863E 01	0.0	0.34281E 01	25.6937
306	107000.00	349.00	0.10981E 04	-0.84375E 01	0.0	0.10981E 04	-0.4402
307	107000.00	446.75	0.31906E 00	0.15616E 00	0.0	0.35523E 00	26.0784
308	107000.00	566.50	0.30229E 02	0.35658E-01	0.0	0.30229E 02	0.0676
309	108666.63	140.33	0.45701E 03	-0.52754E 01	0.0	0.45704E 03	-0.6614
310	109333.25	175.67	0.45707E 03	-0.31597E 01	0.0	0.45708E 03	-0.3961
311	108666.63	212.33	0.45713E 03	-0.69812E 01	0.0	0.45718E 03	-0.8750
312	109000.00	269.25	0.36443E 01	0.13709E 01	0.0	0.40959E 01	27.1700
313	109000.00	347.50	0.11965E 04	-0.79688E 01	0.0	0.11965E 04	-0.3816
314	109000.00	446.00	0.35023E 00	0.13602E 00	0.0	0.37574E 00	21.2331
315	109000.00	565.00	0.33431E 02	0.40711E-02	0.0	0.33431E 02	0.0070
316	111000.00	169.00	0.48281E 03	-0.32351E 01	0.0	0.48292E 03	-0.3839
317	111000.00	268.00	0.39973E 01	-0.51826E 00	0.0	0.40307E 01	-7.3874
318	111000.00	346.75	0.13656E 04	-0.65146E 01	0.0	0.13656E 04	-0.2733
319	111000.00	445.25	0.39454E 00	0.76891E-01	0.0	0.40197E 00	11.0280
320	111000.00	563.00	0.37172E 02	-0.20736E-01	0.0	0.37172E 02	-0.0320
321	113000.00	167.50	0.49692E 03	-0.27669E 01	0.0	0.49692E 03	-0.3190
322	113000.00	267.25	0.41183E 01	0.40148E 00	0.0	0.41379E 01	5.5680
323	113000.00	346.00	0.14078E 04	-0.50815E 01	0.0	0.14078E 04	-0.2068
324	113000.00	444.75	0.40992E 00	-0.13407E-01	0.0	0.41014E 00	-1.8733
325	113000.00	561.25	0.38940E 02	-0.50957E-01	0.0	0.38940E 02	-0.0750

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

ELMT	X-ORD	Y-ORD	1-FLOW	2-FLOW	ANGLE	TOTAL FLOW	DIRECTION
326	115000.00	166.75	0.51225E 03	-0.28311E 01	0.0	0.51226E 03	-0.3167
327	115000.00	266.75	0.41731E 01	-0.18750E 00	0.0	0.41773E 01	-2.5726
328	115000.00	345.00	0.14024E 04	-0.87772E 01	0.0	0.14024E 04	-0.3586
329	115000.00	444.00	0.41365E 00	0.27071E-01	0.0	0.41453E 00	3.7444
330	115000.00	559.50	0.39796E 02	-0.34804E-01	0.0	0.39796E 02	-0.0501
331	117000.00	166.25	0.54207E 03	-0.27300E 01	0.0	0.54208E 03	-0.2886
332	117000.00	266.25	0.44638E 01	-0.13811E 01	0.0	0.46726E 01	-17.1917
333	117000.00	344.25	0.15166E 04	-0.93066E 01	0.0	0.15166E 04	-0.3516
334	117000.00	443.25	0.44383E 00	0.98950E-01	0.0	0.45472E 00	12.5684
335	117000.00	558.00	0.42364E 02	0.0	0.0	0.42364E 02	0.0
336	119000.00	165.75	0.58423E 03	-0.27300E 01	0.0	0.58424E 03	-0.2677
337	119000.00	265.75	0.48355E 01	-0.98786E 00	0.0	0.49354E 01	-11.5462
338	119000.00	343.75	0.16513E 04	-0.93066E 01	0.0	0.16513E 04	-0.3229
339	119000.00	442.50	0.48106E 00	0.89649E-01	0.0	0.48916E 00	10.4413
340	119000.00	556.25	0.45706E 02	-0.90102E-02	0.0	0.45706E 02	-0.0113
341	121000.00	165.50	0.61127E 03	-0.40265E 01	0.0	0.61129E 03	-0.3774
342	121000.00	265.25	0.50123E 01	-0.10957E 01	0.0	0.51307E 01	-12.3314
343	121000.00	343.00	0.16957E 04	-0.10163E 02	0.0	0.16957E 04	-0.3434
344	121000.00	441.50	0.49820E 00	0.11015E 00	0.0	0.51023E 00	12.4672
345	121000.00	555.00	0.47738E 02	0.80644E-02	0.0	0.47738E 02	0.0103
346	123000.00	165.25	0.64846E 03	-0.40098E 01	0.0	0.64848E 03	-0.3542
347	123000.00	265.00	0.53562E 01	-0.14213E 01	0.0	0.55416E 01	-14.8634
348	123000.00	342.25	0.18250E 04	-0.97719E 01	0.0	0.18250E 04	-0.3068
349	123000.00	440.00	0.52798E 00	0.69367E-01	0.0	0.53242E 00	7.4862
350	123000.00	554.00	0.49783E 02	-0.35149E-01	0.0	0.49783E 02	-0.0405

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

ELMT	X-ORD	Y-ORD	1-FLOW	2-FLOW	ANGLE	TOTAL FLOW	DIRECTION
351	125000.00	165.00	0.65088E 03	-0.19783E 01	0.0	0.65089E 03	-0.1741
352	125000.00	265.50	0.54335E 01	0.44259E 00	0.0	0.54515E 01	4.6567
353	125000.00	342.25	0.18708E 04	-0.11333E 02	0.0	0.18709E 04	-0.3471
354	125000.00	438.50	0.52997E 00	-0.27870E 00	0.0	0.59878E 00	-27.7334
355	125000.00	551.50	0.48954E 02	-0.12302E 00	0.0	0.48954E 02	-0.1440
356	127333.25	124.33	0.61106E 03	-0.63134E 01	0.0	0.61109E 03	-0.5925
357	127000.00	178.25	0.61038E 03	-0.10158E 01	0.0	0.61038E 03	-0.0954
358	127333.25	235.33	0.50346E 01	0.90660E 01	0.0	0.10370E 02	60.9553
359	127000.00	274.75	0.52449E 01	0.53247E 01	0.0	0.74741E 01	45.4326
360	127333.25	319.67	0.18294E 04	-0.32760E 02	0.0	0.18297E 04	-1.0259
361	127000.00	350.25	0.18292E 04	-0.98582E 01	0.0	0.18292E 04	-0.3088
362	127333.25	401.33	0.53293E 00	-0.10079E 01	0.0	0.11401E 01	-62.1725
363	127000.00	457.75	0.51105E 00	-0.70808E 00	0.0	0.87324E 00	-54.1806
364	127333.25	510.00	0.50100E 00	-0.10052E 01	0.0	0.11232E 01	-63.5092
365	127000.00	547.50	0.46306E 02	-0.24577E 00	0.0	0.46307E 02	-0.3041
366	127333.25	536.67	0.46301E 02	-0.20107E 00	0.0	0.46301E 02	-0.2488
367	128500.00	133.00	0.47712E 03	-0.62194E 01	0.0	0.47716E 03	-0.7578
368	128500.00	191.50	0.47716E 03	-0.72222E 00	0.0	0.47716E 03	-0.0867
369	128500.00	241.50	0.39866E 01	0.10510E 02	0.0	0.11241E 02	69.2278
370	128500.00	283.50	0.40502E 01	0.11537E 02	0.0	0.12228E 02	70.6561
371	128666.63	330.33	0.20570E 04	0.43513E 02	0.0	0.20575E 04	1.2118
372	128333.25	342.33	0.13846E 04	-0.33535E 02	0.0	0.13850E 04	-1.3875
373	128333.25	364.33	0.13834E 04	0.13281E 00	0.0	0.13834E 04	0.0055
374	128500.00	426.25	0.40826E 00	-0.10078E 01	0.0	0.10873E 01	-67.9465
375	128333.25	485.00	0.41491E 00	-0.11551E 01	0.0	0.12274E 01	-70.2419

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

ELMT	X-ORD	Y-ORD	1-FLOW	2-FLOW	ANGLE	TOTAL FLOW	DIRECTION
376	128500.00	516.25	0.41477E 00	-0.10097E 01	0.0	0.10916E 01	-67.6695
377	128500.00	548.75	0.39040E 02	-0.51885E 00	0.0	0.39044E 02	-0.7614
378	128500.00	582.50	0.39041E 02	-0.19652E 00	0.0	0.39041E 02	-0.2884
379	129500.00	133.00	0.37543E 03	-0.58981E 01	0.0	0.37547E 03	-0.9001
380	129500.00	191.50	0.37535E 03	-0.21667E 01	0.0	0.37536E 03	-0.3307
381	129500.00	241.50	0.29376E 01	0.77838E 01	0.0	0.83197E 01	69.3234
382	129500.00	283.25	0.25964E 01	0.77702E 01	0.0	0.81925E 01	71.5230
383	129500.00	347.50	0.12152E 04	0.17379E 02	0.0	0.12153E 04	0.8193
384	129666.63	425.00	0.12122E 04	0.71008E 02	0.0	0.12142E 04	3.3525
385	129500.00	475.25	0.36129E 00	-0.98426E 00	0.0	0.10435E 01	-69.8435
386	129500.00	530.25	0.36545E 00	-0.95573E 00	0.0	0.10232E 01	-69.0740
387	129500.00	561.25	0.32756E 02	-0.41955E 00	0.0	0.32758E 02	-0.7338
388	129500.00	587.75	0.32753E 02	-0.13360E 00	0.0	0.32754E 02	-0.2387
389	130500.00	132.50	0.31294E 03	-0.75833E 01	0.0	0.31304E 03	-1.3881
390	130500.00	191.00	0.31252E 03	-0.86667E 01	0.0	0.31264E 03	-1.5885
391	130500.00	241.25	0.24435E 01	0.22000E 00	0.0	0.24583E 01	5.1344
392	130500.00	282.75	0.21703E 01	0.38324E 00	0.0	0.22038E 01	10.0145
393	130500.00	352.75	0.10207E 04	-0.14074E 02	0.0	0.10208E 04	-0.7899
394	130500.00	449.25	0.10156E 04	0.31436E 02	0.0	0.10161E 04	1.7728
395	130500.00	512.00	0.21035E 00	-0.47026E 00	0.0	0.51516E 00	-65.9007
396	130500.00	542.75	0.23674E 00	-0.45804E 00	0.0	0.51632E 00	-62.7084
397	130500.00	570.00	0.23980E 02	-0.31062E 00	0.0	0.23982E 02	-0.7421
398	130500.00	590.50	0.23984E 02	-0.13471E 00	0.0	0.23984E 02	-0.3218
399	131500.00	131.75	0.28931E 03	-0.91835E 01	0.0	0.28945E 03	-1.8181
400	131500.00	190.50	0.28936E 03	-0.12639E 02	0.0	0.28964E 03	-2.5010

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

ELMT	X-ORD	Y-ORD	1-FLOW	2-FLOW	ANGLE	TOTAL FLOW	DIRECTION
401	131500.00	241.00	0.23521E 01	-0.39523E 01	0.0	0.45992E 01	-59.2424
402	131500.00	292.50	0.22796E 01	-0.39093E 01	0.0	0.45241E 01	-59.7569
403	131500.00	352.50	0.11342E 04	-0.24000E 02	0.0	0.11345E 04	-1.2122
404	131500.00	449.50	0.11352E 04	-0.11395E 01	0.0	0.11352E 04	-0.0575
405	131500.00	512.00	0.22342E 00	0.85066E-03	0.0	0.22342E 00	0.2182
406	131500.00	542.50	0.22520E 00	-0.39579E-02	0.0	0.22524E 00	-1.0068
407	131500.00	570.00	0.21565E 02	-0.12758E 00	0.0	0.21565E 02	-0.3390
408	131500.00	590.75	0.21567E 02	-0.49019E-01	0.0	0.21567E 02	-0.1302
409	132500.00	131.50	0.30852E 03	-0.70318E 01	0.0	0.30860E 03	-1.3057
410	132500.00	190.50	0.30857E 03	-0.11917E 02	0.0	0.30880E 03	-2.2116
411	132500.00	241.00	0.25238E 01	-0.52105E 01	0.0	0.57917E 01	-64.1117
412	132500.00	292.50	0.24977E 01	-0.51667E 01	0.0	0.57387E 01	-64.2001
413	132500.00	352.50	0.12574E 04	-0.21000E 02	0.0	0.12575E 04	-0.9568
414	132500.00	449.75	0.12572E 04	0.35997E 01	0.0	0.12572E 04	0.1686
415	132500.00	512.50	0.24690E 00	0.48488E-01	0.0	0.25162E 00	11.1105
416	132500.00	542.75	0.24810E 00	0.45921E-01	0.0	0.25232E 00	10.4862
417	132500.00	570.00	0.23709E 02	-0.97070E-01	0.0	0.23709E 02	-0.2346
418	132500.00	591.00	0.23708E 02	-0.32777E-01	0.0	0.23709E 02	-0.0792
419	133500.00	131.25	0.31277E 03	-0.65586E 01	0.0	0.31284E 03	-1.2013
420	133500.00	190.50	0.31268E 03	-0.12278E 02	0.0	0.31292E 03	-2.2487
421	133500.00	241.00	0.25982E 01	-0.50220E 01	0.0	0.56552E 01	-62.6446
422	133500.00	282.50	0.26456E 01	-0.49708E 01	0.0	0.56310E 01	-61.9772
423	133500.00	352.50	0.13530E 04	-0.21000E 02	0.0	0.13532E 04	-0.8892
424	133500.00	450.00	0.13530E 04	0.18703E 01	0.0	0.13530E 04	0.0792
425	133500.00	513.00	0.26591E 00	0.92700E-01	0.0	0.28160E 00	19.2194

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

ELMT	X-ORD	Y-ORD	1-FLOW	2-FLOW	ANGLE	TOTAL FLOW	DIRECTION
426	133500.00	543.00	0.26738E 00	0.90763E-01	0.0	0.28237E 00	18.7496
427	133500.00	570.00	0.25562E 02	-0.12203E 00	0.0	0.25563E 02	-0.2735
428	133500.00	591.25	0.25563E 02	-0.27116E-01	0.0	0.25563E 02	-0.0608
429	134500.00	131.00	0.30837E 03	-0.93438E 01	0.0	0.30851E 03	-1.7356
430	134500.00	190.50	0.30848E 03	-0.10111E 02	0.0	0.30864E 03	-1.8773
431	134500.00	241.00	0.26253E 01	-0.23092E 01	0.0	0.34964E 01	-41.3247
432	134500.00	282.25	0.28015E 01	-0.22879E 01	0.0	0.36170E 01	-39.2379
433	134500.00	352.25	0.14691E 04	-0.21885E 02	0.0	0.14693E 04	-0.8534
434	134500.00	450.00	0.14694E 04	0.52844E 01	0.0	0.14694E 04	0.2060
435	134500.00	512.75	0.28838E 00	0.12668E 00	0.0	0.31497E 00	23.7148
436	134500.00	542.75	0.28835E 00	0.12491E 00	0.0	0.31480E 00	23.3779
437	134500.00	570.00	0.27563E 02	-0.77656E-01	0.0	0.27569E 02	-0.1614
438	134500.00	592.00	0.27570E 02	0.18490E-01	0.0	0.27570E 02	0.0384
439	135500.00	130.50	0.27993E 03	0.0	0.0	0.27993E 03	0.0
440	135500.00	190.00	0.28097E 03	-0.72222E 00	0.0	0.28097E 03	-0.1473
441	135500.00	240.75	0.25389E 01	0.54692E 01	0.0	0.60297E 01	65.0986
442	135500.00	232.00	0.29992E 01	0.54759E 01	0.0	0.62434E 01	61.2308
443	135666.63	316.00	0.16444E 04	-0.23585E 02	0.0	0.16446E 04	-0.8217
444	135500.00	360.75	0.16446E 04	-0.15935E 02	0.0	0.16445E 04	-0.5552
445	135500.00	450.00	0.16450E 04	0.71426E 01	0.0	0.16450E 04	0.2488
446	135500.00	513.00	0.32128E 00	0.91332E-01	0.0	0.33401E 00	15.8690
447	135500.00	542.75	0.31859E 00	0.89346E-01	0.0	0.33038E 00	15.6659
448	135500.00	569.75	0.30212E 02	-0.79647E-01	0.0	0.30212E 02	-0.1510
449	135500.00	592.25	0.30209E 02	-0.30453E-01	0.0	0.30209E 02	-0.0578
450	136666.56	141.33	0.27355E-01	-0.28483E-02	0.0	0.27503E-01	-5.9442

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

ELMT	X-ORD	Y-ORD	1-FLOW	2-FLOW	ANGLE	TOTAL FLOW	DIRECTION
451	136333.25	160.00	0.32652E 03	0.11400E 02	0.0	0.32672E 03	1.9996
452	136333.25	199.67	0.32685E 03	0.58003E 01	0.0	0.32690E 03	1.0167
453	136500.00	240.25	0.29065E 01	0.16002E 02	0.0	0.16263E 02	79.7050
454	136500.00	282.00	0.33209E 01	0.16031E 02	0.0	0.16372E 02	78.2964
455	136333.25	316.00	0.17931E 04	-0.23750E 02	0.0	0.17933E 04	-0.7588
456	136500.00	360.50	0.17945E 04	0.12338E 01	0.0	0.17945E 04	0.0394
457	136500.00	450.50	0.17953E 04	0.10059E 02	0.0	0.17953E 04	0.3210
458	136500.00	514.00	0.35206E 00	0.49982E-01	0.0	0.35559E 00	8.0802
459	136500.00	543.00	0.35222E 00	0.47042E-01	0.0	0.35542E 00	7.6058
460	136500.00	569.75	0.33587E 02	-0.54046E-01	0.0	0.33587E 02	-0.0922
461	136500.00	591.50	0.33539E 02	-0.76270E-01	0.0	0.33590E 02	-0.1301
462	137500.00	181.25	0.57103E-01	0.27028E-03	0.0	0.57104E-01	0.2712
463	137333.25	260.67	0.40343E 01	0.20916E 02	0.0	0.21301E 02	79.0814
464	137333.25	288.67	0.40319E 01	0.20991E 02	0.0	0.21375E 02	79.1274
465	137500.00	351.25	0.20206E 04	-0.98446E 00	0.0	0.20205E 04	-0.0279
466	137666.63	415.33	0.20197E 04	0.11875E 02	0.0	0.20197E 04	0.3369
467	137500.00	464.00	0.20195E 04	0.11404E 02	0.0	0.20195E 04	0.3236
468	137500.00	515.75	0.39649E 00	0.97700E-01	0.0	0.40834E 00	13.8420
469	137500.00	543.75	0.39912E 00	0.99232E-01	0.0	0.41129E 00	13.9620
470	137500.00	570.75	0.38215E 02	0.10240E 00	0.0	0.38215E 02	0.1535
471	137500.00	591.25	0.38219E 02	0.38699E-01	0.0	0.38219E 02	0.0580
472	138500.00	203.50	0.42284E-01	0.65854E-03	0.0	0.42289E-01	0.8923
473	138500.00	353.00	0.21284E 04	-0.30319E 01	0.0	0.21284E 04	-0.0816
474	138333.31	415.67	0.21291E 04	0.97274E 01	0.0	0.21291E 04	0.2618
475	138500.00	467.25	0.21299E 04	0.16964E 02	0.0	0.21300E 04	0.4563

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

ELMT	X-ORD	Y-ORD	1-FLOW	2-FLOW	ANGLE	TOTAL FLOW	DIRECTION
476	138500.00	520.00	0.41711E 00	0.19453E 00	0.0	0.46024E 00	25.0030
477	138500.00	546.00	0.41972E 00	0.19392E 00	0.0	0.46235E 00	24.7979
478	138500.00	572.50	0.40196E 02	0.20436E 00	0.0	0.40196E 02	0.2913
479	138500.00	593.50	0.40197E 02	0.16159E 00	0.0	0.40197E 02	0.2303
480	139500.00	207.50	0.44815E-01	-0.52817E-03	0.0	0.44819E-01	-0.6752
481	139500.00	361.50	0.22728E 04	0.60000E 01	0.0	0.22728E 04	0.1513
482	139500.00	463.75	0.22728E 04	0.20442E 02	0.0	0.22729E 04	0.5153
483	139500.00	527.25	0.44277E 00	0.13769E 00	0.0	0.46369E 00	17.2746
484	139500.00	550.00	0.43779E 00	0.15470E 00	0.0	0.46431E 00	19.4616
485	139500.00	573.75	0.41438E 02	0.12232E 00	0.0	0.41438E 02	0.1691
486	139500.00	596.50	0.41433E 02	0.89603E-01	0.0	0.41434E 02	0.1239
487	140500.00	212.75	0.47849E-01	-0.46771E-03	0.0	0.47851E-01	-0.5600
488	140500.00	377.50	0.24225E 04	0.10357E 02	0.0	0.24225E 04	0.2568
489	140500.00	477.50	0.24223E 04	0.17250E 02	0.0	0.24224E 04	0.4080
490	140500.00	535.25	0.47333E 00	-0.60645E-01	0.0	0.47720E 00	-7.3011
491	140500.00	555.75	0.46953E 00	-0.53660E-01	0.0	0.47259E 00	-6.5198
492	140500.00	576.00	0.44551E 02	-0.41602E-01	0.0	0.44551E 02	-0.0535
493	140500.00	597.50	0.44547E 02	-0.60292E-01	0.0	0.44547E 02	-0.0775
494	141500.00	219.00	0.51552E-01	-0.47269E-03	0.0	0.51554E-01	-0.5252
495	141500.00	392.25	0.26137E 04	0.21506E 02	0.0	0.26138E 04	0.4714
496	141500.00	488.50	0.26154E 04	0.23467E 02	0.0	0.26155E 04	0.5141
497	141500.00	540.25	0.51332E 00	-0.16673E 00	0.0	0.53972E 00	-17.9940
498	141500.00	556.00	0.51277E 00	-0.16290E 00	0.0	0.53802E 00	-17.6240
499	141500.00	577.50	0.48854E 02	-0.15473E 00	0.0	0.48854E 02	-0.1815
500	141500.00	596.50	0.48853E 02	-0.18100E 00	0.0	0.48853E 02	-0.2123

FPM500 P W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

ELMT	X-ORD	Y-ORD	1-FLOW	2-FLOW	ANGLE	TOTAL FLOW	DIRECTION
501	142500.00	225.50	0.53881E-01	-0.21663E-03	0.0	0.53882E-01	-0.2304
502	142500.00	406.00	0.27312E 04	0.33574E 02	0.0	0.27315E 04	0.7043
503	142500.00	501.75	0.27222E 04	0.41745E 02	0.0	0.27326E 04	0.8753
504	142333.25	545.00	0.53959E 00	-0.19145E 00	0.0	0.57255E 00	-19.5355
505	142500.00	559.75	0.53339E 00	-0.24282E 00	0.0	0.59061E 00	-24.2765
506	142500.00	576.50	0.51161E 02	-0.24614E 00	0.0	0.51162E 02	-0.2757
507	142500.00	593.00	0.51160E 02	-0.25450E 00	0.0	0.51160E 02	-0.2850
508	143500.00	231.50	0.54041E-01	-0.49905E-04	0.0	0.54041E-01	-0.0529
509	143500.00	418.25	0.27380E 04	0.33395E 02	0.0	0.27382E 04	0.6988
510	143500.00	517.25	0.27372E 04	0.46075E 02	0.0	0.27376E 04	0.9644
511	143333.25	563.67	0.54240E 00	-0.31942E 00	0.0	0.62954E 00	-30.4914
512	143500.00	575.75	0.51670E 02	-0.21300E 00	0.0	0.51671E 02	-0.2362
513	143500.00	589.25	0.51675E 02	-0.11476E 00	0.0	0.51675E 02	-0.1272
514	144500.00	237.00	0.53524E-01	-0.27372E-04	0.0	0.53524E-01	-0.0293
515	144500.00	427.25	0.27122E 04	0.40670E 02	0.0	0.27125E 04	0.8591
516	144500.00	529.75	0.27139E 04	0.49760E 02	0.0	0.27143E 04	1.0504
517	144500.00	584.75	0.50737E 02	0.15917E 00	0.0	0.50737E 02	0.1797
518	144333.31	592.00	0.50741E 02	0.71317E-01	0.0	0.50741E 02	0.0805
519	145500.00	245.00	0.53777E-01	-0.39147E-03	0.0	0.53778E-01	-0.4364
520	145500.00	440.75	0.27171E 04	0.37936E 02	0.0	0.27173E 04	0.7999
521	145500.00	544.75	0.27133E 04	0.32141E 02	0.0	0.27134E 04	0.6787
522	145333.25	598.67	0.50651E 02	0.36055E 00	0.0	0.50653E 02	0.4078
523	146500.00	250.00	0.58744E-01	-0.14062E-02	0.0	0.58761E-01	-1.3712
524	146500.00	449.50	0.29624E 04	-0.12775E 02	0.0	0.29624E 04	-0.2471
525	146500.00	547.00	0.29526E 04	-0.47809E 02	0.0	0.29530E 04	-0.9277

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

ELMT	X-ORD	Y-ORD	1-FLOW	2-FLOW	ANGLE	TOTAL FLOW	DIRECTION
526	147500.00	250.00	0.64725E-01	0.23062E-02	0.0	0.64766E-01	2.0407
527	147500.00	450.00	0.33555E 04	0.42334E 02	0.0	0.33558E 04	0.7229
528	147500.00	536.75	0.33824E 04	0.93627E 02	0.0	0.33837E 04	1.5856
529	148500.00	250.00	0.31928E-01	0.30750E-02	0.0	0.32075E-01	5.5013
530	148500.00	450.00	0.15548E 04	0.57172E 02	0.0	0.15558E 04	2.1061
531	148500.00	533.75	0.15333E 04	0.15314E 03	0.0	0.15409E 04	5.7038
532	149500.00	250.00	0.29797E-01	-0.28750E-03	0.0	0.29798E-01	-0.5530
533	149500.00	450.00	0.15146E 04	-0.75406E 01	0.0	0.15146E 04	-0.2853
534	149500.00	536.25	0.15179E 04	-0.15306E 02	0.0	0.15179E 04	-0.5776
535	150500.00	250.00	0.30020E-01	-0.12500E-04	0.0	0.30020E-01	-0.0239
536	150500.00	450.00	0.15207E 04	0.13404E 01	0.0	0.15207E 04	0.0504
537	150500.00	543.75	0.15202E 04	0.87534E 01	0.0	0.15202E 04	0.3299
538	151500.00	250.00	0.30004E-01	-0.25000E-04	0.0	0.30004E-01	-0.0477
539	151500.00	450.00	0.15201E 04	0.29684E 00	0.0	0.15201E 04	0.0112
540	151500.00	550.00	0.15201E 04	0.44531E 01	0.0	0.15201E 04	0.1679
541	152500.00	250.00	0.29957E-01	-0.62500E-05	0.0	0.29957E-01	-0.0120
542	152500.00	450.00	0.15134E 04	0.23156E 01	0.0	0.15134E 04	0.0874
543	152500.00	550.00	0.15103E 04	0.10996E 02	0.0	0.15103E 04	0.4142
544	153500.00	250.00	0.30387E-01	-0.41250E-03	0.0	0.30390E-01	-0.7777
545	153500.00	450.00	0.15315E 04	-0.10807E 02	0.0	0.15316E 04	-0.4043
546	153500.00	550.00	0.15250E 04	-0.31944E 02	0.0	0.15253E 04	-1.2000
547	154500.00	250.00	0.26494E-01	0.49437E-02	0.0	0.26923E-01	10.5646
548	154500.00	450.00	0.14395E 04	0.87637E 02	0.0	0.14421E 04	3.4840
549	154500.00	550.00	0.14854E 04	0.25536E 03	0.0	0.15097E 04	10.0727

Base from county maps, Idaho Dept. of Highways

GEOLOGIC AND WATER-TABLE MAP OF CAMAS CREEK BASIN, IDAHO

SCALE 1:63360

1 0 1 2 3 Miles

Mean Sea Level Datum

PLATE I

Base from county maps, Idaho Dept. of Highways

PIEZOMETRIC SURFACE MAP OF CAMAS PRAIRIE, IDAHO

SCALE 1:63360

Mean Sea Level Datum

PLATE II

GEOLOGIC SECTION A-A' AND PROFILE OF PIEZOMETRIC SURFACE

PLATE III

COMPUTER DRAWN FINITE-ELEMENT MESH ALONG SECTION A-A′

FLOW DIRECTION ARROWS ADDED

PLATE IV

FPM500 R W WALLACE, CAMAS PRAIRIE, CAMAS COUNTY, IDAHO

X-SCALE= 2000 Y-SCALE=25